Arctic Worlds

THE BENEFITS OF THE COLD AND DOMESTICATION

A NEW UNDERSTANDING OF HUMAN–ANIMAL PARTNERSHIPS FOR THRIVING IN EXTREME ENVIRONMENTS

Edited by
Florian Stammler and Hiroki Takakura

The Benefits of the Cold and Domestication

This book explores cooperation between humans and animals in extreme environments and contends that understanding domestication is crucial to explaining how life is possible in such conditions.

The chapters draw on work from anthropology, genetics, law, and geography, with a range of ethnographic case studies from cold environments. The contributors offer new evidence for rethinking the dichotomy of trust vs domination previously used to characterize human–animal relations. They show how humans and animals partner for survival, and how a cold environment does not merely threaten existence but rather creates opportunities. Domestication is presented as a continuous, mutually beneficial human–animal relationship of becoming familiar with each other and the surrounding environment, which can lead to a symbiotic partnership of multiple agents for adapting to changes including a warming climate.

This volume will be relevant to scholars from anthropology, geography, and related disciplines interested in human–animal relations, ecology, and the environment, particularly in the North.

Florian Stammler is Research Professor in Anthropology and coordinates the Anthropology Research Team at the Arctic Centre of the University of Lapland, Finland. He has lived with people and led research in Arctic Russia, Finland, and Greenland, and published extensively on human–animal relations, Arctic extractive industries, oral history, and youth well-being.

Hiroki Takakura is a social anthropologist and Director and Professor at the Center for Northeast Asian Studies, Tohoku University, Japan. His research interests cover human–animal relations, climate change, disaster resilience, ethnicity, and arctic human history including the ethnohistory of Siberia and Northeast Asia.

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This series aims to integrate research from across the circumpolar Arctic from across the humanities, social sciences, and history of science. This region – once exotised as a remote and unknown "blank spot" – is now acknowledged to be the homeland of a variety of indigenous nations, many of whom have won or are seeking home rule.

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Edited by Florian Stammler and Hiroki Takakura

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Contributors

David G. Anderson holds the Chair in the Anthropology of the North at the University of Aberdeen, Scotland. He is also UArctic Research Chair in Northern Anthropology. He publishes on political ecology, ethnohistory, circumpolar ethnography, and human–animal relations. His current work is on the political economy of Arctic heritage management.

Hugh Beach took his PhD at Uppsala University, Sweden. He has resided in Sweden for over 50 years, becoming Professor and Chair of the Department of Cultural Anthropology. He has worked among Sámi reindeer herders in Sweden, Norway, and Russia, shifting focus from a dominance on cultural forms to systems theory and political ecology.

Donatas Brandišauskas, a social anthropologist, specializes in ethnographic studies of indigenous peoples of East Siberia, Mongolia, and human-animal relations. He is a senior researcher at the Lithuanian Institute of History and a visiting scholar at Tohoku University in Japan. His current research focuses on human–wildlife conflicts in Lithuania.

Aytalina Ivanova specializes in legal history studies, legal anthropology, environmental and minority law, and extractive industries impacts on indigenous livelihoods in the Russian Arctic. Her employment history includes appointments at North Eastern Federal University in Yakutsk, Russia; The Arctic University of Norway in Tromso; and the Arctic Centre, University of Lapland, Finland.

Juha Kantanen is Research Professor in Livestock Genomics at the Natural Research Institute in Finland. He has led research on animal genetic resources, molecular and population genetics, and genomics of animal species and valuation of genetic resources using multidisciplinary approaches. He has extensively published on native animal breeds and their origin.

Shiaki Kondo is an independent scholar who has worked for more than ten years with the Upper Kuskokwim Athabascans in the community of

Nikolai, AK, USA. He is the author of *Do Not Talk to Dogs: Multispecies Ethnography of Interior Alaska* (2022, in Japanese).

Yuka Oishi is a social anthropologist and associate professor at the Graduate School of Intercultural Studies, Kobe University, Japan. Her research interests cover hunter-gatherers and the global supply chain of fur pelts. She is the author of *Ethnography of Siberian Forest: Fishing–Herding Complex Theory* (Kyoto: Showado, 2023, original in Japanese).

Shiro Sasaki earned his PhD in 1989 and specializes in cultural anthropology on the study of history and culture of the indigenous peoples in Siberia, Far East Russia, and northern Japan. He served in the National Museum of Ethnology in 1985–2016 and has been Executive Director of National Ainu Museum since 2020.

Takuya Soma holds a PhD in Agricultural Science from the University of Kassel. Currently, he is an associate professor at the Hakubi Center for Advanced Studies, Kyoto University, Japan. He was a former assistant professor at the Institute for Advanced Studies, Waseda University, and at the University of Tsukuba before his current position.

Florian Stammler is Research Professor in Anthropology and coordinates the Anthropology Research Team at the Arctic Centre of the University of Lapland, Finland. He has lived with people and led research in Arctic Russia, Finland, and Greenland, and published extensively on human–animal relations, Arctic extractive industries, oral history, and youth well-being.

Charles Stépanoff is a social anthropologist, a member of the Laboratoire d'anthropologie sociale (Paris), and a specialist in South Siberian shamanism and reindeer herding. He has conducted fieldwork since 2002 among the Tuvan in Russia and in Mongolia. He coordinated the international research group "Nomadism, societies and environment" (France, Russia, Kirghizstan 2011–2014).

Hiroki Takakura is a social anthropologist and Director and Professor at the Center for Northeast Asian Studies, Tohoku University, Japan. His research interests cover human–animal relations, climate change, disaster resilience, ethnicity, and the arctic human history including the ethnohistory of the Siberia and Northeast Asia.

Asami Tsukuda is Post-Doctoral Fellow of Japan Society of Promotion of Science and also Research Fellow at the Center for Northeast Asian Studies, Tohoku University. Her specialty is cultural anthropology, and her research focuses on the livestock management techniques, livelihoods, and social relations of pastoralists in the Peruvian Andean highlands, where alpacas and llamas are the primary livestock.

Preface

This book revisits one of the most fundamental questions in scientific inquiry in the social sciences: the theory of the relations and connections between culture and nature. The volume provides new insights into this challenging topic from a transdisciplinary standpoint guided by anthropological theories of domestication. Scholars from anthropology, law, and genetics have contributed to answering the question of how people in extremely cold environments develop sustainable livelihoods by engaging in the domestication of animals. Ethnographic documentation of such domestication processes from Siberia, the Nordic Arctic, Mongolia, and the Andes forms the empirical backbone of the contributions, united by the quest for a new theory of domestication from the North. We argue that in the northern mode of domestication, the interaction between humans, animals, and the environment is based on mutuality, comfort, and joy. Rather than relations of domination, control, and subduing of one party to the other, here the human partnership with a particular nonhuman species in a local ecology forms reciprocity, in what contributions in this book advance as a convivial ecology embracing animal autonomy.

Conventionally, the Arctic and cold regions are not considered cradles of domestication in human history and anthropology. Although Arctic scholarship has made significant contributions to the theory of human–animal relations, these regions are regarded as environments with low biological production and low biodiversity. The reindeer stands out as the only domesticated Arctic pastoral animal, but neither its domestication history nor its degree of tameness is as deep as that of other pastoral animals that come from lower latitudes and altitudes. In much of the scholarly literature, reindeer is still considered "semi-domesticated." The concept of domestication, which has the full control and domination of animals by humans as its final goal, is rooted in a production ideology that increases output in agriculture and pastoralism. The authors of this book show that the benefit of a different perspective for understanding human history and cultural diversity overcomes such a hierarchy and notions of human superiority and draws

on recent advances in multi-species ethnography in a relational world. By incorporating evidence from cold regions elsewhere, this book also shows how such an alternative theory applies beyond the immediate Arctic.

It took a long time to achieve this theoretical integration: many of the contributors of this book started their anthropological fieldwork in Siberia in the 1990s when reindeer herding seemed to be at the top of the scholarly agenda. We started to live with the herders in their cultural setting, which intensely enchanted us, leading several of our authors to make significant theoretical advances based on their thoughts about the livelihoods in which they participated. Anthropologists always try to build theory on experience from the field. The human–animal relations witnessed in the field challenged the conventional idea of domestication as domination and human control. As a result, several of us started to process these insights for theory building independently from each other.

The two editors of this volume decided to bring together some key figures of the theoretical debates on domestication in cold regions and let them engage in scholarly discourses with early career scholars in the field of human–animal relations in cold areas. The venue for this was a workshop held at Tohoku University in February 2019 in the framework of the project "Geologic Stabilization and Human Adaptations in Northeast Asia," funded by the Tohoku Forum of Creativity Program. This program aimed to elucidate Northeast Asian studies in an interdisciplinary manner, including geology, archaeology, mythology/religion, and anthropology. In this framework the editors invited researchers from archaeology, anthropology, genetics, and law to the workshop "Northern Modes of Foraging and Domestication as an Interaction among Humans, Animals, and Geography." Twelve presentations and general discussions were so stimulating that the contributors agreed to prepare their work for a book manuscript based on the workshop.

During the course of the book project, the editors invited other colleagues whose work was on this topic to contribute, while some workshop participants could not commit to the volume for various reasons. All manuscripts underwent a double-peer review organized by the editors, which, in many cases, became a lengthy process of three or more revisions. Charlotte Marchina, an anthropologist at INALCO, France, kindly assisted with the review of the introduction by the two editors. The two editors are happy to have produced a book that represents a new achievement in Siberian anthropology and Arctic studies and addresses one of our field's most challenging theoretical debates.

The gratitude of the editors and many authors also extends to all our partners from field research, especially in Siberia, where many of the chapters originated. We are deeply thankful for the patience and insights on human–animal relations, domestication, and adaptation that our field partners shared

with us during our time when we practiced pastoralism in the cold (and the Siberian heat). Regrettably because of the Russia–Ukraine conflict, this book has become an account of what we learned from our friends in a field that is now closed to our access. This book would not have been possible without the hospitality of our partners, and we do not give up our hope of restarting our exchanges one day when the political situation changes.

Acknowledgments

This book is an outcome of the academic collaboration between the Arctic Centre at the University of Lapland (Finland) and the Centre for Northeast Asian Studies of Tohoku University (Japan). The two editors of this volume affiliated with these institutes acknowledge the generosity and practical support from their universities. A visiting scholar and exchange program in the framework of a Memorandum of Understanding agreed by both sides provided the editors and some authors of this volume with substantial time and space in both departments to promote discussion for the completion of this book. This would not have been possible without the financial support from the program of the Tohoku Forum for Creativity (2019), the Arctic Challenge for Sustainability II (2020–2025), the Research Council of Finland project #342462 "WIRE – Fluid Realities of the Wild" (2021–2025) and the US NSF subaward 9855-PO140356 of Federal award #2126794 (2022–2026).

Many colleagues and friends have participated in this book project. As we mentioned in the preface, the origin of this book was the inspiring discussion in the workshop "Northern modes of foraging and domestication as an interaction among humans, animals, and geography," at Tohoku University, Sendai, Japan, in February 2019. Even though some participants could not contribute to this volume for various reasons, their presentations and arguments in the discussions are also reflected in this book. We sincerely appreciate all the efforts of our contributors for the improvement of the text during the review process, and their patience with the delayed publication. In addition to the authors, we are very grateful to professor Charlotte Marchina for her insightful review, to Rachel Kristy for language editing that included in some cases another round of reviews, and to Nikija Kronberga, Hwana Park, Varvara Parilova, whose assistance was instrumental during the manuscript preparation and submission process.

Notes on Transliteration

In this volume we have used the simplified Library of Congress transliteration system for Russian. For some geographical terms, however, we have opted for transliteration common in the English literature, e.g., Yakutia instead of Iakutiia and Yamal instead of Iamal.

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1 Introduction

The Benefits of the Cold and Domestication

Florian Stammler and Hiroki Takakura

Domestication theory in extreme environments

The areas on our planet with extreme environments are increasing in the current time of a changing climate. The capacity for living organisms to not just survive, but flourish in an extreme environment becomes even more important in such a situation. How did human life become possible in extreme environments? How have different living organisms emplaced themselves in the cold and made home there? In areas of the planet where the cold climate does not allow growing plants for human food procurement, an answer to this key question can come from a better understanding of the interplay between humans and animals for supporting each other's living and thriving. Hence, this book analyses how humans and animals have cooperated for living in extreme environments. The authors of this volume use an extended concept of domestication as a tool to understand how this adaptation to extreme environments happens. The theme of domestication and adaptation is approached interdisciplinarily: anthropology is the principal background of many of the authors, but the book also reaches out to include insights from genetics, law and geography.

In the study of human–animal relations, the last decades have seen groundbreaking advances in the above-mentioned disciplines (Ellen 2009; Beach and Stammler 2006; Clement et al. 2015; Ingold 1994; Layton et al. 1991). These emphasize the symbiotic relations between humans and domesticated animals, and/or the environmental contribution in the process of domestication. These advances allow us to redefine the theory of human–animal relations altogether. Recent publications have focused on interpretative approaches and offered insights into how animals have shaped our thinking (Anderson et al. 2017; Stammler 2010; Stépanoff et al. 2017; Takakura 2010). However, we still lack a comprehensive comparative enquiry of the lived experience between humans and their domestic animals as a base for a theoretical understanding of domestication as process of differential human–animal familiarity. Previous studies on this topic have mostly focused on the arid environment (Krätli and Schareika 2010; Cassidy 2012). The authors of this volume do so with case studies from cold environments, as a different

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example of extreme conditions that continue to be challenging for survival. While most of the cold regions are in the Arctic or sub-Arctic, this book also features studies from the cold regions of North Asia and of the highland Andes. We believe that exploring the common denominators can contribute to advancing our theoretical understanding of adaptation and domestication beyond particular regional studies, thus de-provincializing our research findings. The chapters in this book show how humans and animals partner for this survival, and how the cold or extreme environment does not only threaten survival, but rather creates opportunities. The case studies from cold environments are therefore suitable sites for showing how humans jointly with their animals adapt and form relationships along a gradient of domesticity, or differential familiarity.

This approach builds on an understanding of domestication and adaptation that has evolved in response to Tim Ingold's (1994) much-cited understanding of domestication as a process leading from trust to domination in the human–animal relation. Many authors have since documented human relations to their domestic animals that base on partnership rather than domination – on a social contract of mutual benefit for both sides, hence characterized by reciprocity. Some works emphasize how this reciprocity can lead to a symbiotic quality of the relationship (Beach and Stammler 2006 and Beach, this volume; Stammler 2010), while others highlight the importance of considering the emplacement of the relationship in the surroundings (Anderson, Loovers, et al. 2017; Stépanoff et al. 2017; Seitsonen and Fjellström 2022, also Anderson and Oishi, this volume), with again another emphasis lying on the fluidity, the un-fixedness of this partnership that can change according to circumstances, season, livelihood and other factors along a gradient (Cassidy and Mullin 2007; Takakura 2010; Stépanoff et al. 2017). This also means that such change can lead to a greater alienation between animals and humans again. Animals that were once domestic and have returned to a wild state where they sustain themselves without human assistance are called feral. Hence, as Ellen (2009, 426) and others before him (Layton et al. 1991) have stated, we have gone beyond domestication as unidirectional one-time event in history, leading to a stable state of relationship. Rather, domestication is a process, daily enacted in the human-animal relationship.

The daily enactment of this relationship influences not only cosmologies, emotions, livelihoods and cultural expressions. It can also be traced in the body character of animals, as recent advances in genetics have shown (Anderson, Kvie, et al. 2017; Kantanen and Stammler, this volume). Thus, the influence goes both ways, from humans to animals and vice-versa, hence reciprocity. From this follows the closely intertwined relation between domestication and adaptation: in this human–animal–environment partnership they are two sides of the same coin: adaptation emphasizes how organisms take and change shape in a given environment, while domestication emphasizes human purposeful agency in shaping their relations to other living organisms. Indigenous people beautifully described in their oral history and mythology

the social contract of mutual benefit in which this happens (Vitebsky 2005, 25–27).

This reminds us of the importance of relations that we must not oversee when analysing such processes. We understand the world through understanding relations of beings in the world. The importance of this seemingly trivial insight has led Ingold to build an entire understanding of life on relations – what he calls "the relational constitution of being" (Ingold 2011, 69–70). In his understanding of the organism, Ingold emphasizes the intertwinement. What authors in this book have attempted to describe with symbiotic relationships (Beach and Stammler 2006 and Beach, this volume) can be seen as pointing to a similar direction as Ingold's more fundamental deconstruction of the borders between an organism and its environment. In his understanding "there is no inside or outside, and no boundary separating the two domains" (Ingold 2011, 69). Hence, the idea of delineated borders between entities in scholarly analysis gives way to a more fluid understanding that emphasizes cooperation in the environment, as many contributions in this volume show.

The cold as opportunity to create new forms of life

The cold as one variant of extreme environments is commonly viewed as an arena of deficit: scarce vegetation and biodiversity, minuscule growth rates of biomass, impossibility to grow plants in agricultural scale, deficit of daylight, deficit of fertile ground due to permafrost and lack of comfort for any growing conditions of organisms. Russian incomers to Siberia often even refer to a deficit in oxygen in Siberia's Arctic cities ("*kisloroda ne khvataet, dyshat' nechem*", a discourse that we have not heard in the western Arctic). The Arctic is seen as a place where life as such equals survival, and conditions are challenging. However, why do we see challenges as problems instead of opportunities? In this book we take a more positive starting point: we see cold environments as an area of opportunity rather than deficit: the need of organisms to adapt presents researchers with what could be regarded from the other side as a formidable "natural laboratory" for studying adaptation. From this point of view, cold environments have encouraged living organisms to develop some of the planet's most sophisticated, sturdy, resilient lifeways. Thus, the Arctic and cold environments are approached here not as places of deficit and survival, but as places of plenty and thrive.

Biology and other sciences have in the past mostly focused on specific species in their adaptation and domestication studies – in line with the ever-growing specialization and division of labour between the sciences. In this book we take a different starting point, one of relationality. Chapters in this volume contribute to our understanding of how organisms – here mostly humans and animals – adapt not just separately to an extreme environment, but in relation to each other, in entering a close, symbiotic partnership with all beings in the environment. That is why livelihoods are so important to

analyse: livelihoods have relations of different familiarity (domestication) with different beings.

The cold regions of our planet are like natural laboratories where we can understand the principles how these relations between different organisms unfold. Such principles of relational development are important underpinnings for any regions on our planet. The challenges that the Arctic and cold regions present give us the opportunity to see these processes happening faster and more directly, because failure to adapt leads to death faster than in more benevolent climates. Correspondingly, the history of domestication in the Arctic is shorter than elsewhere. For example, reindeer have a relatively shorter domestication history in comparison to cattle, horses or other pastoral animals (Pokharel et al. 2023, page 10 of 16; see also Takakura, this volume; Kantanen & Stammler, this volume). Even animal species with older domestication histories that came more recently from more temperate environments to the cold display a much faster rate of adaptation than previously assumed, as Librado's team (2015) has shown.

Extreme environments also invite us to revisit the idea of permanency in the domestication process in relation to time: reindeer and horses display different extents of domesticity in different seasons: for example, in Sakha (Yakutia) horses are trained for riding every early summer from a much more feral state that they had in winter when they grazed autonomously. Reindeer too become much more "domestic" in livelihoods where people practice close herding in summer during mosquito and milking time, when the reindeer have 24/7 contact with people, in comparison to other times of the year where the contact with humans is less intensive. Thus, in cold environments these faster paces indicate that we should pay more attention to time as a relevant factor for our analysis. Time is also evident in the expressed seasonality in cold environments, where we observe multiple and fast-changing freeze and thaw cycles throughout the year. Thus, speed and scale of water circulation is more diverse in colder regions. The permafrost is one among such with immediate and delayed hydrological effects (Crate et al. 2017; Takakura 2023).

Therefore, we think it is not by coincidence that evidence from the North has already contributed a lot to worldwide adaptation and domestication theory, which becomes evident from the above-cited literature. This book builds on the prominent role that cold environments have played in our understanding of domestication and adaption and aims to bring our theoretical understanding to a new level with the help of recent empirical material not just from the Arctic but also from other cold environments.

Book sections and chapter summaries

The book consists of five sections. The first, a *Cross-Cutting Perspective on Northern Domestication*, presents new knowledge based on the dialogue of anthropology with archaeology and genetics. It refutes the conventional

scheme on the clear distinction between foraging and pastoral subsistence. The second section, *Domestication among Hunters*, illustrates through ethnography how Northern hunter-gatherers practically and emotionally interact with wildlife to sustain their survival with different species in a given environment. It reconsiders the meaning of a broader entanglement between wild and domestic relations in foraging societies.

In the third section, *Convivial Ecology Embracing Animal Autonomy*, this volume advances our theorical understanding starting with an ethnographic description of conviviality as a cultural technique. The chapters show how a Northern conceptualization of domestication requires a departure from the "from trust to domination" dichotomy (Ingold 1994) that once formed the basis of domestication theory. We suggest uniting the advances from domestication research in cold regions of the recent decades that have focused on less linear and more fluid concepts of familiarity. One way of doing this is through what Anderson (this volume) has termed conviviality.

The fourth section, *Cold Domestication beyond the Arctic*, takes this concept to other extreme environments on our planet. It shows how such theoretical advances can become beneficial for our understanding of human–animal relations beyond the North. The last section, *Domestication beyond Animals: Of Culture, Nature and the Law*, extends this theory-building to more-than-human-animal relations. The chapters show how such adaptation and domestication processes in cold places happen in settings of current sustainability politics. They are always accompanied by complex political and economic contexts that influence the ways in which people relate to their animals, but also ways in which their perception of other beings in the environment, and of human agency in domestication is not restricted to animals only. Thus, people can interact not only with animals in processes of reciprocal domestication, but also with the law, making it fit to their needs and fitting their lives to political–legal realities. This raises questions on how the benefit of the cold and a convivial ecology influence livelihoods to the extent that indigeneity and indigenous people embraced in it become domesticated alongside laws and animals. Such elaborations lead to a critique of sustainability or the ideology of environmentalism as well as to reconsider our understanding of cultural diversity and human history in general. On the following pages we summarize the key points of each chapter by the abovementioned sections.

Section I: Cross-cutting perspective on Northern domestication

The section sets out with a dialogue of anthropology and other disciplines. The second chapter "The North as a space for innovation in human – animal – environment adaptation" (Hiroki Takakura) reviews the recent development of archaeology and anthropology on adaptability of subsistence in the North. The author challenges the dominant ideology of the North as a limitation

of cultural evolution. The mobility enhanced by microblade technology and dog-sledge guided the adaptation in vast inland territories to sparsely dispersed supplies. On the other hand, seasonally affluent migratory fish and the relative ease of access to such resources facilitated the formation of non-egalitarian sedentary foraging societies. The indigenous interactions with vague boundaries between foraging and food production are key for revisiting the conventional concept of human history based on the ideology of production.

The findings of genetics for our understanding of Northern history alluded to in Chapter 2 become the principal focus of the third chapter titled "Domestication and adaptation of pastoral animals and human livelihoods to the Arctic" (Juha Kantanen and Florian Stammler). The authors attempt to contextualize new genomic and bioinformatics insights on the domestication and adaptation of Arctic pastoral animals with anthropological evidence of people's relations to these animals. With this approach inspired by scholarly endeavours to overcome the division between nature and culture, they emphasize the importance of human–animal–environment relations even in the field of genetics. Such research, the authors argue, can show how people have been formative for processes of adaptation and domestication in animals, which can now be genetically traced. However, this human involvement is different from the traditional definition of domestication as purposeful intervention of humans to animal/plant formation. Rather, the authors show the significance of emplacement. Genomic studies successfully identify several genes in livestock associated with tolerance to cold and several physiological changes vital for cold conditions. The anthropologist correspondingly documented the indigenous ways of selective breeding (folk selection) of livestock. The optimal autonomy of the animals is a product of this interaction: it implies as little human care as possible, but as much as needed for sustaining the relationship. The conventional evaluation of reindeer as "semi-domesticated" from the arid pastoralist view is not a deficit of human intervention but a rather an intentional result of the triangle embracing the agency of the human, the animal and the place.

Section II: Domestication among hunters

The second section traces ways in which not just herders, but also hunters engage in processes that we may call domestication. The fourth chapter "Domus-sharing in the vicinity of domestication: An ethnography of human – wildlife – land interactions in Interior Alaska" (Shiaki Kondo) does so on the example of the Athapascan ethnography of inland Alaska. The author elaborates on the local hunter-gatherers' intervention to wildlife not just as acts of foraging. He documents some ways of relating to animals that remind of domestication. For example, Upper Kuskokwim Athapascans take care of stranded migratory birds. They also open a space in beaver dams to help spawning salmon going through. People know intimately how just as humans,

Northern animals and fish need movement for survival in a cold climate where sedentary agriculture is not an option. Human intentional securing of the movement of different species can be seen as ethical behaviour, but it also enables symbiotic relationships in the ecosystem across species. This is the same logic as among herders of reindeer and other pastoral animals, but with the difference that herders engage in selective breeding (folk selection) in animal reproduction.

Our focus moves from North to the South Siberian people in the boreal forest: Donatas Bradišauskas explores in the next chapter titled "From relatives to enemies: emplaced Evenki relationships with wolves in the changing environment of East Siberia and the Russian Far East" what might be called wildlife ethics among hunters and herders. The chapter traces a change from traditional to contemporary relations. Evenki people respect the wolf ritually regardless of it being a predator for both wild and domesticated reindeer. The wolf is not a long-lasting partner for humans, but a significant other that connects to the spiritual world. Living with the wolf is part of Evenki hunter and herder ethics, which the author regards as "co-domestication". A message similar to the previous chapter is put in different terms and context here: both hunters and herders in the North require the *domus* – a symbiosis beyond the clear distinction of wild from domesticated, regardless of whether hunting or herding prevail as practices for subsistence.

Section III: Convivial ecology embracing animal autonomy

The section presents a focus on theory-building that suggests a departure from the conventional concept of domestication towards partnerships of life. Such an approach should be applicable in diverse ethnographic settings to claim general validity. In Chapter 6 "On encountering and holding reindeer in a convivial North", David Anderson starts out on a positive note from his fieldwork, the notion of the "good cold", the joy that a cold wind brings to people in his field. He shows how people in the North achieve a convivial life with the other beings in the environment through a wide variety of approaches to their companion animals in the cold. This is hardly compatible with the dominant idea of domestication based on a utilitarian and productivist ideology. Instead, the author proposes to approach domestication from a conviviality perspective. Borrowed from the work of Ivan Illich, conviviality is considered crucial for understanding human history and cultural diversity in this chapter. As an example, human–reindeer relations are characterized by differing degrees of distance between the agents in the environment, while they also maintain an atmosphere of mutual awareness. This combination of autonomy, care, closeness and distance is at the heart of a convivial ecology, which we might also call a Northern mode of domestication across multiple species. In the following chapter "Reindeer riding and driving: A preliminary essay on the use of domesticated reindeer for transportation", Shiro Sasaki takes such a convivial ecology to the example of the reindeer sledge.

There is a long research tradition on Siberian sledge to explore its historic-ethnographical origin and diffusion. In his work Sasaki takes an alternative direction by analysing how the sledge affords comfortability in coordination with a specific environment. He classifies two sledge types: the Western Siberian model that fits the wide treeless tundra for high-speed driving and long-distance journey, as different from the Eastern Siberian model better suited to forest conditions, where flexibility when encountering obstacles is key during the herders' mid-distance journeys. Sasaki shows how form and material with their agency are alongside humans, animals and other beings in the environment also elements of a convivial ecology.

In Chapter 8 entitled "Between foot rot and wolves: the internal and external threats of Tozhu reindeer herding", Charles Stépanoff emphasizes along similar lines how peace of mind and absence of fear may also be part of human–animal–environment conviviality, even without the use of this very term in the chapter. The author shows how among the Tozhu the partnership in domestication is built on animal autonomy, and on reciprocal ritual relations where the spiritually significant animal provides protection for humans, rather than the human domesticator protection for animals. Stépanoff goes on to show how the modern state negatively affects such indigenous conviviality. While at first glance, organized protection of livestock from wolves and disease seem to be a benefit for herders, such measures weaken the multi-species partnership of humans and animals in the environment that has been at the heart of Tozhu herding from pre-Soviet times. The author highlights that reindeer herders have to navigate constantly along a thin margin between two mutually contradictory threats, be it in traditional or contemporary settings: less herd surveillance is best against hoof-rot disease, but it leads to a higher risk of loss to predators such as the wolf. On the other hand, closer control of the herd reduces predator loss but increases hoof-rot disease. This can be seen in comparison of domestic with wild reindeer, the latter suffering much less from hoof-rot disease that spreads through infected pastures among herds that graze closely controlled rather than widely dispersed. The author suggests that animal autonomy as a herding technique is the optimal response to maintain a healthy balance between these two threats. However, the productivist ideology of the modern state has endangered such indigenous risk management.

The next chapter "Fish sharing between humans and reindeer in the Western Siberian Forest and the mode of herding" (Yuka Oishi) introduces a different picture of animal autonomy, among the Khanty people. The author ethnographically documents a relationship embracing humans, animals, fish and swamp landscape, where fish is a keystone species. As shown in the previous chapter, all organisms in the North would die without movement. In the inland environment of the Western Siberian forests, hunters are part of this landscape of movement. In riverine and lake landscapes surrounded by forest, fish allows a more sedentary life. Fish, reindeer and humans, who feed themselves and their reindeer with fish, form a three-species symbiosis

that also includes parasite relations. In this relation domestic reindeer is a source for fur and meat, but also a means of transportation for travelling to different swamplands. It is, however, fish that shapes this relational triangle most significantly: fish facilitates the closeness of the human–reindeer relations and also directs reindeer grazing behaviour by directing movement without enforcing domination. This fish-mediated human–reindeer relation adds a new aspect to our portfolio of Siberian ethnographic portraits.

Section IV: Cold domestication beyond the Arctic

We entitled the following set of chapters *Cold Domestication beyond the Arctic*, as these contributions show the relevance of the very same theoretical approaches also for cold regions not located in high latitudes. This implies that what we may call a Northern mode of domestication applies also more broadly, perhaps planet-wide, to extreme and cold environments. Takuya Soma's chapter "Traditional ecological knowledge (TEK) of steppe land for *Dzud* disaster reduction in the Mongolian nomadic community" takes herders' knowledge on disaster and disease as a starting point. He shows how these ways of knowing encompass not only livestock but also wildlife and the land. The herders' observation of change of behaviours of wild herbivores such as ibex help them to forecast climate disasters, thus contributing to resilience of humans and their livestock. Moreover, local knowledge of herbs is also important for the problem of zoonoses – infections caused by germs that spread between animals and people. While previous studies of Mongolian pastoralism – similar to those among Arctic pastoralists –focused on the interaction between humans and livestock, Soma's contribution here stands out through his incorporation of wildlife, land and climate in the consideration of social–ecological relations. In doing so, this chapter follows the same approach as we have outlined above for the Northern concept of domestication.

A special take on domestication that we otherwise thought to find only in the Arctic comes from the highland of the Andes by Asami Tsukuda in her chapter "Revisiting the distinction between wild and domestic". The Andes and the Arctic become comparable in domestication studies for the presence of both wild and domestic breeds of the same animal species, who share a habitat and can interbreed. In the Arctic this is wild and domestic reindeer/caribou (*Rangifer*), while in the Andes it is wild vicuñas (*Vicugna vicugna*) and domestic alpacas (*Vicugna pacos*) or wild guanaco (*Lama guanicoe*) and domestic llama (*Lama glama*). From her years- long fieldwork in Peru, the author approaches human–animal–wildlife relations in Andean pastoralism from the perspective of the animal autonomy elaborated earlier by Stépanoff and his colleagues (Stépanoff et al. 2017 and this volume). One distinct feature of pastoralism in the Andes is its strong market orientation: raising livestock is important for selling meat of lama and fibre/wool of Alpaca. However, herder activity also extends to hunting vicuñas – another wild

Alpaca breed – for fibre/wool that is even more valued on the market. In this kind of hunting the animal is not killed but captured in a traditional way called *chacu*. A striking difference with Arctic and Asian pastoralist settings evolving from Tsukuda's work is on movement: Andean herders do not need to be mobile with their household for the sake of pasture rotation, due to the diverse ecology in the different altitudes of the Andes. Humans and animals can afford a semi-sedentary life, where the animals are let free in the vicinity of people. This is a different take on animal autonomy, which we believe further confirms the approach to domestication in this volume as a fluid reciprocal process between humans and animals in a given environment in diverse gradations.

This leads us further to ethnographically inspired broader theoretical considerations on domestication beyond the immediate realm of animals only. We have moved beyond domestication in its importance as historical event triggering the origin of agriculture and pastoralism. Beginning with Layton and colleagues' seminal article (1991) and the discussion it triggered, we see domestication as process continuing in the present, which by far does not need to be unidirectional nor irreversible. This invites to regard domestication as an approach to interactive relations between people and various significant others, which do not have to be animals only, which brings us to the final section in this volume.

Section V: Domestication beyond animals: of culture, nature and the law

The section opens with the chapter "Laws of domestication and domesticating the law in Yakutian human-animal relations", where Ivanova and Stammler highlight how the symbiotic process is entangled in complex relations with the law, both customary and as extended hand of state power. This reminds of Khazanov's (1994) seminal statement that no contemporary pastoralism can be analysed in isolation without the outside world state involvement. The authors show how laws of animal conservation trigger social processes in human-animal relations among pastoralists that influence both sides, domesticity and wildness. Exploring the relations between people, the law and animals such as cattle, reindeer, horses and also snow sheep, the authors show the liminality of domesticity and wildness that seamlessly integrate in customs but remain challenging for state regulation. As a result, people engage in what Ivanova and Stammler term the "domestication of the law" in this chapter, which is a reciprocal process where a codified legal document develops its own social life adjusted to the specifics of a human–animal relation, while at the same time it also influences that human–animal relation with its imported regulatory power. The effects of such reciprocal legal domestication can be seen when the foals of formerly domestic horses that became feral are hunted on the Arctic coast of Yakutia, by the reindeer herders who also engage in legal conservation of the rare *Kharaulakh* snow sheep population (*Ovis nivicola*), who also hunt this sheep in small numbers

for their precious meat. This chapter reminds us that entangled ecological relations between wildlife and livestock that many chapters in this volume analyse always unfold with the law as an additional relevant actor.

The final chapter continues the theorizing of the state's involvement in domestication but takes it to a different level through its link with sustainability politics. Hugh Beach starts his chapter "Domesticating wolves while colonizing their hunters" with the Jewish midrash (story) of the pigeon and the hawk, in which the human (Moses or another spiritual leader) is confronted with the challenge of protecting the pigeon without depriving the hawk of its feed. For Beach this raises the important question of sustainability for whom? Elaborating on domestication as a relation of symbiosis alongside other authors in this book, he broadens the perspective towards a new relation of different organisms entailing the unintentional feedback from the domesticated to the domesticator. Such feedbacks can open a different understanding both of human history and present climate politics. In this case, the Swedish state's enthusiasm for the protection of the wolf is related to a state-engineered sustainability ideology where the intention is to preserve the "wildness" of the wolf. However de-facto the wolf is transferred to a domestic relationship where human herders raise reindeer to feed the wolf that is closely monitored by state agencies. Neither the wolf nor the state seems to recognize this change in the quality of the relation. This also feeds back to humans in an unintended way, as Sámi reindeer herders need to change their relations to the wolf as a predator to seeing it as an animal fed by their reindeer at the expense by the state that pays compensation. In enforcing such a regime for the sake of what is called sustainability, Beach includes in his domestication analysis all beings in what the state calls a pristine wilderness. Consequently, the Sámi and their indigeneity also become domesticated in this closely managed conservation regime. Hence, unintentional feedback processes from the domesticated to the domesticator are an important aspect of domestication that is not limited exclusively to animals.

Conclusions

Several key messages evolve from the combination of all chapters in this volume for their relevance of a revised understanding of domestication and adaptation of living organisms. Firstly, there seems to be a firmly established agreement that the conventional view of domestication as domination from a human-centrist productivist angle is overcome. Secondly, cold environments inhabited by humans, animals, plants and other beings appear among all authors of this volumes as arenas of opportunity, rather than challenges for survival. This leads us to emphasize the contribution of the cold for the evolvement of a diversity of ecological relations on this planet. This may first seem strange, as we are more used to thinking of warmer regions such as the Amazon with its biodiversity as most significant. Although the Amazon too has seen domestication long before contact with Europeans (Clement et al.

2015), this volume shows how cold regions continue to hold keys for a better general understanding of ecological relations, specifically for an improved and broadened notion of domestication and adaptation as continuous processes that influence the shaping of organisms of all kinds. While in the Amazon the focus has been on plants, in cold places animals in their relations to humans and their surroundings hold such keys for our understanding.

Far beyond linear models of domestication from trust to domination, the theoretical advances that are further developed by the chapters in this volume show evidence of the partnership element and the reciprocity of domestication and adaptation that Anderson summarizes under the term convivial ecology (this volume). Such a convivial ecology bases on the opposite of domination, namely on mutuality in the relation. However, rather than emphasizing mutual dependence for survival, this book shows that domestication is more about creating opportunities for joint life – hence conviviality. The modes of subsistence as well as market-oriented livelihoods in extreme environments presented in this volume demonstrate the importance of ecology in its broader understanding that also includes aspects such as spirituality, emotional attachment with animals and wellbeing. Jointly with living organisms, such broader aspects boost the adaptability of human beings in general, equipping them not only to survive but thrive with others in an extreme cold environment.

For harnessing such opportunities, most authors in this volume emphasize – with or without using this very term – the importance of autonomy as a precondition for the partnership character in domestication and adaptation processes. Stépanoff's and colleagues' earlier focus on this aspect (2017) has proven to be of seminal importance also in this volume. Key is the interplay between distance and closeness, the fluid realities of freedom and protection in the relations between humans, animals and other beings. The chapters have further extended this relevance beyond the immediate realm of domestic pastoral animals. They show how animals are autonomous agents which change their relations to other beings in the environment in ever-evolving relations and feedbacks, across conventionally established definitions of qualities that people have termed domestic, wild, feral, tame or hybrid. Domestication and adaptation therefore unfold along a fluent gradient of familiarity between the beings. The importance of fish for relations of domesticity (Oishi), or the feral foals hunted in Arctic Yakutia, the conservation-yet-hunting of *Ovis nivicola* in an increasingly regulated Arctic (Ivanova & Stammler), or the not-invasive hunting (or shall we call it ranching?) of supposedly undomesticated vicuñas in the Andes for wool (Tsukuda), as well as the expressions of the same genes in pastoral animals selected by herders in similar ways across species in the Arctic (Kantanen & Stammler) – all of this evidence can be seen as examples of such animal autonomy in a convivial ecology.

On the other hand, with so much evidence for conviviality, partnership and evolvement of bio-culturally diverse life, we urge not to forget that such human–environment relations cannot be explained exclusively with

processes of harmonization and egalitarianism. As harmonious as it may seem, chapters in this volume also remind us how partnerships for sustainable life can result in unintended feedbacks that create stratified relations: be it the domestication processes between the people and the animal-laws that Ivanova and Stammler have documented, the de-facto domestication of the wolf and the Sámi in Sweden that Beach elaborates on, the evolvement of the wolf as enemy in Bradišauskas' chapter, or the non-egalitarian sedentary foraging societies in Takakura's chapter.

However, even including such unintended feedbacks, this volume shows how cold environments are more than hotspots of a changing climate, which inhabitants witness happening around them, as well as from the almost daily news of new climate disasters. These places are of planetary importance in a different realm too: they hold explanatory keys for understanding the principles how life evolves and thrives from relations, and what determines the changes governing such relations. We therefore assume it is not by coincidence that so many of the seminal advances in domestication theory have been based on evidence from cold regions. There seems to be growing evidence for the relevance of such a cold place-based mode of domestication and adaptation not only beyond the Arctic, but more generally for extreme environments on this planet. From this could follow that extreme environments are at least as much places of opportunities and thriving as they are of deficit, scarcity and challenge for survival. A "cold" view on domestication and adaptation bears further lessons for contemporary sustainability politics: in a convivial ecology, the human being is not a master of the world subduing, controlling reproduction and conservation of other species but is entangled in life holding relative power and responsibility.

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Section I

Cross-Cutting Perspective on Northern Domestication

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2 The North as a space for innovation in human–animal–environment adaptation

Hiroki Takakura

Introduction

This study pursues new dimensions in the anthrohistory of human adaptabilities, while focusing on the northern modes of foraging and domestication. It incorporates methodology and knowledge from anthropology, archaeology, biology, and geological sciences. Styles of adaptation found among northern human populations are different from those seen in tropical areas, the birthplace of the *Homo sapiens*. Mobility and meat pastoralism are supplemented with hunting (neither milk- nor grain-trading), and sedentary fishing complexes are observed in the North. The carnivorous tendency owing to hunting, fishing, and pastoralism with changing cold environments has formed distinct subsistence patterns and adjustable social organizations, which should be key in understanding human adaptability with global extension.

However, the master narrative of human history has heretofore dealt with northern foraging and domestication in terms of environmental determinants. The Arctic environment is characterized by extremely cold weather, low biological production in land-based ecosystems, varying amounts of daylight determined by the seasons, and the dangers of working in snow and ice. Owing to the low land-based biological production, the Inuit lifestyle, encompassing land and coastal hunting, can be seen as the result of ecological adaptation to available resources (Moran 2000, 113–116).

Does the cold limit the development of human culture? As a Siberian anthropologist, I propose a different vision. First, the words of Robert Lowie written almost a hundred years ago state, “Siberian data lend no support to the doctrine of inherent laws of social progress” (Lowie 1929, 169). This answers the question with the old-fashioned theory of social evolutionism that types of social organizations reflect social progress. It was a snapshot of anthropological history refuting the evolutionary theory and showed the role of Siberian ethnographies in overturning the theoretical assumptions. However, many anthropological considerations have ignored the significance of ethnography and the issue of domestication in the North. In fact, it drove the recent research on the human–dog relationship (Wishart 2018, 2). Thus,

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it is important to now re-evaluate the cultures of the cold climate, or rather cold possibility, and its benefit in human adaptabilities.

The recent development in the various sciences calls for a rethinking of northern foraging and domestication. Concurrent to the new paradigm of human–nature interactions or the socio-ecological systems in the Anthropocene age (Gallopin 1991; Young 2006), new findings of Arctic archaeology, animal genetics, and the theoretical innovation of the biological idea of domestication have been prominent. Based on the observations in Siberian ethnographies over 30 years after the end of the Soviet Union, new theoretical reconsiderations of Arctic domestication have appeared. This chapter thus provides a re-envisioning and explanation of human adaptabilities in cold and extreme conditions by integrating the recent findings of bio-geophysical sciences and archaeology. As an introduction to the volume, I recollect the North as a triggered space for innovations in human history from archaeological and anthropological perspectives.

Microblade technology and sledge dog as Paleolithic innovations

To begin with, the study focuses on the first Siberians, and when and how humans first inhabited Siberia. While some researchers estimate the habitation of Northern Siberia to around 34,000–26,000 BP (Yaroslav et al. 2018), most acknowledge the human race was limited to Southern Siberia during the Last Glacial Maximum (LGM: 23,000–19,000 BP). The Paleolithic hunters targeted game animals not restricted to mammoth and reindeer, but also horse, red deer, moose, and bison, which follow similar seasonal and long migration patterns. Their hunting skills were supported by microblade technology (Kimura 1993). Analyses of lithic raw materials provide evidence to the manufacture and transportation of microblades over a distance of 200 kms, thus indicating high human mobility (Sano 2007). Microblades of less than three centimeters in length were inserted around the tipped bone/antler, shaped as a spear. This combination of tools exhibits the human capacity of tool making and entails the planned acquisition of multiple materials, elaborate technology, and effective application of the tools adapted to the human physical abilities and animal ecology (Kanomata 2018).

Generally, there were two means of reducing the size of stone tools or microlithization in the late Pleistocene age. One was used in Europe, North Africa, and western South Asia, and the other was used in North and East Asia. There are several hypotheses regarding the origin of microblade technology in Siberia and China between 23,000 and 18,000 BP; however, all agree that the high level of residential mobility and the reduction of hunting risk in unfamiliar territories or unpredictable conditions were common factors (Kuhn 2002; Yi et al. 2016). Scholars regard the invention of the microblade as key to human colonization of Siberia that indicates a mobile livelihood, transitioning from generalized to specialized hunting such as reindeer, red deer, or bison after the LGM (Goebel 2002).

Researchers could not conclude that the invention of the microblade originated in Siberia, although its advantage flourished in cold conditions making human adaptation possible in late Pleistocene or early Holocene Siberia. The mobile way of life targeting specialized game with seasonal migration patterns, like reindeer, is somewhat similar to the 20th-century ethnography of foraging in the North. Interestingly, humans with microblade technology explored Hokkaido Island before the rest of Japan (Sano 2007; Yi et al. 2016). However, the tradition disappeared between 13,000 and 11,000 BP, not only in Japan but also in warmer Northeast Asian coastal societies (Kanomata 2018).

Were the late Paleolithic Siberians who possessed microblade technology capable of living with domesticated dogs? While some scholars argue the possibility of the earliest domestication of dogs at 33,000 BP in Altai, Siberia (Germonpre et al. 2017; Ovodov et al. 2011), a recent study convincingly suggests the dual origin of dog domestication in western Eurasia and in East Asia between 14,000 and 6,400 BP. Interestingly, the genomic evidence makes a distinction between the Eurasian Samoyed dogs and the Siberian huskies in Asia (Flantz et al. 2016).

Archaeologists have also found evidence of dog domestication in Yakutia (17,000 BP), in Kamchatka (12,500 BP), and that the foragers possessing microblade technology in the Lake Baikal region in 8,000 BP buried dog remains in human burial sites. While humans used dogs in hunting for survival (Shipman 2015), the emotional bond formed between them was a result of domestication (Flantz et al. 2016; Lozey et al. 2013; Losery et al. 2018). Biologists emphasize that the emotional bond was significant in the evolutionary diversification of a dog's barking, enabling it to effectively communicate with humans. While wild wolves create a single utterance mainly in the context of caution, dogs bark in varying lengths, either short or long, with single or successive calls in various contexts, including play, which could be the effect of a longer symbiosis (Yabuta 2019). Archaeologists who follow the multiple domestication theory insist that Paleo-Siberians used the dog sledge in 8,000 BP, as they discovered dog bones and wooden fragments of sledge-runners on Zhokhov Island (76°N latitude) in the Arctic Sea (Pitulko and Kasparav 1996). Recent archaeological analysis of the Zhokhov dog bones suggests a special breeding technology for sledge dogs and traced it to 9,000 BP (Pitulko and Kasparav 2017). The domestication of dogs in Siberia, thus, is an important innovation in human history (Grim 2017).

After the mammoths went extinct, Siberian foragers focused on reindeer as the main game in the early Holocene (Pitulko 1999); thus, mobility targeting the animals' long migration patterns became an important strategy for human survival (Kanomata 2018; Takakura 2012). The emphasis here is on the connection between microblade technology and using dogs as a means of transportation. While the microblade technology preceded the domesticated dog, the two cultural agencies of microblade tools and sledge dogs enhanced the adaptation to mobility in a cold environment during the Holocene. It

might have been the origin of "a threefold [human, dog, reindeer] synergy in the northern landscape" (Davydov et al. 2018).

Innovation in ethnological contexts

What are the anthropological arguments for the ethnological innovations in adaptation to the harsh north? We first recollect the classical study on Siberian adaptation by Soviet anthropologists, known as the economic and cultural type theory. Siberian people in the traditional setting (from the latter half of the 19th century to the early 20th century) were divided into (1) hunter-fishers of the Taiga who traveled on foot, (2) marine animal hunters of the Arctic, (3) sedentary fishers along large river coasts, (4) reindeer hunters and herders of the taiga, and (5) reindeer herders of the tundra. This shows the subsistence patterns formed in correspondence with the ecology regardless of the difference in historical and ethnological backgrounds (Levin 1958; Levin and Cheboksarov 1955; Matsuzono 1962; Sasaki 1985). The mobile foraging strategy invented in Paleolithic Siberia developed in diverse ways, including new elements such as marine animal hunting and fishing with sedentarism, and reindeer pastoralism.

These five patterns were dependent on human–nature interactions. Archaeologists have found evidence of sedentary fishing, maritime animal hunting, reindeer hunting, and combinations of these across Siberia in the past few millennia. Maritime hunting appeared at least between 4,000 and 3,500 BP owing to the shortage of reindeer, and thus humans were forced to turn to sea mammals to hunt for food. This, however, was seasonal. Owing to over-exploitation, at least in Ural and Yamal, this subsistence pattern disappeared in the middle of the second millennium AD, while it continues to the present day in Northeast Asia including Chukotka (Pitul'ko 1999).

The relationship between sea mammal hunting and reindeer hunting was theoretically discussed by Russian-American anthropologist Igor Krupnik in his book on Arctic adaptations. He assumes that two poles of subsistence adaptation were at play within the scope of the past 2,000 years. The first revolves around sedentary fishing and marine animal hunting along coastal areas, that is, adaptation by permanent settlements of hunter-gatherers who depend on migratory fish and marine animal resources. Since climate conditions allowed for the preservation of food, wealth could be accumulated, and there was, thus, the possibility of developing a hierarchical society. The other pole gravitates to nomadic hunting, primarily wild reindeer in the hinterland. The range and movement of nomadic settlements are regulated by the distribution and migration of animal resources. Thus, sedentary coastal adaptation and nomadic inland adaptation are characteristics of Arctic adaptation that developed along the continuum formed between these two poles. Historically, concrete forms of subsistence adaption emerged in accordance with climatic and ecological conditions as well as social-political environments. Such a subsistence pattern is a result of crystallization somewhere

along this continuum (Krupnik 1988, 1993; Takakura 2008). This helps when explaining the originality and diversity of subsistence adaptation in the Arctic, in contrast to that practiced by tropical hunter-gatherers.

Japanese ethnologist Obayashi Taryo had a different argument about the relationship between coastal and inland adaptation in Siberia. He revisited the early 20th-century German diffusionist ethnological theories on Siberia, the 1950s Soviet Siberian cultural economic typology, and the 1970s American cross-cultural statistical analysis to insist on the importance of two perspectives—sedentary and mobile adaptations—to understand human history in Siberia (Obayashi 1991, 1957). This chapter further discusses sedentary adaptation focusing on coastal fishing and mobile adaptation focusing on reindeer domestication.

Cultural plasticity in sedentary adaptation

Previous research has emphasized the significance of coastal adaptation in two ways: one focuses on sea mammal hunting in contrast to inland foraging in the context of far north Arctic adaptation, as explained in the previous section; the second focuses on migratory fishing in the northern Pacific Rim, known to be a complex hunter-gatherer society (Habu 2005). The chapter now revisits the latter to evaluate sedentary adaptation as a northern innovation.

The traditional culture of the northern Pacific Rim is known to be a sedentary and storage hunter-gatherer culture in anthropology. In the 1980s, Hitoshi Watanabe and Alan Testart insisted on the importance of seasonal affluent migratory resources for sedentary adaptation with social stratification even within hunter-gatherer societies without food production. Family-based occupational differentiation can also be observed in these societies (Testart 1982, 1995, 185; Watanabe 1983; Watanabe 1988, 1990). The arguments provoked the generally accepted idea that inequality was the origin of agriculture and contrasted with that of the characteristics of hunter-gatherers, such as a substantially high ratio of gathering and distribution systems in food procurement, nomadic lifestyles among small-scale groups called bands, and individualistic and egalitarian tendencies.

Some may refute it, since those hunter-gatherers had historical relations with the state and its influence created hierarchy and sedentarism. The ethno-histories of the indigenous peoples of Sakhalin, the lower Amur, and Hokkaido certainly indicate that the state's involvement with the Qing Empire and the Tokugawa-Japan government created complex social structures and economic inequalities (Sasaki 1999; Schweitzer 2003; Takakura 2007). However, it cannot explain why some coastal societies in the far north with less state influence, such as in Chukotka, formed a sedentary and hierarchical society (Krupnik 1993).

Recent scholars, who analyzed the ethno-history of America's northwestern coastal peoples, argue that the key to understanding the inequality

among hunter-gatherers lies in social institutions such as hereditary, property relations, non-bilateral descent, and religious leaders (Flannery et al. 2012, 75). Another study emphasized resource distribution effects in a given environment. While the southern societies among the northwestern coastal peoples were rather egalitarian with relatively less resources of migratory fish, the northern societies were hierarchical with more resources. War and potlatch often broke out in the latter (Kelly 2013, 261). The researcher persuasively insists that either egalitarianism or non-egalitarianism is not human nature, but an adaptation to increase fitness in a given environment from an evolutionary perspective (Kelly 2013, 267). This study claims that the key determinant must be an environmental aspect in the long term. Egalitarian hunter-gatherers could become non-egalitarian according to ecology and resource conditions, in particular, due to changes in food resource affluence and the cold climate necessary for food preservation. The cold further contributes to the conditions of food resources and its human use. Coastal foraging adaptation interacts with people, animals (fish), and climate, thus exhibiting the historical feasibility of cultural plasticity. I do not insist on environmental determinism, but that the environment, politics, and economy are strong drivers of adaptation or among agencies of norms and behaviors.

Degraded evaluation of the inland adaptation

What were the innovations of inland adaptation in ethnological contexts? We already confirmed that the innovation of microblade technology and sledge dogs in the late Paleolithic Siberian peoples resulted in increased mobility and contributed to human adaptation and geographical expansion to the cold environment. In contrast, the conventional view states that such great innovations did not emerge in Siberia. The introduction of domesticated reindeer, by the Siberian peoples, was however an important social process in the North. Regardless of the ethno-historical background, many inland ethnic groups have adopted domesticated reindeer as a mode of transportation to aid their subsistence and enhance foraging efficiency. Some tundra reindeer people established reindeer pastoralism for meat production in the 19th century and established the production economy among other groups. The cultural diversity of reindeer herding has fascinated several anthropologists who studied the North in the early 20th century.

The reindeer enthusiasm, however, remains only among social scientists in the Arctic, owing to the conventional view of pastoralism. Most scholars believe that sedentary agriculturalists first domesticated animals to include them in livestock. The reindeer is an exception because the domesticator was also a hunter (Harris 1996, 455). Tim Ingold (1980, 25) proposed distinguishing between the contrasting types of milk pastoralists and carnivorous pastoralists. The former refers to the pastoralist in the dry region and the latter to the reindeer herders in the cold region. Previous scholars on human adaptabilities have regarded reindeer herding as an insufficient means

of animal domestication compared to the steppe pastoralism that originated in the Near East. The reason here is milk. The technology of milking and milk production demands pastoralism from other subsistence activities. Milking requires an intimate human–animal relationship and is completely different from hunting. Therefore, Arctic reindeer husbandry has often been viewed outside of pastoral adaptation, rather as a kind of "semi-domestication" practice due to the absence of milking and the focus on meat consumption, as well as the relatively relaxed management of reproduction (Glutton-Brock 1999, 31; Harris 1996; Tani, 1976, 2017; see also Takakura 2020).

However, post-socialist anthropological studies have refuted these conventional views. First, the indigenous perspective clearly denies the idea of "semi-livestock." The reindeer herding practitioners have their set terminologies distinguishing the domesticated and the wild, based on biological rather than behavioral differences. Tameness here is not related to domestication (Beach and Stammler 2006, 10; see also Chapter 6 by David Anderson in this volume). The evaluation of tameness across domesticated animals does not contribute to the understanding of pastoralism. In contrast, intimate human–livestock relations could be observed without the "milking culture" or other than in "the south." Stammler (2005, 166) emphasized this in the case of the Tundra as a type of "carnivorous pastoralism." Takakura (2010) reported a close relationship built not only on milking but also among riding, drafting, and sledge-leading individuals in far north conditions. In addition, recent developments in biology, archaeology, and anthropology on domestication and reindeer herding suggest the necessity of rethinking these conventional views. The chapter now reviews arguments on the concept of domestication itself, the interpretation of Arctic human–animal relations, and the biological findings of reindeer domestication.

The re-conceptualization of domestication

Previous scholars regarded domestication as a historical event in the opening of a new dimension of human history. Recent specialists criticize this view and instead propose domestication as a process or pathway. While one may presuppose the clear-cut image demarcated by undomesticated or domesticated animals, these scholars insist upon the importance of the metastable equilibrium that prolonged the persistence of the "semi-domesticated." They emphasize human unintention at the beginning of the process and behavioral and morphological changes in its consequences (Fuller et al. 2010).

A more fundamental perspective appears in the argument around the non-human domestication of social insects. These domesticators manipulated the conditions of growth of an organism to increase its relative abundance and predictability and to reduce the time and energy required to harvest its produce. This definition of domestication represents the co-evolving mutualism between the manager and the managed resources, and the responses undertaken to promote this relationship (Zeder 2015). The concept of co-evolving

mutualism is important in domestication because it emphasizes that domestication is not a human control of nature. As with the prominent failure of domesticating zebras, human history shows the limitations in domestication of the local wild plant and animal species available to them. The vast majority of wild species do not lend themselves to domestication. Rather, one should recognize that some fortunate compatibilities between human and wild species resulted in domestication of a local origin (Diamond 2005, Chapter 9). It implies historical coincidence that is dependent on the geographical distribution of the wild species.

There are several common conditions for the success of animal domestication: a relatively large size, easy feeding, rapid growth, captivity, docility, follow-the-leader behavior, and insensitivity to fencing (Diamond 2012). However, if domestication occurred in each local area, mutualism should have been formed differently. The local population has recognized the resourcefulness of domesticates in time and space. However, most scholars uniformly emphasize the significance of milking in animal domestication. Seemingly, they believe that in human cultural history, milking is an inevitable consequence of proper domestication of animals.

Recent archaeological studies argue against the conventional relationship between domestication and milking. Certainly, the scholars found the milk exploitation of the Pre-Pottery Neolithic People of the Near East back to 10,000 BP soon after domestication, and that the quest for this new food might have stimulated this process. However, those people continued to use a meat diet from hunting for thousands of years after the introduction of domestication. The origin of pastoralism did not lie in the inevitable technological consequences of animal domestication, but in local socioeconomic conditions (Vigne 2011). Anthropologist James Scott also noticed the unignorable time span between domestication and the origin of the production economy (agriculture). While he criticizes the standardized "progress of civilization" that domestication inevitably resulted in an agricultural society, he emphasized the risk of dependence of the domesticates on foragers (Scott 2017). The most revolutionary argument on the concept of domestication is Melinda Zeder's theory of "pathways." She insists on the importance of initiatives in animals, which once embarked on the pathways to a domestic partnership with humans. There are three pathways: the commensal pathway, where animals like dogs first approached the human home range; the prey pathway, where the animals were targeted as game; the directed pathway, where humans secure a particular resource such as milk, wool, or labor. The pathways are not a typology; therefore, once an animal is domesticated in the predatory pathway, it may be transformed into a directed pathway under various conditions (Zeder 2012). From this perspective, cattle were first domesticated in predatory pathways but soon changed to directed pathways, either for milk or traction; reindeer were domesticated both in predatory and directed pathways as transport. Arctic dogs might have been domesticated in the commensal pathway, but later it was changed to a directed pathway in

the use of a sledge. Animal domestication might proceed to food production under certain conditions, but this is not an inherent attribute. Each human population in various socio-ecological conditions constructs a livelihood with the domesticates.

Let us revisit the issue of the subsistence patterns of inland adaptation in Siberian-Soviet anthropology. We can define "reindeer hunters and herders of the taiga" as a foraging system wherein the labor power of the domesticates plays a dominant role in resource management. I also define "reindeer herders of the tundra" as a provision system wherein the production and consumption of the domesticates play a dominant role. Both these relationships are not irreversible and do not imply inevitable change from foraging to pastoralism.

Arctic domestication

Presumably, there is no direct influence from those studies on the reconceptualization of domestication, although the resonant approach to reindeer domestication has simultaneously proceeded Siberian anthropology. This is a consequence of the accumulation of ethnographic research of Siberian reindeer nomadism that began after the collapse of the Soviet Union. While many Euro-American and Asian anthropologists studying Siberian peoples in the 1990s first uncovered the contemporary socio-cultural dynamics related to the post-socialist condition and resource development, some have inherited the research concern of Arctic adaptation originating in Soviet anthropology from the perspective of comparative pastoralism. Siberian anthropologists did not prefer to define reindeer husbandry as a "weak copy of more complex pastoral situations in southern climates" (Anderson et al. 2019, 1). These scholars were concerned with the anthropological accounts of human–animal relations and the social significance of reindeer based on their own field data and the related reconsideration of the definition of domestication (Stammler 2010; Stammler and Takakura 2010).

The key question here was how can one evaluate the issue of untameness of the domestic reindeer from the perspective of comparative pastoralism. Most scholars on pastoralism believed in the existence of a general feature of domestication for pastoral livestock, including sufficient tameness and milking. As shown in the previous section on the re-conceptualization of domestication, no such features exist. Rather, they emphasize the domestication pathways derived from animal biological attributes and the context of mutualism between humans and animals. Siberian anthropologists, in their own contexts, began to argue about the issue. Criticizing the presumption that domestication should result in the same level of tameness of animals, Takakura argued that the formation of different mutual relations was according to animal features under different conditions. He insisted that reindeer domestication differentiated familiarity from intimate to feral (Takakura 2010). The object of private property does not always guarantee

the tameness of livestock, and the existing wildness is a result of domestication. Charles Stépanoff and his team emphasized the interspecific common ground as a result of domestication, which contributed to the food and livelihood of the human owners. They proposed the sophisticated idea of the animal autonomy (un-tameness) of livestock as a cultural method of resource utility, which could explain why reindeer is not always tamed and still seems to be wild (Stépanoff et al. 2016). David Anderson and his group also agreed to underline the interspecific interaction design with mutualism. They critiqued the previous idea that domestication brought dominance to animals to propose the concept of architecture of domestication such as material cultures of reins, corrals, and traps that make the space to possibly live together with animals, as per the will of a human master. The emplacing of human–animal relation is a *longue durée* quality of northern adaptation (Anderson et al. 2017).

Animal genetics and the formation of pastoralism

While archaeologists and anthropologists have innovated on the concept of domestication and expanded its meaning in the northern context, biologists have proceeded with the genome analysis of reindeer (*Rangifer tarandus*) to argue the origin of domestication and pastoralism.

The trigger might be the reindeer genetics presented by Knut Røed. His group analyzed the DNA of reindeer in the Eurasian North and concluded that the three geographical centers of domestication included Fennoscandia, Russian West, and East. There are two important points of argument: the independent origins of reindeer domestication in Fennoscandia and Russia, and the preceding domestication of the tundra reindeer over those in the forest (Røed et al. 2008). This research was provocative since long-dormant arguments were reawakened. Scholars in the early 20th century discussed reindeer domestication to reach two unproved hypotheses of the origin of the practice as either single (South Siberia) or polycentric (South Siberia, Fennoscandia) (Laufer 1920; Røed et al. 2020, 2). Some scholars supported the single origin of Southern Siberia in terms of the diffusion theory with evidence of material cultures wherein reindeer herding originated from the influence of more complex pastoral cultures in Inner/Central Asia by the south-to-north route (Mirov 1945; Vainshtein 1980; Vainshtein 1986). Since then, there have been no active arguments. Other scholars hold the hypothesis that reindeer domestication was directed from reindeer hunting or herd following in the late Ice Age (Glutter-Brock 1999, 31). Genetics has reopened the old debate. Their findings posed at least three critical questions: whether reindeer domestication originated locally or began by diffusion; if it were of local origin, is it single or polycentric origin; and if it were diffusion, does the route follow a north-to-south or south-to-north direction?

Røed and his group have taken the initiative to address these issues. First, they explored the genetic analysis of the ancient reindeer of Fennoscandia

archaeological (south and north) sites to conclude that the ancient wild reindeer did not contribute to reindeer domestication in the region. The extant domestic reindeer in Fennoscandia are not of local origin (Bjørnstad et al. 2012; Røed et al. 2011). One should note that these conclusions contradict their previous research. Røed et al. later declared that there was no evidence of local domestication in Fennoscandia and insisted that the introduction of non-native genomes to the region in the 16th and 17th centuries resulted in the transition to reindeer pastoralism among the current Sami people (Røed et al. 2018). Correspondingly, related genetics and archaeology denied the hypothesis of local domestication in Yamal or northwestern Siberia (Anderson et al. 2019). They also pointed out that a significant genetic shift occurred between the 15th and 18th centuries wherein the Nenets reindeer pastoralism emerged. The key to the genetic shift was rooted in the South Siberian ancient reindeer (Røed et al. 2020). It is quite stimulating that almost the same phenomena of genetic shift occurred in the 15th to 18th century in Fennoscandia and northwestern Siberia, and the introduction of the non-native genome was key to the transition of reindeer pastoralism. Here, we may recollect the hypothesis of Laufer and his followers. Did reindeer domestication occur in South Siberia by cultural diffusion from the south to the north?

We need to clarify the differences between domestication and pastoralism. If the transition of reindeer pastoralism was associated with a genetic shift of the population derived from the south, it would not guarantee the single origin of reindeer domestication in that region.[1] The study of Fennoscandia by Røed et al. (2018) suggests that the Saami people had draft reindeer even in the 9th century AD, which must have been a domestic reindeer. The establishment of reindeer pastoralism as a production economy was certainly revolutionary because it was adopted by many northern peoples, resulting in the contemporary northern indigenous landscape. However, the finding of a genetic shift related to reindeer pastoralism does not contribute to the question of origin of reindeer domestication. If the local population invented riding and/or sledging reindeer even though pastoral production had not occurred, it definitely indicates domestication. Following the phrase of Zeder (2012), the directed pathway of reindeer domestication first developed into a transport function in various regions, while a predatory pathway led to pastoralism only upon the 15th- to 18th-century genetic shift. My interpretation supports the polycentric origin of reindeer domestication, although Laufer's hypothesis is only valid in the context of reindeer pastoralism after the 19th century.

As mentioned in the previous section, archaeologists and anthropologists have refuted the canonical story of "progress of civilization" with domestication. Recent Siberian anthropologists have also expanded the meaning of domestication: it does not inevitably change to pastoral production and is rather a way of mutual symbiosis that selects the domestication pathway. One such example is the interspecies interaction space formed among humans, reindeer, and dogs in northwestern Siberia (Anderson et al. 2017,

2019). Stépanoff elaborates on this idea to explain the transformation of reindeer pastoralism: it was not intentional and not directed to food production, but rather a result of the pursuit of hunting efficiency and the demand for exchange/prestige goods (Stépanoff 2017). I totally agree with those studies and would acknowledge that these are new elaborations on the classical statement by Bogoras (1929, 588), who argues that the principal trait of Arctic Rim culture is animal hunting, and that reindeer breeding is no more than the end result of the evolution of this hunting. Probably, the genetic shift must be a requirement for the transition of reindeer pastoralism, but this does not imply the general concept of pastoralism wherein a human society would develop into a nomadic state like in the case of the Mongolian Empire. It is an interspecific space of humans and animals with autonomy that occurred in the Eurasian North.

Why did such unique adaptations appear in the North? Most scholars might have emphasized that adaptation is key in the cold environments. However, I would like to pose a hypothesis of the relatively short history of reindeer domestication as a reason for this formation. Many scholars agree that both wild and domestic types often cross each other in many areas. This phenomenon does not occur among extant domestic livestock, such as horses and cattle. Biologists suggest that reindeer is "an appropriate model species to approach the key questions of when and where, how and why the early domestication took place" (Røed et al. 2018). The interspecies interaction space or domestication livelihood with pursuit of hunting efficiency might be a universal process in the early domestication of animals.

I would like to consider another theoretical implication of northern domestication, by focusing on the meaning of hunting or foraging directivity in reindeer pastoralism as a production economy. Unfortunately, due to the limited scope of this study, I have simply posed the theoretical question. I intend to explore it in terms of ethnography in future studies. The foraging directivity in the production economy may limit wealth accumulation or the political control of resources. It would be contrasting to the theoretical implications of coastal adaptation in the North: the foraging economy does not contradict the sedentarism and economic inequality.

Conclusion

This chapter reconsiders the human history of the North in terms of innovation in the human–animal–environment adaptation. Previous studies have regarded the North as a limited resource environment and as a challenge for human species. They evaluated the history of human adaptation in the North as a special evolutionary trait in an extreme environment or as a weak copy of tropical and temperate zones.

However, the author shows that the cold environment has triggered various cultural innovations in human history, at least since the last Pleistocene and the early Holocene. The microblade technology and sledge dogs were among the

first. The places of origin were still under debate, but I would like to emphasize the archaeological facts pointing to the development of these innovations in the North, which further contributed to the human expansion in the North. It is in a cold environment where humans required a mobile livelihood for northern ruminants in an extended space. The cold environment provided varied resources to the human population, either in coastal or inland landscapes. The seasonal affluent migratory fish and the relative ease of resource expectation have provided clues to the formation of non-egalitarian foraging societies with a sedentary lifestyle. The indigenous history of inland Northern Eurasia represents the relationship between humans and animals in the early stages of domestication. It established the unique livelihood of interspecific interactions with vague boundaries between foraging and food production. It also established the property regime of untamed livestock and feral animals.

Subsistence is a fundamental activity of humans as a living organism. Northern history in archaeology and ethnography forces us to reconsider the conventional scheme of egalitarian and non-egalitarian food producers. It is an archive of the plasticity of human culture, dependent on various conditions of the socio-ecological system. We can deepen it from the lost and extant ethnographies of northern adaptation.

Note

1 The other biological study identifies two independent genetic clusters (Fennoscandia and Russia-Alaska) among the wild and domestic reindeer population. They insist that the two clusters reflect the two independent domestication origins (Weldenegodguad et al. 2020). As an anthropologist, I value their finding of the genetic clusters but their conclusion of two independent domestication origins seems to be overinterpreted.

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3 Domestication and adaptation of pastoral animals and human livelihoods to the Arctic

An integrated genetic-anthropological approach

Juha Kantanen and Florian Stammler

Introduction

Domestication is at the heart of all animal husbandry and is hence a fundamental process in human–animal livelihoods. This chapter starts with the proposition that humans, animals, and other agents in the environment all have their influence on the emplacement of a living organism in its surroundings. That interplay of agents enhances the organism's survival and enables it to thrive, a process more commonly called adaptation. Hence, both domestication and adaptation are part of this process of emplacement. In northern Eurasia and the Arctic, animal husbandry is predominantly based on reindeer (*Rangifer tarandus*) but in Fennoscandian Lapland, northern Russia, and Siberia, other locally adapted animals, namely cattle (*Bos taurus*), horse (*Equus caballus*), and sheep (*Ovis aries*) are used for food production and other societal and cultural needs. From these species, locally adapted, northern native breeds, such as Northern Finncattle, Yakutian cattle, Mezen horse, Yakutian horse, Kainuu Grey Landrace sheep, and various reindeer ecotypes, have been developed. In genetics, adaptation of domestic animals refers to a process where domestic animal species, starting from the domestication of wild ancestral species, have become adapted to humans (tameness), to environments they live in, and to production systems provided by humans (Mirkena et al. 2010). In tandem with these adapted breeds, local livelihoods developed for which these animals form the basis: in this domestication process, local people help the animals to provide highly important services, such as milk, meat, and hide. Moreover, reindeer, horse, and cattle have been used for transport.

The northern animal breeds' economic, social, cultural, political, and ecological values for their respective societies have been discussed by a number of authors in recent decades (Mazzullo 2010; Granberg et al. 2009; Stammler 2010; Soini et al. 2012). Without specific characteristics needed for adaptation to the often-challenging environmental conditions of North Eurasia,

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these animals would not have these economic, social, and cultural values for northern and Arctic societies. Anthropological research on adaptation has highlighted the role of people and cultural diversity in this process and emphasized that domestication is neither a uni-directional exertion of domination by humans over animals, nor a one-off event. Based on fieldwork with local and indigenous peoples from the Arctic and Eurasia, several authors show how domestication is a reciprocal relationship that changes both the animals and the people in relation to other processes in the environment (Vitebsky 2005, 28–33; Beach and Stammler 2006; Takakura 2010; Stammler 2010; Stépanoff 2017; Anderson, Loovers, et al. 2017; Salmi et al. 2022). In this relationship, adapted domestic animals survive, reproduce, and produce valuable output for human use within a given environment, guided by priorities that are also influenced by culturally specific decisions of the humans that breed them.

In this genetical–anthropological field of study, so far we know of only one piece of pioneering research that achieved a far-reaching integration of evidence from both disciplines for a holistic understanding of pastoral animal domestication in the Arctic: Anderson, Kvie and colleagues (2017) have shown that purposeful human interbreeding of domestic with wild reindeer around Lake Baikal did not reduce genetic diversity; the wild reindeer remained genetically diverse from the domestic. The same authors' team also showed that domestic reindeer did not originate from the northernmost Arctic but were introduced there from a region further South (Røed et al. 2020).

This chapter aims for a similar integration of genetics and anthropology, but with the aim of better understanding the human partnership with not only reindeer, but with three Arctic pastoral animal species. Especially in extreme environments such as the Arctic, traits such as disease resistance, tolerance to less optimal conditions, and ability to cope with poor-quality feed are important when any animal population is mitigating and adapting to environmental changes (Passamonti et al. 2021). 'Adaptation traits' are complex and often controlled by many genes and environmental factors (Pritchard et al. 2011). Therefore, such an integration of disciplinary approaches is relevant not only for human–reindeer relations studies.

From a genetic viewpoint, adaptations of animal populations to environments or diets are typically associated with structural and functional genomic variations (Axelsson et al. 2013; Hu and Barrett 2017). The raw-data for structural genomic variations is DNA. Examples for such variations are various types of mutations in DNA sequences, or copy number variations. A copy number variation refers to a circumstance in which the number of copies of a particular gene or a specific segment of DNA varies among individuals' genomes (Upadhyay et al. 2017). Functional genomic variations are based on RNA as raw material and refer to variations in gene expression and variations in the regulation of gene expression between individuals, tissues, and other cohorts. Studies based on the whole-genome (DNA sequences) and whole transcriptome (e.g. messenger RNA) can be used to investigate the

genetic basis of adaptations in animal populations (Pritchard et al. 2011; Harrison et al. 2012; Jiang et al. 2014; Hu and Barrett 2017; Weldenegodguad et al. 2021; Pokharel et al. 2023). Pairwise comparisons between closely related taxa (e.g. populations originating from different environments) provide a powerful approach to identifying loci that show divergence between populations and that may have been under positive selection pressure, thus promoting adaptation (Weldenegodguad et al. 2021; Pokharel et al. 2023).

From an anthropological viewpoint, animal husbanders contribute to these processes by consciously working with animals to help them survive and thrive. Such practices are called traditions of 'folk selection,' in contrast with those implemented by institutions. This means people work with their animals through culturally specific innovations and practices to increase their Arctic fitness through the above-mentioned specific environmental traits, but also socio-cultural properties, such as calmness of character combined with endurance, herd leadership qualities, capacity to transport people and goods, skin color and texture, and other relevant traits. In combination, these traditions alongside other processes in the environment have been shaping Arctic animals' valuable qualities and their genomes. While we cannot (yet) give evidence of a waterproof causal relationship between the two, we show that certain gene expressions coincide with certain management practices of the animals in a given setting. Native cattle and horse breeds and domestic reindeer populations have been adapted e.g. to the cold dark winters, the short summers, and the fodder plants native to these northern environments. Arctic ethnic groups handling such animals (Finns, Sámi, Nenets, Pomors, Russians, Sakha, Eveny, Evenki) have myths and legends connected to orally transmitted narratives of domestication and selection of their animals.

It is suggested that reindeer descended from a large Eurasian glacial reindeer population (e.g. Weldenegodguad et al. 2020), have the longest adaptation history but the shortest domestication history among the three species studied here, and can be considered as native to the Arctic. Cattle and horses, on the other hand, have longer domestication histories, but have shorter adaptation histories and are regarded as having been 'imported' by people into the Arctic (Ajmone-Marsan et al. 2010; Librado et al. 2021). As a result of natural and folk selection, reindeer and subarctic cattle and horse breeds show metabolic, morphological, and reproductive adjustments. In the animal genomics analyses, we focused on animals' structural and functional genomic variations. We used modern genomic approaches for the analyses: whole-genome sequencing of animals and gene expression analyses (DNA and RNA sequence analyses, respectively). The study of these Arctic human–animal relationships and genetic resources of Arctic domestic animals contributes to further conservation of biological and cultural diversity and sustainable resource governance (Ovaska et al. 2021).

In genetics, the particular focus is on candidate genes and chromosomal regions important for the adaptation and production traits of the different animals. Our recent studies have indicated that similar genes have promoted

and been under selection in the different species indicating the existence of convergent evolution between the mammalian populations adapted to the subarctic and Arctic environments (e.g. Pokharel et al. 2019; Weldenegodguad 2021). In parallel, fieldwork in Siberia has shown that husbanders value the same physical traits of their animals across species, and they partially apply the same folk selection techniques for strengthening these traits.

Materials and methods

Materials consist of anthropological field data in the form of notes, audio recordings, photos, and video recordings, using mostly participant observation and interviews, between 2016 and 2018, with follow-up visits up to 2022.[1] Biological sampling took place at the same time, with materials consisting of blood, hair, and adipose (fat) tissue samples from the animals. In this chapter we shall specifically rely on joint fieldwork data from the East Siberian Republic of Sakha (Yakutia) for showing the potential of a holistic approach to adaptation studies in human–animal livelihoods, even though data was also gathered in other locations specified below.

Joint naturecultural field work data collection

Fieldwork for such studies is particularly challenging, as timing, locations, people, and animals need to be agreed among all participating actors, each with their own agendas, including anthropologists and geneticists. Not always, but in the best cases, fieldwork was possible as a joint effort of the geneticist and anthropologist together with people and animals in one location; however, disciplinary research design required some deviation from that ideal scenario. Most of the joint fieldwork was done in the Evenyo-Bytantay district, Sakha (Yakutia, Russian Federation). Separately, fieldwork also took place in Finnish Lapland and the Arkhangelsk region in northwestern Russia. The study focused on domestic native cattle, horse, and reindeer breeds and the livelihoods connected to them. Genetic samples of Northern Finncattle, Finnhorse, and Finnish reindeer were collected in Finland. In Arkhangelsk, biological materials were sampled from Nenets reindeer and Mezen horse breeds, while in Yakutia, samples of Yakutian cattle, Yakutian horse, and Eveny reindeer were collected. We conducted anthropological fieldwork during three years with the owners of these animals in all seasons.

Such fieldwork would not have been possible without previous cooperation and good networking with local actors such as animal breeders, but also local researchers and agricultural and reindeer husbandry officials. For the studies, blood, tissue, and hair were sampled for the extraction of DNA and RNA, and to examine genetic diversity and function of genomes in various environments. Tissue samples were collected at slaughter. Particularly, adipose tissues were collected from different anatomical depots, as adipose tissues are vital for northern animals to adapt to extreme conditions (Soppela et al.

2008). In addition, adipose tissues are important organs for several functions in energy metabolism that are crucial for survival and successful reproduction. Muscle and liver tissues were also collected. In the Russian Arctic, most slaughter takes place outdoors. Biological samples were collected in Finland and Yakutia during the early winter and early spring, while we also conducted anthropological fieldwork in summer and winter. The idea for the biological sampling was to investigate the function of genes when the animals were in the best physical condition after the summer and autumn. These samples contrasted with those collected when the animals had consumed their energy stores after a long winter and were in a worse condition than during the autumn. Cattle samples were collected from both male and female animals. Furthermore, autumn samples of the Yakutian Eveny reindeer were collected from both males and females.

The anthropological fieldwork focused on the seasonal differences in human–animal relations for all three animal species and in three different locations, where the genetic sampling was also performed. The second aim was to document practices of folk selection (Rus: *narodnaia selektsiya*) and compare how herders perform them similarly or differently across the three species. For Yakutia, such herding practices have been excellently described in the literature for specific animal herding settings, for example for cows by Crate (2006), and Granberg et al. (2009), for horses by Takakura (2002) and Maj (2006), for both by Takakura (2015), and for reindeer by Vitebsky (2005). However, there is hardly any literature that considers the fact that many families in Yakutia herd these three pastoral animals simultaneously, and employ herding and selection practices across all three animal species. In this setting, each animal species has their own niche of social significance (Stammler 2010).

DNA and RNA extractions and next-generation sequencing

Genetics has made rapid advances due to the increased availability of sequencing technology, which enables much further reaching studies, including both DNA and RNA analysis. In our study, DNA was extracted from blood and hair samples (samples of hair only from Nenets reindeer and Mezen horse from Arkhangelsk), using standard laboratory protocols for analysis of cattle, horse, and reindeer genomes. RNA was extracted using blood samples from all three pastoral animal species.

Cattle

DNA extracted from blood samples was available for the two Finnish cattle breeds (Eastern Finncattle and Western Finncattle) and one Siberian breed (Yakutian cattle) from a previous study (Li et al. 2007). Five unrelated individuals from each breed (composed of 14 females and one Yakutian bull) were examined. One type of library was constructed for each sample (500

bp insert size); 15 paired-end DNA libraries were constructed for the 15 samples. The DNA sequencing libraries were subjected to Illumina HiSeq 2,000 sequencing at Beijing Genomics Institute (BGI, Shenzhen, China). The sequencing protocol is described in Weldenegodguad et al. (2019).

As far as cattle RNA is concerned, we extracted and analyzed blood samples of three Yakutian cattle, three Northern Finncattle, and three Holstein cattle cows (Pokharel et al. 2019). The aim was to characterize the genetic differences among the breeds based on gene expression differences. In this study, nine samples (three in each breed) from the northern Eurasian cattle farming region were sequenced (see Pokharel et al. 2019). This allowed us to compare gene expressions between the cattle breeds and their functional genomic responses to various environments.

Reindeer

We built a reference genome for reindeer genomic studies from 1-year-old male reindeer form Sodankylä, Finland (Weldenegodguad et al. 2020; Pokharel et al. 2023), owned by a private reindeer herder, from whom we also have ample social background information about the management and environment of that particular animal. A reference genome is an assembly (like a 'base map') of all genes of a species and their functions. Such templates of genomes are used in genomic analyses to compare DNA- and RNA-sequence data sets of various individuals. In the building of the Fennoscandian reindeer reference genome, we first constructed seven paired-end DNA libraries with various insert sizes, which were sequenced at high coverage on the Illumina HiSeq 2,500 and 4,000 platforms using a shotgun-sequencing approach (Weldenegodguad et al. 2020). The Fennoscandian reindeer reference genome was improved in terms of completeness displaying fewer sequence gaps by using a more advanced sequencing technology (Pokharel et al. 2023).

In addition, 58 samples of domestic and wild reindeer were sequenced using the so-called resequencing approach, where only one type of sequencing library was produced. Here samples of domestic reindeer from Finland, domestic Nenets reindeer from the Arkhangelsk region, domestic Eveny reindeer from Yakutia, and wild forest reindeer from Finland were sequenced. Moreover, for the resequencing project, we obtained DNA samples from a previous study (Røed et al. 2008) of domestic forest reindeer from Russia (n = 2), domestic tundra reindeer from Norway (n = 4), wild island tundra mountain reindeer from Russia (n = 2), wild tundra reindeer from Russia (n = 4), wild tundra reindeer from Norway (n = 5), wild Arctic reindeer from Svalbard [Norway] (n = 3), domestic reindeer from Alaska [USA] (n = 2), and Alaskan wild caribou (n = 1) (more information in Weldenegodguad et al. 2020). From these DNA samples, sequence libraries with an average fragment size of 500 bp were constructed for each individual (the resequencing approach). The raw sequences for the 58 reindeer samples were generated

using the Illumina HiSeq 4,000 platform. The raw reads were preprocessed; adapters[2] and low-quality data were removed.

RNA-sequences of 47 adipose tissue samples from 16 reindeer males were generated for the functional genomic study (Weldenegodguad et al. 2021). Perirenal samples were taken from the adipose tissue around the kidneys, prescapular samples from beneath the cervical muscles in front of the scapula, and metacarpal samples from the bone marrow in the diaphysis of the metacarpal bone (left front leg). RNA sequencing data allows us to investigate which genes were expressed in the samples and compare the level of expressions of genes (highly expressed vs lowly expressed vs not expressed at all) e.g. between Eveny and Fennoscandian reindeer in the three adipose tissues.

Horse

DNA samples of the Yakutian horse were included in the horse-breed study, alongside ancient DNA samples of wild horse from Yakutia. Radiocarbon dating indicated that the wild horses lived ~5,200 years ago. Ancient bone and tooth samples were excavated in archeological sites in northern Yakutia (see Librado et al. 2015). Extraction of ancient DNA from the archeological samples and sequencing protocols for modern and ancient horse samples are described in Librado et al. (2015).

We also extracted RNA from the same Yakutian horses from one particular private horse herding family in central Yakutia in four different months throughout the year. This RNA data allows us to investigate the seasonality of gene expressions, as well as compare gene expression among horses with the other animal species. First results of this research show high differences in gene expression between summer and winter, with less between spring and autumn. This matches well with the different management regimes of the horses by the herders, as well as the most extreme temperature and feeding differences between winter and summer.

Statistical and bioinformatic analyses

The genome data sets are analyzed using bioinformatic methods. Bioinformatics can be defined as the computational branch of molecular biology or computational biology (Weldenegodguad 2021). In bioinformatic analyses, tools of computation are applied to analyze DNA-, RNA-, or protein-sequence data sets.

For our studies, we have used bioinformatic tools to investigate genetic diversity within the animal populations, genetic relationships between the animal populations within species, structure of genomes, selection signatures, differentially expressed genes in various tissues, and many other parameters describing genomic diversity and demographic events. Detailed

information on applied bioinformatic analyses and tools are described in Weldenegodguad 2021.

Of particular interest for our approach was to devise methods that would allow us to detect effects of selection resulting from environmental effects or purposeful human agency on genomic diversity. These methods provide critical information on adaptation of native breeds and reindeer populations to their environments and climatic factors. They also show us that the role of people as part of an environment is not limited to factors that are usually called natural. This is the focus in the results and discussion section.

Human–animal relations analyses

The analysis of the field observations started in a process of co-creation of knowledge jointly with the herders, the partners in the field. This would take place in the evenings after participant observation, when the anthropologist would write up the field notes of the day and double-check interpretations of observations and actions with the partners. Photographic and video material underwent the same analysis and was immediately shared with the field partners on site. This immediate data analysis, while everyone's memories were fresh, contributed significantly to the quality of the recorded observations.

In light of our common agenda during the joint naturecultural field work, a particular interest in our discussions with the field partners was on animal grazing and feeding, animal shelter and cold resistance, immune system and disease vulnerability, calf/foal survival, extreme weather events, and selection practices of animals geared toward enhancing the resilience of the animals related to these factors. In the following discussion, we describe for all three animal species the seasonal activities of herders in which the anthropologist participated and observed. Some of these activities are rather specific for the conditions of our particular field sites in Sakha (Yakutia), in which most of the anthropological fieldwork was carried out. In other regions these animals are kept very differently. Therefore, comparative reference to regions outside of Yakutia in this chapter stem mostly from genetic fieldwork.

Cattle

We conducted fieldwork in all seasons in private cattle farms in the Evenyo-Bytantay district of Sakha (Yakutia). Moreover, shorter visits to three branches of the state-owned genetic preservation farm (see Ivanova & Stammler, this volume) helped contextualize the human–animal practices among the private farmers.

In winter and spring, the principal interaction with the animals was through tidying up the cow sheds (*khoton*); manure waste treatment; feeding the animals; hay selection, storage, and preservation; and supplying water for

the cattle. Practices among the farmers differed between villages (see below results).

In summer, the fieldwork focused on hay-making, guiding animals to the grazing areas and back to the cow shed, milking, and preparing the milk for sale, including processing it for butter, cream, and sour cream. Moreover, summer is the time for making repairs and improvements to the houses of people and those of animals (cow sheds). The latter have to be regularly coated with new layers of manure for natural heat insulation that breathes.

In autumn, the slaughter is an important focus, as meat is, besides milk, the principal source of income from cattle. Slaughter is, at the same time, the prime occasion to study selection practices, as through slaughter or castration, animals with less desired properties can be prevented from reproducing (see below section results).

Reindeer

Reindeer herding, as a practice of humans relating to their pastoral animals, is different from the relationships to cattle and horses in so far as reindeer are the most autonomous of our three pastoral animals in the Arctic. Reindeer are well-adapted to the Arctic surroundings and thus have less need for human protection and shelter than cattle or horses. In Russia, usually reindeer are classified to four different sub-types named after their herding peoples, namely the Nenets, Eveny, Evenki, and Chukchi breeds (details on reindeer breeds in Stammler 2005, 56–60). The animals in the herding teams in this region that we worked with were all from the Eveny sub-type of reindeer (*evenskaya poroda*); these were the animals from which we also took blood samples. In Yakutia, the practice of reindeer herding does not include feeding of the animals, nor hay-making for reindeer, but—very unusual these days—some of the herders we worked with milk some females in the summer. There is a large abundance of natural pastures on which reindeer can graze, and the total reindeer numbers do not reach the carrying capacity of pastures by a wide margin. Nonetheless, herding activity strongly differs between the seasons and is determined by both the needs of the animals and their herders (see results below).

Recently, a less predictable climate has let reindeer pastures freeze over, preventing the reindeer from digging through the snow all the way down to the lichen. While such icing-over events have received much attention in other regions (Bartsch et al. 2010; Forbes et al. 2016; Stammler et al. 2020), in our case region of Sakha (Yakutia), this kind of extreme weather event did not have the same disastrous extent and consequences.

Horse

The horse fieldwork for this chapter concentrated on two specific herding operations, one in the central Yakutia Namski district with our research

partners Vladislav and Lyudmila Konstantinovy, from which we also took blood samples in all four seasons. Another field site was in the 'Primorski' enterprise in Arctic Yakutia in Nayba (see Ivanova & Stammler, this volume), with additional evidence from horse herders in the Evenyo-Bytantay area where we also did fieldwork with cattle and reindeer herders. There were some significant differences between these three sites, as in the northernmost regions of Yakutia, horse herding is rather recent and only a very small supplement to reindeer herding, which is the dominant livelihood. Whereas in the Namski family, horse herding was the principal source of income for the family with more than 100 horses in their herd. In Evenyo-Bytantay, there are some herders whose principal income is from horses, but the ones with whom we worked had horses mostly as working animals in their reindeer herding livelihood (Stammler 2010, 226–235). We accompanied horse herders in all seasons in the Namski site, while in Evenyo-Bytantay, the horse fieldwork was mostly in summer together with the reindeer herders, while we joined herders in Nayba in autumn. Crucial points in the seasonal cycle for the horse herders are the mating, foaling, and slaughtering times, which occur in spring (April–June), early summer, and late autumn, respectively. The most esteemed meat is that of foals that have not yet grazed on pastures and have been mainly fed on mare's milk.

Results and discussion

The results of this fieldwork give us an indication on the usefulness of co-designing research questions jointly with animal practitioners between geneticists and anthropologists. Both disciplines can inform their own research agendas with insights from the respective other side. In this process, we reach a certain integration between the natural and social science research, which is far from the goal of completely eliminating boundaries between natural and social sciences in a way that Ingold (2004) has promoted. Rather, we regard this as a step in a beneficial direction. At the end of this section, we shall demonstrate how synthesizing results can enrich general debates about the origins of animals and their respective husbandry cultures, using the example of the three pastoral animal breeds of the Sakha herders.

Sakha (Yakutia) is the coldest inhabited area on earth, with the most extreme climate: the annual variation in temperatures can exceed a range of 100°C and permafrost covers most of the Sakha Republic (Kopoteva and Partanen 2009; Crate 2008, 570; Stammler and Ivanova 2017). Winters are long, but due to the low levels of precipitation in winter, the snow cover is not deep. However, as our field partners confirm, this has changed and some have suffered losses of horses and reindeer due to extremely deep snow in some of the recent winters. These conditions make the area especially interesting for the study of the adaptation of organisms to a particular environment, including animals as well as humans.

Adaptation of cattle

Genomic adaptation of northern cattle breeds

For the first time, we genetically characterized three native northern Eurasian cattle breeds adapted to the northern regions—Eastern Finncattle, Western Finncattle, and Yakutian cattle—using the whole-genome sequencing approach (Weldenegodguad et al. 2019). The results provide insights into the genetic diversity, demographic history, and selection signatures of these cattle breeds.

We estimated the population-level genetic diversity measures (number of genomic variants, nucleotide diversity) for the three northern Eurasian breeds and found that Eastern Finncattle, Western Finncattle, and Yakutian cattle display greater within-breed genetic diversity than several other European taurine cattle breeds that have been analyzed (Kim et al. 2017; Chen et al. 2018; Mei et al. 2018). We observed that Yakutian cattle, like several other Asiatic taurine cattle breeds, exhibit high levels of genomic diversity. These observations may reflect differences in the effective population sizes[3] of the European and Asiatic humpless taurine cattle in the past; the present elevated genomic diversity of the Asiatic taurine cattle breeds may reflect the higher 'ancient' effective sizes of the ancestral populations of the Asiatic taurine breeds (Chen et al. 2018).

We identified a number of genomic regions displaying selection signals that harbor genes associated with disease resistance, sensory perception, cold adaptation, and growth in the three native northern Eurasian cattle breeds. The identified regions may have been subject to selection that played a key role in the breeds' adaption to northern and subarctic environments. Weldenegodguad et al. (2019) and Buggiotti et al. (2021) identified, for example the NRAP gene (the nebulin-related-anchoring protein gene) as the target of the selection signatures. The NRAP gene may have played an important role in the adaptation of the northern native cattle breeds to cold climate, possibly by enhancing the blood circulation (Buggiotti et al. 2021). Moreover, Yurchenko et al. (2018) identified several candidate genes in Russian cattle breeds, such as RETREG1 and RPL7, for adaptation to harsh environments, e.g. to cold.

Gene expression profiles in three cattle breeds

Gene expression profiling of two native cattle breeds (Northern Finncattle and Yakutian cattle) and one commercial breed (Holstein cattle) was performed using RNA-sequencing technology. RNA was extracted from blood samples.

All the three of the examined breeds share similar northern Eurasian living conditions (Holstein samples were collected from the Finnish Holstein

population). In general, the breeds exhibited different transcriptional response to the northern Eurasian living conditions, but we found that Northern Finncattle displayed more similar gene expression pattern to the Yakutian cattle than to the Holstein cattle. Genes involved in maintaining immunity and in certain disease resistance mechanisms were identified among the breeds.

In general, genes associated with immunity and disease resistance mechanisms were among the significantly differentially expressed genes. The identified differentially expressed genes associated with immunity and disease resistance mechanisms may provide unique biological characteristics for the native breeds to adapt to the harsh northern Eurasian environment. Previous studies have suggested that biological processes associated with diseases, immunity, and viral processes may be related to environmental adaptation (Librado et al. 2015; Iso-Touru et al. 2016).

Seasonal adaptation in Yakutian cattle herding

Practices among the herders differed between villages and families, but below we describe some specifics as well as commonalities: most striking was the winter keeping of the cattle in unheated sheds (Sakha: *khoton*) at temperatures below –50°C, and cows going out for drinking water even then. When it was extremely cold, herders would let the cows drink only every other day. While in the village of Kustur, the cattle were brought to an ice-hole in the lake neighboring the village for drinking. In the bigger settlement of Sakkyryr, the water supply for the cows came from the municipal heating pipes, where water was released to metal trenches (pipes half-cut open) from which the cattle would drink, which required much less work and exposure to the cold for both humans and animals at temperatures partially below –50°C. However, everyone was aware that the quality of the water from the municipal pipes was far from clean, while the water from the lake was considered fresh.

For both private herding families applying this practice, drinking dirty water was another proof of the resilience of the Yakutian cattle breed—that they are able to survive with very little effort—different from imported high-production cattle breeds. The same applied to the selection and quality of hay for feeding the animals through winter. During the second winter of the fieldwork, the hay-making campaign brought poor-quality and quantity, which meant that hay was rationed and selected for quality. Again, the herders were proud that their Yakutian cattle would be able to survive on bad quality, half-brown, and partially moldy hay, and would need little to sustain their principal bodily functions through the 'bottleneck' season of late winter–early spring.

In summer, our field partners' cattle graze on fresh grass pastures near the villages. In other areas of Yakutia, herders traditionally move their cattle to summer places called *Sayylyk* (see Ivanova and Stammler, this volume),

where pastures are most lush, such as in specific thermokarst lake areas called *alaas* (Takakura 2016). People make sure that these are not the same grazing areas from which hay is harvested for the winter, because the summer hay is best when moist and fresh, while the winter hay will be dried. After the short summer, when the pasture grasses fade, turn brown, and get covered by snow, cattle continue to graze outside, roaming in nearby forest areas where they eat shrubs that stick out further from the snow. Elders have reported that there used to be specific camps where the herders would bring the cattle in autumn, which were located in areas with specific shrubs that the cattle would feed on. This kind of diet would be suitable for the cows to accumulate fat layers inside of the meat. Such marbled meat carries a high prestige, similar to the famous Kobe beef. However, at the time of fieldwork, no one in the Evenyo-Bytantay area was willing to take on the additional work any longer to drive the cattle to such places, build camps for the people, and live in uncomfortable conditions as the temperatures get colder. Hence, the knowledge of this pasture rotation with the cattle for producing marbled meat will likely die out with the current generation of elders.

During the autumn grazing period, the cattle mate naturally, with herders controlling the number of bulls per herd, and the cows that are covered by them controlled by negative selection only: similar to horses and reindeer, animals with undesired characteristics are slaughtered or castrated. It was worth noting that besides 'natural' characteristics such as disease and cold resistance, 'social' characteristics of the animals also played a role in the selection: animals with too 'wild' temperament would be slaughtered because they disturb the social cohesion in the herd and are more work for herders. During our fieldwork, the characteristic most valued for cows was the cold resistance of the udder in winter—that the cow would not start suffering from mastitis even when they go out to drink water from an ice-hole in a natural water body at −50°C. Moreover, in general what the herders valued most was low need for care and maintenance of the cattle in comparison to other breeds, especially that they consume much less hay in winter, require hardly any other feed except hay, and need practically no veterinary care at all.

Adaptation of reindeer

Genomic adaptation of domestic reindeer

We investigated the genetic variation underlying the unique characteristics of reindeer through building the reference genome (Weldenegodguad et al. 2020; Pokharel et al. 2023) of the Fennoscandian reindeer and conducting a comparative genome analysis with nine other mammalian species (human, polar bear, dog, horse, dromedary camel, domestic taurine cattle, yak, goat, and sheep). In addition, whole-genome sequence data analysis of 58 domestic and wild reindeer samples from various bio-geographic locations

(Finland, Norway, Svalbard, Russia, and Alaska) was conducted to examine genetic diversity, domestication, demographic history, and adaptation (Weldenegodguad et al. 2020; Pokharel et al. 2023).

We identified 32,721 protein-coding genes in the reference genome assembly of the Fennoscandian reindeer (Pokharel et al. 2023). We used the assembled draft genome to investigate changes in the effective population size of the ancestral population of reindeer during 1 million years of the Pleistocene period (see Weldenegodguad et al. 2020). This analysis revealed remarkable fluctuations in the effective population size of the ancestral population: two population expansions at 150,000 and 20,000 years ago and three bottlenecks at 600,000, 40,000, and 11,000 years ago. These fluctuations in effective population size may be associated to radical climate change in the past; the effective population size decreased dramatically during the glacial periods and increased when climate warmed (deglaciation).

We compared the reindeer reference genome with nine other mammalian species (listed above) to examine the genetic variation responsible for unique characteristics in reindeer. The gene family analysis demonstrated that numerous genes (e.g. *PRDM9*, *TRPV5*, *TRPV6*, *PRDM1, SCN11A*, and several others) may play an important role in the adaptation of reindeer to the challenging Arctic and subarctic conditions. These genes are associated to unique characteristics of reindeer, such as vitamin D metabolism, retinal development, circadian rhythm, immunity, tolerance to cold-induced pain, and antler development (Weldenegodguad et al. 2020).

Furthermore, we investigated genetic relationships between the reference genome reindeer from Sodankylä, Finland, and the additional 58 sequenced reindeer animals from Finland, Norway, Russia, and the USA, including both wild and domestic reindeer (Pokharel et al. 2023). For the first, genomes of wild forest reindeer were sequenced. Population genomics analysis (principal components analysis and phylogenetic analysis) revealed existence of four main genetic clusters in our data: Fennoscandia, Russia-Alaska, Finnish forest, and Svalbard reindeer. In the Fennoscandian and Russian-Alaskan clusters, there were wild and domestic reindeer.

Gene expression profiles in Finnish and Eveny reindeer

Functional genomic variations were investigated in Finnish and Eveny reindeer. We extracted RNA samples from three adipose tissues from different anatomical depots (metacarpal, perirenal, and prescapular). The sampling occurred in tandem with anthropological fieldwork at two different seasons (spring and winter). The resulting study (Weldenegodguad et al. 2021) investigated the changes in gene expression in adipose tissue due to seasonal differences in Finnish and Eveny reindeer and identified genes that responded differently to seasonal changes.

In total, 14,103 genes were expressed in each tissue. This is approximately 52% of the list of genes available in the reindeer reference genome

(Weldenegodguad et al. 2020). Metacarpal adipose tissue revealed a higher number of expressed genes compared to perirenal and prescapular adipose tissues in each season in both Finnish and Eveny reindeer. Moreover, metacarpal adipose tissue revealed a higher number of tissue-specific expressed genes, indicating the distinctiveness of metacarpal tissue in terms of gene expression profiles (Weldenegodguad et al. 2021).

The number of significantly differently expressed genes identified between spring and winter samples in Finnish reindeer (346 metacarpal, 583 perirenal, and 611 prescapular) was higher than in Eveny reindeer (156 metacarpal, 103 perirenal, and 176 prescapular). Particularly adenosine triphosphate (ATP)—related genes were highly expressed in the spring samples of the Finnish reindeer. ATP is a molecule that provides energy to drive many processes in cells. These observations may indicate that seasonal differences and feeding practices have a more notable impact on Finnish reindeer than Eveny reindeer. This might be due to the influence of management (extra feeding in Finland, not in Yakutia) and temperature (relatively warmer in Finland).

Moreover, this study suggested that during less optimal circumstances, mainly characterized by starvation, the genes associated with the immune system, such as cytokines, chemokines, interferons, and interleukin receptors, are expressed in perirenal and prescapular adipose tissues, while genes involved in energy metabolism are upregulated in metacarpal tissue. So there seems to be physiological 'share of tasks' between the adipose tissues in different anatomical depots. Furthermore, the study reported several genes (e.g. *ACOT2*, *ELOVL7*, *APOA1*, *PHYH*, *ANGPTL1, ST3GAL6*, and several others) and biological processes (fatty acid metabolism, lipid metabolism, and fatty acid elongation) that are generally associated with energy metabolism and cold adaptation (Weldenegodguad et al. 2021).

Seasonally specific reindeer herding practices in North Yakutia

In winter, reindeer in Yakutia graze rather freely and herders do not drive the herd to the human camp every day. The main work consists of checking the herd's location and making sure that snow and ice conditions are of a kind where the animals can reach the pasture under the snow. This involves intimate knowing of the land by the herders, as they need to know if the vegetation under the snow is good for reindeer grazing. In winter, the availability of lichen is crucial, as it sustains the principal functions of the reindeer body throughout the coldest season. In some cases, herders would feed some additional salt to their reindeer, in places far away from the coast of the Arctic Ocean.

In summer, the principal goal of reindeer herding is ensuring calm grazing conditions for the reindeer, who feed on green plants (different grasses and leaves of shrubs). Herders confirm that summer grazing is crucial for the reindeer's weight gain for the entire year and largely determines the fitness of the animals throughout the year. The main stressor that disrupts the calm

grazing condition in summer is mosquito harassment. Therefore, herders guide the herd to places with maximum wind exposure during peak mosquito harassment time. This means that elevated places, or windy coastal areas are the first choice for grazing. Moreover, the herders carefully design the daily grazing rhythm for the herd between the three components of grazing, drinking, and resting throughout the 24 hours of the day. In order to do so, herders guide the herd during that peak mosquito season on a 24/7 basis, which requires a large labor force to organize work shifts.

In early spring, the herders usually move with the herd from the winter pastures toward the calving grounds, which may be tens or hundreds of kilometers away. The female animals in the herd mostly remember the calving grounds. Herders accompany the animals in their migration. During the calving, the herders try to provide the best conditions, include minimizing outside disturbance for the calving females, as well as providing snow-free spots where the calf would lie on the ground for the first few hours of its life. If there is still abundant snow cover during calving season in May, the calves may become more vulnerable to pneumonia or other diseases from lying on the cold snow immediately after birth before they first stand up.

During autumn, gradually the share of lichen in the reindeer diet increases. Autumn and early winter marks the mushroom season, reindeer rut, and slaughter. Herders report that mushrooms are a delicacy for reindeer, making reindeer move a lot in search of them. This again requires close herd monitoring, for keeping the herd together and preventing it from running away too far. As the hours of daylight per day rapidly diminish, herd monitoring against predators such as wolves becomes ever more important. Recently herders reported an increase of wolves even in the northern areas of Yakutia where they were previously less numerous, while in the forest reindeer herding area, wolves have already heavily diminished herds of domestic reindeer to the extent that reindeer herding as a livelihood is under threat of extinction (Lavrillier and Gabyshev 2018; Brandisauskas, this volume).

During the rut, herders do not usually interfere. They believe that the fittest animals will reproduce. Weak animals or those with undesired qualities are usually caught before the rut and prevented from reproducing through negative selection either by slaughter (females) or castration (males). Anderson, Kvie, et al. (2017, 6791) also emphasize in their pioneering anthropogenetic study how efficient that selection technique is for maintaining desired genetic traits and diversity in reindeer. Among these undesired qualities are also social ones, as among cattle, where animals that disturb herd cohesion too regularly are slaughtered. Moreover, females that give birth to weak calves, or that give birth too early or too late may also be slaughtered. Early births may lead to calf deaths because there are not enough snow-free patches for the calves to spend their first hours of life before they stand up. Late births mean that the calves will be still too small when mosquito harassment starts and thus may not survive the summer. We have witnessed and participated during fieldwork in assisting such late-born calves to survive, by feeding them

with milk from a bottle and building a tent for them against mosquitoes. It was heartbreaking, especially for the herders' children, when these attempts proved unsuccessful.

Adaptation of horses

Genomic adaptation of the Yakutian horse breed

Yakutian horses display several physiological and morphological characteristics that are important for adaptation and survival in the harsh environment. The effects of natural selection on genes and gene regulation were studied by Librado et al. (2015), and a detailed list of genes that have promoted adaptation can be found in their original publication. For example, genes involved in sensory perceptions of smell, thermoregulation, hair density, hormonal regulations, blood coagulation, and circadian clock have been under natural selection. Moreover, these authors have found that regulation of gene expression plays a vital role in animals' adaptation to extreme subarctic environments.

Seasonally specific horse herding practices in Yakutia

In terms of the extent of human care and interaction with the animals, horse herding as a livelihood in Sakha (Yakutia) is positioned between cattle and reindeer: horses are less work-intensive to care for than cattle, but still require more human attention than reindeer. While the Yakutian horse can survive the world's coldest winter without shelter (shed) nor feeding in principle, most herders nonetheless feed their horses with hay and a small amount of oat in late winter/early spring, in order to ensure the animals to stay fit and healthy.

The grazing method employed in Yakutian horse herding is called *tebenevka* (Russian), where the horses access pasture vegetation under the snow like reindeer do. In winter, herds loosely graze together, while toward the mating season, one stallion gathers 'his' approximately 10 mares in a certain territory. The stallion basically 'herds' his own mares and keeps them close in this area. Different from reindeer, the herd (Rus: *tabun*) will not move far away from their accustomed grazing areas by themselves, which means that the herder can leave the herd alone for some time and will be able to find them again. However, each stallion and his herd have their own territory and seasonal migration, and the herder undertakes regular trips to check up on the herd. Jointly with the stallions of his herd, the herder negotiates the different grazing territories throughout the seasons. These can vary a lot between different herds and places, so it is difficult to illustrate a general pattern.

In our Namski case, we observed how the seasonal feeding patterns and challenges of the Konstantinovy family's herd are connected to the microclimate and geography of the area: some of the stallions would go with

their migration instinct to islands in the Lena River, where they graze on a grass called *Baru* (Sakha, lat, *Equisétum*) under the snow. However, the problem is that this does not give them enough vitamin intake during the winter. Therefore, Vladislav tops up their diet with hay from the surrounding hills, as he considers the carotene content of the hay there important for the horses' diet. Other herds graze close to the shore of lakes in early winter. In the summer those who graze on mountain pastures do not need to get any additional vitamins.

During the coldest period, the herds graze on *alaas* pastures,[4] where Vladislav considers their consumption of *Ivan-Chai* (Rus for *Epilóbium angustifolium*) most important. This is interesting in terms of rotation with cattle, which use the same pastures in summer.

Similar to reindeer and cattle, a crucial bottleneck for horses is in spring, when temperature changes are sudden and some horses have a weak instinct to self-clean the snow off their fur. As a result, the snow may melt on the fur, re-freeze, and then lead to the horse catching a flu or pneumonia in the worst-case scenario. That can be prevented through assisting the horses with the cleaning. However, Vladislav does not consider this a viable strategy: rather his herds should consist of horses that are independent enough to sustain themselves. Therefore, he would rather slaughter such weaker horses and thus prevent them from passing on this need for human assistance to the next generation. This is the same negative selection practice as for reindeer (Anderson, Kvie, et al. 2017) and cattle, where animals with undesired qualities are prevented from reproducing. Takakura (2002) shows how this selection practice was broadly applied in the Soviet practice of horse herding in state enterprises in Evenyo-Bytantay, in an institutionalized setting.

Synthesized insights on the origin of the three pastoral animal breeds in Sakha (Yakutia)

The spread of domestic animals to Yakutia has been closely linked to theories of ethnogenesis of the Sakha people, who have linked their identity closely to their domestic animals, specifically horses and cattle. Hence, the topic of origin of the Yakutian breeds of cattle and horses also implies statements about the possible geographic origin of the Sakha people as an ethnic group. The most accepted theory in the social sciences is that both these domestic animals as well as the Sakha people came to what is present-day Yakutia in the Middle Ages sometime between the 9th and the 15th centuries (Gogolev 1999). At this time reindeer were already domesticated by people, but large-scale reindeer pastoralism had not yet been invented (Krupnik 1993, 160–170; Vitebsky 2005, 33–34). However, debates continue as to whether the Sakha people could also be autochtonous, i.e. indigenous to their Arctic homeland, and would have developed their unique pastoralist Arctic livelihood there. One of the components used to prove an Arctic origin is the

uniqueness of using the *alaas* thermokarst formations for animal husbandry, and the specific fishing culture along the rivers (Likhanov 2015). Another one is the Sakha myth of *Jyl Oghuha* (bull of winter), who comes from the North to Yakutia in early winter and retreats back there in spring (Crate 2008). Nonetheless, even the proponents of a more indigenous origin do not deny roots of the Sakha from Mongolian and Turkic origins (Alekseyev 1996; summary of theories in Ushnitskii 2011).

Similarly complex is the prehistory of their domestic animals: cattle domestication in East Asia appears to be more complex than previously understood (Gao et al. 2017; Chen et al. 2018). An additional speculative explanation for the elevated genomic diversity in the Yakutian cattle and several other Asiatic taurine cattle breeds (or their ancestral populations) could be ancient admixture with the East Asian aurochs (*Bos primigenius*) that existed in the East Asian region during the arrival of near-eastern taurine cattle (Chen et al. 2018; Buggiotti et al. 2021). Our previous mitochondrial DNA and Y-chromosomal diversity study indicated the near-eastern origins of the ancestral population of the Yakutian cattle (Kantanen et al. 2009). However, the possible introgression with the East Asian aurochs may have increased the genetic variation in the ancestral population of Yakutian cattle, as seen even in the current population. This may have played a pivotal role in the process of adaptation of the Yakutian cattle to the subarctic environment in the Sakha Republic in eastern Siberia (Buggiotti et al. 2021). However, the high genomic diversity detected in the Yakutian cattle may be due partly to the breed's selection history: the artificial selection by humans has not been intensive (Kantanen et al., 2009). The Yakutian cattle breed is an aboriginal taurine population, the gene pool of which has been shaped by natural and artificial selection. However, the centuries-old 'folk selection' methods and traditional knowledge for the selection of the most suitable animals for the challenging subarctic environment followed the methods used by local people rather than the breeding implemented by organizations or institutions (Kantanen et al., 2009). Moreover, the observation of the elevated genomic diversity in Yakutian cattle may partly be due to the reference genome assembly used in the study causing some ascertainment bias (more detailed explanation in Weldenegodguad 2021).

As for the Yakutian horse, there have been speculations that wild horse populations, which still existed in Sakha during the arrival of horses with the Yakut people, may have contributed to the gene pool of the Yakutian horse breed (Librado et al. 2015 and references therein). This admixture could have promoted the adaptation to the subarctic circumstances. Librado and colleagues' study was based on sequenced genomes of modern Yakutian horses (9 horses), and 27 present-day horses of nine different European and Asian breeds, as well as Przewalski horses. In addition, DNA was successfully extracted from two ancient specimens (bone, tooth) of wild horses in northern Yakutia around 5,200 years ago as determined by radiocarbon dating.

There are several challenges specific to studies of ancient DNA. Often archeological bones or teeth do not contain DNA at all (not preserved in archeological specimens) or the ancient DNA concentration obtained from DNA extraction can be very low. In addition, ancient DNA is typically fragmented, there can be chemical changes in ancient DNA, or ancient DNA can be contaminated with external DNA (Frantz et al. 2020). Previously, archeological genetic studies have been particularly based on analyses of maternally inherited mitochondrial DNA. However, current next-generation sequencing technology provides excellent possibilities to produce genomic data. In the Yakutian horse study (Librado et al. 2015), next-generation sequencing was applied to sequence genomes of two prehistoric wild horses originating from North Yakutia. When genomic diversity of these ancient wild horses was compared with genetic diversity of the modern Yakutian horses and their genetic relationships were calculated, it was found that the ancient wild horses and the modern Yakutian horse were not genetically related. This suggest that the modern Yakutian horses do not descend from the wild horse populations that once existed in Yakutia. Instead, the Yakutian horse seems to share genetic ancestries and domestication history with several other Asian and European horse breeds (Librado et al. 2015).

For reindeer, debates continue about three different questions of origin: (1) the origin of ancestral reindeer populations, (2) the origin of its domestication, and (3) the origin of large-scale reindeer pastoralism. It is important to note that all three of these are probably chronologically and geographically different. The development of large-scale reindeer pastoralism occurred rather recently, around 400 years ago in both Siberia (Krupnik 1993, 160, 170; Stammler 2005, 47–49; Vitebsky 2005, 33–34) and Fennoscandia (Bjørklund 2019, 94; Salmi et al. 2022).

The existence of two main genetic clusters in our reindeer data, namely Fennoscandia and Russia-Alaska, and the presence of both wild and domestic reindeer in these clusters may reflect differences in the colonization history of ancestral populations after the Last Glacial Maximum. The Russia-Alaska reindeer may have their origins in some refugia populations in the Beringian regions, while the Fennoscandian reindeer may have descended from Central European refugia populations (Weldenegodguad et al. 2020). Separate from that is the question of where reindeer were domesticated: the existence of domestic reindeer in both genetically distinct clusters suggests at least two independent reindeer domestication events from wild reindeer after the Last Glacial Maximum (Weldenegodguad et al. 2020). However, it remains unclear where exactly these two domestication events happened geographically. Most anthropological studies support a domestication hypothesis in South Siberia, close to Central Asia (Laufer 1917; Krupnik 1993, 161; Stammler 2005, 46; Vitebsky 2005, 28–31; Røed et al. 2020, 9070; Salmi et al. 2022, 227).

At first glance, this would point to a contradiction between the anthropological and the genomic research results. However, there is no evidence that

the original Beringian reindeer were actually domesticated in the Beringia region. It might be that they moved to South Siberia/Central Asia before they were first domesticated. In that case both the genetic and the anthropological studies would contribute to the explanation of the origin.

Combined for all species, we can thus state that according to the latest research evidence from all disciplines, all three pastoral animals, as well as the people herding them in what is today Yakutia, originated from outside the region. However, people's herding and selecting practices significantly contributed to both the animal adaptation to this extreme environment and to unique human livelihoods that are based on partnerships with these animals.

Conclusions

This chapter has combined approaches from genetics and social anthropology to achieve a more holistic understanding of the ways in which humans and animals jointly adapt to a specifically harsh environment in the Arctic. The idea of 'naturecultures' (Valkonen et al. 2022) was useful to guide us in the attempt to overcome disciplinary boundaries for working toward an integration of domestication and adaptation theories. In doing so, we have shown that such an approach allows us to better trace how human practices with animals in the environment contribute to 'co-creating' livelihoods to the extent that they may be traced even in the genome of domestic animal species. We thus expand Anderson, Kvie, and colleagues (2017) seminal anthropological-genetic study further by including horses and cattle in addition to reindeer. Our study shows parallels between the animal species and their associated management practices. Hence, this chapter shows how Ingold's theoretical suggestion of integrating biology and culture in a relational world (Ingold 2004) can be operationalized.

Genomic studies successfully identified several genes associated with immunity, tolerance to cold, disease resistance, circadian rhythm, and several physiological and morphological characteristics vital for adaptation to subarctic and Arctic environments. Through such studies, we obtained new information on structural and functional genomic variations of native cattle, horse, and reindeer breeds in northern Eurasia. This contributes to both our understanding of the domestication of these animals, as well as their adaptation to the environment. Additionally, such studies reveal how these native animals survive and thrive, reproduce, and produce meat, milk, hides, clothing, mobility, emotional, and spiritual fulfillment and identity for people in these northern circumstances.

Our anthropological analyses have not only accompanied the genetic studies; they have also informed the research agenda by highlighting specific priorities of the animal husbanders, which inform their care for the animals and their culturally specific selection practices. We have found that people consciously and carefully select animals, not only for providing milk,

meat, hides or transport, but they also strike a careful balance by supporting optimal autonomy of the animals, which means providing as little care as possible but as much as necessary for sustaining them as partners of people in a harsh environment. At the same time, they also consider social qualities of the animals vis-à-vis people and within their herds, which makes their management tasks easier and relies on the lead animals within the herds to ensure collective survival.

Taken together, this provides empirically grounded data for the ways in which adaptation of living organisms to an environment is determined by factors that, in a 'natureculture' approach, do not need to be boxed into natural and socio-cultural silos anymore. Instead, these factors can be analyzed together in their relational interplay, so that the analysis can mirror their interaction, which we observed in the empirical reality.

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Notes

1 In February 2022, the field in Siberia became inaccessible for Western researchers because of the Russian war in Ukraine.
2 The DNA sample is cut in smaller pieces for constructing sequencing libraries, and for constructing these libraries, adapters are needed. Such adapters were removed using a bioinformatic computer tool before the bioinformatic analyses are performed.
3 Effective population size (N_e) is an important parameter in population genetics and conservation biology. It translates census sizes of a real population into the size of an idealized population showing the same rate of loss of genetic diversity as the real population under study.
4 *Alaas* are specific thermocarst landscape formations in Yakutia that are valued as pastures for cattle and horses. See more detail in Crate et al. (2017).

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Section II

Domestication among Hunters

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4 Domus-Sharing in the Vicinity of Domestication

An Ethnography of Human–Wildlife–Land Interactions in Interior Alaska

Shiaki Kondo

Introduction

Inspired by recent discussions on domestication, this chapter describes tripartite relationships among people, wildlife, and the land in the Upper Kuskokiwm region of Interior Alaska as "domus-sharing." The aim of this chapter is to complicate the narrative of northern "domestication" through an ethnography of the Dichinanek' hwt'ana (Upper Kuskokwim) Athabascans, a northern hunter-fisher group, by revisiting the famous designation of trust and domination put forth by Ingold (2000, 61–76).

In order to understand Northern Athabacan societies, one cannot go without addressing the relationships with animals that have been culturally and historically constructed within the process of adapting to life in the boreal forest zone. Effective hunting and fishing techniques differ by the species upon which livelihood depends, and the effects of these differences on band size and patterns of movement have been discussed since the very earliest work on Northern Athabascan ethnography (Osgood 1936). Thus, it is no wonder that classic ethnographies of Northern Athabascan groups frequently report people's relationship with and attitude toward animals, especially in relation to subsistence activities (McKennan 1959, 31–36; Honigmann 1954, 31–46; McClellan 1975, 107–184; Hara 1980, 64–135). Among these early works, Nelson (1983) is one of the most comprehensive on Northern Athabascan ethnobiology to date.

In Northern Athabascan societies, animals share an "original oneness" (Irimoto 1996) with people; there exists an idea that humans, by observing taboos and rules regarding their livelihoods, can build good relationships with various species. In doing so, as means of expressing respect for animals, the Northern Athabascan make use of wildlife with as little waste as possible, while not allowing animals to suffer needlessly (Nelson 1983). For that reason, catch-and-release of fish to rivers or the sea, which is considered a conscientious act with respect to fish by non-indigenous people, is viewed by Northern Athabascans as an unethical act of toying with the fish (Cruikshank 1998).

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Dogs, the only domesticated animal known to be widely kept in Northern Athabascan societies, have been discussed in relation to the socialization of children (Hara 1980; Savishinsky 1994). In the same manner as Northern Athabascan children, puppies are spoiled when newborn, but are scolded and subjected to cursing from around the time that training for sled pulling begins.

A number of studies have also taken up social changes (or lack thereof) due to the impact of fur trading, including the introduction of dog sleds (Slobodin 1962; Vanstone 1965; Hosley 1966; Jarvenpa 1980; cf. Scheneider 2012). In discussions about animal helper spirits, there have been examinations of leadership within bands and settlements, based on cases in which those who lead bands on successful hunts with the aid of helper spirits are regarded as influential within the bands (Smith 1973; Ridington 1978). Generally speaking, Northern Athabascanists take the approach to understand human society by focusing on relationships with animals in subsistence activities.

In this chapter, I argue that we should not only discuss human–animal relations but also expand the framework to include the land as an important actor in the entanglement. Now, as global warming ushers in large-scale environmental changes, the land should not be regarded as an immutable background against which humans and animals act, but should itself be regarded as an actor that interacts with humans and animals and that dynamically brings about change (Cruikshank 2005; cf. de la Cadena 2015). This chapter aims to contribute to Northern Athabascan ethnobiology by establishing an approach that takes into account the land as a dynamic actor in determining the course of interactions between humans and wildlife. Prior studies on Northern Athabascan ethnobiology tended to frame the interactions consisting of the two parties (i.e. human–animal relations), but my approach shows that human–wildlife–land entanglements need to be analyzed to get a clearer picture of interspecies relationships in Interior Alaska.

My view is largely inspired by Anderson et al. (2017) as well as Stépanoff and Vigne (2019, 4–5), both of which proposed to take a close look at the *domus*, a Latin word for "home" and etymology of "domestication." While an approach that takes into account an animal's agency was born out of disagreement with a much older view of domestication as human mastery over animals, Anderson et al. (2017, 400) sees "a rather barren landscape where neither exceptional human interests, nor those of concerned animals (or things) break the entangled horizon." Instead, they call for an approach that allows "a more ecological engagement with the world—where the land, things, animals, and human persons together call attention to meaningful situations." In so doing, they focus on how tethers, enclosures, and traps as architectures of domestication make it possible for humans and animals to encounter and cultivate a co-specific *domus* in the north (Anderson et al. 2017).

Stépanoff and Vigne (2019) criticize the image of domestication as one-way relationship that is taken for granted in an expression like "A (human)

domesticates B (non-human)." Rather, they define domestication as consisting of three parties: "the human, the non-human, and the *domus* where their entangled lives take root in the long term" (Stépanoff and Vigne 2019, 13). Stépanoff and Vigne (2019, 14–15) borrow from Dominique Lestel's "hybrid community," the entanglement of these three parties that may or may not lead to domestication. Their discussion on "hybrid community" in relation to human–animal–domus entanglement is useful especially for this chapter in that they encompass "various forms of association in the vicinity of domestication" (Stépanoff and Vigne 2019, 15). That is, some entanglements may turn into domestication, while some others may not. Stépanoff and Vigne (2019) look beyond what is usually regarded as "domestication" and thus are able to put the concept into wider contexts of varied human–wildlife–domus interactions.

This chapter will examine examples of temporary sheltering of migratory birds that failed to leave Alaska as well as that of partial destruction of beaver dams in order to save stacked salmon in upstream travel. The examples in this chapter are surely, as I will show, "in the vicinity of domestication," yet they cannot necessarily be characterized as "domestication" per se. Instead of arguing that northern hunter-fishers' wildlife-related practices as lacking "domestication" except for dogs, I will propose the term "*domus*-sharing" to describe them as a conscious act of interspecies care (cf. Lien 2015). My chapter is a reminder that northern hunter-fishers' practices and attitudes toward wildlife and their *domus* should be discussed in comparison to northern pastoralists if we are to re-think "domestication" from the perspective of anthropology of the North.

Ethnographic Setting

Upper Kuskokwim region comprises a vast area of 35,000 square kilometers surrounded by the Alaska Range to the west, the Kuskokwim Range to the east, the Swift River to the south, and the Kantishna River to the north. In this region, the Dichinanek' hwt'ana (formerly known as Upper Kuskokwim) Athabascans have lived a lifestyle rooted in hunting and fishing. The region belongs to the subarctic climate zone and features vegetation including white spruce, black spruce, balsam poplar, and paper birch. The Upper Kuskokwim region (particularly the North Fork) is called "the river of timbers" (*dichinanek'*) in the local language. This term is also used in *dichinanek' hwt'ana*, the ethnic autonym used in this chapter. In short, the region is part of a vast boreal forest zone and the Dichinanek' hwt'ana Athabascans have made their living through skillful use of the wildlife in the forests and rivers, including moose, caribou, bears, beavers, salmon, and whitefish.

In Upper Kuskokwim region, the temperature rises to around 30°C in summer but can fall below −50°C in winter. The period from spring to autumn is the thawing season; winter is the freezing season in which rivers, lakes, and marshes freeze over. The rhythm of thawing and freezing, by which

waterfowl migrate from other areas to breed and fish such as salmon make spawning runs during the thawing period, has been an important element in the formation of humans' and animals' lives.

The boreal forest area of Interior Alaska is a semi-permafrost zone with permafrost scattered throughout the ground. Recent research reveals a symbiotic frozen soil–vegetation relationship by which permafrost partially melts in summer and promotes vegetation growth, which subsequently protects frozen soil through the action of tree crowns blocking direct sunlight from reaching the ground surface (Hiyama 2015, 7).

Recent environmental changes caused by climate change include the delay and destabilization of the river, lake, and marsh freezing season, melting of permafrost, reduction of snow cover, drying of wetlands and lakes, and increased forest fires (Hinzman et al. 2005; Kofinas 2010). People living here appear to be generally aware of these environmental changes within their daily lives. For example, one hunter in Nikolai believes that poor conditions for berries have continued for several years because of high summer temperatures and reduced rainfall.

Today, a cash-based economy has spread to Upper Kuskokwim region and people's subsistence activities make use of equipment such as motorboats and snowmobiles. However, the important position that hunting and fishing occupy in obtaining the resources necessary for daily life has not changed.

For 14 months from July 2012 to August 2015, I conducted ethnographic fieldwork in Upper Kuskokwim region. Nikolai, Alaska, was the main location of my stay, but I also accompanied villagers to the nearby village of McGrath and to their hunting and fishing camps. To the extent possible while engaged in the ethnographic survey field work, I also conducted bird observations inside and outside the village, using Nikon Sportstar EX (10×25 6.5 WF) portable binoculars. In particular, data concerning human–bird–land relationships, discussed in the next section, are based on the results of this birdwatching.

Temporary Sheltering of Migratory Birds that Stayed in Alaska

Alaskan Athabascans have a custom of sheltering individual migratory birds that failed to migrate to the south (referred to as "leftover" in this chapter), keeping the birds throughout the winter and releasing them to the bush in the spring. Groups in which I have confirmed similar or related customs to date are the Dichinanek' hwt'ana (Upper Kuskokwim) (Kondo 2020), Dena'ina (Russel and West 2003, 36–40), Deg Xit'an (Osgood 1940, 185–186, 1958, 260), and possibly Koyukon (cf. Nelson 1983, 118).[1] This section contributes to ethno-ornithology of Alaskan Athabascans by reporting the first-hand observational data on the practices of temporary sheltering of "leftover" birds, which is mostly based on oral history interviews in prior studies.[2]

After the first snowfall around October, summer birds that have not completed their migration are targeted for capture. In Interior Alaska, small

birds such as white-crowned sparrow, dark-eyed junco, fox sparrow, rusty blackbird, and American robin have been seen as targets for capture (cf. Osgood 1958, 260; Russel and West 2003, 37; Kondo 2020, 37–38).[3] The method of capture is generally the basket trap. A corrugated box or wash-basin serving as a basket is propped up with a rod; when a bird goes under the basket, a string is pulled to remove the rod and trap the bird under the basket (Kondo 2020, 38).

The motive for capture has been one of sympathizing with the “leftover” birds (Kondo 2020, 37) and keeping them as companions for children and the elderly (Osgood 1958, 259; Kondo 2020, 37; Russel and West 2003, 36–37). In terms of material culture, baskets of spruce appear to have been used in the past (Osgood 1940, 185–186), but commercially available bird cages are now used. There are taboos on keeping the birds during the summer breeding season (Kondo 2020, 38) or on keeping birds in pairs for breeding (Osgood 1958, 259). With the arrival of spring, the “leftover” birds are supposed to be released to the bush (Kondo 2020, 37; Russel and West 2003, 37). No cases of killing and eating these “leftover” birds have been identified.

Example of a White-Crowned Sparrow

On October 14, 2014, a white-crowned sparrow was observed near a cabin in Nikolai. The first snowfall after the thawing season was recorded on October 4, 2014. On October 14, 2–3 cm of snow remained on the ground across the village.

The white-crowned sparrow is a migratory bird in Interior Alaska. From spring to summer, it is commonly seen foraging in flocks of several birds in grassy locations in and outside of Nikolai. However, as most birds migrate south by autumn, the white-crowned sparrow is normally not seen in October. This particular white-crowned sparrow was attempting to forage, searching for a place that had little snow cover. According to observations by villagers and by myself, it had a deformed beak, and appeared to be unsuccessful at foraging. Healthy white-crowned sparrows would begin migration after they accumulated fat to a certain level. It is likely that this particular bird could not begin migration due to the beak deformation and subsequent inability to forage.

Two men (Jimmy Nikolai and Steven Nikolai Jr.) attempted to capture the white-crowned sparrow using an improvised box trap made of cardboard and created a hiding place for themselves by stacking cardboard on a hand-rail of the cabin. They were interested in catching the bird out of concern for Dora Eai, an elderly woman and Steven’s godmother. She used to care for “leftover” birds during the winter with her husband Philip, who passed away in the spring of that year. Many people were worried that Dora, a beloved elder, was grieving over her husband’s death. Steven wished to cheer up Dora by offering a “leftover” bird for her to keep during the winter.

Jimmy and Steven removed snow from around the box trap to create a place for the bird to easily forage, and attempted to lure it. However, capture failed as the cabin was close to the local municipality office of the village, with many people passing by. At times when they were away from the trap to do some other chores, I watched the box trap. However, whenever an unwitting villager would approach the cabin, the bird would become wary and fly away. Accordingly, the box trap was abandoned by the evening of October 14. From October 2014 to January 2015, warmer days than usual continued, with nearly no snow. This does not occur in normal years and can be considered an effect of climate warming.

In January 2015, I observed a white-crowned sparrow near the cabin where I often stayed during my fieldwork. It was likely the same bird observed earlier, as viewing through binoculars revealed what appeared to be a deformed beak. The cabin was a few minutes' walk from the one where Jimmy and Steven had attempted to capture it. The bird appeared to have changed the location where it attempted to forage. Observations by myself and by Paul, a middle-aged man with whom I stayed,[4] revealed that the bird frequently used an opening to enter a cache adjacent to our neighbor's cabin. This bird was living indoors, relatively protected from wind and snow. As the year was one with little snowfall and relatively high temperatures, it had been able to survive. Subsequently, the temperature dropped in February 2015, and snowfall returned to nearly that of a typical year. The bird was not observed after January and is thought to have frozen or starved to death.

As noted above, Jimmy and Steven had been hoping to capture this "left-over" white-crowned sparrow so that it could be kept by Dora until spring. According to Nick Alexia Sr., a Dichinanek' hwt'ana elder, this is based on the idea that captured "leftover" birds make "good company" for the elderly (see Osgood 1958, 259 for a similar comment). However, Paul told me that "someone should kill the bird quickly" because Jimmy and Steven abandoned their attempts to capture it. He felt sorry for the bird, which faced suffering and death from cold and hunger.

Paul shared his opinions about other "leftover" birds as follows. He stated that nothing should be done about three American robins observed near the village church on October 18, 2014, as they appeared to be in the process of migrating. The robins were in fact not observed from the following day. A fledgling of trumpeter swan was observed by many villagers around the village runway on October 28 of the same year. He stated that the swan should be killed, as it was separated from its parents. Some villagers speculated that it may have been slow to grow due to the relatively cold summer.

Example of a Rusty Blackbird

On November 25, 2014, a single rusty blackbird was observed near the Nikolai village school. The next day, the bird was found to have wandered into the smokehouse at the cabin of John Runkle, a non-Native man employed as a

janitor at the school. John used a flashlight to dazzle the bird, and succeeded in capturing it with a net. John is the son-in-law of Dora, and, like Jimmy and Steven, had decided to capture the bird for the purpose of cheering her up. After being kept for a while in John's cabin, the captured bird was moved in January 2015 to the home of his son, Andrew, who lives next to Dora. This arrangement would allow her to easily interact with the captured bird without the burden of caring for it. This bird was named Chaga. The word refers to the fungus *Inonotus obliquus*, which recently has been used by the villagers as an ingredient for medicinal teas. It was given this name for its coloring, which resembles the black color of the fungus.

In the early stages of its captivity, Chaga moved about agitatedly within a commercial bird cage. As it gradually became accustomed to people, Chaga was let out of the cage and allowed to fly about freely indoors, particularly inside Andrew's cabin.

According to Dora, rusty blackbirds live near lakes and rivers, and have been observed eating insects, small fish, seeds, etc. At John's cabin, where Chaga was first kept, the bird was fed birdseed. At Andrew's cabin, it was given salami, crackers, buttered bread, chocolate milk, and other foods containing oils and fats. As Chaga reacted positively to these foods, the feeding continued. It may be assumed that Chaga entered into the smokehouse at John's cabin because it was attracted by bits of fish and game meat that had fallen to the ground there.

When Chaga was taken out of its cage to flying about in Andrew's cabin, it was frequently observed to forage by pecking at crackers crumbs on the table where the family ate meals. It was not particularly prevented from foraging outside of its cage; rather, people enjoyed seeing it move about freely. Chaga adapted to its new environment and became a bird that foraged on the table.

However, Chaga died suddenly in April 2015. Dora speculated that Chaga may have remained behind because it was an old individual without the strength to migrate. With the death of Chaga, I could not observe how they were supposed to release the "leftover" bird during the spring time. However, many people took it for granted that Andrew would have released Chaga to the bush in the spring if it continued to live.

Let me summarize what we can learn from these examples: People refrain from intervention when there is no need to capture and shelter the birds. On the other hand, the "leftover" birds should be captured and temporarily sheltered if they are overwintering in desperate conditions, or should be killed to prevent suffering if the species is too large to be housed indoors or if capture fails.

Activities at Salmon Spawning Streams

In this section, we turn our eyes to salmon and their *domus*. Three salmon species—Chinook, coho, and chum—make spawning runs in the Upper Kuskokwim region. Chinook salmon are locally considered excellent food

source (for humans). Coho and chum salmon are sometimes eaten, but people mainly fished these two species for dog food.

Fish runs, especially Chinook salmon runs, are matters of great concern to people, a fact also indicated in the following story, "Raven and Seagull People."

> Once upon a time, people were troubled by failure to catch fish and turned to Raven for help. They killed a dog to make a "nemaje" (a ritual dish) to feed Raven, so he headed downstream. The village downstream had set fish traps and was catching many fish, which was why fish were not heading to the upper reaches. Raven lied to the people in the downstream village, telling them that better fishing grounds were upstream, and urged them to destroy the fish traps. With this, the people upstream were able to catch fish. This is why it is still possible to catch fish in upstream villages even when they cannot be caught in downstream villages.
>
> (Nick Alexia Sr., May 17, 2015)

Today, gill nets are used as fishing gear in the main stream where the water is muddy due to silt from glaciers. In tributaries where the water is clear, fishing rods are used, as fish traps have been banned by the state government since the 1960s. People also used to gather spawned-out salmon. According to the childhood recollections of Miska Diaphon, a Dichinanek' hwt'ana elder who died in the 1980s, summer hunting parties that traveled in the upper reaches of South Fork of the Kuskokwim River saw some salmon that had died and washed up on the riverbank after spawning. They collected, filleted, and cooked these. According to Miska Diaphon, spawned-out salmon should be collected and used; it is wrong to leave them behind (Collins 2004, 19, 23).

People still visit salmon spawning areas today, with grizzly bear hunting as the main objective. Predators such as grizzly bears gather in salmon spawning areas. Hunters hide themselves in the bush and wait for bears to show up. As many of the bears found in salmon spawning areas have a particularly fishy smell, the hunted bears were used as dog food (cf. Hosley 1966, 47). The hunting of grizzly bears further helps protect populations of moose and other species that sustain people's livelihoods, while hunting the fierce grizzly bears also imbues male hunters with prestige (Noguchi and Kondo 2019).

On October 6, 2014, I participated in a bear hunt at a coho salmon spawning stream with the hunters from Nikolai, including Andrew. This area is located about 2 hours upstream from Nikolai by motorboat. Steller's sea eagle, ravens, and other birds soared above in large numbers, checking out the area. The remains of spawned-out coho salmon were scattered on the ground. Bear tracks could be seen near the shore. Hunters who had shot a black bear the day before searched for and finished off the wounded bear that had fled into a grove. During the butchering, they expressed surprise that this bear had been found in a place where grizzly bears roam around. Brown bears are thought not to tolerate black bears. Black bears normally eat large

amounts of berries to prepare for winter, but due to unseasonable weather in the summer of 2014, the growth of berries was poor. The hunters concluded that the black bear had headed to the salmon-spawning area out of hunger, risking the competition with grizzly bears. I also helped with the butchering and found that the bear had the least amount of lower body fat of any bear that I had observed during my fieldwork. The bear blood on my hands had a fishy smell.

Later, as the hunters walked along a stream to investigate bear tracks, they encountered a beaver dam disrupting the river flow. A dozen coho salmon were swimming downstream of the dam. The hunters used thick branches to break the center portion of the dam and allowed water to flow. When the downstream water level began to rise, I could see coho salmon swimming toward us. They then proceeded up the river through the gap opened in the beaver dam. Watching the coho salmon on their re-started run, Adam Nikolai[5] said, "This way, the fish will come back next year."

The weak run of Chinook and other salmon populations in recent years is considered a problem. Increased beaver activity is cited as one of the reasons by villagers. Beavers were captured in large number during the heyday of the fur trade, and were even threatened with extinction at one point. In recent years, however, the number of beavers has exploded. At the peak of the fur trade, beavers were not only hunted for their furs as a commodity, but as a valuable source of winter food for humans and sled dogs. However, as fur prices are not as high as they once were and as some young people dislike eating rodents such as beavers, the hunting pressure on beavers has fallen sharply. As a result, beavers and the dams that they build are increasing in number.

In addition, Interior Alaska is becoming drier due to climate change. According to research employing remote sensing technology, areas of Interior Alaska, which is part of a discontinuous permafrost zone, have seen a drastic decrease in wetlands and lakes over the past 50 years (Riordan, Verbyla, and McGuire 2006). The people of Nikolai believe that the increase in beaver activity and the drying up of water surfaces are combining to increase the damage that is caused by beaver dams blocking fish runs (Holen, Simeone, and Williams 2006, 92).

The act of opening a small gap in beaver dams can be viewed as a practice for alleviating the problem of fish runs blocked by beaver dams, a problem that is thought to stem from the combined effects of climate and social changes.

On October 16 and 17, I had the opportunity to revisit the same salmon spawning area. The beaver dam, in which a gap had been opened 10 days prior, was being repaired by the beavers that used the location. Recent studies have revealed that beaver dams create favorable environments for the development of salmon fry (Pollock, Pess, and Beechie 2004). The practice of opening gaps in beaver dams, as reported in this chapter, is performed to alleviate the blockage of salmon runs by the dams. This destruction is kept to

a limited extent that can be repaired later by the beavers, so that the beaver dam's benefit to salmon fry is not lost.

Discussion

In Interior Alaska, humans and non-humans have migrated in line with the rhythm of thawing and freezing. The migratory birds that come to Alaska to breed and the salmon that run upstream to spawn are examples of this. In the case of aiding salmon in their runs, people expect that increasing the number of fish that successfully lay eggs will increase the food available to humans in the future. However, by also considering the case of temporarily sheltering migratory birds that are not used for food, it would appear premature to analyze such cases simply in terms of food acquisition.

What the two cases have in common is consideration of the survival and mobility of other species. In an ecosystem in which mobility is key to survival, the failure to reach an intended destination means death. For that reason, while intervention is avoided wherever possible with respect to migratory birds that have not missed their chance to migrate, it is thought that sheltering or killing are the two correct options with respect to the "leftover" birds. A creature that loses the ability to move and that cannot reach its destination will suffer and starve to death (e.g., the white-crowned sparrow that was left behind). Unwilling to bear the sight of suffering in such "leftover" birds, people have sheltered them.

However, while intervention for aid in survival is permitted, situations in which relationships are fixed and the autonomy of other species would be impaired are consistently avoided. The taboos against catching birds in summer and keeping them in pairs are likely based on the respect toward the birds' autonomy and mobility. The bird named Chaga gradually became accustomed to the environment of Andrew's cabin, and began to feed on the table. This behavior manifested because Chaga was often let out in Andrew's cabin and allowed to roam freely. In the case of salmon, intervention in reproduction is performed with respect to removing obstacles to salmon runs, but this is done only for the purpose of maximizing the mobility of the salmon. When intervening with wildlife, the Dichinanek' hwt'ana people do so in a way that does not compromise their mobility.

Based on this, I want to introduce here the concept of "*domus*-sharing". *Domus*-sharing is a conscious act of minimally intervening with other species in need and their *domus* in order to care for them without neglecting their autonomy. *Domus*-sharing with a "leftover" bird means that people invite it to share their *domus* (i.e. cabin) so that it has a safe shelter. Even though this invitation is executed rather forcefully in the beginning, the captured bird is often allowed to move freely in the cabin. Eventually, it is released to the bush in the spring when it can live by itself. On the other hand, *domus*-sharing with stacked salmon means that humans intervene with the landscape to maximize the survivability of multiple species involved (i.e. salmon,

humans, and beavers). At a first glance, breaking the beaver dam may just look like sacrificing an important part of beavers' *domus* for the benefit of spawning salmon. However, their intervention was so minimal that the beaver can fix their dams, thus maintaining their function as a cradle for salmon fry. Their carefully crafted practices make it possible for the three players to share their *domus*.

I think of *domus*-sharing as a contrastive yet related concept to domestication. Both concepts deal with tripartite relationships among people, wildlife, and the land (cf. Stépanoff and Vigne 2019). While domestication in the sense of Clutton-Block (1989) is imagined as a human intervention toward animal's reproduction, *domus*-sharing of Alaskan Athabascans exhibits mixed attitudes toward such ideas.[6] On one hand, breaking the beaver dam to save stacked salmon is considered a good act, which benefits the salmon's reproduction in the long run. On the other hand, there are taboos on keeping birds in pairs or catching during the summer breeding season. Rather than characterizing *domus*-sharing as something that fails to be a full-fledged member of the domestication guild (i.e., not-quite-domestication), I see an active cultivation of interspecies care without compromising the autonomy of the humans and non-humans involved. People share their *domus* with other species, but they are allowed to leave when they can survive on their own.

My argument on *domus*-sharing is resonant with part of Ingold (2000)'s discussion on trust and domination. To be sure, I agree with Anderson et al. (2017, 403) in that Ingold's argument "had the unintended consequence of turning the material attributes of pastoralism into univocal symbols of human mastery." However, Ingold (2000, 69–70) is correct at least in pointing out that the hunter-gatherer's attitude toward other humans and non-humans is based on the idea of trust, exemplified in their practices of sharing.[7] According to Ingold (2000, 70), trust "always involves an element of risk—the risk that the other on whose actions I depend, but which I cannot in any way control, may act contrary to my expectation." *Domus*-sharing differs from the concept of domestication in the sense of Clutton-Block (1989) in that the former maximizes the mobility of non-humans by minimally intervening with them and their *domus*, thus often leaving a room for non-human agency.

The point of this chapter is the necessity of taking the land and *domus* into account when analyzing domestication and its vicinity. In terms of the temporary sheltering of "leftover" birds, the relationality of land with snowfall determines which birds should be caught. Capture of the "leftover" birds began after the first snow, when it had become clear that the birds had missed their opportunity for migration. The autonomy (self-sufficiency) of the remaining birds depends on whether the land is hidden by snow, i.e., whether it is possible to access food such as insects. What is important here is that "leftover" birds emerge in relation to the dynamics of the land. Rather than seeing humans and "leftover" birds within the framework of human–animal relationship, it is more accurate to define the relationship as a result of human–wildlife–land entanglements, the tripartite relationship that figures

so prominently in the theoretical discussions by Anderson et al (2017) and Stépanoff and Vigne (2019).

As climate change wreaks major changes in the environment, change is also taking place in the "leftover" bird. The white-crowned sparrow with the deformed beak, for example, attempted to survive by nesting under the eaves of a storehouse in an unusual winter with little snowfall. The white-crowned sparrow, which missed the time for migration and lacked an appropriate place to live, had found a new *domus* within a human settlement (cf. Anderson et al. 2017).

The impacts of change in the subarctic climate–hydrological regime have also affected the relationship between beaver dams and salmon. Falling beaver fur prices and changes in eating habits have led to the proliferation of beavers, resulting in an increase in beaver dams. The drying up of freshwater surfaces due to climate change, which prevents salmon from swimming upstream, has further added to the effects. However, it is understood that the activities of people in salmon spawning areas have the effect of alleviating the damage. The human–beaver–salmon–freshwater entanglement is changing dynamically in the face of rapid socio-ecological change.

In this chapter, I have discussed "*domus*-sharing" as Alaskan Athabascan practices. However, with further investigation, this concept may be extended to include other foraging societies. In which case, then we might be able to set a comparative distinction between "domestication" and "*domus*-sharing" as (northern) pastoralists' and foragers' strategies to interact with wildlife and their *domus*. In thinking about the benefits of the cold environment for domestication, it is also important to take into account the existence of the foraging neighbors (in terms of geography and theory), who have cultivated different bundles of practices around animals and their *domus* in somewhat similar northern environments.

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Notes

1 Russel and West (2003, 37–38) document that the Dena'ina people in Lime Village area not only take care of stranded migratory birds but also train ravens, hawks, and other birds of prey as hunting assistants.

2 There are plenty of prior studies on raven mythology as part of Alaskan Athabascan ethno-ornithology. However, this chapter does not necessarily deal with the

mythological aspects of human–bird relationships, so I do not comment on those prior studies. (See Kondo (2021b) for a discussion on raven mythology in Interior Alaska.)

3 Osgood (1958, 260) writes that "purple grackle" is one of the most common birds that Deg Xitan people keep. "Purple grackle" stands for a subspecies of common grackle, but this species is not found in Alaska. It is possible that he mistook rusty blackbird with "purple grackle," which more or less look alike. My observation also suggests that rusty blackbird can be a target of capture. Osgood (1958, 260) also states that "Robins, ruffed grouse, owls, and butcherbirds add to the list of these entertainers [companion birds]," but I do not find any other material to support ruffed grouse and owls were kept or cared by Alaskan Athasbascans. It is also not compatible with contemporary Nikolai people's idea that they are supposed to catch the "leftover" migratory birds, so I did not include these species in the body text.

4 I use a pseudonym for this person because he explicitly asked me to remain anonymous.

5 He used to go hunting grizzly bears with Philip Esai, Dora's deceased husband. Adam wanted to bring Andrew to the hunting ground because this is the area where Andrew's grandfather hunted every year.

6 The "*domus*-sharing" concept might contribute to the discussion on the origin of domestication even though I have emphasized the differences between the two concepts in this chapter. "*Domus*-sharing" as Alaskan Athabascan practices may not necessarily be a direct ancestor of "domestication," but further study of foragers' interactions with wildlife and their *domus* is crucial in understanding the process where domestication emerged from non-pastoralist ways of life. Yutaka Tani (2010, 74) speculated that "collective sharing of home range" between humans and animals is an important precondition of "domestication" to take place. It is interesting to note that the *domus* shared between humans and animals in Interior Alaska is transitory, fragile, and subject to change due to seasonal hydrological condition (e.g. snowfall and water level), while it seems less so in West Asian counterparts. I am aware of the danger of environmental determinism, but this difference in climatic–hydrological regimes is worth further investigation and relevant in the theme of this collected volume.

7 It is beyond the scope of this chapter to discuss how we can characterize pastoralists' attitude other than domination. It may be possible to argue that hunter-gatherers and pastoralists practices different versions of "trust" with their human and nonhuman partners. See also Takakura (2020) on semi-domestication as a collaboration between humans and domesticated species, not the human domination of nature.

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5 From relatives to enemies

Emplaced Evenki relationships with wolves in the changing environment of East Siberia and the Russian Far East

Donatas Brandišauskas

Introduction

The taiga, a subboreal forest of East Siberia and Russian Far East is a place where nomadic and semi-nomadic livelihoods continually rely on day-to-day human interactions with and reliance on domestic and wild animals and the mountainous landscape. Since the collapse of socialism, a significant amount of ethnographic research based on extensive fieldwork research among indigenous peoples of North Eurasia has been published focusing on changes in their lifestyles, in particular how indigenous peoples have organized their reindeer husbandry after the privatization of collective herds and in the context of the market economy (see Anderson 2000; Stammler 2005; Habeck 2005; Vitebsky 2006; Vladimirova 2006). More recent studies also stress the multi-species approach, contributing more practice-based and nuanced ethnographic descriptions of indigenous interactions with domestic animals by showing that intraspecies relations are social, intersubjective interactions in which animals are also able to respond and communicate to humans in a same way as humans attend to animals (Oehler and Varfolomeeva 2020; Klokov and Davydov 2019; Anderson 2017; Stépanoff 2012, 2017; Stammler and Takakura 2010; Beach and Stammler 2006). However, even recent ethnographies of Siberian indigenous hunting and pastoralism still tend to exclude agency of predators from the nomadic livelihood and describe wolves as unpredictable and objectified "natural forces" whose actions and movements are determined by their instincts and ecological contexts. A few recent publications on pastoralists of Inner Asia are good first steps in describing mutual relations with wolves (see Gieser 2020; Jefanovas 2020; Oehler 2020; Charlier 2015), nevertheless nuanced interpersonal interactions and reciprocal partnership relations in situ with wolves still remains a little understood topic in Siberia.

Pre-Soviet sources underline that Evenki herders and hunters avoided hunting wolves and paid them respect (see Cherkasov 1867). In post-war Soviet times, wolves were announced to be "enemies of the nation" (*vragi naroda*), and organized measures were taken by the state to exterminate wolves for the benefit of large-scale reindeer herding (see Jefanovas 2021).

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In the 1970s, some Soviet ecologists and environmentalists promoted the idea that a wolf is a valuable "sanitizer (*sanitar*) of nature" that should not be harshly chased or exterminated (see Skalon and Shargaev 1974, 52; Bibikov 1980, 1985, 569). Despite this, wolf extermination continued to be promoted and encouraged by the Soviet state apparatus through technical support, awards, training, and establishment of the institution of *volchatniki* ("wolf hunters" see below). Many indigenous reindeer herders showed some resistance toward the harsh measures of wolf elimination and continued to rely on their own strategies of respect of cooperation in interactions with wolves.

Ongoing contemporary debates on wolves worldwide sometimes call on humans to take on the obligation to reduce (or sometimes extinguish) the wolf population, while on the other side there is a call to protect wolves by prohibiting their hunting and bringing back ecological balance by reintroducing wolves to the different areas of Europe. Hence, the wolf has become a powerful tool of political action for a variety of groups engaged in negotiating effective farming and land use or in teaching humanity to conservation values. However, all these somehow paternalistic approaches toward wolves are quite alien to indigenous groups, to whom any meaning of management or controlling animals is seen as threatening the social relations of exchange between animals, humans, and the environment (see Nadasdy 2011; Anderson 2017). Hence, my chapter aims to reveal how Evenki reindeer herders and hunters, who live together with wolves on an everyday basis, interact with wolves as respected and equal partners, but also as individuals. Relations between indigenous people and wild animals often tend to be described as more relations with the species and with the spirit of the species (see Beach and Stammler 2006) than with individual living beings. I propose to underline that individual interactions are not pregiven as interactions between generic biological species, but such relations are developed through a mutual process of socialization and adaptation, which can also be referred as "co-domestication" (see Fijn 2011). This chapter shows that notions of "co-domestication" can also be apt to not only describe human–domestic animal relations but also reveal the mutuality of neighboring relations that occur between reindeer herders and predators in certain spatial settings, outside humans' and domestic animals' encampments.

Evenki hunters and herders perceive wolves as other persons, with their own families, intentionality, modes of communication, learning abilities of certain social laws, and empathic perception of human intentions. They perceive wolves as individuals with unique reactions, emotions, characters, as communicative beings that are able to respond and establish good-neighbor relations. Hence, I aim to explore how the Evenki establish interpersonal relations of mutuality, domesticity, and adaptation with wolves with whom they share joint living-places and even domestic animals. I introduce to the emic understanding the practical interactions by which humans and wolves create, maintain, and sustain mutual partnerships contributing to the creation

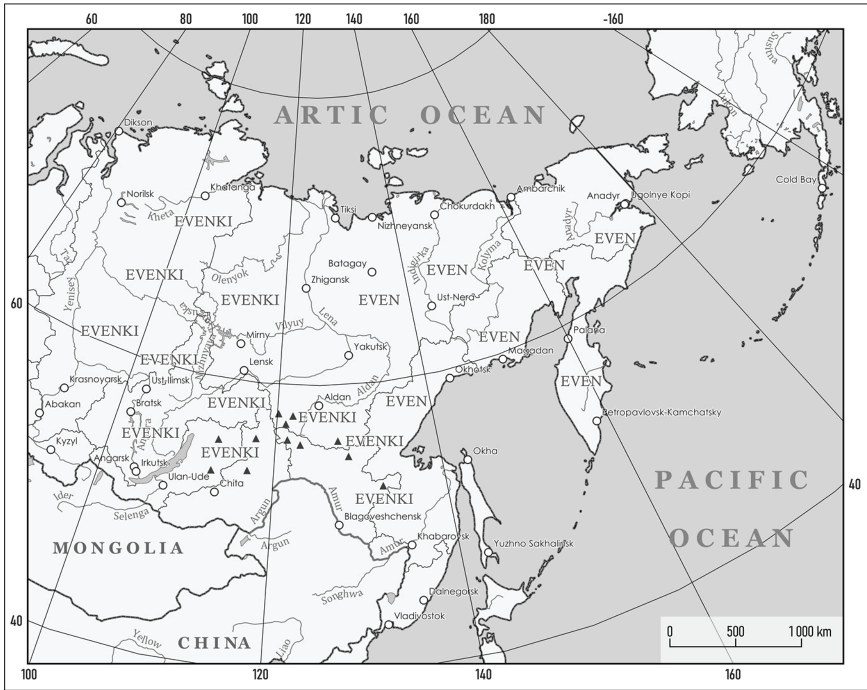

Figure 5.1 Map representing fieldwork research areas. ⏎

of domestic living-places for them both. To show this, I will rely on my long-term participant observation research, which I have been conducting since 2004 among different Evenki reindeer herding and hunting communities in the regions of Zabaikal'ia, Buryatia, Amur, and South Yakutia (see Figure 5.1).

Today, in the context of dramatic shifts in the Evenki economic and ecological environment, which also result in land-use constraints and even loss of the land for subsistence, nomadic Evenki face much ambiguity and danger interacting with wolves. Reindeer herders and hunters stress, and sometimes loudly complain, that due to the devastation of the living environment, wolves have become more unsettled, mobile, and unfamiliar and less predictable. They notice that predators also experience land-use hardship and migrate toward the most flourishing areas of the taiga, competing increasingly harshly even among themselves. This makes existing partnerships between neighboring humans and wolves hard to sustain and balance in the remaining taiga. Today, the Evenki encounter more and more fearless, asocial, and aggressive individual wolves and packs that threaten continuation of traditional Evenki livelihoods and the foundation of the Evenki cultural identity.

Socio-historical context of "antisocial wolves"

The Russian tsarist official's Alexandr Cherkasov's (1867) book on hunting strategies and wild animals in Zabaikal'ia was a highly influential publications in Russia and was published several times in Russia as well as all over Europe. This book well illustrates the negative vernacular wolf perception of the Zabaikal old-settlers and Cossacks.

> Wolf is cunning, but tameless and chicken-hearted, while dog is tender, brave and humble as well as wide-hearted. The last one enjoys partnership, while wolf does not like common living and live only among his brother-wolves .... They gather into packs and only in rare cases live in peace and always conflict and even fight with each other.... Wolf is an unbearable and very harmful animal, ugly, wild-sighted, creepy, and having an unpleasant voice, unbearable smell, and fervid; it has uncontrollable manners and uselessness, even when it is dead.
>
> (Cherkasov 1867, 69)

Indeed, at that time the wolf was seen by state administrators as an object of execration and contempt for its anti-social and anti-state behavior (see Cherkasov 1867; Sabaneev 1877). The well-known Russian zoologist and hunting expert of the 19th century Leonid Sabaneev (1877) also noticed that the rise in the number of wolves was linked to the fall in national wellbeing due to wars and economic crises and thereby came to view the rise of the wolf as an inevitable outcome of such social disorder. In this context, he also argued that the rising number of wolves could become a real "whip against the state" (*bichom gosudarstva*).[1] Indeed, many Russian old settlers in Zabaikal region also used to call the wolf a degenerated animal (*Vyrodok*) (see Zavitsky 1932). Already in the 19th century, the wolf was actively poisoned with strychnine in Siberia.

In the early USSR, the wolf was considered a dangerous and very damaging "pest" that was supposed to be eliminated year-round. As hunting expert Zavitskii (1932) said, "with such a malicious (*zlostnyi*) enemy as the wolf all means and tools can be justified." The wolf was even named an "enemy of the nation," a most sound term mainly used during Stalin's repressions. Post-war wolf biologists documented a few waves of boom and bust of wolf populations in the European part of the USSR; however, in the Russian Far East and Siberia such dynamics could not be grasped in the context of sparsely populated territories.

In Siberia during Soviet times, wolf extermination was an activity highly organized by the state, with large subsidies, awards, and the most advanced gear in the USSR (see Bibikov 1980; Bibikov and Shtil'mark 1993). Some collective farms (*kolkhozes*) that specialized in hunting and herding of domestic animals introduced their own professional wolf hunters called *volchatniki*, while reindeer herders were also skillful hunters and trappers and were

supplied with rifles and ammunitions to fight wolves. In my field sites, wolves were exterminated in dens, trapped, snared, and hunted from helicopters and planes. Amur region *kolkhozes* located in the mountainous taiga were supplied with the strong poison barium fluoroacetate, and reindeer herders were encouraged to use it to regulate wolf populations around their herds. During the wolves' rutting season in February, there were also brigades of hunters mobilized for extermination of wolves, as the animals were more easily hunted because they lived in packs during that period. Hunters used to receive an award for the successful extermination of wolves. The award used to reach and exceed a monthly salary: 100 rubles for a male wolf and 150–200 rubles for a female wolf. Reindeer herders had even been strictly prosecuted, with prison terms, for losing the collective farms' reindeer to wolves.

In the context of the strong Soviet ideology of modernization, taken to include the extermination of wolves, the influential zoologist Dmitriy Bibikov (1980, 1985) was one of the few scientists who argued for some level of protection of wolves. He saw the rise of the wolf population as linked to ecological factors such as solar magnetic activity, but also pointed to anthropogenic factors such as cutting trees in taiga, which affected the way wolves subsist. He argued that the full extermination of wolves could be unjustified, since wild dogs might then take over their niche (ibid). However, such an approach was met with extensive criticism and opposition from hunting experts that blamed biologists for "amoral thinking" also arguing that wolves' populations has always been twice larger than it could be. They also condemned the idea of seeing a wolf as a "sanitar" (cleaner) of the forest hunting only weak and sick animals and putting a check on wolves' unbalanced predatorial behavior (see Pavlov 1990). Therefore, the harsh measures continued for wolves' extermination in the USSR and especially in Siberia.

Despite the Soviet state's ideological and practical efforts to exterminate wolves, its modernistic ideologies did not eradicate animistic perceptions of wolves as powerful non-human persons; such views continued flourishing among indigenous people who interacted with wolves on a daily basis. In remote reindeer herding communities, people still respected their relationship of mutuality with local wolves, although they also engaged in poisoning on behalf of the state and this practice was perceived to bear the risk of the predators' revenge. Some game wardens who were active in Soviet times in Yakutia told me recollected stories of how reindeer herders—Evenki and Eveny—often refused to collaborate with *volchatniks* sent from state institutions to exterminate wolves around collective farms. They did not want to "betray their wolves" (*sdat' svoikh volkov*). These people used to hide dens as well as routes of wolves' movements leading to their dens. The Evenki also saw poisoning of wolves with barium as the least interpersonal way of extermination of predators, which would eliminate the cheekiest (*naglye*) wolves without exterminating all wolves in the area. A similar belief

can be also found in regard to bears: that one has to kill the most transgressive bears, who lack the ability to respect social rules. According to them this helps to continue collaboration with all local bears.

The collapse of the centralized Soviet system of resource redistribution also resulted in the cessation of subsidies for extermination of wolves, collective farms, and village infrastructure in most Siberian regions. Most plane and helicopter flights also ended, and many airports located in taiga villages were soon dismantled. The remaining state farms and newly established indigenous hunting and herding clan communities soon started to experience a shortage of gasoline supplies and ammunition, and therefore the organized hunting of wolves became expensive, a high-investment-required activity. To deal with these different uncertainties, indigenous communities started to search for allies not only among local industries such as mining companies, state institutions, or extended kinship networks, but also at powerful landscape sites, where they started to contact spirits (see Brandišauskas 2017). Today, they engaged in constant fights to secure state donations for reindeer herding and negotiations for territorial rights. The state institute for game management in the Amur region stated that in the 1990s, on the verge of the collapse of the Soviet Union, there were about 450 wolves in the districts; in contrast, in 1996, they could count more than 2200.

Post-Soviet sociopolitical changes were coupled with a shift in the ecological environment that resulted in unpredictable weather and new migrations of animals, also changing their behavior in other ways and requiring difficult attempts at adaptation. At the same time, reindeer herding and hunting started to play a crucial role for local communities not only as an exceptional source of subsistence and cash income, but also as activity both culturally and legally linking communities to the land, thereby also being a crucial source of cultural identity. Practically speaking, fighting wolves became the main problem of the reindeer herders, who lived nomadic lifestyles on the large former state farm territories and engaged in traditional subsistence activities such as hunting, herding, and fishing. This was still a manageable task for most communities until 2005, when the Russian Federation prohibited the use of barium to poison wolves. As leader of Ulgen village Evenki community, Sergei Nikiforov, explained to me: "once the state took over the responsibility from Evenki to deal with predators, therefore it should continue doing this; instead it leaves us alone among all kinds of predators."

The Evenki also acknowledge that the rising numbers and unpredictability of wolves started to correlate with the intensification of resource extraction, expansion of mines, and deforestation, which also led to indigenous people's land-use disputes with state agents and mining companies and recent changes in legal regulations (see Fondahl et al. 2019). Hence, the remote taiga areas, which are the last standpoints for reindeer herding, also became the living-places and hunting-grounds of large numbers of wolves, who even started to compete for use of the landscape with other, displaced, or immigrating wolves. In the context of land-use and poison-use restraints and lack of

sufficient support for reindeer herding economies, wolves became a medium to understand how the Evenki construct relations with the state in connection to their traditional economic practices as well as their identity linked to reindeer herding. The Evenki are calling out the state treatment of the indigenous people as predatory that lack exchange and partnership.

They call such state standpoints to indigenous people as predatorial that are enacted in alliance with wolves. Nevertheless, despite this pressure, the aim to maintain mutual balanced interaction with predators in the taiga remains the main mode guiding everyday strategies of contemporary reindeer herders.

Wolves: partnerships and exchange

When talking about wolves, Evenki hunters express their deep respect for wolves' intelligence, skills in hunting, and ability to be unseen and to foresee humans' movements. The wolf is seen as the smartest animal, possessing keen senses, including an extra sense to foretell the future. Thus, some groups of Evenki call the wolf a "mighty one" (Ev. *erkali*) (see also Mazin 1984, 48). The Evenki say that humans and wolves have similar social and family structures, use strongly defined living-places, and maintain strongly related extended families, elaborate modes of communication and learning, as well as passing on hunting skills one needs to subsist on the land and defend one's territory. Hunters can relate evidence for how wolves can show devotion, empathy, and self-sacrifice for members of their family. The Evenki have a very strong respect for wolves' familial bonds and can tell about wolves' intentions and personalities just by hearing them howl, which can mean many things, such as the start of the hunt or reunion with other members of the family.

Most Evenki elders would note that wolves were not hunted animals in the past. Buryatia research expedition of land use (Burnarkomzem 1934–1936) also documented in their survey report that only the local Buryat villagers, "who hated wolves," killed wolves in early Soviet times, while the Evenki did not show any interests in wolf hunting. Cherkasov (1867), mentioned above, made the following observation:

> The superstitious Orochen [Evenki] would never revenge on the wolves if wolves killed his reindeer, even though the reindeer for him is more valuable than the horse for a villager. The Orochen says that if wolves killed his reindeer, then it is the will of god, and if one tried to punish wolves with death, then other wolves would kill all his remaining reindeer.

For the Evenki, as for most of the Siberian indigenous groups, the boundaries between animals and humans are very permeable, and thereby, these relations are often perceived in terms of all-inclusive kinship bonds. Many groups of Evenki describe the wolf in terms of a distant relative with whom

reindeer herders should establish relations based on respect and exchange. Hence, the Evenki state that such predators as wolves often share with their hunting and herding communities the same living-place (Ev. *bikit*) or at least humans' and animals' *bikit* can be each other's neighbors (see more for *bikit* in Brandišauskas 2017, 2012). In practice, Evenki–wolf interactions cannot be described in one simple category and with one set of characteristics, but instead represent complex and sometimes ambiguous social relationships.

Elders also point out that neighboring wolves sometimes also shared food with humans in the past. Hence, in the perception of some clans of Evenki that wolves helped their ancestors survive through famine and sustain their lives. Thereby, the Evenki of Buryatia call the wolf a "remote relative," "luck provider," or even "feeder."[2] Nikolaev family members from Tiania village also tell stories about their special relations with predators. Some generations ago, their ancestor was healed by a wolf, who brought a special plant for ill humans. This plant is now known in the villages as a "wolf root" and is continuously gathered as powerful medicine for all kind of illnesses. This established affinity also obliged family members to refrain from killing wolves.

Neighboring each other for long periods in the taiga, reindeer herders and wolves can observe and learn about one another and find the best ways to live together and avoid conflicts. Experienced hunters would say that any predator can be contacted and negotiated with by talking with them—and sometimes by saying, "Go away, we are not touching you and please do not touch us" or "We have our way and you have your way," and that wise animals would react to this. If a domestic animal were killed by a wolf, the Evenki would also show respect to wolves' choice by saying: "Wolves also want to eat." Many Evenki would stress the "wolves' right" (Rus. *volch'ia pravo*) to access food, even if it killed a domestic animal. This right was also widely respected in the past; hence, according to Evenki elders, some wolves living close to reindeer herders also believe that a domestic reindeer is their domestic animal (see also, for the Eveny, Sleptsov 2015). If a herder is reluctant to take care of a reindeer and does not guard it, then wolves take care of the herd by killing some of the sick or slow animals. Thus, the Evenki also refer to some groups of wolves as "herders of god," or as the Evenki described it to Shubin (2007, 256), the "wolf is like the Orochen [Evenki], he is a god's dog." Further, some Evenki believe that in the past wolves only used to kill sick animals that could spread illness to the herd, and in this way took care of the good health of all reindeer. Thus, one should never take reindeer killed by wolves; such meat should be left for wolves' families' survival. Evenki also believe that wolves can warn hunters of the wolves' attack by howling or in their dreams. It is also the case that parts of game animals killed by successful hunters can be left for neighboring wolves or bears, who can receive certain part as masters of certain territories. An elder from Ust'-Karenga village, Anna Taskerova, told the following story:

> Once we were moving to another camp with our thirty reindeer. When we stayed on a flat mountain pass for the night, my father let his reindeer graze and after some time we heard a wolf howling. Father shot into the air but he was not very concerned since the reindeer were grazing quite close to our camp. However, we could not find a certain reindeer in the morning. We found it killed by wolves, but my father did not let us take the meat although it had not even been touched by the wolves. He said that it is not ours, since the wolf killed it. The wolf was master of this killed reindeer. Thereby, the loss of animals could be explained in the following way without blaming wolves: "wolf also wants to eat," "it is our fault since we did not manage to look after reindeer."

The Evenki of Buryatia views the wolf as skillful hunter that is called a keeper of luck (Ev. *kuturuk*). Thus, one should never shoot a wolf if it appears as the first animal one sees while hunting game animals, as this will help generate hunting luck. These kind of perceptions of the wolf come from hunters' experiences of everyday interactions rather than a mythological image. Hence, for example, the ethnographer Mazin (1984, 48) recorded a story that an Evenki named Yakovlev told him in 1964, about how a trapped fox escaped with a whole trap attached, but eventually was killed by the wolf. The wolf left the fox on the hunters' track (ibid). In the Zea region (Amur region), elders talked about wolves as partners in hunting. They believed that if one interacts with a wolf successfully, then the wolf can even drive wild game animals toward one and then disappear without being noticed (ibid).

Today, hunters and herders from different regions continue telling similar stories, also referring to established relations with wolves as "agreement" (*dogovor*) (see also Lavrillier and Gabyshev 2019). Such established relations based on exchange, respect, and ethics are described by Shirokogoroff (2001, 91–92) as the "taiga commonwealth" (*taezhnoe obshchestvo*). However, the most transgressive, "cheeky," unsettled, or unpredictable individual wolves have always been killed by the herders, partly in the belief that this will lead to more stable relationships.[3]

Reindeer herders and hunters know biographies of individual wolves and can describe stories of their subsistence, movement, interactions with humans or other animals, and living-places. The Evenki perceive every wolf as an individual, with its own characteristics, size, color, age, experience, certain modes of behavior, energy level, habits, preferences, and potentialities. Wolves are also attributed certain social roles, such as scout within the pack or lonely follower of the pack. For experienced herders and hunters, wolves' tracks, imprints, toothmarks, or even excrement can reveal every detail of each individual wolf in the pack (see more on tracks in Brandišauskas 2017, 145–174). With the right knowledge and skills of reading footprints, one can reconstruct a whole picture of wolves' hunting scenes: size, gender, age, character, role in a pack hunting, level of energy, and even recreate all movements and intentions. Sometimes a set of different signs, marks, and imprints can

help to recreate individuals with their own emotions, intentions, and actions. Thereby, by knowing wolves' motivations and desires, hunters can predict the future behavior of the wolves and foresee their activities such as rest, feeding, hungriness, and movements toward the kill. Hunter can also recreate social dynamics within the pack and, by reading tracks and imprints left on the snow, describe how wolves hunt, cooperate, or play or conflict and how wolf adults teach their cubs and try to restrain young wolves from approaching hidden traps. Indeed, learning about individual wolves continues even when skinning killed wolves.[4] Each killed wolf is carefully observed, and their biography is identified by their fur, lack of fur, missing digits, scars, and so on. However, most wolves are well familiar to the hunter by observation of their lives through footprints, even before they get into a trap.

By sharing the same living-places and being in proximity to reindeer herders, wolves can adjust to humans' capabilities, habits, intentions, weaknesses, or strengths. Such wolves would also refrain from approaching too close to humans' activity areas and avoid making harm in the shared living-places, and therefore some level of trust can be established. In return, humans avoid places where wolves subsist or raise their children; hence, people and wolves can share living-places without much intersection. Also, it is not a rare case that wolves had dens raising young offspring close to the reindeer herds; however, herders were sure that wolves would never touch reindeer that is grazed by humans in the same location.

Based on the experiences of living in a neighborhood, humans and wolves can attune to each other by learning about each other, being able to predict each other's movement and intentions. This is the way how both humans and animals can coexist avoiding conflicts. Similarly, Alex Oehler (2016, 212) describes how the Siberian Soiot and wolves built their relations on "the capacity to observe how others observe." Indeed, this can be described as constant awareness of the wolves' movements, preferences, and different seasonal stages of their life. Most hunters know that wolves know very well when to show up near humans, how an experienced herder operates, or what hunting tools he has. Wolves also learn to adjust to dogs and even behave like them, aiming to approach the herd easily or attract dogs for killing them.

Furthermore, similarly to humans, each individual predator or certain families of predators have their own living-places or territories of habituation with constant migration routes, mating and giving birth sites, and important sites of daily subsistence. The Evenki in the Vitim (Zabaikal region) and Zeya (Zabaikal region) river basins call these places *bikit*. To the Evenki a *bikit* literally is "a place of being," a living-place for one's comfortable life. Whether for human or animal, the *bikit* is created through one's dwelling practices such as movements, leaving signs of one's mastery, and imprints of one's living-place. Such a place is associated with one's home, while different imprints such as structures and camps even gain the agency of the master, affecting others peoples' lives. In the nomadic lifestyle, such a *bikit* can be a

seasonal place where the interests of humans, domestic animals, and spirits intersect (see more on *bikit* in Brandišauskas 2017). Such places are marked with different signs delimiting the boundaries of the living-place, which also serve as a warning for intruders. Hence, the famous Tungus (i.e., later called as Evenki) researcher, Sergei Shirokogoroff (1935, 78), in his detailed accounts of the territoriality of varied predators, states the following:

> The Tungus believe—and it seems to be a matter of observation—that the tiger recognizes his RIGHT ON A CERTAIN TERRITORY which cannot be harmlessly visited by the man, or large bears as well as other adult tigers. The tiger would not attack the man or large bears outside of his own territory and he will not attack the man or bear on his own territory if they do not show hostility. The tigers, bears and many other animals, according to the Tungus, know perfectly well the meaning of the fact when the man is armed with a gun, or with a spear. The same recognition of territorial right is supposed to exist amongst the large bears. The Tungus of Manchuria are inclined to see the idea of property amongst the small bears too, when they put their marks on the trees (by biting them) located at the radius of 25 or so meters from the den. They do the same with the entrance to the den if it is located in a hole of a tree.

Similarly, Evenki hunters discern how wolves mark their own territories and how they express their wishes or emotions by leaving messages in certain places (trees, bushes, stones) by urinating there constantly or leaving imprints, scratches, or teeth marks. For example, the Evenki of Ulgen in the Amur region knows exact places with certain rocks that serve as marking spots pointing to important entrances to the wolves' territories. In the Evenki experience, if a human leaves marks close to a place marked by predators, this can be understood as a challenge that one gives to the master of the place. Therefore, it might also be understood a declaration of warfare or challenge for the living-place. In the wolves' perception, such declarations occur when humans start killing wolves or at least when hunters actively start following tracks of wolves, setting traps and snares, or showing interest in their important sites of habitation and touching their marks. Hunters know that wolves also show interest in their own marks and tracks, checking if anybody else has shown any attention or interest in their movement. Shirokogoroff (1935, 79) stated similar perceptions among the Evenki formerly called Tungus:

> The Tungus also recognize such a distinction of ownership of territory and they would not go into war with their neighbors—the tigers and bears—unless they are forced to take away the territory occupied by them. In the Tungus mind it is a war. According to the Tungus, such a war is very dangerous because the bears or tigers may destroy the family of the hunter and

> his domesticated animals during his absence, while he cannot stay all the time watching his family and household.

One of the main strategies in the past, which is still used today, is the avoidance of close interactions with wolves by observing tracks left by predators, which can be outspoken about predators' intentions. Again, this protection is based on observation not only of different animal tracks but of the whole environment. The source of knowledge can be tracks of other hunted animals, who might behave differently because of wolves or of communicative non-human persons such as crows, that always by their sound helped skillful reindeer herders to avoid the presence of wolves too close to the herd.

If it happens that wolves start chasing or killing reindeer, then the herder most probably will change his location right away, moving the herd to another river basin and this way avoiding a meeting. In many cases, the Siberian Evenki escape wolves successfully in this way, and it seems this practice was prevalent in many Siberian places.[5] In the winter time, this might mean moving to the safer places at the upper part of the river, located at a higher altitude, expecting that the deep snow would protect reindeer from wolves. Nevertheless, it is also thought that every herder must use all his skills and knowledge to make attempts at protecting domestic animals and avoiding the misfortune of losing reindeer to predators. In spring, when reindeer are calving, or autumn, when they are rutting, herders have to spend nights in the herd guarding animals and their offspring. Different corrals and fences can be used for these tasks, which allow the controlling of domestic reindeer as well as protecting them from wild reindeer and predators (see Anderson et al. 2017; Davydov 2014). At the same time, shooting with rifles and having many smoky fires around the grazing area also helps to remind wolves that this area belongs to humans.

However, it is also necessary or important to kill predators who do not abide by this social contract and are "cheeky," unpredictable, and aggressive, whether wolf or bear. If wolves start excessive killing or kill without reason leaving reindeer corpses to rot rather than eating them, such wolves are always better to eliminate. At the same time, one would never boast or even talk about such kills. It is expected that their territories might then be taken over by more social animals. Evenki elders would say that predators are extremely sensitive and have an ability to smell, hear, and even understand human emotions. In this context, it is extremely important for successful hunting that one should never show emotions or aspiration to kill any animal, especially a predator. If predators sense such intentions, they can take revenge in advance. Therefore, fighting back against "transgressive" wolves, as opposed to pre-emptively attacking them, is often a necessary, though always dangerous, activity that also leads to more balanced relations. In the past, wolves would also leave the area only if they just saw that hunters and herders had started tracking and trapping them.

According to Malykh, in the 1930s the Evenki–Orochen of Buryatia knew only one method of protecting reindeer from wolves overnight in autumn and spring: by guarding them. Evenki born ethnographer Shubin (2007, 122) also stated that when predators used to approach the herd, then herders used to go to the reindeer grazing areas and sleep under the open sky together with reindeer near the large fire—shouting and firing from rifles if wolves approached, but not supposed to kill them (ibid). However, if one starts revenging wolves harshly, which among many Evenki groups means "combatting wolves" (*tropa voiny*), then wolves start attacking quite soon in revenge for the breaking and unbalancing of the relationship. Killing a whole family of wolves is almost impossible, and the remaining wolves start killing more animals than they need. If one is lucky enough to kill an entire family of wolves, then their living-place soon is taken by a new family of wolves. In the beginning these new wolves engage in really extensive killing; then they settle down in the new territory and start acknowledging the herd as their own. Some elders even believed that wolves can protect the herd from other migrating wolves, and that therefore there is no sense in combatting wolves and it is better to come to an agreement. Even recently, the Evenki of Kurumkan district in Buryatia also stated that in their community the wolf is a powerful animal, which people avoid killing, because recently one hunter managed to kill about 20 wolves and then unexpectedly died. After that some hunters quit hunting wolves in that village. Hence, hunters know from their experience that if one kills wolves, then he might lose *talan* (hunting luck) or one's animals might start dying or might even be chased for many years by wolves.[6] Reindeer herder I. P. Kayunchin from Buryatia described his experiences to Shubin (2007, 117) in the following way:

> In the past [in the 1930s] there were many wolves, but they not always used to attack us. Once we made a camp close to the wolves' den. They had small cubs. They did not give any disturbances to us and we did not touch them. We lived well as neighbors for a long time, while also observing each other. Eventually we left, and wolves stayed there. Wolf is a clever animal, one should not make him angry, because he can take revenge. One of our friends who had very few reindeer had only five reindeer, including a female with a calf. This friend found a wolf den once on his migrational route and killed two small wolves and moved further. But wolves started to follow him until they made revenge. Firstly, they took away the young reindeer and then killed its mother. In such a way they left the hunter without reindeer. Hence, wolves took as many [deer] as the hunter took their cubs. Only then, they left him for good.

In many cases, the wolf's name is said only rarely or by employing nicknames. When questioned about wolves, many people used to say, "We should not talk about them," or that it is "bad luck" to talk about them. Different groups of Evenki refer to wolves using different nicknames, such as *bagdama*,

bagdarin, or *bagdaka* referring to their bright-colored fur, or *irgichy*, "one with a tail." Evenki in Ulgen village call wolves *dolbokhik*, "night creature," because wolves are the most active at night. There are not many people who can claim to have seen wolves in Soviet times, as this animal was extremely wise, and also was able to subsist almost unseen without causing much threat. One Evenki explains it in the following way:

> The wolf can feel danger in advance and foretell the future. It conceals its movements at all times, which makes it extremely difficult to kill. Wolves can signal danger to each other and share information about harm caused to them by humans. They can also predict the movements of hunters.

The Evenki of South Yakutia also noticed that wolves living as their neighbors are wiser and less damaging than those that come from the Irkutsk region. Andrey Nikolaev, from Tiania village, even told us that local wolves can have a den almost in the middle of a reindeer grazing area and no reindeer will be killed because wolves would take care of reindeer. Such neighboring wolves can also howl in a certain special way to announce their presence. They are also cleverer in terms of avoidance of traps and snares or humans' presence, since they are well adapted to the methods of the hunters living in that area, and therefore much more elaborate ways need to be used in hunting them. At the same time, wolves from other territories do not follow such an ethos or the established modes of interaction, making it easier to hunt them as such wolves get into traps and snares more easily. According to the Evenki, such newcomers' animals can be less wise and have a more predatory nature, striving to kill more animals than they can consume and causing much more harm to domestic animals. People would recall some wolves as "our wolves" (*nashi volki*) also saying that these wolves would help to herd large reindeer herds, as the reindeer would stay in herds and not run in different directions, because reindeer are afraid of wolves. Furthermore, such wolves used to kill only ill reindeer, and it was believed that if herders took all reasonable measures to protect the herd, these wolves would not bring any substantial harm.

"Everything is changing—including wolves"

When Evenki hunters and herders complain about the hardships of their subsistence, they also point to the imbalance (*vse narushaetsia*), by which they mean complex negative social and economic shifts and environmental changes that affect their everyday livelihoods and land use in the taiga, as well as relations within the community and with other animals. These challenges include unpredictable weather and temperature fluctuation; changing conditions of soil, snow, and ice; and increases in the number of blood-sucking insects, all of which influence the health and prosperity of domestic and wild animals as well as vegetation, creating new opportunities for wolves

(see Lavrillier and Gabyshev, 2019, 23–25, 2017). However, climate change is still seen as a matter for the Evenki strategy of skill and adaptation, even as the land-use constraints caused by intensification of resource extraction industries and growing industrial infrastructure are often framed as the real long-term disaster. Mining, deforesting, and forest fires cause extensive depredation of whole river basins and affect the ecological balance of the whole region. This causes scarcity of resources. The spread of development also results in the migration of predators to remote river basins, which herders already use as the last frontier for reindeer herding and subsistence economies. As an elder from Ulgen village, Gennadii Struchkov, explains,

> Before development there were no wolves, but now there are a lot of them. The reason is spreading civilization such as BAM, it creates lots of noise, and wolves are running to the places where we live, while we live on the edge. They came here in great numbers; before, you could rarely see a pack of wolves. When I was an active reindeer herder, I encountered a pack of wolves only one or two times. They never made any big harm to us. Where are they coming from now? I think they are running from civilization.

Thus, over the last five years, due to the critical increase in wolf populations in nomadic Evenki living-places, some communities have even started to neglect their remote clan territories and united their herds into joint herders' groups, moving closer to industrial sites and leaving all the wolves in rich reindeer herding and hunting areas.

Today, most herders would acknowledge that wolves have started to affect the loss of domestic reindeer significantly, as has the loss of taiga territories suitable for reindeer grazing. Indeed, over the last five years reindeer herds diminished dramatically, from around 300 to around 30–50 in most Evenki communities in South Yakutia, Buryatia, Zabaikal, and Amur regions. In some places, such as Kindigyr village in South Yakutia, all reindeer were killed by predators in the last five years, leaving no reindeer in the whole area, which was formerly was known as a reindeer herding and hunting village.

The Evenki stress everywhere that the reason why it is hard to respond to wolves' predation is that wolves' behaviors have changed significantly. Today, reindeer herders are pointing more and more to the cases where predators become "crazy" (*durnye*) or "without head" (*bezbashenyi*).[7] *Durnye* does not mean "stupid" or "mentally ill," but points to the unpredictable and unbalanced behavior of predators. First, wolves become less careful in terms of intrusion into human living-places, coming directly into reindeer herders' camps or even villages. As reindeer herders from Ust'-Urkima village told me, last summer wolves even started to cross the camp and chase reindeer back through the camping area some minutes later. This was such an unexpected event that the reindeer herders were not even ready to use their rifles.

Thus, it is said that due to the migrations of wolves and even due to competition of wolves among themselves, too many young, cheeky, and "lacking culture" (*nekul'turnye*) wolves have appeared in too close proximity to reindeer herders. Evenki refer to such wolves as *prishlye* (newcomers), as opposed to "familiar" wolves, "our wolves." Leaders of communities also say that it becomes impossible to guard their reindeer, because such wolves show extreme insolence. Such wolves even respond to reindeer herders by challenging them: they leave urine and excrement on the human routes, snares, traps, and even in the camps. Reindeer herders also remember that before, wolves used to kill one or two reindeer, whereas now they are they can kill more than ten without eating much. A female Evenki reindeer herder, Raya Nikiforova from Ulgen village, commented on this change: "nowadays, if wolves start running after the reindeer, they follow the herd everywhere. They start herding the reindeer everywhere." Most elders remember that during the Soviet times, a wolf was a very constrained and careful animal that used to be afraid of humans' smell and avoided human routes by even jumping over the tracks of sledges. A wolf would rarely be encountered close to camps or villages. In the past, wolves also used to be afraid of domestic reindeer tracks if they were made by a reindeer with a human riding it, as well as the tracks of snowmobiles and all-terrain vehicles. Wolves would jump over such tracks and even change their direction of movement. Today, wolves walk everywhere without fearing roads or tracks. Furthermore, they even use roads to move across the landscape and make raids on domestic reindeer. At the same time, they have started to be afraid of open areas, where one can easily catch wolves if driving a snowmobile. Nevertheless, wolves are not afraid of humans' scent anymore and have even started to appear very close to villages. Recently, wolves appeared only 3 km from the village of Ulgen, while in the villages of Tiania, Tokko, and Iengra, people indicated that wolves had come to the homes on the outskirts of the village.

The Evenki try to explain these wolf-related changes and hardships in different ways. Some elders would argue that wolves are coming to revenge themselves for their harsh extermination during Soviet times (see also Jefanovas 2021). In the context of indigenous peoples' search for economic and spiritual wellbeing and efforts to re-enchant and re-ritualize everyday life, predators can be still thought to hold a powerful agency by acting on behalf of spirits, masters of the taiga, or negative agents (see, for example, the Evenki of Tunguska, in Vasilevich 1969, 219; see also Brandišauskas 2017, 204–207). However, today most hunters and herders point more and more to the disbalanced environment, which is more and more associated with activities of government.

After the state prohibition of the use of barium fluoroacetate to poison wolves in 2005, the substance was still acquired through local networks from the factory in Irkutsk region where it was produced; recently, however, it has disappeared completely from the market. While state managers have proclaimed that the poison damages ecosystems, the Evenki have a different

emplaced knowledge of and perspective on this. Sergei Nikiforov explains this in following way:

> There was a thinking that barium is transmitted through a food chain, but this is not true. Why [do I know this], because we are practitioners. Its influence was minimal. … We never used barium all over the taiga; we used to leave it only in some places of the territory. I am a practitioner. They decided without asking us. On my hunting territory 15 wolves live, but I only managed to kill two without poison. Recently I used to exterminate up to 10 wolves with poisoned meat, now I cannot do anything to them. Now they have even prohibited traps and snares; how we can catch them now?

His stepfather, Gennadii Struchkov, describes this on a similar note, saying that poisoning was done in the past with some attention, as all poisoned wolves' carcasses were collected in spring and burned, since a poisoned wolf would not walk far away. Furthermore, such poisoning would kill only the "cheekiest" wolves, who were responsible for extensive killing of reindeer. Today, people believe that the state does not fulfill its responsibility to take care of the wolves, "once the state took from Evenki the responsibility to regulate it," and the Evenki say that they are left out to "live among all kinds of wolves." On this basis, most Evenki interpret state resource exploration policies, prohibition of wolf poison, and land-use restrictions as exclusion of their communities from possible ways and means to save their herds and balance their relations with predators in an environment, which is getting more and more impoverished by industry. Today, this hardly manageable challenge is referred to by the Evenki as joint predating: the state standpoint enacted through wolves or accompanied by wolves.

In this situation, the Evenki have started to search for alternative ways to protect their herds from wolves. A medicine to fight tuberculosis mixed with strong anti-vomiting medicines became one hopeful option for poisoning wolves. While many hunters were disappointed in the effect of this mixture, nevertheless they continue to experiment with different medicines and domestic animal poisons, such as *adilin*. However, even the extermination of wolves with poison or traps is a matter of real competition with the animal, when humans must take all measures to hide their tracks or approach from downwind, imagining how a wolf would behave when approaching the poisoned meat. Reindeer liver or lung, rabbit, or any soft piece of animal meat is filled barium pills and left on the main wolf routes or sites of passage. If herders find killed animal carcasses, then they will cut a piece of meat from it, introduce the poison, and leave it on the body of the killed animal, expecting the wolf to return to its prey. Such poisoning is the most esteemed way of extermination for most hunters as it involves no interactions between hunters and wolf, and thus reduces the risk of the animals' revenge. However, wolves rarely eat carrion, which means that even poisoning or using traps or snares

with lures (*primanka*) does not work so easily. In the past, the elaborate construction of wolf traps by the Evenki–Orochen in Zabaikal region revealed how well aware the Evenki were of wolves' abilities, body potentialities, and limitations; knowledge of their sensory perceptions helped humans catch wolves with the specially designed traps made from sharpened logs called *Orochen rozhon* (see Figure 5.2). As elders remember, such traps could be made with variations adapted to individual wolves, carefully measuring each detail of the device. In many cases, hunters used their own body to measure elements of structures built for hunting wolves. Similarly, today hunters leave

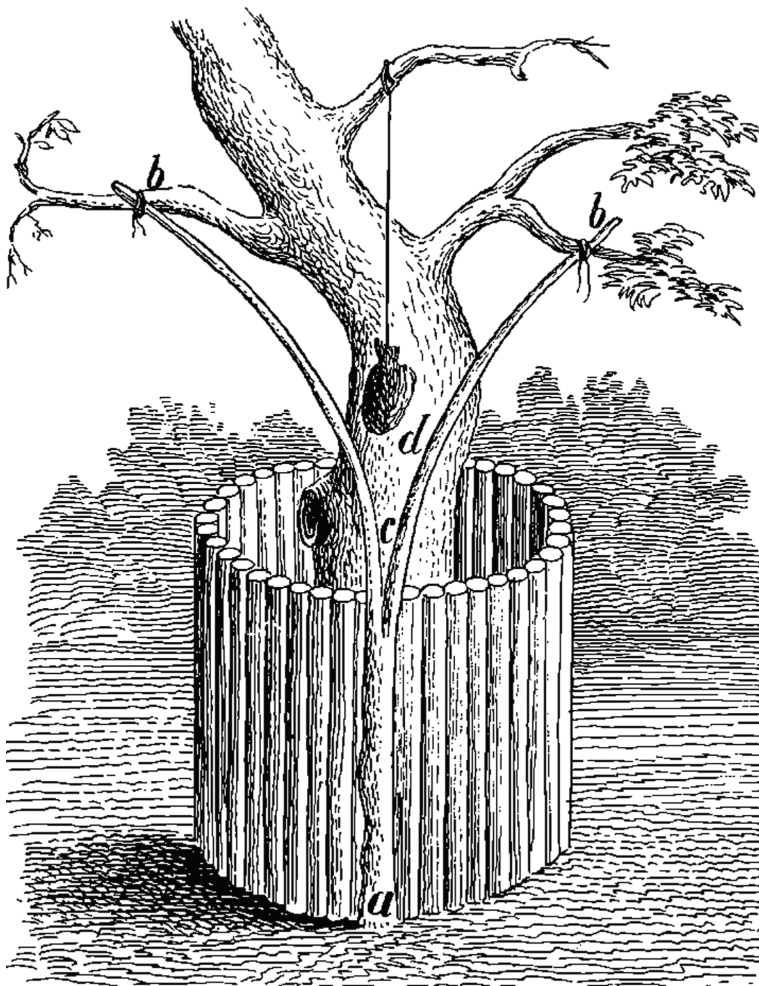

Figure 5.2 Orochon rozhon from Cherkasov (1867). ⏎

traps and also use vegetation, landscape features, and old tracks as well as other lures, trying to drive individual wolves into the trap.

Reindeer herders stress that fighting back against wolves is an expensive activity and requires lots of effort, resources, and risk. The most effective hunting can be conducted in February, during rutting, when wolves are in groups. A variety of strategies and decisions to distract the attention of individual wolves are used, so that they can be snared or trapped. For instance, objects such as plastic cans or bags can be left on wolves' routes, so that curious wolves will approach them and will be unexpectedly trapped or snared. Most traps and snares are set up on the basis of the attempt to understand wolves' ways of hunting, pack behavior, and perceiving the world, as well as with some understanding of their sensory abilities—taking into account that wolves can see, smell, and hear extremely well. In South Yakutia, reindeer herders also use VHS cassette footage that flashes and makes noises in the window to drive wolves away. Red strips of cloth are sometimes attached to the back of a horse or reindeer in Zabaikal region, believing that it will also protect humans from wolves. Reindeer can also be sprayed with cheap perfume or smelly insect spray called *diklofos*. At the same time, there are attempts to hide the smell of the iron traps by boiling them in birch tar or rubbing them with smelly plants such as *bagulnik* (rhododendron) before they are set up in the taiga. Such different strategies to outmaneuver wolves are also based on the ability to think and see like wolves.

Today, many hunters have also turned back to old, well-known techniques of fighting against wolves, such as using bent frozen sharp bones of roe deer or bent frozen needles. Such sharp bent items are wrapped into a piece of meat and straighten out in the stomach after the frozen meat is devoured and warmed up in the wolf's belly. Also used is an easy-to-digest sinew tied to the bent needle (see also, for the Chukotka, Sleptsov 2017). In remote places, the Evenki even produce old hunting tools such as crossbows, which shoot with a trigger for wolves as well as special traps using deadfalls pits, called *davilki*. Those who are wealthier and those living closer to population centers, such as the reindeer herders in the Northern part of Zabaikal'ia, even bought a special drone, hoping that it will allow them to navigate the area searching for wolves. In the past, when a large reindeer herd was moved to new grazing areas, two or three young reindeer herders moved ahead of the herd searching for wolves. If a fresh track was encountered, the only way to kill the wolf was by following it with skis or a snowmobile for several days or even a week, because the wolf would stop as soon as it got hungry and hunters could approach the wolf. However, today, artificial boundaries created between national reserves, pipelines, federal units, and hunting territories are seen as opportunities for wolves to hide from such trespassers.

Since it is impossible to predict future weather anymore due to climate change, any unusual weather such as weeks without snow might also mean that wild reindeer or a group of wolves will leave too many tracks, so hunters cannot track them properly, because the surface of the land is "all stumped

in" (*vsia zemlia natoptana*). A melting and refreezing surface does not retain imprints, and hunters can easily lose the track. Even helicopters may be useless; it is complicated to track wolves by helicopter, because wolves learn to use reindeer or moose tracks to obscure their own tracks and in this way escape hunters. If a helicopter flies, wolves have learned to run directly to areas of thick forest or brush cover and then sit there waiting until the helicopter flies away; only when hunters find fresh wolf marks is it worth using a helicopter. I was told that after extensive hunting with helicopters, wolves even learned how to hide standing on two legs and leaning against the stump of a tree.

These kinds of experience of warfare with wolves bring much tension to nomadic Evenki, and indeed even the hunters specializing in wolf extermination are sensitive toward wolves' extraordinary agency and therefore often follow ritual rules. Most Evenki would explain that wolves have "broken an agreement" with humans and now they are guilty for their "sinful behavior"; thus, they underline their moral right to eliminate wolves. If, in the past, such conflicts with wolves would have led to establishment of more balanced relations, today, in the context of changed wolf behavior, the fight is "a matter of life and death," as the hunter must exterminate the whole pack, leaving no "witnesses" (*svideteli*), as such remaining adult wolves would revenge themselves harshly. The Evenki of Iengra also tell elaborate stories of how direct warfare against wolves has ended up in fleeing from remote areas because wolves started extensive killing of reindeer and followed the herd up to the village, and indeed many herders now dwell close to the roads and gold mines all year.

When telling of the extermination of wolves, hunters often acknowledge that they feel discomfort at their work, but they also point to having no other option. They say words of excuse or atonement before killing wolves in the traps: "*please do not hold revenge on me, this is a spirits' will that you have to pay for sins, I have no other option, travel to the world of your relatives successfully.*" Once, while men were telling me elaborate stories of hunting individual predators, we started somehow to laugh and soon an elder female told us to stop talking about wolves, saying "this is *grekh* (sin), *ngelemo* (scary)." Indeed, hunting wolves today is an act of necessity but also a morally ambiguous act, and hunters and herders believe that it is dangerous to kill a large number of wolves or to boast about one's kills. The wolf is also referred to as *odiokit* (prohibited one) or *nelevki* (dangerous or attracting sin).[8] While people today can harshly complain about wolves, I have never heard words of contempt toward wolves from reindeer herders or hunters. Instead, hunters use neutral words: "wolf paid with his life," "wolves are regulated," "wolves are taken" (*prikhoditsa volkov brat'*). When people talk about hunting wolves, the stories have no winners, because any person can lose or win the next time. Some groups of Evenki and Eveny place the body of the hunted wolf on a special burial platform, on the piles of stones, or hanging in trees, leaving it with respect (for the Evenki, see Tugolukov 1969;

for Eveny, Sleptsov 2015). Today, many hunters and herders continue to show their open admiration of wolves for their social and family life, seen as example for humans. Even though the human–wolf relationship is currently hugely conflict-ridden, I was still surprised to meet reindeer herders that would prefer not to touch wolves dwelling close to the herders' camps.

Discussion

This ethnographic study aimed to reveal how nomadic Evenki relate to wolves in a personal way, despite Soviet ideologies of modernization and recent tensions in human–predator relations. Evenki hunters and herders living on the land with wolves as neighbors have found those wolves to be one of their most important partners in their subsistence, economy, morality, and land use in the taiga environment. By looking at the everyday emplaced interaction between wolves and Evenki reindeer herders and hunters, I have shown how joint agreements for the use of shared living-places can be created out of intimate relations between humans and wolves. The most transgressive animals can be killed, or silenced, but also at the same time ceremonially adored, to maintain and renew balanced relations and respect. The established human and animal neighborhoods are also sustained through mutual attunement, interpersonal relations, and mutual acknowledgment of social norms. Such human–wolf relations can also be understood as relations of co-domestication, similar to relations involving humans, domestic animals, and landscapes (see Fijn 2011). In this context, I argue that wolves labeled as "wild" or "predating" animals are known by the Evenki not only on the "species level," as has been argued in hunter-gatherer studies, but as individuals or familiar families (packs). Wolves as non-human persons and potential partners also have communicative abilities, characters, and preferences learned through the human and animal active processes of socialization and rivalry with them in shared living-places.

Human–wolf daily interactions are guided by the flow of communication between them, which can be understood as a form of dialogue. Eduardo Kohn (2013) in his ground-breaking book demonstrates how Amazonian indigenous Runa hunters interact with jaguars as thoughtful selves who have the ability to represent their thinking through various signs and icons that can be well-understood and reacted to by other beings. Thereby, taking the perspectives of these non-human others and understanding their thinking helps the Runa protect themselves from predators and enact hunting and gathering successfully (ibid). For Kohn (2013), language is merely a human-specific domain of communication that relies on a symbolic form of communication. My own pilot research also suggests that human interactions with wolves as individual persons can be studied as a form of emplaced interaction based on specific patterns of land use, territoriality, and mutual communication, which contain narratives of signs and embrace specific moralities of neighborhood.

This ethnographic account also shows the contemporary ambiguity that the Evenki face as a result of sharing their living-places with wolves in the context of the shifting economic and ecological environment and the animals' changing behavior. The Evenki point out that wolves have become unpredictable, displaced, spoiled, and unsettled animals with whom the Evenki have little opportunity to form long-lasting connections or partnerships. Due to the intensification of industrial development, which causes land-use constraints and devastation of whole ecosystems, both the Evenki and wolves experience scarcity of sources of subsistence and are pushed toward competition. Prohibition of poison barium and lack of prosperous pastures have together hindered the Evenki from maintaining the balance between landscape, reindeer, hunting needs, and predators. The pressure caused by wolves has started to threaten not only nomadic Evenki livelihoods, but also the foundation of their cultural identity, causing herders in particular to live through the most depressive economic and emotional times. This has led the Evenki to think about wolves not as mediators between humans and spirits, as in former times, but as outcomes and allies of state industrial policies, which are also referred as *predatorial*, meaning lacking reciprocal relations, and established modes of mutual cooperation. Therefore, similarly to the Nenets people's reaction to disasters noticed by Stammler and Ivanova (2020), for the Evenki, state policies that prevent them from either fighting back against wolves or escaping them successfully are perceived as a human power locus that is more dangerous to them than non-human forces.

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Notes

1 The agency for environment protection and regulation in the Amur region stated that in the 1990s, on the edge of the collapse of the Soviet Union, there were about 450 wolves in the districts, but that in 1996, they could count more than 2200.

2 Explorer Malykh (1924) also describes that the Orochon-Evenki of Zabaikal'ia referred to the wolf "as equal to a brother."

3 Wolf biologist Boitani (1995) argues that wolves can adapt to the human presence "through a process of natural/artificial selection and learning" (see also Lescureux, 2006). Similarly, Lescureaux and Linnell (2010, 394) argues that killing predators that attack livestock is necessary for "peaceful coexistence" between humans and large carnivores.

4 Hence, for instance, an elder hunter from Tiania village told me how the analysis of the stomach of a killed wolf also helped him to find out what plants were eaten by the wolf.

5 See for such strategies among reindeer-herders Karagas (Tofalar), in Petri (1927, 19–20).
6 See more on the ecological knowledge of Barguzin Evenki in Zaitseva et al. (1999, 22).
7 In the Evenki worldview, the head can be associated with the soul of an animal, rebirth of animals, and their life force, *musun*. Thus, the head of a game animal should be left respectfully on the wooden platform or consumed for food.
8 See the so-called taboo around hunting wolves and bears among the Evenki of Buryatia in Buraeva (2017).

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Section III

Convivial Ecology Embracing Animal Autonomy

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6 On Encountering and Holding Reindeer in a Convivial North

David G. Anderson

Introduction

The circumpolar Arctic is often represented as a harsh and extreme environment where people, and animals, struggle to survive day by day. The developmental discourse surrounding Arctic megaprojects generally frames ideas of conquering, exploiting, or taming the environment. It is commonly recognised that Indigenous peoples, as well as long-term settlers, understand Arctic landscapes differently. They embrace the cold, which in some seasons transforms a fluid surface into a solid surface allowing efficient long-distance travel in any direction; or which floods the landscape with constant daylight—or alternately in a stunning moonlight; which energises activity as well as focusing them.

In his classic work on Eskimo seasonal "morphologies," Mauss (1904/1979, 76–7) dismissed theories that mapped Eskimo social institutions onto their harsh climate. Instead, he argued that the alternating seasons opened up a convivial "rhythm" ranging from: "a state of continual excitement and hyperactivity" in winter contrasted with a phase of "languid and depressed social activity" in summer. It is not often remarked that in his examination of social life, he also points to the movement of animals—of fish, caribou, and seals—as part of the orchestra of sociality. Furthermore, he also stresses that these stark alterations are not forced upon these coastal hunters but are embraced with joy.

> We might almost say that social life does violence to the minds and bodies of individuals which they can sustain only for a time; and there comes a point when they must slow down and partially withdraw from it. We have seen examples of this rhythm of dispersion and concentration, of individual life and collective life. Instead of being the necessary and determining cause of an entire system, truly seasonal factors may merely mark the most opportune occasions in the year for these two phases to occur. After the long revelries of the collective life which fill the winter, each Eskimo needs to live a more individual life; after long months of

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> communal living filled with feasts and religious ceremonies, an Eskimo needs a profane existence. We know, in fact, that the Eskimo are delighted with this change.
>
> (Mauss 1904/1979, 79)

In my own conversations with hunters, I have often been impressed by the joy that a cold wind in summer will bring (as with clear and still weather in winter). I was amused by the visit of two Nenets fishermen to our archaeological camp one summer on the Yuribey river on the Yamal Peninsula. They had come to politely scold us for having scavenged a seemingly discarded wooden sledge runner which, they explained, had simply been stored *in situ* until it was needed in the future (see Figure 6.1). With a glint in his eye the elder brother asked what I thought of bracing Northwind, and as if on cue I commented that the weather seemed to be spoiling. They laughed and said that it was a “good cold”—later commenting that their reindeer would relax, feed, and enjoy respite from the overly social life of the insects that tormented them.

In this chapter I want to explore this convivial aspect of Arctic environments with examples from the Canadian and Russian Arctic. As with Mauss (1904/1979), I wish to confront models of technical adaptation by sharing idioms of mutual understanding and conversation that bind living things together. I will argue that the way that Northerners achieve a convivial life is

Figure 6.1 Two Nenets brothers heading home after discussing the weather at the site of Yarte 6 excavation, Yuribey river, Yamal 2015 (photo by author). ⏎

to exercise a wide variety of approaches to their companion animals. I will perhaps controversially cast my definition of companions broadly, including so-called wild or independent animals as well as those who choose to spend part of their lives, intermittently, with people. For reasons of length, the chapter will focus specifically on human–*Rangifer* relationships—and on the sociality between both "tame reindeer" and "wild caribou." *Rangifer* are arguably one of the most important keystone species in most Northern places (Curry 2009). However, the argument could be extended to dogs, wolves, Arctic foxes, martens, fish, and a large number of other sentient animals who populate this place. In showing how this cold environment is actually a convivial one, I hope to question some of the ways that we approach this setting with our tools of understanding domestication.

Rangifer as Neighbours

In understanding human and animal relationships in the North, I have been guided throughout my career by a wise and classic article by Colin Scott describing how James Bay Crees understand their companions. He writes,

> our conventional attitude is to assume fundamental differences between people and animals, while exploring the nature of their connections. The Cree disposition seems rather the converse: to assume common connections among people, animals, and other entities while exploring the nature of their differences.
>
> (Scott 1996, 72)

Insights such as these, with a good measure of Northern ethnography from Ojibwes, Yukaghirs, and Inuit, are often cited to illustrate the "ontological turn"—an anthropological style which insists on the parallel validity of multiple worldviews (Holbraad and Pedersen 2017; Heywood 2018). We are told to take alternate cosmologies "seriously" and accept them with the conviction that each narrator is giving evidence as a witness interacting with their own fixed reality which cannot be contextualised or translated by argument or persuasion. These are presented as a series of hard, independent worldings. Thus, as serious readers of ethnography, we are asked to accept that there are multiple natures where sentient entities such as (some) rocks, geese, or caribou think and react as clearly, and in a similar way, as humans. I wanted to stress at the very outset that this is not the type of social and convivial engagement that I want to document here. Although I agree that it is serious work to understand different cosmologies, to accept that all cosmologies exist as multiple universes internally consistent only within themselves is only a refusal to see the "connections" between animate creatures. As Bessire and Bond (2014) argue it is a "deferral of critique" which imagines away and "disregards" the important political realities of day-to-day, fruitful, coexistence. As such, the serious description of multiple realities is really only

another form of technical interaction with the environment, breaking it up into active and pensively inactive realms.

Rather than speculate how *Rangifer* move in the *Rangifer* worlds I would like to understand the interests that humans, reindeer, and caribou share (Anderson 2000). In doing so, I am guided by Jeff Kochan's (2015, 2) model of "epistemic neighbourliness" as a style of thinking and action that denotes "a relation between persons dwelling near to one another, a relation which is constitute of their shared knowledge of a common place." Neighbours can be engaged in entirely inconsistent activities of foraging, calving, dreaming, or cooking. However, as they inhabit a common expanse, they are aware and tolerant of the movements and needs of the sentient entities just beside them. Jeff Kochan was pointing to the often-silent interactions between wildlife biologists and knowledgeable Indigenous hunters which have allowed them to build a co-authored set of understandings which guide their fieldwork—if not, in some cases, the structure of concepts published in scientific publications. In my earlier research (Anderson 2000) I worked out the social history of important categories in scientific studies of *Rangifer*—such as the idea of a stable and re-occurring "calving ground"—which was based on a lively exchange of information between field biologists and local hunters (if not the calving behaviour of caribou themselves). However, I also demonstrated that a similar dialogue in the Russian Arctic produced an equally valid and productive idea of a "stream of movement" (*potok*)—a habitual migration pattern or road—which arguably linked together "calving grounds" with "rutting grounds" but also captured an entirely different and important intuition of *Rangifer* in movement (Figure 6.2). Neither idea—the North American idea of a "calving ground" or the Eurasian idea of a *potok*—is better nor worse for counting, hunting, or living with wild *Rangifer.* Given the starkly different political economies of the North American and Russian Arctic, the spatial/territorial metaphor of a calving *ground* makes for a better fit in a post-colonial environment obsessed with property relations and possessive sovereignty. The fleeting and opportunistic model of a stream similarly fits the temporal obsession that Soviet central planning had with plans and quotas. Each concept fits a distinct knowledge ecology and, more to the point, a distinct political economy. As Kochan argues, these are decolonised concepts both in the sense that the voice of Indigenous experts who helped craft them can be heard … faintly … but in a deeper sense that the concepts entwine different ways of knowing of what some might characterise as different ontologies in a way that is neither competitive nor mutually destructive.

The epistemological neighbourliness which characterises *Rangifer* and human interests has an additional quality which might help us rethink models of domestication. *Rangifer* presents a very interesting case in point where different knowledge traditions posit tame and wild *Rangifer* either as different natural kinds or as a blended or ambiguous type. While in North America, these keystone Arctic ungulates are starkly divided into caribou and

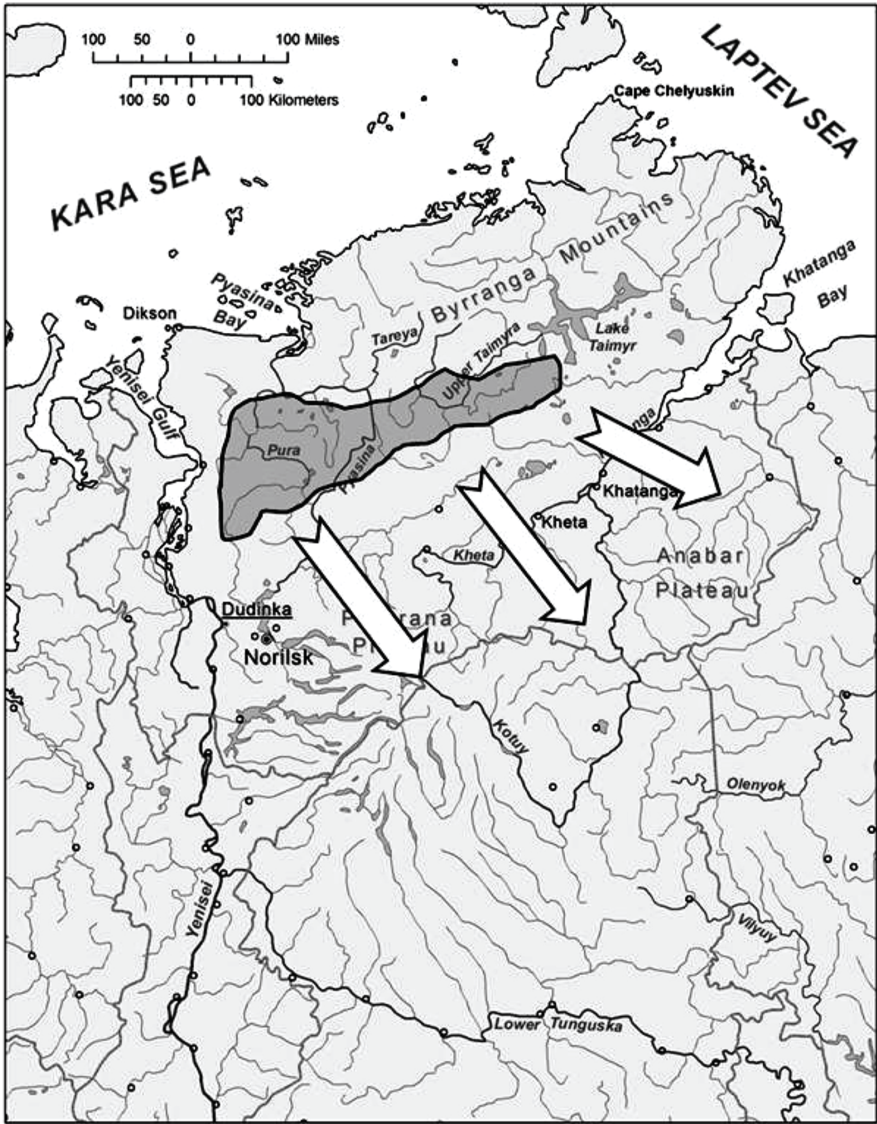

Figure 6.2 Corridors or "Streams of Movement" in Kolpashikov et al. (2015).

Note: This diagram, in an English language article, translates Soviet biological understandings of *Rangifer* movements by sketching calving grounds into a diagram of corridors.

reindeer, in Fennoscandia, they are known by the not-entirely polar opposites wild and "semi-domestic" reindeer. Some Indigenous languages likewise posit hybrid qualities to some *Rangifer*. Evenkis recognise *oror* as reindeer that follow a trail, and *beiur* who "run wild" and are therefore useful for meat—along with moose which is known by the same name. Neighbouring Sakhas also recognise the same with *tabalar* being domestic reindeer and *kyylar* being wild (Takakura 2010). Saamis recognise *goddi* as an uncontrollable and untameable type while *boazu* which "make a living-compromise with humans" (Sara 2015, 91). The ambiguities in these two examples might be better described as a shared interest in the way that *oror*, *tabular*, and *boazu* make living compromises or learn to follow the same road.

Neighbourliness is also evident in the dominant metaphors which are now being used to recalibrate domestication studies. Most authors, some of whom are represented in this volume, try to describe mutuality in the relation between people and *Rangifer*. Beach and Stammler (2006) put forth a model of "symbiotic domestication" which while rejecting notions of tameness or passivity places a lightweight on human intervention. There is much in this definition that reminds us of the "living-compromise" identified by Sami herders. Takakura (2010) marks out a territorial and emotional continuum marked by concentric fields of household intimacy (Figure 6.3). Stépanoff et al. (2017) speak of "animal-autonomy" through temporal metaphors with their concept of an "intermittent coexistence." Rob Losey et al. (2021), in a recent overview of theories of domestication in archaeology, emphasise the open-endedness of a process which can never be complete since it entwines

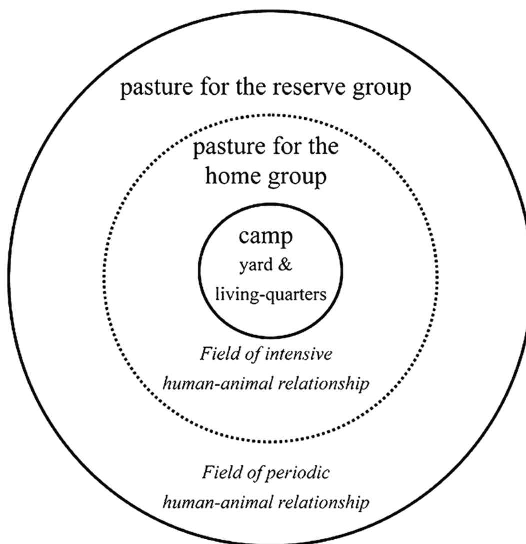

Figure 6.3 The spatial model of pasture and camp in Takakura (2010). ⏎

people and animals who are co-resident and emplaced in a landscape that itself has been shaped by their actions. In all these examples, the capacity of human agency to model a particular form is always necessarily partial or self-limiting. In all of these theories, domestication means more than simply working with a handful of "prosocial" animals—animals who are already pre-adapted socially—into human communities, but less than the application of force and domination to meld animals to our will. In order to try to clarify these ambiguous terms, I wish to explore two concrete paradoxes of domestication. In each case I will show how, with critical analysis, the term "domestication" can be stretched to fit the complexity of each case. However, I will move into the conclusion to suggest that for those of us interested in capturing the detail and richness of particular cases we might be better to move beyond the term.

Paradox 1 Domestic Caribou

Irrespective of the fact that both free-roaming *Rangifer* and *Rangifer* which share many of the same intuitions and behaviours, it is not uncommon to divide them into the categories of wild and domestic. This practice is particularly clear in applied wildlife biology where it is assumed that the two subtypes occupy different niches, interact intermittently, and more importantly that their breeding, and therefore their genetic signatures, must be different. Despite the fact that these founding assumptions are widely shared, it has proven difficult in practice to distinguish free-roaming from homely *Rangifer* osteologically or genetically—especially if one wants to draw conclusions about social evolution over time (Salmi et al. 2021; Pelletier et al. 2020). On the other hand, recent research has shown that at least in some parts of the North, there are old traditions of deliberate interbreeding between migratory and local *Rangifer* either to improve their resilience (Bureau 2021) or perhaps more controversially to "keep to hand" a hybrid type which can easily be offered up for the show to state auditors, or for food (Anderson et al. 2017; Vodopyanov 1970). In this case these unruly domestic animals might form an extra circle in Takakura's domestic continuum. The controlled introgression of so-called wild types is now becoming the norm in detailed studies of the mechanics of domestication in specific regions (Losey et al. 2021; Rowley-Conwy et al. 2012; Larson et al. 2014).

A much more difficult thought is that of the trustful or domestic qualities of migratory *Rangifer* or caribou. My learning on this topic is guided primarily by an early apprenticeship in the Gwich'in Settlement Area long before I became an anthropologist. I occasionally accompanied hunting parties along the Dempster Highway to intersect with groups of Porcupine caribou moving towards the soft snows and protected embrace of the forests to the South. Gwich'in hunting—like all hunting—has a number of age-old rules which regulate its resilience. The first almost-universal circumpolar rule is never to kill more animals than you can butcher, preserve, and share.

Gwich'ins are particularly mindful of the social structure and "folklore of the herd" (Simard 1979)—often letting "leaders" pass so that they can continue to share their learned experience with other younger animals (Padilla and Kofinas 2014). A particularly evocative, and likely extremely old, caution is to keep the land clean by developing extremely efficient ways of slaughtering caribou which minimises the loss of blood—and of removing and burying all signs of a kill. This perhaps might be linked to the rules governing the maintenance of the guiding fences and enclosures—"corrals"—that once helped to intensify the hunt and likely had to be kept clean to encourage caribou to enter them (Ross et al. 2007, 27, 48; Stern 2009). Wishart (2004, 85–8) has documented that migratory caribou will avoid valleys where a tragic death has occurred, or will avoid people who observe or watch them without being engaged in a productive exchange for food. Some of these ideas are embedded in the often-cited mythic metaphor that Gwich'ins are caribou people each sharing the same piece of meat and muscle in their hearts (Slobodin 1981). Another myth with a moral and biosocial proscription is that of the supernatural provider Marten—the "boy-in-the-moon"—who, after guiding the People to the caribou, demanded to be rewarded with a certain specific fat piece in the caribou hindleg (Figure 6.4) (Linklater 2010; Horowitz et al. 2018). Like Marten, some elders confessed to having physical hunches or "dreams" that they would encounter a caribou in a particular time or place.

Figure 6.4 Marie-Effie snowshoe prepares a caribou hind quarter for making dry meat and bone grease in her kitchen in the town of Fort McPherson, 1987 (photo by author). ⏎

The "encounter" where a so-called wild animal establishes trust was famously described for anthropology by Tim Ingold (1998, 158):

> When pursuing a reindeer [in Finnish Lapland], there often comes a critical point when a particular animal becomes immediately aware of your presence. It then does a strange thing. Instead of running away it stands stock still, turns its head and stares you squarely in the face … [The Cree people] say that the animal offers itself up, quite intentionally and the sprit of goodwill or even love towards the hunter. The bodily substance of the caribou is not taken it is *received*. And it is at the moment of encounter, when the animal stands its ground and looks the hunter in the eye, that the offering is made.

The paradox of a "domestic caribou" challenges us to deconstruct both the natural type of caribou and the theory of domestication. Here the proposition from knowledgeable Gwich'ins that caribou are part-human and that (at least) some people are part-caribou points to the way that close interaction and mutual tolerance can lead to a mutually sustaining set of behaviours. In short, animals and people are enveloped in a mutual interest of care. This is not unlike the convivial metaphor of neighbours sharing the same space—while each is going about their own business. This type of mutuality requires that the domestic relation be described as something other than the use of force and control to alter an animal's phenotype. Instead, the modest motions of people—and their sharing amongst themselves—ensure predictability and generosity in encounters between people and free-ranging *Rangifer*. The flipside of this is that opportunistic hunting and industrial development break that relation and entice animals, who are no longer asked to be part of a collaborative project to become "wild."

There are some clear case studies which illustrate the stableness of human–animal encounters. Bryan Gordon has spent a lifetime documenting what he reads as a 2000-year-old relationship between people and caribou in the Canadian Barrenlands (Gordon 1996, 11–2; Gordon 2003, 2005). His archaeological research along the Thelon river has documented ancient water-crossing camps where he argues that people travelled to encounter Barrenland caribou for generations leaving behind stone implements as a record of their butchering camps. Making frequent reference to circumpolar ethnographies, and ethnohistoric evidence, he maps out how riverside hunting camps share a regular organisation with an encounter site kept clean of blood and entrails, and a butchering site, often on a windy outcrop out of sight and smell of the encounter site. Through the comparative analysis of archaeological sites, he maps out an inter-regional strategy where either the same hunters, or a division of labour among hunters, allowed the herd to be encountered at different places across its range. Gordon calls his model "herd following," which sparked a discussion in the scholarly literature (Gordon 1990; Gordon et al. 1990; Burch and Blehr 1991). Clearly, hunters cannot literally follow

a migrating group of *Rangifer* day and night at the same pace as the animal travel. However, given that *Rangifer* established regular migration routes—and regular river-crossing routes—their intentions can be anticipated and welcomed and specific sites year after year. This type of appreciation for the movement and "flow" of the animals bears a lot in common with Soviet models of *Rangifer* behaviour. An important, but understated, part of Gordon's argument is that these anticipatory strategies are not strongly evident in the contemporary ethnographic literature on Caribou Inuit and Chipewyan. The effect of the fur trade, and the new devices it brought, led to the restructuring of life in the Barrenlands leaving unattended many of these ancient strategies (although see Stewart et al. (2004)).

From the other side of this equation is an interesting discussion of the social and legal meaning of a "wild caribou." The legal anthropologist Michael Asch (1989) notes that Euro-American legal texts—and, in particular, the texts that define aboriginal land rights settlements in Canada, work with folk concepts of wilderness and wildness which imply the lack of attention of human beings. With a summary of statements gathered during the documentation of Indigenous land claims in the Northwest Territory, Asch demonstrates that there is a clumsy slippage between the idea that no one person owns or controls an animal and the legal concept that animals are owned by "no one." Dene hunters in a number of settings are quoted as expressing their rights to access the land, and to the provisions of the land, by means of dreams, social need, or reciprocity. In analysing these statements, Asch draws the conclusion that the better translation of Dene relations to caribou would be that of a domestic relation—albeit one that is sketched out over a vast territory in a manner that is unfamiliar to Euro-American farmers.

Whilst it may the case that there is some utility in studying migratory *Rangifer* with different methods and different means than those of *Rangifer* living in a tight relationship with people—there is an ecological lesson to be learned about studying the interrelation between people, *Rangifer*, and likely other Arctic animals. The neighbourly attention that migratory *Rangifer* have to a shared landscape gives people and animals a common interest in building a life together. Euro-American folk traditions give us a poor vocabulary to describe relationships between people and animals. Free-ranging and independent animals can only be "hunted"—and those who live with them can only be hunters. Similarly, farmers can only "keep" subdued animals and generally profit from the control over their life cycle. Arctic relationships, however, are extremely flexible and nuanced such that dependability and generosity can be built on the shared understanding of space. Rather than basing one's energy around metaphors of animal welfare and control, these Dene and Inuit examples point to a philosophy of encounter—of rather than how one knows where and when to encounter an animal. The sense of autonomy and choice is an important part of this ecosystem which will be evident in the second paradox.

Paradox 2 Hobbled and Tethered—but Nevertheless Autonomous

The second paradox revolves around the sense of agency and independence that home-bound *Rangifer* have when interacting with their human hosts. This is captured evocatively in Tim Ingold's (1994) description of "domination" among pastoralists:

> The instruments of herding, quite unlike those of hunting, are of control rather than revelation: they include the whip, spur, harness and hobble, all of them designed either to restrict or to induce movement through the infliction of physical force, and sometimes acute pain.

Many of these artefacts—for which Losey (2022) chose the neutral term "gear"—are in regular use among Siberian reindeer herders. To be generous, Ingold's dualistic model of Trust vs Domination was not designed to capture the details of reindeer pastoralism. Instead, his chapter was rhetorically designed to convey the skill and intelligence of Arctic hunters who at that time suffered a poor opinion within cultural evolutionary theories. To a great degree, the human–*Rangifer* relationship, within cold conditions, has always relied upon a very complex mixture of domination *with* trust. It is that paradox which can lead us to describe the particular knowledge ecology which might better describe Arctic pastoralists.

The re-analysis of pastoral gear and infrastructures is admittedly a difficult and counter-intuitive argument. Reindeer harnessed to pull sledges—or reindeer who are saddled—are entwined in leads and often head pieces which bear a superficial resemblance to the bits placed in the mouths of horses or the leads which restrict the movement of dogs. Hobbles are a prominent and important part of reindeer pastoralism in forested settings—although like all of this gear, they too are designed differently. I will argue that these differences are significant in that reindeer gear—or perhaps even Arctic gear in general—is designed to restrict but not dominate; to suggest movement or inertia but not to dictate it.

The head gear of a lead harness reindeer—and to a lesser degree the head gear of a draught reindeer running in parallel to the lead—differ from horse bridles and bits in the fact that they are placed between the raised eye socket of the deer and the place where the seasonal antler grow. This location on the reindeer's skull is extremely sensitive. Therefore, the smallest movement of the lead harness gear is designed to signal to the deer to turn its head either left or right depending on the signal sent along the lead. We may debate if humans "follow" reindeer but reindeer bodies tend to follow their heads—and when the signal to the gear evokes a change in head position, the lead reindeer changes course (Figure 6.5). The head gear on the reindeer harnessed in parallel to the leader is similar in design, but they lack the finely carved and finely tailored fitting of the long over-the-eye piece for the lead reindeer. In sending signals through head gear there are a number of styles

Figure 6.5 A photograph of a contemporary tundra Nenets male lead reindeer showing the carved bone over-the-eye head gear (photo by A. Gusev). ⏎

of communication, of which classical domination is only one. It is possible to yell, beat, and whip an unruly lead, just as it is possible to speak softly and lightly pull the reins. Both types of communication are carried through the head gear. The impatient instructions, in my experience, in circumstances of disrupted sociality during a crisis, or an argument, or more likely when a new herder is taking charge of a reindeer team for the very first time. A very common time of abrupt and firm communication happens when trying to get the reindeer team to leave the social environment of their herd to strike out on the trail. One of the editors of this collection recounts a similar experience learning to drive a Nenets reindeer (Stammler 2010, 220–1). However, a properly habituated team will often require light or little intervention—and many herders tell stories of their lead reindeer bringing a wounded or incapacitated herder back to camp without any guidance whatsoever.

There is considerably more domination when training young reindeer to harness, although it is interesting that it is never linguistically marked as such. The Evenki herders with whom I have spoken across Central and Eastern Siberia always speak about "learning" or "knowing the tether." Another gloss might be "understanding." This linguistic data I believe is quite important. In training a young reindeer—usually (but not always) a 2-year-old male—the animal will first be caught with a lasso and tethered for a few hours each day. The so-called untame or "wild" reindeer will often pull against the tether, and it may take a few days or a week for it to come to an understanding that this form of domination, to paraphrase Stépanoff et al. (2017), is intermittent. The "social contract" (Armstrong Oma 2010), as it were, is that period of tethering alternated with very significantly long periods of complete

autonomy. Not all reindeer accept the contract, and some are marked linguistically as "wild in spirit" and impossible to harness. Similarly, properly migratory *Rangifer* can be caught and trained to know the tether (although our interviews suggest that they could never be safely harnessed or saddled until they interbred for a few generations (Anderson et al. 2017). In cases such as this, a very harsh type of head gear might be employed with carved spikes or ridges. These sharper head pieces are more efficient in transferring signals to an animal who is anxiously distracted. Examples of such strongly dominating gear have played a role in trying to interpret archaeological sites where researchers have argued that an early form of harnessing might have taken place (Anderson et al. 2019).

The reindeer "hobble" is also an ambiguous concept and likely does not limit itself to any particular artefact. The item that functions like a hobble prevents a reindeer from galloping by hanging a pendulum-like stick from a collar which bounces off the animal's knees should try to run. The reindeer, however, is free to forage and to walk (not shuffle) about. In that sense, this reindeer hobble is "less-dominating" than the leg-irons sometimes placed on horses. Particularly troublesome reindeer often have bells put on them—especially those who might be charismatic enough to lead a small group away. The bells help herders to find the wandering leader (or group) much easier and in that broad sense restrict their movement. Similarly, a herd might be deliberately placed into a particular bug-filled environment in the summer, leading the herd to seek to escape harassment to the smoky fires that are lit for them by the herders. Along with the provision of salt, or even of urine, herders in this way signal a "joint commitment" to safety and welfare and thereby encourage the herd to be co-resident with the humans in the camp (Stépanoff 2012). In these environments of encouragement, herders employ a different type of sonic device to communicate with the animals. A rattle made out of a string of clipped reindeer toenails might be used to call the animals to the safety and relief of the salty, smoky camp—or indeed a song might be sung.

Finally, reindeer movement might be guided using infrastructures in a hard sense—such as corrals or fences. In these cases, the "social contract" still holds in that the animals will not be enclosed for a long time—and will be allowed to go on their way after whatever operation that is needed by the herders—antler trimming, harnessing, counting—is completed. For "domestic" caribou there are also soft infrastructures such as the use of a chain of short flags made of the wings of birds which startle and guide animals towards a central point (Figure 6.6).

All of these artefacts and techniques present a type of soft "self-limiting" domination that is carefully managed so that the intelligence and the autonomy of the animal are not crushed. In this sense, this is where the specificity of the "cold" comes in. In Arctic environments—with their temperature "extremes" but also their incredible and empowering variety of settings—herders rely on their companion animals be they dogs or reindeer to feed

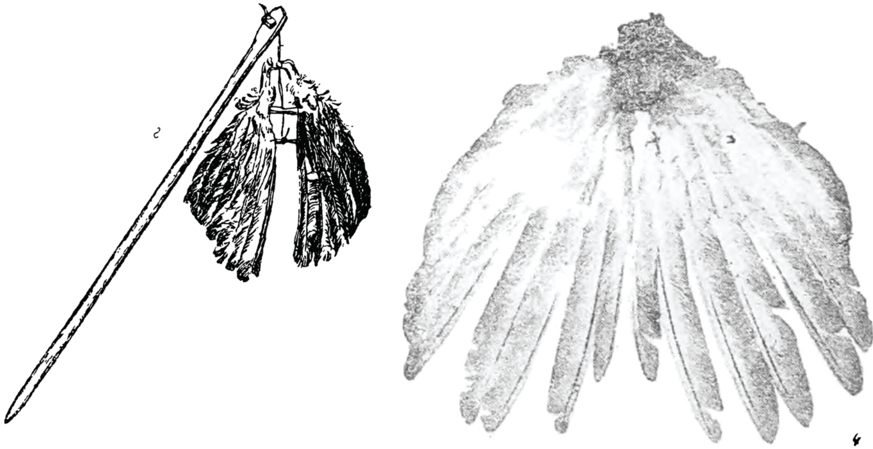

Figure 6.6 Collage illustrating Nganasan ptarmigan-wing flags used to guide migratory *Rangifer* composed from Popov (1948, 37; Appendix Table 3). ⏎

themselves, to be actively aware of the danger, and in many cases also look after the welfare of the people. Anyone who lives with herders will hear stories of how a lead reindeer will sometimes pull an incapacitated hunter on his sledge back to camp even if the hunter is unable to guide them. Stories of caribou being sent by generous and mindful agents, or of offering themselves to hunters, make *Rangifer* part of a cycle of life and regeneration. To encourage this environment of mutual care, one can never seek to dominate the animal—and thus arguably never domesticate them.

In these convivial settings, the artefacts and techniques are embedded in a particular ecology—a knowledge ecology of human–animal relationships—that encourages *Rangifer* and people to live together. These examples encourage us to revisit some of the dualistic vocabularies of hunting/herding, wild/tame, and trust/domination. Instead of dominating, I would argue that Arctic dwellers sometimes "hold" animals to hand (while also releasing them). The relation is one of balance—which in some dysfunctional social contexts might turn towards force and violence—but in other moments is mutually supportive.

A Convivial Knowledge Ecology

I began this chapter by distancing myself from theories which reduced intuition and technique to the climate—and similarly from theoretical styles, which ask us to take difference "too seriously" (Willerslev 2012). Instead, I have tried to focus discussion on finding connections between species in a neighbourly manner, which leaves room for differences but also finds space

for common interests and compromises. In this light I have argued that many dualistic theories of domestication can be dissolved into a study of how different sentient animals build life together. This "convivial" approach draws upon various intersecting streams of social theory which at this fraught time of the 21st century are becoming intertwined.

The term conviviality was first introduced by Ivan Illich (1973) and drew a critical edge to how one could judge social relationships within the utilitarian and productivist ideologies that defined the height of the Cold War. He treated the term in a very special way "to mean autonomous and creative intercourse among persons, and the intercourse of persons with the environment" (p. 11). Much of this definition was directed against bureaucracies and expert knowledge—and in particular what he saw as the "industrial" manner in which tools have come to master people. His book instead argued for "ample and free access" to tools that people could use to build life. The book was clearly aimed at humans in human society—and not companion animals—and the tools that he spoke of were the instruments that were needed in an industrial exchange economy. However, he first introduced that materials could help bring people together. To my reading, his concept and his examples speak to the "responsibly limited" way that tools—gear and enclosures—can be used to accentuate autonomy and interdependence. Like Illich's critique of management, this suggests that a "domestication" that dominates must be replaced with a more subtle concept.

Since Illich wrote, the term convivial has been gaining traction seemingly independently in a number of diverse areas. Its roots in the romance languages—*con vivir*—evoke Latin American theories of how to live well (*buen vivir*)—which have reinvigorated development theory (Bravo Díaz 2021). Understood as being something more than well-being, the philosophy of *buen vivir* is intended to evoke an inclusive type of political and ecological change which directly recognises sentient forces within the land (Boogaard and Van Norren 2021). The term is closely associated with Latin American movements to recognise the legal rights of rivers or of guardian Earth Spirits. More recently, conviviality has been marshalled prominently by one of Britain's foremost theorists of race and identity. The literary scholar Paul Gilroy (2004, xi) uses the term to try to find a language to show how Britain's divided urban Black and White communities might share something in common "processes of cohabitation and interaction." To a great extent, this idea anticipates that of neighbourliness that we have found in human–*Rangifer* relations. Paul Gilroy's theory has been greeted controversially with some anti-racist activists finding it to be naïve and far too forgiving of the colonial-era crimes (Back and Sinha 2016). Much like the anthropological ontologists whom we described at the beginning of the chapter, theorists like Les Back and Shamser Sinha call for a way of seeing difference. Other theorists, such as Luke de Noronha (2021), working with imprisoned youth defend the notion as a way of paying attention to the way

that "people still [find] ways to negotiate, rub along and make friends along lines of difference" (p. 15). I am hoping that the examples in this chapter, which do acknowledge moments of domination and control in circumpolar environments, point to a general ethic of mutualism which comes out of living together in a shared place.

Conclusion

Mauss (1904/1979) drew attention to the joy that Eskimos felt in the alternation of seasons, which gave them space to alternately enjoy intense sociality followed by a season of decompressing individuality. He suggested that this is a feature of the Cold environment—and one that should draw our attention away from technical survivance to a study of rhythms. In this chapter I have suggested that the human–*Rangifer* relation so characteristic of the circumpolar Arctic is also best understood as part of a convivial ecology of knowledge where very different agents find a role for themselves in caring for their neighbours. I have chosen to represent this knowledge ecology through examples of domestication. By citing articles which point to symbiosis, mutualism, and coexistence, I suggested that contemporary scholars of domestication (many of whom are represented in this volume) have grown out of the concept. Although the concept can be stretched, tweaked, and stitched up to fit—a much more convincing idea is to look at the everyday compromises that sentient entities use in order to live well together. At one time it was a radical stance to insist that Arctic landscapes were productive just like plantations and settler farms. The language of domestication helped in the struggle to draw attention to the richness of Arctic landscapes. However, we now have the opportunity to take these lessons one step further. By studying the convivial knowledge ecology of working with *Rangifer* (and dogs, and fish), we might be able to enliven Southern ecologies as well.

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7 Reindeer riding and driving

A preliminary essay on the use of domesticated reindeer for transportation

Shiro Sasaki

Introduction

The indigenous people of Siberia and the Russian Far East, who engage in reindeer breeding and herding, use domesticated reindeer as transportation animals. Some people ride and pack luggage on them, while others harness them to a sled. The use of reindeer for transportation is perhaps the most important purpose of reindeer breeding, along with using their meat for food, fur, horns, and bones for daily utensils, and livestock herds. The equipment and methods of reindeer transportation reflect the geographical and ecological conditions of a given area and represent the cultural characteristics of the ethnic groups living there.

Although current researchers pay little attention to ethnographic issues regarding reindeer transportation, focusing on it could help fill the gaps in our current knowledge. For example, what are the characteristics of each type of sled, riding saddle, and packing saddle? Which factors make people choose their transportation method (i.e., driving a sled, riding on the animal, and packing on it)? Why do people native to western Siberia, such as the Nenets and Tuva-Tozhu, get on the sled or animal back from the left side, while eastern Siberians like the Evenki, Eveny, and Uilta, do it from the right side? Why do Siberian reindeer breeders and herders still use reindeer sleds or riding–packing reindeer, even after the popularization of motor vehicles like snowmobiles?

Some articles suggest that these issues need to be considered. For example, Kwon (1998) argues, regarding the use of saddles and sleds by the Uilta people (though he called them “the Orochon,” it is not their proper self-denotation) in Northern Sakhalin, that these items represent not only the surrounding geographical and ecological conditions but also reflect the worldview, subsistence activities, and life and death of the Uilta. Golovnev (2017) suggests that Nenets sleds are not only transportation equipment but living things that allow smooth movement on the tundra and enable them to achieve effective reindeer herding. Stammler (2013) indicates that technological innovation of transportation equipment (i.e., the introduction of snowmobiles) was

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incomplete among the western Siberian reindeer nomads, unlike among the Saami reindeer herders.

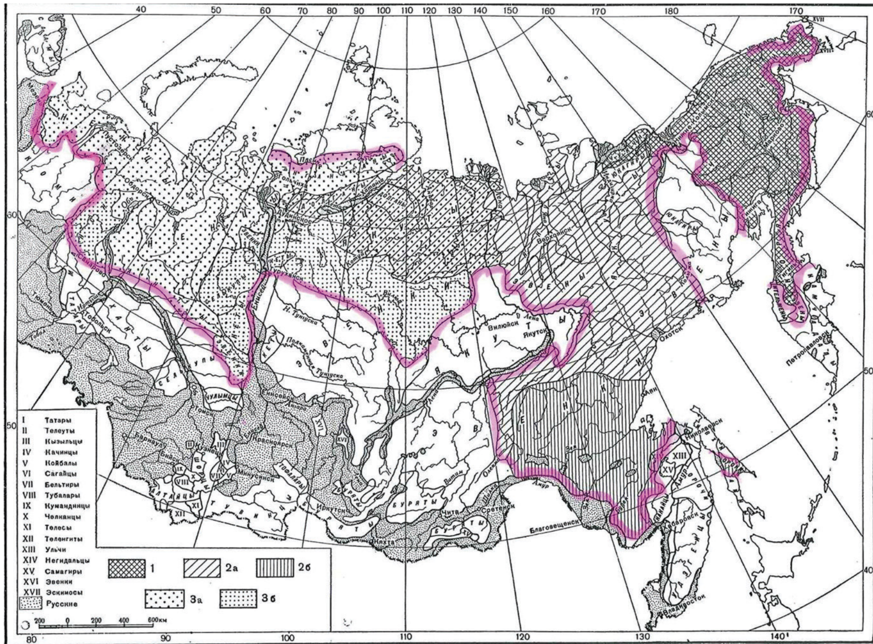
In this study, taking these works into consideration, I discuss the issues regarding the geographical and ethnographical distribution of driving and riding, the differences in types of sleds and saddles, and the survival of reindeer transportation during the popularization of motor vehicles. This is merely a preliminary discussion based on past ethnographical data and my own field observations. I conducted field research on reindeer herders and breeders in Nenets Autonomous Okrug in 1988; northern Yakutia (Republic of Sakha) in 1994, 1995, and 1998; and Tuva (Republic of Tuva) in 2012.

Reindeer-sled driving and reindeer-back riding

A famous atlas edited by two Soviet anthropologists, M. G. Levin and L. P. Potapov (1961, 50), shows some interesting figures regarding the distribution of reindeer-sled driving and reindeer-back riding. A map showing the distribution and types of reindeer sleds indicates that people who drive reindeer sleds as their main mode of transportation can be found across almost all areas of northern Siberia and Far East Russia, except central Siberia, where the Evenki hunters and Sakha (Yakut) stock farmers live (see Figure 7.1). This implies that reindeer sleds continue to be the most popular transportation system for indigenous people in the arctic tundra and forest–tundra zones. However, there are exceptional cases shown on the same map in which some people living outside these areas often use sleds.

The Evenki, who live in the basins of tributaries flowing into the right bank of the Lena River and the left bank of the Amur River, the Negidals who live in the Amugun River basin (a tributary of the Amur River), and the Uilta in Sakhalin used their original sleds, which Levin and Potapov (1961, 23) named the "Aldan-Amur type." These areas could not be included in the "northern part" of Siberia. Their flora is not arctic tundra or forest–tundra types, but rather subarctic forests. Their living spaces are mountainous and covered with deep forests of Dahurian larch (on the Lena River side) or mixed forests (on the Amur River side and Sakhalin). Nevertheless, such groups use reindeer sleds while the ground is covered with snow and ice. In the case of the Uilta, they drive the sled along the Poronai and Tymi River basins and the eastern coast of Sakhalin (Missonova 2006, 143–147). It was reasonable to drive reindeer sleds on open and flat river basins and sea coasts during winter. In the case of Sakhalin, however, only the Uilta used reindeer sleds, while other indigenous peoples, such as the Nivkh and Ainu (Karafuto Ainu), drove dog sleds.[1]

Another point can be clarified by comparing this map with a map of the distribution and types of riding saddles (Levin and Potapov 1961, 52); that is, people who live on large-scale reindeer herding for meat production in the tundra (i.e., Nenets, Enets, Khanty, and Mansi in western Siberia; and Chukchi and Koryak in the northern Far East) use reindeer sleds but do



КАРТА 1. РАСПРОСТРАНЕНИЕ ТИПОВ ЕЗДОВЫХ НАРТ

1 — дугокопыльные; *2а* — прямокопыльные, североякутский вариант; *2б* — прямокопыльные, алдано-амурский вариант; *3а* — косокопыльные, тундровый вариант (без барана); *3б* — косокопыльные, таежный вариант (с бараном).

Figure 7.1 Geographic distribution of the types of reindeer sledges. (1) Two-runner type with arch-like props, (2a) two-runner type with vertical props, (2б) two-runner type with vertical props (Aldan-Amur type). (3a) Two-runner type with inclined props, (3б) two-runner type with inclined props (forest type). Bold line indicating range of reindeer sledge usage (author's research). ⏎

Source: Levin and Potapov (1961, 50).

not use reindeer as a riding or packing animal at all. In particular, people in western Siberia, such as the Nenets and Khanty, use sleds even during summer. This can be explained by geographical conditions because the tundra's surface is covered with lichen, grass, and shrubs and contains a thick layer of peat under the ground. Hence, it is soft, wet, and slippery during the snowless season and wet grass and lichen enable smooth sliding of sleds. Sleds do not sink into soft and wet ground because long and flat runners widely disperse the weight of drivers and luggage. Consequently, reindeer sleds do not cause any damage to the surface of the tundra region, which is the most advantageous aspect.

Geographic conditions promote the use of reindeer sleds in the tundra region where they are a convenient mode of transportation. However, reindeer breeders in western Siberian forest zones use only reindeer sleds. This was independent of the herding scale. Indigenous people such as the Ket,

Selkup, and forest Nenets, who mainly live on forest hunting and river fishing and breed reindeer in small numbers, prefer sled drawing and never ride on the animal. However, riding–packing reindeer would be useful for their lifestyle and advantageous in such geographical conditions, which poses the question as to why they do not use reindeer in this way. This problem cannot be answered based on the geographical approach or physical conditions of reindeer, but from a historical–ethnographical perspective.

Contrary to the cases in western Siberia, indigenous people of the central, eastern, and southern Siberia and the Far East use reindeer for riding and packing. As illustrated in the maps of Levin and Potapov (1961, 52–53), people like the Evenki, Eveny, Dolgan, northern Sakha, Tuva-Tozhu, Tofalar, Negidals, and Uilta use them for riding and packing (see Figure 7.2). They live in mountainous regions covered by dense forests (taiga) where the ground is often rocky and rugged. While it is possible to drive a sled in winter when the surface is covered with snow and ice, it is easier to use animals for riding and packing during snowless seasons. The Tuva-Tozhu, Tofalar, and

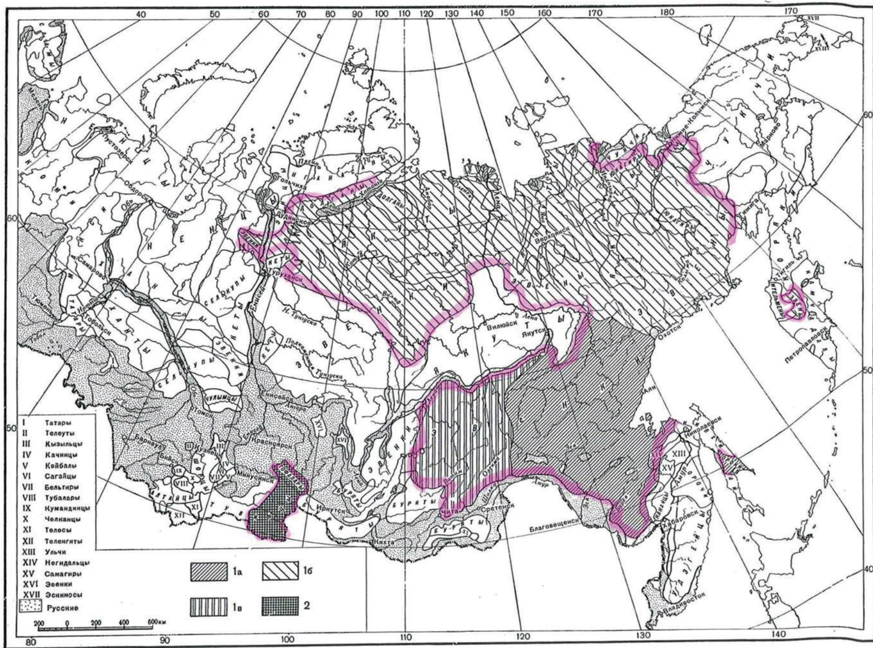


Figure 7.2 Geographic distribution of the types of saddles for reindeer riding. (1a) Siberian type with wings, (1б) Siberian type with planks, (1в) Siberian type with neither wings nor planks, (2) Sayan type. Bold line indicating range of reindeer riding culture (author's research). ⏎

Source: Levin and Potapov (1961, 50).

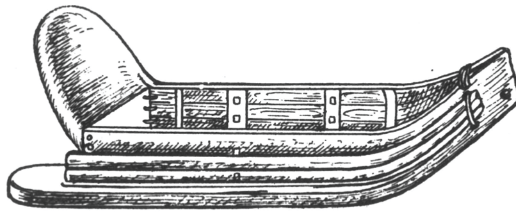
some Evenki, who live in mountainous areas in southern and central Siberia, only ride and pack luggage on reindeer back regardless of seasons, moving distance, and purposes and do not drive sleds in any case. The Eveny, Evenki, Dolgan, and Northern Sakha, who live in more northern areas, and Negidals and Uilta, who live in comparatively flat river basins or sea coasts, use both reindeer sleds and riding/packing reindeer depending on the seasons, geographical conditions, and purposes (see the "Proper Use of the Reindeer Driving and Reindeer Riding of the Eveny Herders" section).

In Siberia, even in mountainous forest areas, one sometimes encounters a surface that is wet and slippery, even during snowless seasons, as in tundra. There, horses are not as useful as reindeer. I witnessed an accident when a horse slipped and fell on the ground on a tundra-like surface. This incident occurred in 2012 when I participated in field research on Tuva-Tozhu reindeer breeders in the mountainous eastern region of the Republic of Tuva. The research team, in which I participated, traveled to reindeer pastures on horseback (it was my first horseback journey experience). When approaching the pasture, one horse suddenly slipped and fell on the ground. Though the rider was an anthropologist from Mongolia and proficient in horseback riding, he could not control it. The horse fell in a wetland, where the surface was covered with wet and slippery grass. The horse stepped on and slipped in sedge-like plants. The rider said that it was not convenient for a horse to walk in these places. A Tuva man who led our team to the pasture explained that the reindeer could walk without any problems because they have open hooves that could grasp the plants to avoid slipping. In fact, the Tuva-Tozhu people, who had traveled along the same route a day before and waited for us at the pasture, had traveled along the same place using reindeer without encountering any problems. Reindeer are superior to horses as vehicles and transporters under certain conditions in Siberia.[2] This is one of the reasons why indigenous people never give up reindeer breeding, even when herd sizes are limited and are not profitable for their economy.

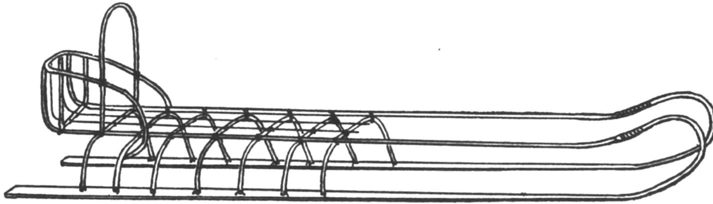
Types of sleds

According to the classical typology of the culture of reindeer breeding by Levin and Vasilevich (1951, 64–66), reindeer sleds can be classified into four types: (1) one runner type; (2) two-runner type with arch-like props; (3) two-runner type with vertical props; and (4) two-runner type with inclined props (see Figure 7.3).

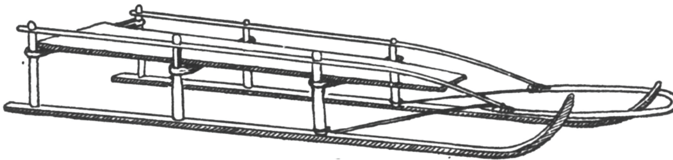
The first type of sled was used only by Saami reindeer herders in Scandinavia and in the Kola Peninsula and has a boat-like shape. The runner was set at the center of the sled and functioned as the keel of a boat. The body of the sled was compact and drawn by one reindeer. The driver sat in a sled with legs stretched and controlled it using reins. They used sleds only during snowfall and packed the luggage on the reindeer's back with their original saddle



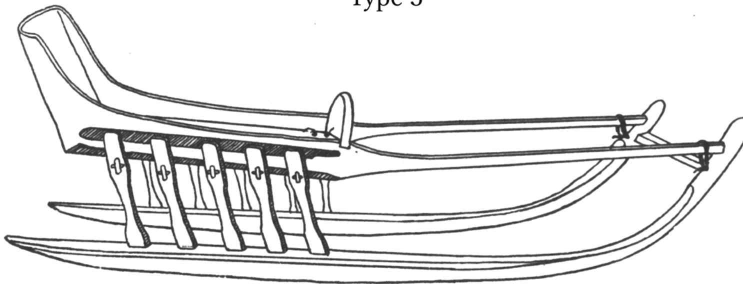
Type 1



Type 2



Type 3



Type 4

Figure 7.3 Types of reindeer sledge. ⏎

Source: Levin and Vasilevich (1951, 64–65).

during snowless seasons. After motorbikes became popular and snowmobiles were used to drive livestock in the 1960s (also called the snowmobile revolution), people stopped using sleds and have almost forgotten how to use them. However, sleds are now used in ethnic tourism.

The second type of sled is seen among people in Chukotka and northern Kamchatka, especially Chukchi, Koryaks, and Yukagirs. It has two runners on which several arch-like props are attached to support a seat or luggage carrier. The props are made of naturally curved reindeer horns or birch tree roots. The front end of the runner is slightly bent and attached to a bar that extends from some front props and bent downward in a semicircle shape. This type of sled is long (no less than 2 m), narrow (less than 35 cm wide), and low (less than 25 cm high; Levin and Potapov 1961, 17). Various parts of the sled were tied to each other using leather straps. Consequently, this type of sled does not have a highly rigid body but can respond flexibly to the roughness of the surface. They usually harness two reindeers, to draw them, and a driver sits on the sled with legs straddled on both sides.

The third type of sled is used by the ethnic people of central and eastern Siberia and the Russian Far East (i.e., Evenki, Eveny, northern Sakha, Dolgan, Negidals, and Uilta). It has two runners, on which three short props are vertically attached to support a seat or luggage carrier. The front end is bent to glide smoothly on snow. This type of sled is long (approximately 2 m), wide (the width of a driving sled is approximately 70 cm, but a carrying sled is a little wider), and low (less than 60 cm) (Levin and Potapov 1961, 16). The most characteristic part of this type of sled is a bow-like curved bar attached to the front end of the runners. Both ends of the bar are fixed to the first props on both sides with tensioned leather ropes. This curved bar functions like the bumper of a car, absorbing shock from obstacles such as shrubs, stumps, and roots. Although all the parts are joined with leather ropes, as in the Chukchi sled, this sled's body is more rigid because the props on both sides are fixed using beams. As a result, the rear part of the sled is rigid to support a driver, passengers, and luggage, while the front part is flexible and resilient to respond to the unevenness of the surface. Simultaneously, it is not easily damaged by obstacles. The drivers sit on the right side of the sled, stretch their left leg on the seat, and place the right leg on the right runner. Two or three reindeer are harnessed, and the drivers control the sled with reins attached to the reindeer on the right side and a long stick. Drivers hold the sled reins in their left hand and the stick in the right hand and give the reindeer basic instructions such as "start" and "stop" using the reins and sometimes prod the animal's back with the stick to encourage them.

The fourth type of sled is widely used in western Siberia by indigenous people, such as the Nenets, who may have distributed it to the Khanty, Mansi, Komi, and Saami to the south and west, and the Enets, Nganasan, Selkup, Ket, and a part of Evenki and Sakha to the south and east. Sleds of this type are long, wide, and high. The driving sled is approximately 2 m in length and has a height of less than 100 cm (Levin and Potapov 1961, 11). Although width was not referenced, I observed that it was the same as the third type of sled (approximately 70 cm, but the width is dependent on the kind of sled). It has two runners on which three, four, or five props are attached to support a seat or luggage carrier. Its most prominent characteristic is that the props are

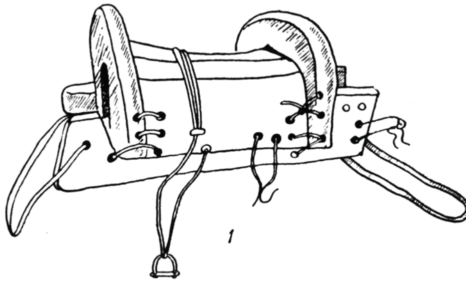
slightly inclined toward the rear and inside. These inclined props function as shock absorbers to soften shocks from the unevenness of the surface. Every part is joined using a mortis and tenon joint. Its body is much more rigid than either the second and third types discussed above and is well adapted to high-speed and high-power driving in open and flat tundra regions. While two or, at most, three reindeer are harnessed to draw the second and third types of sleds, these sleds are drawn by three to seven reindeer and are used even in the summer on snowless grass. In such cases, people harness more animals to obtain more power to draw on a surface with high resistance. The drivers sit on the left side of the sled, stretch the right leg on the seat, and place their left leg on the left runner. Similar to the third type, drivers hold both reins and a long stick to control the sled. However, in this case, they hold the reins in the right hand, stick in the left, and instruct the left-side reindeer to which the reins are attached.

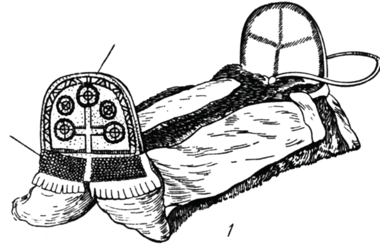
There is a variation derived from the fourth type. Although the fundamental structure is the same, a bow-like carved bar is attached to the front. As is the case with the third type, it functions as a bumper. Levin and Potapov (1961, 11) call it "forest type." Indigenous forest people (i.e., Nenets, Selkup, Ket, and some Evenki) who live in the central and western Siberian forest areas that spread from the left side of the Lena River to the middle basin of the Ob' River use this type.

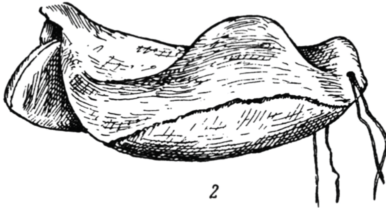
Types of riding and packing saddles

The use of reindeer as riding and packing animals is popular among forest people such as the Evenki, Eveny, Dolgan, and northern Sakha in central and eastern Siberia, Uilta in Sakhalin, Yakut-Evenki in northern China, the Tuva-Tozhu (including the Tsatan), and Tofalar in southern Siberia and Mongolia. The only exceptions are the Saami in Scandinavia, who engage in reindeer herding under tundra-like conditions. Levin and Vasilevich (1951, 71–75) also classified riding and packing saddles for reindeer into several types. Particularly, two types of riding saddle: Sayan and Siberian; and three types of packing saddles: Saami, Sayan, and Siberian (see Figures 7.4 and 7.5).

The Sayan-type riding saddle is similar to that used for horse riding. The size is small, but the method of sitting on the back is the same. The saddle is fixed on the back, slightly behind the shoulder blades, and fastened with three belts running along the breast, belly, and hip (Levin and Vasilevich 1951, 73; Vainshtein 1971, 38). It also has stirrups, on which the riders put their feet when controlling the animal. However, as far as I observed, when they ride, they do not use stirrups but climb directly from the ground to the back. If the rider's physique does not allow them to reach the reindeer's back, they use something on which to step, like a stump or rock. They mount the reindeer on their left side. This type of saddle is used by the Tuva-Tozhu and Tofalar in the Sayan regions (the eastern part of the Republic of Tuva of the Russian Federation).







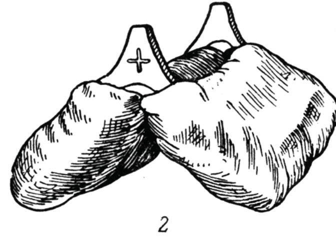


Figure 7.4 Types of saddles for riding and packing reindeer. ⏎

Source: Levin and Vasilevich (1951, 74).

A riding saddle of the Siberian type has a simple structure. Although it has some variations, it fundamentally consists of two boards connected in the front and rear by two parts shaped like a crescent moon. The Evenki often attach a small "wing" to the main board. The riding saddle is wrapped with a fur cover stuffed inside with hair (Levin and Vasilevich 1951, 73). It is fixed on the shoulder blades of the animal and fastened by a belt running along the belly (Vainshtein 1971, 38). The riders did not use stirrups. When I saw riders on the reindeer, they created a rhythm with their legs hanging from both sides of the animal's neck. They mount the reindeer on the right side. First, they put their left leg on the saddle and climbed using a stick for support. I heard that placing a leg was a signal to the animal that the rider would climb.

Among the three types of packing saddles, the Saami type is decisively different from the others. It consisted of two long curved boards connected to the top and was fixed on the back with a string running under the animal's belly. Saddles of this type have not been used for a long time, since the beginning of motorization, and can only be seen in museums of traditional Saami culture. The saddles of the Sayan and Siberian types resemble each other; they consist of two boards and two parts shaped like crescent moons that connect the boards at the front and rear. The distance between the boards is

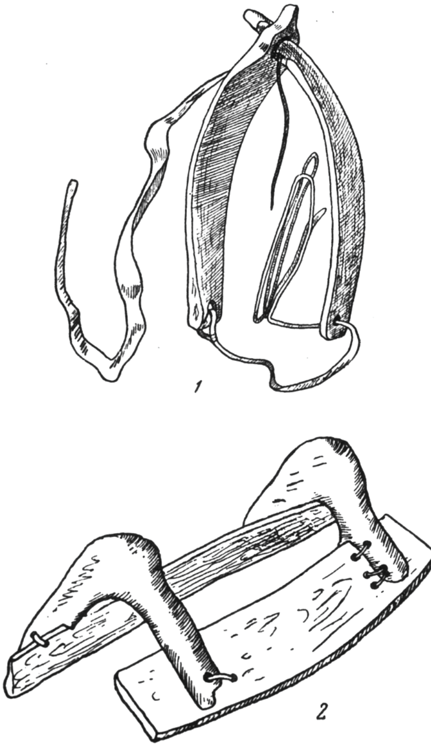


Рис. 7. Вьючные седла: *1* — лопарский тип; *2* — саянский тип

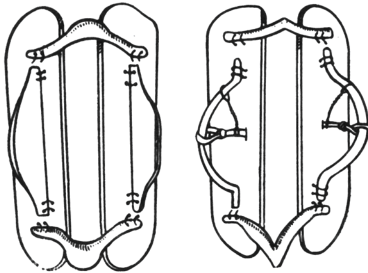


Рис. 8. Остов седла сибирского типа с «крылышками»

Figure 7.5 Types of saddles for packing reindeer. ⏎

Source: Levin and Vasilevich (1951, 72).

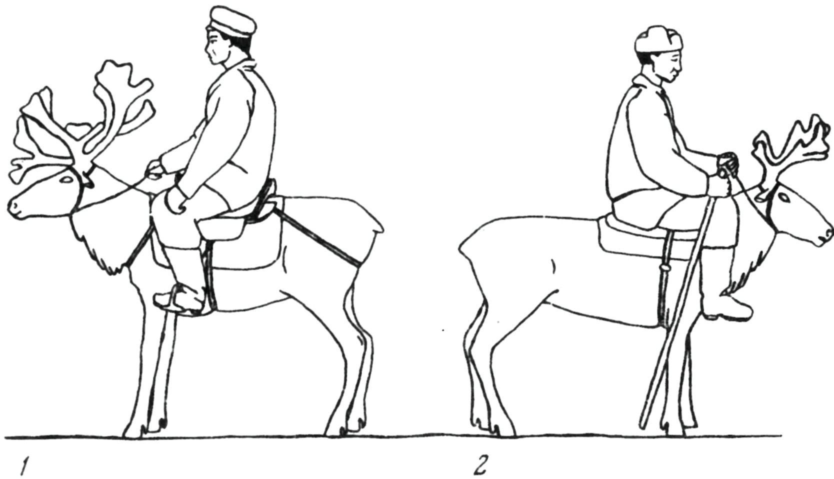


Рис. 1. Способы верховой езды на олене: *1* — саянский способ, *2* — тунгусский способ.

Figure 7.6 Difference of the saddle position and riding manner between Sayan type (left) and Tungus type (right). ⏎

Source: Vainshtein (1971, 38).

wider in the Sayan saddles, which is usually used without a cover, whereas all the Siberian saddles are wrapped with a fur cover.

The manner of reindeer riding is unique and different from that of horse riding (see Figure 7.6). Even Tuva-Tozhu and Tofalar, who use a saddle similar to that for horse riding, control the animal in a different way. First, there is no bit fit into the reindeer's mouth (bridge). A bit is the most important part of controlling the animals. It is set in the gap between the front and back teeth. However, reindeer riders do not use it and attach a rein to a bitless bridle that is worn around the face and tied behind the ears and horns with leather straps. A rein, which is a simple leather rope, is attached to the bridge under the neck (Vainshtein 1971, 40–41). The structures of the bridle and rein are almost common between the Sayan and Siberian styles of reindeer riding, although the saddle type and riding manner are different.

As mentioned above, the people of Tuva-Tozhu and Tofalar mount on animals from the left side. They put their feet in the stirrups, hold the rein, which runs on the left side of the body, in the right hand, and control the animal by pulling and loosening it. When a rider wants to start a reindeer, they kick the belly side using legs. In contrast, Tungus riders who use the Siberian saddle mount on the reindeer from the right side. They hold the rein, which runs on the right side of the animal, in the left hand and have a stick

Figure 7.7 A reindeer saddle of the Sayan type (photo by the author in the Republic of Tuva in 2012). ⏎

Figure 7.8 A Tuva-Tozhu hunter riding on the reindeer (photo by the author in the Republic of Tuva in 2012). ⏎

or cane in the right hand. They do not use stirrups but control the animal with the rein, stick, and legs (as to the saddle and riding manner of the Sayan type, see Figures 7.7 and 7.8; as to those of the Tungus or Siberian type, see Figures 7.9 and 7.10).

Figure 7.9 A reindeer saddle of the Tungus type (photo by the author in Eveno-Bytantai ulus in the Republic of Sakha in 1995). ⏎

A Soviet anthropologist, S. I. Vainshtein (1971, 43), explained the difference between Sayan- and Tungus-type riding as related to the difference in the size and power of the animal. Domesticated reindeer of the Tuva-Tozhu and Tofalar are larger and more powerful than those of the Tungus people. Consequently, the former set saddles on the back, while the latter set it on the shoulder and use a stick to encourage the animal. With the support of the stick on the right hand, they mount from the right side. However, such an explanation is not reliable, as I observed a Tuva-Tozhu hunter going hunting on reindeer back with a stick (used to encourage the animal) in the right hand and, regardless of that, they mounted from the left side.

As Levin and Vasilevich pointed out (1951, 70, 73, 81) and based on what I witnessed in my field research, the Turkic (Tuva-Tozhu) and Samoyed (Nenets) people mount the animal back or sled from the left side, while Tungus people (i.e., Eveny, Evenki, and Uilta) from the right. Levin and Vasilevich (1951, 87), while considering a hypothetical theory of the origin of reindeer breeding in Siberia, assumed that the former had a historic relation to Turkic nomads, while the latter to Mongolians. However, although the Tungus people borrowed some elements and vocabularies of animal breeding and riding culture from Mongolians, their manner of riding is different. The Mongolian people mount the horse from the left side. Meanwhile in East Asia, the Japanese samurai in the middle and pre-modern ages mounted their horses

Figure 7.10 An Eveny herder riding on the reindeer (photo by the author in Eveno-Bytantai ulus in the Republic of Sakha in 1995). ⏎

from the right side. Hence, it is necessary to accumulate more historical and ethnographic data and provide a wider perspective to discuss this problem.

Proper use of reindeer transportation

In the previous sections, I have clarified the geographic distribution of sled and riding–packing use in reindeer transportation, and the types of sleds, and riding and packing saddles. In this section, I will briefly discuss the choice of

the types of reindeer sleds and sled and riding use by comparing the cases of the Nenets reindeer herders in the European tundra (Nenets Autonomous Okrug in Arkhangelsk Oblast) and the Eveny herders in northern Yakutia (Eveno-Bytantai Ulus in the Republic of Sakha). The former live in flat tundra areas, while the latter live in mountainous forest–tundra areas.

Difference between the sleds of the Nenets and Eveny

Ground conditions, flora, and purpose of use influence the choice of the types of sleds that people make. This is because these elements determine the appropriate rigidity and resilience of the sled body. On the comparatively flat ground of a tundra, people often require high rigidity to the sled body to drive at high speeds. The ground surface of tundra consists of lichen, grass, and peat, which contain significant amounts of water. It is soft, wet, and slippery in snowless seasons, but hard and smooth when covered with snow and ice in winter. People (i.e., the Nenets, Enets, and Khanty) use the fourth type of sled (see above) even in summer. The rigid body drawn by several reindeer provides a smooth and swift drive on the soft and wet ground of the summer tundra. Moreover, it does not damage the tundra surface, unlike a tracked vehicle such as a *vezdekhod*. When I visited a summer pasture of Nenets herders in the Nenets Autonomous Okrug in October 1988 with a Japanese TV crew, I was surprised to see how fast herders drove sleds on snowless ground. Each sled was drawn by five reindeer (see Figures 7.11 and

Figure 7.11 A reindeer sledge of the Nenets (photo by the author in Nenets Autonomous Okrug in 1988). ⏎

Figure 7.12 Reindeer sledge driving in the snowless season (photo by the author in Nenets Autonomous Okrug in 1988). ⏎

7.12), which moved away from us so fast that my camera could not keep up with their movement. This type of sled can be used on snow-covered ground with fewer drawing animals (see Figure 7.13).

The Nenets sleds are used for both long-distance journeys in seasonal migration and reindeer chase in herd control activities. Unfortunately, I have never witnessed their seasonal migration caravan, but according to Golovnev (2017, 10), the caravan has 20–30 reindeer sleds for driving and luggage carrying in the case of a medium-sized family (a large family requires 30–40 sleds). However, they actually take along additional sleds (80–90 sleds), because the whole caravan is changed in the middle of the migration route that connects winter and summer pastures and they often leave some sleds on the route to conserve food and other essential equipment.

The caravan is formed to take reindeer herds to the next pasture with all their equipment including houses (i.e., conical tents covered with sheets of sail cloth in summer or reindeer fur in winter). They use various kinds of luggage-carrying sleds as well as driving ones that Golovnev showed (2017, 11 [second figure]).

In the case of reindeer herd control, the driver (reindeer herder) has to repeat the start, stop, and turn steps during watching the herd. For this purpose, they require a light body, as well as a rigid one, that enables them to drive at high speeds and with quick response. When I visited the Vaigach

Figure 7.13 ⏎ A reindeer herder driving a sledge driving in the winter tundra (photo by the author in Vaigach Island in Nenets Autonomous Okrug in 1988).

Island, located between the continent and Novaya Zemlya, like a stepstone, with the same crew, I observed how a Nenets herder led a reindeer herd on a sled. The herder controlled a thousand heads of reindeer, driving around with his faithful dog, which supported the herder in bringing back any reindeer that would run away from the herd. The driver manipulated his sled at will with a rein and long stick. As described in ethnography, the driver gave instructions to a drawing reindeer on the left side, which was well trained, tethered to the driver through the rein, and had mutual reliance with him. As far as I observed on this island, the collaboration between a herder, harnessed reindeer, and a dog enabled him to control a herd of a thousand animals without any other help.[3] This might be similar to the triad that Anderson (2017, 405) pointed out in the case of the Evenki hunter; though the dog was not tethered, it always walked snuggling up to the sled in the Nenets case.

For the Nenets reindeer herders, who fundamentally live a nomadic life and always move with their livestock in search of better pasture, herd control and migration are inseparable. The fourth type of reindeer sled, which has a light and rigid body that facilitates quick manipulation and long-distance traveling, is the best choice for their lifestyle and reindeer herding.

Unlike the case of the Nenets, the Eveny and Evenki, who use the third type of sled, live in the forest–tundra zone, in which open spaces and forests are distributed in a mottled pattern. The open spaces have tundra-like flora,

and soft, wet, and flat ground, whereas there are many obstacles in the forest zones, where the ground surface is solid. Consequently, it is more appropriate to ride and pack reindeer than drive a sled when traveling through both tundra-like places and mountainous forests during snowless seasons. The Eveny, who live in more northern areas than Evenki, use reindeer sleds more often. However, they neither drive sleds to control herds nor chase wild animals for hunting. Their sleds do not fit such activities that require quick response. Instead, they ride on reindeer when necessary. Reindeer riding is much more convenient for chasing animals quickly, both in the case of herd control and hunting of wild animals.

The Eveny and Evenki people use the reindeer sled for comparatively long-distance movement with much luggage during the winter. Paths for reindeer sleds that connect villages and reindeer herding pastures or hunting and fishing territories are often seen in these forests. They make a caravan of sleds (for driving and luggage carrying) and dozens of reindeer, both to draw the sleds and as spare reindeer. The luggage consists of food and equipment needed for camping in the pasturelands or products of reindeer herding, hunting, and fishing carried to the villages. In addition, they use reindeer sleds to make a middle-range trip to hunting and fishing sites from the camps. If the hunting/fishing is successful, they need to carry a significant load back to the camping site using the sleds. As explained below, their manner of using sleds and riding reindeer is similar to that of the Uilta (Orochon) in Sakhalin

Figure 7.14 A reindeer sledge of the Eveny (photo by the author in Eveno-Bytantai ulus in the Republic of Sakha in 1998). ⏎

Figure 7.15 A reindeer herder driving a sledge in the winter forest-tundra (photo by the author in Eveno-Bytantai ulus in the Republic of Sakha in 1998). ⏎

(Kwon 1998, 118). In both long- and middle-distance journeys, they do not have to drive a sled at high speed or repeat the start, stop, and turn steps and, consequently, do not need a high-rigidity sled body, but a flexible body that can overcome obstacles without damage; thus, a sled body should be more resilient. According to a Sakha hunter–herder guide, who took me to the reindeer pasture and wild sheep hunting during my field research in 1995 and 1998,[4] the third type of sled, which has vertical props and a bow-like bumper, matches their requirements (see Figures 7.14 and 7.15).

Proper use of the reindeer driving and reindeer riding of the Eveny herders

As mentioned above, the Evens, some Evenki, northern Sakha, Dolgans, Negidals, and Uilta use both reindeer sleds and riding/packing reindeer. Based on my observations, they chose their equipment in accordance with the differences in location, distance, and purposes. I will describe how they choose to sled or ride from my own field research in Eveno-Bytantai Ulus in the Republic of Sakha.

My field research in this region was conducted in October to November 1995, with an animal ecologist, and in November to December 1998, with another anthropologist. In both cases, I observed how the Eveny and Sakha herders used reindeer sleds and riding animals. In 1995, our guides (see endnote

Figure 7.16 A reindeer sledge caravan in the winter forest-tundra (photo by the author in Eveno-Bytantai ulus in the Republic of Sakha in 1995). ⏎

4) took us from Batagai-Alyta (the capital village of the Eveno-Bytantai Ulus) to Kustur (the second village of the Ulus, in which our guides lived) by car and from Kustur to a base camp of reindeer pasture by sleds. It took three days to sled from the village to the camp. They created two sets, composed of driving and luggage-carrying sleds. In one set: two reindeer were harnessed to a driving sled; another two that were tied to the rear end of the driving sled were harnessed to a luggage-carrying sled; and two more were tied to the rear end of the luggage-carrying sled. The final reindeer were spares. Twelve reindeer were used as caravans. This was not that large, because I observed a caravan consisting of five sleds and dozens of reindeer on the way (see Figure 7.16). Two herders took the reindeer and some luggage to Kustur. Our caravan guides said that it was a normal size when they moved between the pasturelands and village, and that our caravan was comparatively small.

Our guides got on the driving sleds, while we, the Japanese researchers, sat on those for luggage carrying. When driving, they gave instructions to a reindeer (a well-trained one) on the right side and, simultaneously, encouraged those harnessed to the luggage-carrying sled and running after the driving sled. It served as training for young reindeer, which had less experience.

Similar to the Nenets, mutual reliance can be seen between a driver and a well-trained leading reindeer in the case of Eveny and Sakha drivers. We had an accident when we started to move from the reindeer pasture to a sheep-hunting

camp. Our Sakha guide lost a reindeer, which he always harnessed on the right side and gave instructions. The reindeer might have been mixed in the herd staying in the pasture. Upon noticing that the reindeer was not close to him, the herd spread over a wide area. He was deeply shocked and disappointed because it was his beloved animal. Though he stayed in the camp for a couple of days to look for the reindeer, I later heard that the result had been negative. This indicates that Sakha and Eveny herders have intimate relations with some of their domesticated reindeer, especially with a leading sled animal; such a relationship enables reindeer to properly respond to the driver's instructions.

In this research we participated in wild sheep hunting conducted by some Eveny and Sakha hunters and observed how they approached hunting grounds and animals. They took us to the hunting ground on reindeer sleds. One of the hunters always took a reindeer for riding. They drove sleds to search for a hunting game. When they found wild sheep at a distance, they went to the foot of mountains or hills, where the animals rested on the slope. Upon arriving, they got off the sleds, told us to wait and watch the hunting process from there (so as not to disturb their activities), and hurried to the vantage points on foot or on reindeer back (Figures 7.17 and 7.18). Their movement was swift and quiet and was not noticed by the animals. The riding reindeer was good at hill climbing and swift movements. Hunters had to carry a gun and many bullets while wearing heavy, fur clothes. Although they were

Figure 7.17 Hunting with reindeer sledges and riding reindeer (photo by the author in Eveno-Bytantai ulus in the Republic of Sakha in 1995). ⏎

Figure 7.18 Hunting on a reindeer (photo by the author in Eveno-Bytantai ulus in the Republic of Sakha in 1995). ⏎

tough, powerful, and able to climb cliffs even with heavy equipment, it was more convenient for them to ride on a reindeer to approach the game.

As far as I have observed, the hunters, whether moving on foot or on reindeer back, only chased and shot the game, but they never brought back the hunted animal's carcass even to our waiting point. They once came back to the waiting point with empty hands; they took the sleds to collect the hunted animals. We, the Japanese researchers, were able to help load the animal carcasses onto the sleds. As it was the cold season (I conducted the field research in October and November, and the temperature often reached −30°C or sometimes even −40°C), the hunters dismembered the carcasses on the way back to the camp, before they completely froze up.

This way of using sleds and riding reindeer reminds me of Kwon's description on the Uilta (Orochon) hunters. He wrote,

> Orochon hunters search for and stalk the game, mostly wild reindeer, on saddled reindeer. The dead animal is beheaded, skinned on the spot and left covered with skin and shrubs. Before the hunter returns to the camp, he installs a few traps around the kill, in which some pieces of the victim's gut are laid in the hope of catching sables and foxes. Within the next few days, the hunter will drive back in his sledge to the sites of his kills and collect the carcasses.
>
> (Kwon 1998, 118)

The Uilta hunters were so clever that they used the wrapped carcasses for trapping carnivorous fur-bearing animals, leaving the carcasses at the kill site until they came back to collect them. I have never seen such a scene in Northern Yakutia, probably because the carcasses often attracted wolves.

Kwon refers to the ideological difference between sleds and saddles (riding reindeer) on the basis of hunters' narratives. However, I have never heard Eveny and Sakha hunters speaking about a difference between sleds and saddles in this way. They only said that because the hunted game was heavy, it was much easier to carry on the sled. This explanation only reflects a practical use of the reindeer sled and reindeer riding.

There are few riding reindeer compared to sled-drawing animals. The reindeer must have special training to carry a person and establish a more intimate relationship with riders than with drivers. A riding reindeer appears to be an elite, specifically chosen from the many animals of the herd. The reindeer may choose a rider; foreigners cannot easily master how to ride a reindeer because they decide whether the person deserves to be placed on the back or not, and because they do not easily give a rider their acceptance.

Unfortunately, I could not observe how they traveled in a caravan with packing reindeer during snowless seasons. They said that they had packing saddles for luggage. However, when I conducted my field research, I saw them using horses more often in summer than riding/packing reindeer for transportation between pasturelands and their village. Based on my own field observations and experiences, I can conclude that Eveny and Sakha reindeer herders and hunters properly use reindeer sleds and riding reindeer in accordance with the difference in moving distance, seasons, and purposes. They use riding reindeer to approach game, gather reindeer herds, and move in the summer. In the first two cases, the distance covered was relatively short, the trajectory of the movement was complicated, and the quick response was needed. Riding reindeer for long-range travel in summer was almost entirely replaced by horses and motor vehicles. For middle- and long-range travel in the snow-covered season, the reindeer sled is the best transportation equipment, especially in the case with heavy luggage. They make a caravan of driving and luggage-carrying sleds with dozens of drawing reindeer. However, this has been partially replaced by snowmobiles since the end of the 1990s as discussed below.

Motorization among the Siberian reindeer herders

Motorization has caused critical changes among reindeer herders with the introduction of motorbikes and snowmobiles (Pelto 1973). It also influenced the use of reindeer among the Siberian people; however, the influence was restrictive and not as decisive as that of Saami reindeer herders in Scandinavia.

During the second research in the same village in 1998, the herders and hunters took us to their pasturelands on a snowmobile caravan that consisted of three snowmobiles, each of which was attached a sled for

luggage (and for the Japanese passengers). It was faster and required fewer days to complete. However, it was extremely painful to ride on a snowmobile and attached sled during the severe Siberian winter. One had to drive at a high velocity at a very low temperature (often at –40°C). Moreover, the Soviet snowmobiles were not reliable because the engine often failed owing to mechanical problems and low-quality gasoline and oil. We would repeatedly drive for 30 minutes followed by 1 hour of rest to repair and clean the engine. Nevertheless, it was faster than moving on a reindeer sled. We ran through a distance that would take three days on the sled, in one day on the snowmobile. Therefore, in the case of our 1998 research, herders and hunters moved on a snowmobile caravan for long-distance trips, such as that between the village and pasture lands, on a reindeer sled caravan for a middle-range trip, such as that between a base camp of pasturelands and hunting or fishing grounds, and on reindeer back or foot to reach waiting points for hunting.

Some hunters, especially Russians, used snowmobiles to hunt wild reindeer in the 1990s. They chased the animals on snowmobiles to a predetermined point where the shooters were waiting. In this case, unlike the narratives of the Uilta hunters that Kwon (1998, 117) quoted, the smell and loud noise from the engine helped chase the animals to the shooting spot. However, snowmobile hunting requires hunters to use the latest model vehicles, high-quality fuel, and oil. It was impossible for indigenous hunters and herders in northern Yakutia, who experienced serious hardships caused by the economic crisis after the collapse of the Soviet Union, to buy such expensive equipment. The "Snowmobile Revolution," which led to drastic changes in the Saami society during the 1960s and 1970s, did not have a similar decisive influence on the indigenous societies in Siberia during the 1990s because of certain technical, energetic, economic, and social problems that were characteristic of a post-Soviet society.

Other factors that restricted the popularization of the snowmobile in Siberia and Far East Russia can be seen in articles by Kwon (1998) and Stammler (2013).

According to Kwon, Uilta hunters on Sakhalin rejected snowmobiles for hunting for practical and psychological reasons. The practical reason was that the smell of the fuel and the engine noise caused a major disturbance during the hunt. The Uilta hunters stated that animals are highly sensitive to human smell and noise, and so hunters should make every effort to minimize them. Snowmobiles elevate noise and smell to such a level that the hunters "themselves would not be able to stand" (Kwon 1998, 117). Kwon indicated that contrary to the Russian hunters in Northern Yakutia, who made use of the smell and noise from snowmobiles to drive the wild reindeer, Uilta hunters preferred to keep silent and steal up to the game without being noticed. The Uilta hunters "conclude that snowmobiles are an ineffective technology for hunters and that it would be irrational to waste money on such thing" (Kwon 1998, 117).

Regarding the psychological reason, Kwon pointed out an interesting thing—a snowmobile was considered a prestigious item and created envy among the villagers. People used them to go fishing in nearby rivers and send elders to visit friends and relatives within the village. However, they also took pride in traditional reindeer transportation, not only because it was their cultural heritage but also because they found reindeer transportation to be superior to motorized vehicles (Kwon 1998, 117). Remember that Kwon's research was done in 1989–1990 (Kwon 1998, 125), that is, the final years of the Soviet Union. This means when he stayed in Sakhalin, Soviet political, economic, and social systems were still alive, and those who were familiar with the "real traditional way of life" were also still alive. Thus, the Uilta hunters' skepticism regarding snowmobiles, as reported by Kwon, may reflect the ideas of this older generation.

Stammler highlighted interesting and important factors that restricted the popularization of the snowmobile among the Nenets herders in Yamal Peninsula, western Siberia. First, the Soviet Union policy that promoted "large-scale transportation mechanization with helicopters, tractors and tracked vehicles (*vezdekhod*) for the tundra" restricted the popularization of the snowmobile, which was seen as an individualized consumer good that was "not desirable for the practice of reindeer herding" (Stammler 2013, 230). I think this is a key factor that caused the shortage of spare parts and fuel and reinforced the idea that the snowmobile was unreliable.

Second, geographic conditions are quite different between Scandinavia and western Siberia. Stammler wrote, "physical conditions in much of Fennoscandia are more favourable for the diffusion of individual mechanized transport" and in "Siberia, distances between populated centres are much further than any snowmobile fuel tank can reach" (Stammler 2013, 230). He also wrote, "travel activity has become restricted to the range of fuel tanks" (Stammler 2013, 231). This means the size of the snowmobile tank is too small to travel in the vast tundra of western Siberia. However, in the early 2000s, the use of snowmobiles increased among nomadic fishermen and small herd owners, who did not have to travel long distances. And he witnessed "herders doing the actual day-to-day herding work on a snowmobile" in the early 2000s in the furthest north, and such use of snowmobiles became widespread by the 2010s (Stammler 2013, 230). Comparing his observation with mine in 1988 (in Vaigach Island), it is clear that, since the early 2000s, herding on a reindeer sled has been rapidly replaced by that on a snowmobile, which provides similar or better performance in terms of speed and manipulation.

Interestingly, Stammler pointed out that many privately bought snowmobiles were used only for "social activities such as bride-search, visiting friends and relatives, trips to town, etc" (Stammler 2013, 230). Kwon showed a similar trend among the Uilta (Kwon 1998, 117), except for the bride-searching part. As Kwon conducted his research in the final

years of the Soviet regime, this can be considered a typical and popular use of snowmobiles among the Siberian people since the late Soviet era.

The comparison between Northern Yakutia, Sakhalin, and Yamal revealed the difference in the use and popularization of snowmobiles based on geographic and social conditions. The Eveny and Sakha hunter–herders used snowmobiles to travel longer distances with luggage and passengers, for example, from a village to a herding pasture. The Uilta and Nenets used them for social activities requiring short-distance travel like bride-searching, visiting friends and relatives, and so on. Some Nenets used them for herding reindeer, while Eveny, Sakha, and Uilta hunter–herders did not. Only Russian hunters, who had the latest model, chased wild reindeer on snowmobiles to hunt them.

Unlike in Scandinavia, the use of snowmobiles was restricted in Siberia and Far East Russia. However, since the 1990s, people have been slowly expanding their use of snowmobiles, tailoring their utility to changes in economic and social conditions.

Conclusion

Based on the ethnological analysis by Soviet anthropologists, the results of the field research of some western and post-Soviet anthropologists, and those of my own field research, I discussed some issues regarding the use of domesticated reindeer for transportation purposes: (1) characteristics of each type of sled, and riding and packing saddle; (2) factors that make people choose the transportation methods, such as driving a sled, riding on the animal, and packing on it; (3) differences in the driving and riding manners between east and west; and (4) the influence of motorization on Siberian reindeer herders.

The following conclusions were reached. Regarding the first issue, I compared two types of sleds, that is, inclined props (the fourth type of Levin and Vasilevich's classification) and vertical props (the third type of the same classification). The fourth type of sled has a more rigid body and affords the driver high-speed driving and quick response. This type is widely used by western Siberian peoples, such as the Nenets, Enets, Nganasan, Khanty, Mansi, Sel'kup, Ket, and some Evenki, Dolgan, and Saami. Herders can use sleds for herd control as well as long-distance journeys. In an extreme case, the triad of a herder, well-trained harnessed reindeer, and a dog can control a thousand reindeer without any other help, as was seen in the Vaigach Island.

The third type of sled has a more flexible and resilient body and bow-like bumper. This type is well-adapted for use in a forest environment, where many obstacles block the way. A driver can dodge or ride over them without damaging the sled. This type is used by Eveny, Dolgan, Evenki and Sakha, Negidals, and Uilta. Although it does not have a high speed and quick response, these people do not require such a sled, rather, they need resilience and durability. They mainly use sleds for long- or middle-distance journeys

during winter. For the summer journey and chase of animals, riding and packing reindeer are used. However, the Eveny, who live with Sakha in the same villages, more often use horses to move in the summer.

Regarding the second issue, geographical conditions, such as ground surface, landscape, and flora, and the purpose of use are the decisive factors that make people choose the methods. For example, in tundra or tundra-like areas, where the ground is comparatively flat, covered with water-containing lichen, grass, and peat, which is always wet and slippery in summer and frozen and covered with snow in winter, a reindeer sled affords people the most comfortable and eco-friendly transportation. In particular, in western Siberia, where vast tundra areas are spread along the cost of the Arctic Ocean, the Nenets, Enets, Nganasan, some Khanty, and Komi drive reindeer sleds in both winter and summer. They use sleds for herding and long-distance journeys. The structure of their sleds corresponds to the high-speed driving and quick dash, stop, and turn that they require of the sleds.

People in central and eastern Siberia and the Far East, such as Dolgans, some Sakha, Evenki, Eveny, Chukchi, Koryaks, Yukagirs, Negidals, and Uilta, use reindeer sleds only in winter, when the ground is covered with snow. Unlike the tundra areas in western Siberia, their residential areas are mountainous, and the forest and tundra-like zones are distributed in a mottled pattern. They use the sled for long- or middle-distance journeys, such as between a village and pasturing camps or between camp and hunting/fishing grounds. The structure of their sleds corresponds to the requirement that the sled body be flexible and resilient to ensure smooth driving on rough ground. However, they do not use it to chase animals in herding and hunting because the sleds cannot respond to their quick movements.

Riding reindeer is a well-adapted transportation method for the mountainous forest environment. They can walk smoothly on rough and slippery grounds covered with wet grass and sedge-like plants. Such places are often found in the mountainous areas of Siberia. People in southern and central Siberia, such as Tuva-Tozhu, Tofalar, and Evenki, use reindeer only as riding–packing animals.

Simultaneously, riding reindeer is useful for chasing animals during herding and hunting. A well-trained reindeer is faithful to a rider, quickly responds to his instructions, and affords him swift and quiet movements. The Eveny, Evenki and Sakha, Dolgan, Negidars, and Uilta, who drive sleds to travel in forest–tundra or tundra-like areas in winter, also ride reindeer. They ride on a reindeer's back when gathering herds and chasing animals in hunting, regardless of season. These people properly use sleds and riding animals in accordance with differences in seasons, geographic conditions, and purposes. Practices of the Uilta hunters described by Kwon (1998) and those of the Eveny hunters observed in my field research exemplify the proper use of reindeers for sled-driving and riding.

In this study, I could not address some issues that require a historical–ethnological approach. For example, those concerning the sled use and disuse

of riding reindeer by forest hunter–breeders in western Siberia and the distribution of the "Aldan-Amur type" sleds in the southern part of eastern Siberia and the Far East are included. The third issue regarding the difference in driving and riding manners between east and west is also one of the questions that cannot be answered. Although Soviet anthropologists, such as Levin, Vasilevich, and Vainshtein, have provided some answers, they were so suspicious that I could only outline the issues. Further analysis of historic and ethnographic data on the reindeer herders in Siberia and the Far East, and those on the people in the neighboring areas are thus needed to fully address this matter.

As for the fourth issue, regarding the influence of motorization on Siberian reindeer herders, it was found that motorization has influenced the transportation of indigenous Siberian herders and hunters in some degree. However, some serious factors like mechanical problems, low-quality fuels, and limitation of range of movement by the fuel tank capacity prevent people from wholly depending on their motor vehicles. Social and economic problems, such as impoverishment after the collapse of the socialist economy, do not allow people to use the latest vehicle models and high-quality fuels due to the expense.

Adding to these negative factors, some positive factors encourage people to use reindeer sleds and riding/packing reindeer even in the current era, when mechanized and digitalized goods are predominant. For example, reindeer transportation is physically superior to other animal transportation and motor vehicles as it enables smooth and comfortable movement on the soft, wet, and slippery land in the tundra and it does not generate smells and noises that drive away game. An ideological factor is that reindeer herding is a source of ethnic identity for the Siberian and Far Eastern indigenous people, and hence, it is important to promote reindeer transportation. I believe that the use of reindeer for transportation will be sustained even in the 21st century.

As mentioned in the beginning, this is merely a preliminary discussion, and I described only an outline of the answer to each question. Moreover, there are many other issues that remain unanswered in this study. I hope that research and discussion on the transportation use of domesticated reindeer, as well as the origin and process of reindeer domestication, will also develop.

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Notes

1 The choice of dog sleds or reindeer sleds can be generally explained by the difference in lifestyle and feed for domesticated animals, that is, settled or nomadic and sufficient supply of meat and fish or reindeer lichen (Levin and Cheboksarov 1955, 4–6; Levin 1972, 4). In Sakhalin the Nivkh and Ainu lived in the former style and had a sufficient supply of fish, whereas the Uilta in the latter had reindeer feed in their living areas. Some Nivkh practiced reindeer breeding to pack luggage on the back and harness a sled, borrowing techniques and equipment from the Uilta. Ainu have never engaged in reindeer breeding. Nevertheless, they had an original word "tunahkay," which meant reindeer and which turned into the Japanese word "tonakai." However, the questions of why only the Uilta chose nomadic life, and how and where they learned reindeer breeding, sled harnessing, and luggage packing are still under discussion.

2 The superiority of reindeer transportation was often witnessed in the battles of indigenous reindeer nomads in tundra, such as the Chukchi, Koryaks, Evens, and Chuvans, against the Russian Cossacks in the 18th century. The former often attacked the latter using hit-and-away tactics, driving reindeer sleds. The Chukchi has never been subdued by Russian military campaigns. Even the Russian Cossacks used reindeer sleds and riding reindeer maneuvered by the surrendered reindeer Koryaks and Evens when moving in the tundra area (Okuni 1935). Currently, reindeer transportation is superior to modern vehicles in that it does not waste expensive fuel, rarely malfunctions, and causes no damage to the ground surface and local flora.

3 The fact that there were no wolves on this island is also an important factor that enables the herder to control a large herd with such a small team. On the continental side, I heard that reindeer herds were often victims of wolves. In many cases, it is impossible to leave the herd to a single herder.

4 The two guides took us to pasture and hunting sites in 1995. One was of Sakha ethnicity and the other was Eveny. They were old friends who served military services in the Soviet Navy. As they grew up in an environment where hunters and reindeer herders were always close, they were good at sled-driving and hunting. The Sakha guide finished graduate school at Yakutsk University and became a specialist in agricultural sciences. When I conducted the field research, he worked in the village administration office in Batagai-Alyta as deputy mayor, while the Eveny guide lived in Kustur as a member of a local collective farm. The Sakha guide led us to the second research in 1998, while the Eveny guide did not due to scheduling conflict.

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8 Between foot rot and wolves

The internal and external threats of Tozhu reindeer herding[1]

Charles Stépanoff

Reindeer (*Rangifer tarandus*) are reared in North Asia in highly variable conditions and methods. Pastoral livestock herding on the northern tundra brings together herds of several thousand animals, mainly for meat production. In the central and southern taiga regions, hunter-gatherers raise small herds of only a few dozen reindeer, the primary use of which is transport. Irrespective of the type of reindeer herding, the fragility of reindeer pastures traditionally requires herds to be moved regularly over vast unfenced territories. Paradoxically, to domesticate reindeer, people need in some way to keep them (in the) wild (Stépanoff 2012). This essential mobility confronts herders everywhere with a double threat, having contrasting consequences. If reindeer are too scattered, they may fall prey to predators or join herds of wild reindeer from which they are barely distinguishable biologically. If, on the other hand, the reindeer stay gathered in one place for too long, the pasture will be quickly depleted, the animals becoming weak and stressed and therefore more prone to contracting diseases, the contagion of which is itself facilitated by the concentration of the herd. Protecting the reindeer from wolves, which first cull sick individuals, prevents their action of cleansing the herds. The best remedy for disease, which is the dispersal of the herd, exposes the reindeer to what can be described as the "external" threat posed by predators and wild reindeer. Conversely, the fight against this external threat involves keeping the reindeer under surveillance close to humans, which provokes the "internal" threat of epizootic diseases.

In annual cycles, the internal threat is most acute in summer, as reindeer tend to gather to escape from insects; in winter, when reindeer disperse in search of food, the external threat is greater. Beyond this rhythmicity, it is important to observe that the very process of reindeer husbandry, which necessarily involves gathering reindeer close to humans for varying lengths of time and with varying degrees of regularity, is in itself a constant factor in the spread of disease. Infectious diseases such as foot rot (necrobacillosis) and anthrax are endemic among domestic reindeer. Evidence of the direct role of domestication in the spread of these diseases can be found in the fact that

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wild reindeer populations are generally much healthier than domestic herds (Klein 1980, 751; Jernsletten & Klokov 2002, 63).

All reindeer husbandry systems must implement techniques to deal with this paradoxical double threat, one internal, arising from the practice of reindeer herding itself, and the other external, arising from the environment that is necessary for reindeer herding. Here we will examine the case of reindeer herding among the Tozhu people of the Sayan Mountains in southern Siberia, in the eastern part of the Tuva Republic. Sayan reindeer breeding has long attracted the interest of researchers because it is both the southernmost and one of the oldest known, dating back to the Bronze Age (Kyzlasov 1952). During the 20th century, Tozhu reindeer herding underwent two dramatic crises: (i) collectivization in 1949 following the incorporation of Tuva in the USSR (Union of Socialist Soviet Republics, 1944), and (ii) privatization in the 1990s, which saw reindeer livestock diminish by 90%. As reindeer diseases are closely linked to the way of life of reindeer herders, they were an important political issue for the Soviet government over time. This article examines how Tozhu herders have responded to this double threat in the context of these historical upheavals. This approach will attempt to shed light on the origins of the recent disaster suffered by Tozhu herders.

Nomadic herding: between foot rot and wolves

Today, 35 Tozhu herding families are officially registered, with total livestock of around 1,100 reindeer. Herders became de facto independent after the liquidation of the *sovkhoz* (state-owned farm) regime in 1996: even when they are registered in phantom cooperatives, they are free to choose their nomadic routes, to slaughter their reindeer whenever they wish, and to kill the predators that threaten them. The Soviet-era helicopter veterinary service has been discontinued, which many farmers complain about. The herds today are small, varying for the most part between 20 and 50 animals, which corresponds to herd numbers prior to the Soviet period (Vainshtein 1980, 122). Tozhu herders say they know their individual reindeer, each of which has a name. They are used for transport, either for riding or as pack animals. Furthermore, from spring to autumn, female reindeer provide milk from which butter and cheese are made. Reindeer meat is rarely consumed, as meat supply is more likely to come from hunting. The same was true in 1910 when D. Carruthers visited the Tozhu: “killing [reindeer] is deemed an extravagance as long as there is game available” (Carruthers 1914, 220). Reindeer are valued as living animals rather than as a source of meat. From the descriptions provided by Carruthers, Tim Ingold (1986) estimated that Tuva reindeer are “domestic” in the strongest sense of the word: they are indeed members of the family. Ingold called such a system of “social” relationships between humans and reindeer *taming*, where the latter feature as “quasi-people” (Ingold 1986, 10). A similar kind of small-scale reindeer herding

associated with hunting and fishing was widespread further in the North, in the Eurasian Arctic, up to the rise of pastoral economies from the 17th to 18th century in this region. In the large-scale herds, which now prevail in the Arctic tundra, the hybrid human–reindeer sociality is counterbalanced by the strength of the internal sociality of the herd (Stépanoff 2017). Recent fieldwork studies have shown that these pastoral communities maintain a personal relation of taming with their labor animals combined with a more distant relation with the majority of the herd, which is intended for meat production (Stammler 2010; Takakura 2010; Bureau 2021).

Contemporary Tozhu herders do not aim for growth of their herds but rather for stability, yet many have great difficulty in maintaining the numbers in their herds. It is not uncommon for a herder with 30 reindeer to have 10 of them killed by wolves in one year. In 2010, several herds were halved or depleted to one-quarter of their size, while the luckiest were stable or increased slightly.

Seven or eight herders, however, do have more than 50 reindeer. Among these, old Oleg Orai-ool, particularly respected in the Upper Yenisei valley, is recognized as both commanding the largest herd and being the most experienced herder. Having started with around 20 animals after the fall of the *sovkhoz* of which he was an employee, he now has a stable herd of around 150 animals. He claims that his reindeer are spared from wolf attacks and that the diseases known at the time of the *sovkhozes* have "disappeared." For the Tozhu, the reason for this success is evident: Oleg is highly knowledgeable about both reindeer and the taiga and knows how to choose his pastures and nomadic routes. He is a role model for everyone, and it is for this reason that his methods are described here. Established before all other herders, he is not afraid to live 150 km from any village, nor to endure the harsh mountain climate, at an altitude of 1,200 m at the lowest point, in order to allow his reindeer to access the best pastures.

To avoid foot rot (in Tuvan, *duiug aaryy* or "hoof disease"), but also to ensure the replenishment of lichen on which the reindeer feed, Oleg moves around 15 times per year. In addition to these seasonal movements, he changes his nomadic route from one year to the next so that he does not return to the same grazing pastures two years in a row. Veterinarians (Rebrov 1962; Zhigunov 1968) describe foot rot as an infectious illness, the germs of which are spread by animal excrement and remain in the soil for several years, so that the best prevention and remedy is indeed to change pastures (for more on the Evenki explanation of this process, see Lavrillier 2005). Foot rot is promoted by excessive summer heat (Handeland et al. 2010), as is bronchial pneumonia, a non-contagious disease (Zhigunov 1968). Oleg remembers how Soviet veterinarians treated "lung disease," *ökpe aaryy* (bronchial pneumonia), with a penicillin injection that restored the animals to health within three days. Now that such treatments are no longer available, Oleg treats the reindeer with decoctions of herbs from the forest, but he admits that these are not always effective.

Therefore, he tries above all to prevent the disease by choosing his summer pastures correctly. Like all Tozhu herders, Oleg goes up to the mountain pastures in the summer, which enables him to guarantee the cool temperatures necessary for the reindeer's good health. "If you put yourself in the wrong places," he explains, "the reindeer will get lung disease straightaway. They will suffocate. You have to choose a place where there are no trees, where the wind is blowing day and night." The wind ventilates the herd and chases away insects, which tire the reindeer considerably in the summer and cause or spread disease.

In order to avoid having to monitor and assemble their herd too often, which would require excessive effort and increase the risk of disease, farmers skillfully draw on the behavior and intelligence of their animals. Oleg chose to lead a nomadic lifestyle in the rather steep valley of the Sajlyg, taking the same paths for the spring ascent and for the autumn descent. The steep mountains surrounding the valley discourage reindeer from straying.[2]

> So, I have only one route, there and back. It is my routine and the reindeer's routine too, they know the road better than I do. I send them to the summer pastures, and they go there, I don't have to look for them. … The animals have learned the way [*öörenip algan*].

Reindeer herders even say that the reindeer sometimes begin to move without their intervention as soon as it becomes hot. It is therefore the herd which gives the signal to begin roaming.[3] In winter, Oleg alternates between five log cabins he has recently built in the wooded valleys of the tributaries of the Upper Yenisei. Having perfect knowledge of the usual relative snow cover of the five camps, he chooses one or another according to the snowfall to guarantee an ideal snow depth of around 60 cm. The snow should not be too deep so the reindeer can reach the lichen by digging the snow with their hooves, nor too shallow so they do not move away too quickly. The high-altitude region where Oleg roams is always more snow-covered than that of other herders, which explains, according to him, the absence of wolves, whose movements are hindered in these areas. The herder also relies on the vigor of the male reindeer to defend the herds against wolves, which reminds us of Olsen's observation in Tuva in 1914: "even when there are several wolves, little is done to help the reindeer, who must fend for themselves" (Olsen 1921, 101).

The response of herders to internal and external threats is therefore to make wise and effective use of their knowledge of the environment and the skills of the animals themselves. Rather than tethering the reindeer, fencing their pastures or treating the animals with drugs, they prefer to use the mountainous landscape, microclimate variations, and the animals' memory to their advantage.

Maintaining the herd as a united whole with which one can interact rather than with each individual animals is a necessity for herders, whatever the

species being bred. The domestication of ungulates is based on the social organization of the herd and the gregarious motivation of the animals (Zeuner 1963; Baskin 1974). In the Tozhu technique of herding, the task of "herd control," defined by Dwyer and Istomin (2008, 529) as maintaining the herd's cohesion and maneuverability, is shared between humans and the animals themselves. From birth, reindeer calves are given salt and sugar by hand, so that they experience pleasure in their contact with people. As adults, reindeer travel for miles to return to the camps to taste the salt, which is again offered to them as soon as they arrive (see Figure 8.1), and to lick the human urine collected in urinals specially built to satisfy and encourage their appetite. Most of the time, the Tozhu do not watch their reindeer, instead relying on their ability to orient themselves in their space, to gather around "leaders" (*bashtanchy*), and return to the camps by themselves to eat. This type of shared control, which is central to Tozhu reindeer husbandry, implies an *autonomy of the animals*. In herding based on animal autonomy, herders expect and favor skills in the animals, which enable them to play an active role in their interactions with people and their environment.[4]

This relational mode is mirrored on a ritual level. In order to fight against or protect themselves from reindeer and human diseases, the herders consecrate within their herd—with or without the help of a shaman—a particular

Figure 8.1 Distribution of salt, Tozhu, 2011 (photo by the author). ⏎

reindeer called *ydyk* meaning "sacred" (Stépanoff 2011). The role of this reindeer is to actively participate in rituals and to "guard" the camp. Paradoxical as it may seem for our western conceptions of domestication, the Tozhu, who do not guard their herd, think that a reindeer protects them. The *ydyk* reindeer, usually a female or castrated male, is left free, is not used, and—an important point for the present discussion—is never tied up. Usually, it is necessary merely to tether a female to keep her calves close, as well as her daughters' calves if they have already given birth. Keeping a female untied not only means that she cannot be milked, but also that her offspring will be difficult to control. It is interesting to note that, according to the findings of a Soviet veterinarian on foot rot (*necrobacillosis*), the best method for controlling this disease in reindeer is "free grazing" in scattered herds (Rebrov 1962, 27). Thus, it is possible that the practice of reindeer consecration may have a real effect on the health of the herds. What is certain is that, on a psychological level, this tradition actively contributes to the transmission and stabilization among Tozhu herders of a way of relating to the animals that gives them both autonomy and responsibility.[5]

Collectivization in the Tozhu region

By its animal husbandry techniques, herd size, and nomadic style, the contemporary Tozhu system is very similar to the pre-Soviet Sayan type of herding (see Figures 8.2–8.3, and Olsen 1921; Petri 1927; Vainshtein 1961). Generally speaking, it can be said that for contemporary pastoralists, as for their ancestors, the best response to internal and external threats to their livestock is to resort to animal autonomy. This continuity should not hide radical changes: nomads living in contact with reindeer are now only a small minority of the Tozhu population, tending a total number of livestock ten times smaller than it would have been in 1931 (Vainshtein 1980, 122).

Everything came into play during the intervening period, the *sovkhoz*, which introduced new relationships to reindeer, responded differently to internal and external threats. While contemporary reindeer herds are much more affected by wolves than by disease, now-retired Tozhu *sovkhoz* herders confirm, on the contrary, that disease regularly affected their herds, while the threat of wolves was well under control. To understand these changes, a brief review of how reindeer herding was reorganized during the Soviet period is necessary.

In the spring of 1949, two *kolkhozes* (collective farms) were formed in Tozhu, named "First of May" and "Soviet Tuva" (Vainshtein 1961, 195). Many refractory pastoralists fled to Mongolia, which led to the reindeer herd in the country declining from 8,000 in 1945 to 3,100 in 1950.

During an expedition in 1951, Russian ethnologist S. Vainshtein visited the camp of a very new *kolkhoz* "brigade." Reindeer there were now considered collective property, while humans were integrated into a military-style hierarchy.[6] The head of the brigade explained the changes in herding as follows:

Figure 8.2 A young Tozhu woman on the back of a reindeer (photo by Ørjan Olsen 1914, The National Library of Norway). ⏎

Figure 8.3 Tozhu summer camp, beginning of the 20th century (National Museum of the Tuva Republic, n°1178). ⏎

> In the past, there were no keepers to watch them and many reindeer died because of predators. Three or four wolves could kill many reindeer in a year (...). Now the herd is protected day and night by keepers taking turns. The wolves will be furious! (…) We castrate them differently, according to scientific methods, we care for them differently, with drugs. There is a vet. The camp herds were small, rarely as many as a hundred animals, now in our herd we have more than 500 reindeer.

But the brigadier also recognized the drawbacks of the new method: "To be honest, I don't yet know if this method of grazing is better or worse. It is more difficult to change pastures constantly, and yet it is indispensable" (Vainshtein 2009, 134). Larger herds exhaust the pasture more quickly and therefore require more movement. We can see that it is mainly the fight against wolves that inspired the adoption of the new herding technique. Health prevention did not intervene at this level because diseases were now to be treated with medication under the guidance of a vet who had a tent in the camp.

The permanent surveillance of herds on a pasture, inspired by large-scale tundra pastoralism, was an experiment that was quickly abandoned. In the recollections of the elder *sovkhoz* herders that I was able to gather, the reindeer mostly grazed unsupervised, as they did before collectivization, and were only sought out and gathered together when they had been absent for a long period of time. On the other hand, the sizes of the herds remained much higher than in the previous period. In the 1980s, each brigade was divided into three or four "links" *(zveno*), each comprising six or seven families, each one responsible for a herd of 300 to 400 reindeer. Therefore, at this time, the average herd was the same size as those of the rare wealthy herders before collectivization. Livestock farming was based on planned objectives of producing meat for sale in Krasnoyarsk. Every autumn, the herders would take the reindeer to the slaughterhouse, which was built near the village. The nomadic routes of each family were decided every year by the brigade, which was itself under the direction of the *sovkhoz* located in the village. Supposedly settled, the herders had to travel frequently to the village, on which their entire activity depended (see Figure 8.4). In 1969, the *kolkhozes* were transformed into *sovkhozes* (state farms), with the reindeer becoming state property and the herders becoming state employees.

This densification of herds, coupled with regular visits to the villages, was followed by major epidemics. The older herders all confirm that diseases wreaked havoc due to the sizes of the herds. Oleg remembers that foot rot killed 100–120 animals every year in the Ödügen mountain range. After peaking at 14,500 reindeer deaths in 1981, the livestock population dwindled to 10,600 in 1984, a sign of the failure of densification. This statistical decline undoubtedly resulted from the effects of foot rot epidemics, which herders still remember.[7]

Between the internal risk of foot rot and the external risk of predators and escape, it is clearly the latter that seemed to be more feared by the organizers

Figure 8.4 A Tozhu boy on his way to school in a settled village, 1944 (National Museum of the Republic of Tuva, n°435). ⏎

of the *kolkhoz* economy, and it was to address this external risk that the ways of herding were revised. The "extermination of wolves" (Zhigunov 1968, 314–325) was a planned mission in the USSR, carried out mainly by depositing large quantities of poison and by aerial hunting. Tozhu herders did not have to worry about doing this individually, as they were given only one rifle between six and seven families. Poison deposits are now banned because of the contamination they caused throughout the food chain.

The changes brought about by collectivization have been profound. Besides the relationship of livestock ownership, the personal relationships wherein each reindeer knew its master and each master knew its reindeer, with both sharing the tasks of maintaining their cohabitation, were undermined. Collectivization had redistributed not only the livestock, but also the skills needed for raising them. Reduced to the role of keepers of reindeer, the latter having become merchandise, Tozhu herders were displaced from their native territories to work in other regions they knew little about, on routes they had not chosen. Caring for sick reindeer became a science reserved for veterinarians. Hunting and the fight against predators were no longer the domain of the herders, who were deprived of rifles. In the new system conceptualized by zootechnicians, reindeer, left out of this redistribution of roles among humans, moved from the rank of actors to that of commodities. In their books, Soviet livestock theorists did not attribute any initiative,

intelligence, or capacity for learning to reindeer. They merely suggested ways to stimulate "conditioned reflexes" in animals to obey human calls (Borozdin et al. 1990, 138; Zhigunov 1968, 80).

In this reorganization, the creators of the *sovkhoz* in Tuva were trying to convert the Tozhu from a mode of subsistence centered on hunting with transport reindeer to a pastoral system specializing in meat production. This was based on a model developed in the USSR as early as the 1920s for nomadic pastoralists on the tundra, in particular the Komi. In order to better understand the origin and theoretical issues of this model, we must briefly look back at this period, which would define the future of reindeer herding in North Asia as a whole.

Soviet industrialization: transitioning from "natural" to "cultural" herding

From 1925 onward, the fledgling Bolshevik state took charge of the "rationalization" of herding, marking a break with the previous lax "*laissez faire, laissez passer*" policy (Dmitriev 1925, 105, in French in the text). At that time, theorists of change considered that "the Samoyeds had never before carried out herding in a rational way: they did not treat the activity as a commercially viable business requires, but rather practiced herding reindeer in their natural form, from a 'poetic-daily' perspective" (ibid. 106). The large Samoyed herds were prey to anthrax epidemics (*sibirskaia iazva*), which were known to kill up to 200,000 reindeer. An expensive but necessary campaign to eradicate diseases would, the experts hoped, make it possible to send the surplus reindeer to pioneer cities and thus feed "the colonization effort of the northern tundras" (ibid. 112). Livestock farming could only become "commercial" (*tovarnyi*) by becoming "industrialized" through the construction of slaughterhouses and canning factories (ibid. 109). In this way "the transition from primitive and natural animal husbandry to cultural and industrial herding" would be accomplished (Griuner 1926, 49).

This transition of reindeer and their herders from "nature" to "culture" took place in practice through the establishment of a generalized monitoring system: keepers watching over their herds day and night, aircraft sightings of registered herds on collective farms, general monitoring of herds by zootechnicians and veterinarians, and political supervision of veterinarians by the authorities.[8] The takeover began with the gathering in collective farms of herds and their herders, who were usually scattered over large areas in the steppe or taiga regions. Collectivization, which began in 1929, was met with strong resistance. At the turn of the 1930s, Russia lost a total of 700,000 reindeer, most of which were slaughtered by the herders themselves (Jernsletten & Klokov 2002, 28). In order to improve the profitability of collective farms, a campaign was launched in the 1950s to "merge" them *(ukrupnenie)*. "The larger the herds, the fewer non-productive losses there are." Among the Nenets, the *kolkhozes* were actively merged, their number

being almost halved between 1948 and 1960 (Stammler 2005, 142). However, this policy initially had the opposite effect to what was expected: although statistics published on this subject are obviously rare, it is clear that the creation of very large herds favored the uncontrolled spread of diseases, foot rot in particular. While the fight against anthrax, one of the justifications for "rationalization," had been a success, no veterinary remedy had been found for foot rot. In the Nenets national region, one of the richest in reindeer, the number of animals killed by the disease increased 12-fold between 1950 and 1955 (Rebrov 1962, 3). In 1956, the Nenet *kolkhoz*, "12th Congress of the Communist Party of the Soviet Union," lost as many reindeer to foot rot as it supplied to the state for slaughter. Reindeer herds that had been reorganized according to the most modern methods were not spared; quite the contrary, an "avant-garde" *sovkhoz* among the Yamal Nenets lost in 1956 between 40% and 50% of its reindeer due to foot rot, whereas ordinary Chukchi herds had an annual loss of only around 10% (ibid.). Such losses are a threat to the very survival of the herds.

Despite these difficulties, large herds remained the model promoted by theorists. Even in the taiga, as among the Tozhu, it was claimed that the highest productivity (calculated in working days per 100 kg of meat) was achieved with herds of 1,500–1,800 reindeer (Klein 1980, 754). The herding model judged to be the most effective, "controlled grazing" (*upravliaemyi vypas*), was practiced on fenced pastures to prevent reindeer escaping and predator attacks, and to increase labor productivity by reducing the number of keepers required (Borozdin et al. 1990, 139–140). This type of herding could not be self-sustaining as it required the reindeer to be given fodder, enriched in particular with fishmeal (ibid. 120). In the late 1980s, however, Soviet veterinarians found that excessive numbers of reindeer kept in pens led to a sharp increase in disease and significant losses (ibid. 140).

The experiment of fenced pastures was not tried in Tuva, but according to herders' recollections, reindeer were sometimes confined in stables during livestock censuses. Herders remember how "the reindeer would hit their heads against the walls. They would go crazy." Traumatized by this experience, the reindeer would no longer come back to the camps after being released and would instead run away from humans. Excessive control therefore resulted in rendering the herd uncontrollable.

Very significantly, Soviet theorists often tended to attribute responsibility for epidemics to contamination of domestic reindeer by wild reindeer and predators. However, as D. Klein (1980, 749–752) highlights, these suspicions have little empirical basis, as it is known that it is rather domestic reindeer which contaminate wild reindeer (Jernsletten & Klokov 2002, 63). However, in order to avoid contact with wild reindeer, it was even recommended that nature reserves with wild reindeer populations should be fenced off (Klein 1980, 754). Thus, what we called an internal threat (diseases) was actually identified by health authorities as a side effect of an external threat (wildlife).

In addition to the presumed danger of infection, it is also clear that exchanges between wild and domestic animals could only appear as a hindrance to the transition from "primitive and natural" to "cultural" herding. Government policy thus aimed to totally eliminate wild reindeer in areas frequented by domestic reindeer. Herders were advised to avoid breeding between wild and domestic reindeer, as cross-bred calves were reputed to be uncontrollable (Klein 1980). In short, a series of measures were implemented to establish clear and impenetrable boundaries within this area of porosity and exchange between the wild and the domestic, which is traditional reindeer herding.

Whereas, in the past, the risks of inbreeding were naturally avoided through cross-breeding with wild reindeer, which the Tozhu people considered to be highly beneficial (Olsen 1921, 90), during the Soviet era, the authorities organized the arrival in Tuva of breeders from the domestic herds of the Yakutian Evenks, but their acclimatization was a failure. Nowadays, opinions are divided on the possibility of keeping calves produced by cross-breeding domestic and wild reindeer. A breeder like Oleg welcomes such cases, because the "little savages," although fierce, are taller on their feet and more vigorous.

Conclusion

Soviet herding techniques were aimed at responding to the external threat of predator attacks and animal escapes rather than addressing the internal threat of disease. The primary concern of monitoring, fencing-off, and avoiding contact with the outside was not a coincidence. It was accompanied by a policy of settlement of herders who hitherto used to cross the Mongolian border freely. And if we remember that the invention of permanent surveillance of herds in Tuva in 1949 occurred at a time when the USSR was reaching the peak of its concentration camp population with two and a half million inmates (Werth 1993), we can guess that in such a totalitarian context there may have been a close and unsuspected relationship between the "domestication of animals" and the "treatment of others," to quote Haudricourt (1962).

The Soviet authorities managed to eradicate the devastating anthrax epidemics and temporarily keep the wolves at bay. However, these achievements were only possible by building up a vast system of interdependence and control, in which herders lost a part of their autonomy and of their personal relationships with the animals. As Beach and Stammler (2006, 6) put it this "rationalization" of reindeer herding led "to full resource use at the cost of intimate human–animal relations." Management of growth and of pastures; defense against predators; botanical, zoological, climatic, and topographical knowledge; analytical and decision-making skills; all these skills necessary for the preservation of herds were distributed among various specialists with the aim of improving performance. One kind of distributed cognition has given way to another—the sharing of skills between humans

and animals has been replaced by a division of labor between humans assisted by various technologies: agricultural schools, books, satellite maps, medicines, helicopters, radios, etc. Among the Tozhu, these technologies have now disappeared and when the state livestock was privatized and distributed to members of the *sovkhoz*, most were unable to take care of them themselves. This explains the disappearance of 90% of the reindeer: sold, eaten by their new owners, or carried away by wolves, wild reindeer, and disease (see Donahoe 2004). The few herders who managed to maintain a viable herd, free from disease and predators, are those who have been able to break away from the grasp of the villages and create a flexible balance in which their environmental cognitive skills and those of their reindeer are intimately linked.

Notes

1 This study is based on two surveys carried out among the Tozhu in 2008 and 2011, with the support of the Fyssen Foundation and the "Nomadism, Society and Environment in Central and Northern Asia" international research group. I would like to express my gratitude to the administration of the Tozhu region for their help and to the herders who welcomed me. I would also like to thank Jean-Pierre Digard, Roberte Hamayon, Frédéric Keck, Alexandra Lavrillier, Florian Stammler, and Hiroki Takakura for taking the time to read this work and for their insightful contributions. This text is a modified version of an earlier publication in French: "Entre piétin et loup. Menace interne et menace externe dans l'élevage de rennes des Tožu." *Cahiers d'anthropologie sociale*, 2012, 8, pp. 137–151.

2 This use of natural barriers was also described by the Tofalar at the beginning of the 20th century (Petri 1927).

3 I observed a similar role of reindeer agency among the large-scale herds held by the Eveny in Kamchatka (see the cartographic recording of reindeer movements by Fossier (2013)). The role of reindeer agency in the decision of migration was analyzed by Dwyer and Istomin (2008).

4 On animal autonomy and intermittent coexistence in North Asia herding practices see Stépanoff et al. (2017). With the shared control, the management of the herd is not a one-sided domination of human over animals but implies a "circulation of wills" and a "partnership" as other scholars have noticed among other herding systems in Siberia, described in the chapters of the volume edited by Stammler and Beach (2006) and by Anderson (2014).

5 The practice of consecrating individual animals in the herd is widespread among pastoral communities in Asia, from the Arctic to Mongolia, Nepal, and India (see Charlier and Stépanoff 2013).

6 The organization in "brigade" under the direction of a "brigadier," borrowed from military vocabulary, was introduced in USSR in the management of labor among the kolkhoz in 1929 ("Brigada proizvodstvennaia" *Bol'shaia sovetskaia enciklopediia https://rus-bse.slovaronline.com/10425-%D0%91%D1%80%D0%B8%D0%B3%D0%B0%D0%B4%D0%B0%20%D0%BF%D1%80%D0%%BE%D0%B8%D0%B7%D0%B2%D0%BE%D0%B4%D1%81%D1%82D0%B2%D0%B5%D0%BD%D0%BD%D0%B0%D1%8F)*.

7 The Tozhu who fled to Mongolia with their herds to escape collectivization met other sanitary problems. They were forced into a policy of assimilation with Mongolian pastoralists, which led to their reindeer being contaminated with anaplasmosis, a sheep disease previously unknown in reindeer (Haigh et al. 2008; see Jernsletten & Klokov 2002, 150).

8 Veterinarians accused of spreading epizootic diseases were executed on a massive scale in the USSR in the 1930s (Conquest 1995, 261).

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9 Fish sharing between humans and reindeer in the Western Siberian Forest and the mode of herding[1]

Yuka Oishi

Introduction

This chapter focuses on the interconnections between reindeer herding and fishing, and discusses the symbiotic relationships, including with fish and the swamp landscape, which encompass relationships beyond those of just humans and livestock. Anthropologists have criticized the human-centric view of domestication, in which humans control livestock entirely, and instead, have shown a view of the interactions between humans and animals in herding. Adding to these discussions on herding, Anderson and others (2017) suggest a perspective that is not limited to human–animal relationships, but is a holistic ecological worldview, which includes the land, things, animals, and human persons, without insisting that "human" is the measure of all things. Based on this point, this chapter considers the co-existence of humans and reindeer in the fishing–reindeer herding subsistence complex.

The Northern Khanty and Forest Nenets who live in the Western Siberian Forest engage in fishing, hunting, gathering, and reindeer herding. They not only eat fish, but also feed their reindeer fish in order to attract and gather the herd (as is depicted in Figure 9.1), using the abundant freshwater fish in the region's rivers and lowland lakes. Some ethnographies have examined the fish feeding practice and the complex relationship between reindeer herding and fishing in Western Siberia (e.g. Zen'ko-Nemtinova 2006; Sokolova 2009), and pointed out that herders use fish as a tool to gather reindeer and to bring them back home from free grazing (Lukina 1973).

To examine the fishing–reindeer herding subsistence complex, the author uses two analytical notions: animal autonomy (Stépanoff et al. 2017) and differentiated familiarity (Takakura 2010). Stépanoff et al. extensively researched the "mode of herding" as a temporal strategy in North Asia. They found that herders acknowledge the autonomy of animals: their perceptions, desires, preferences, memory, environmental adaptation skills, and social organization, while intermittently maintaining balance by using autonomy as well as cooperative interactions with humans. For this chapter, the most crucial mode of herding is "Attraction," as defined by Stépanoff et al. (2017, 61). Livestock are attracted to things like salt, urine, mosquito fires, and baby

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Figure 9.1 Reindeer eating fish (photo by the author, taken near Lake Num-to in January 2012). ⏎

livestock; as mentioned above, reindeer are attracted to fish. This chapter examines cases in which herders selectively provide fish to some members of the herd, resulting in special relationships where some individuals are closer to humans.

Takakura (2004) researched Eveny reindeer herding and stated that, compared to sheep and goats in the arid zone that stay relatively close to a camp, reindeer herds do not have boundaries with wild reindeer or clear controls. For reindeer to grow, extensive grazing is required, which is carried out with a high degree of freedom. Rather than domesticating all members of the herd to the same degree, as is the case in sheep and goat herding, reindeer herding creates a gradation of human–livestock relationships, with varying degrees of familiarity and unfamiliarity. Herders distinguish trained reindeer for riding and female reindeer for milking as more closely human-related individuals. Herders use their increased familiarity with some of the individual reindeer to manage the herd (Takakura 2010).

This chapter will illuminate how herders attract reindeer using fish and how relationships are created between herders and reindeer. How do herders setup animal autonomy in an environment of swampland with abundant

fish? Seasonal movement, subsistence territory, and the mutual complementarity of reindeer meat and fish as food will be used to locate the Num-to regional mode of herding in the broader interactions with the land and other animals and plants, rather than limiting it to the relationship only between humans and livestock.

Data were collected through ethnographic fieldwork around Lake Num-to in northwestern Siberia from September 2011 to March 2012. Khanty and Forest Nenets live in this region, referred to here collectively as Num-to people. Although their ethnic groups are different, they manage subsistence under the same environmental conditions, so the author will not describe their way of herding separately. Because almost all the author's fieldwork was done during the winter, the discussion on reindeer herding is limited to the winter period.

The present subsistence complex: Collectivization and de-collectivization of the Num-to people

Lake Num-to is in the northwestern part of the Khanty-Mansi autonomous region and abuts the Yamal-Nenets autonomous region. It is located at 63° latitude north, in the northern part of the taiga where there are many lakes and swamps. The perimeter of the lake is approximately 60 km and its around 4 m deep. About 200 (Kurikov 2008, 131) to 250 (Zen'ko-Nemtinova 2006, 5) people live around the lake. A settlement, also called Num-to, is located at the lake's south shore. Although there are about 50 houses in the settlement, almost all of the inhabitants live in the taiga and herd reindeer, fish, hunt, and gather food.

Today, the herding type used by the Num-to people is characterized as "Loose" herding (Baskin 2000, 24). Herders only periodically gather scattered reindeer and move them to fresh pastures in summer and less frequently gather them in winter, using fish to attract them. However, in the Soviet period, this was not the case as herders could not catch enough fish to maintain the practice as the scale of their herds became more extensive than before and there were changes in the route of seasonal movement.

In the area around the Kazym River and Lake Num-to, the civil war continued until the 1920s, after which the Khanty protested Soviet rule, starting in the first half of the 1930s. Collective economy consolidated in the 1950s (Balzer 1999, 130). The people in this area worked in the Kazym *sovkhoz* (state-owned farm) as professional reindeer herders, fishers, and hunters.

Interviews by the author revealed that the Kazym *sovkhoz* had 17 brigades, each comprising three to four herders, three to four camp workers (usually herders' wives), and 200–300 reindeer. Beyond this, each individual herder was permitted to hold 50 personal reindeer. The herders moved and camped in tents in provided pasture ranges. The fishery section included ten groups,

each comprising four to five fishers, and each fisher had assigned fish-trap points along the Kazym River.

During the second half of the 1980s, the herders gradually increased the number of private reindeer since "nobody exactly counted reindeer" (as stated by a Khanty man born in the 1960s). In the fishery *sovkhoz*, the fishermen also began to work individually. After the Soviet era, the Kazym *sovkhoz* was managed by the Kazym village, and the number of brigades was reduced to three. Herders who left the *sovkhoz* began to carry out subsistence complex—including reindeer herding, fishing, hunting, and gathering in the forest—with their family and private reindeer. In fact, only 1 household continues to work in the Kazym *sovkhoz*, while 15 households were registered as private agricultural farms in 2011.

Although the collective farm had been privatized and continued to run in Kazym village, several Num-to people resigned and left. As stated in their interviews with the author, they chose to live without cash income because their salaries were delayed for some time during and after the collapse of the Soviet Union. Some residents chose self-sufficiency in order to survive. Later, because the collapse of the Soviet Union reduced the number of jobs that provided cash income in the villages, they continued to live in the forest, breeding livestock, hunting, gathering, and fishing. Today, the children leave their parents and complete their compulsory education at boarding schools in villages.

Thus, during the Soviet period, the Khanty and Forest Nenets practiced herding in the form of "production nomadism" (Vitebsky 1989, 215), grazing reindeer as professional herders in a large production division, established away from the settlement, to produce meat, while also holding personal reindeer. However, when the Soviet system collapsed, people quit working in brigades and began living independently around Lake Num-to. Now families do not live in settlements, instead each household herds, fishes, and hunts independently. Moreover, each household has several houses, and they herd reindeer by moving in a cyclical fashion among those houses. This differs from nomadism as a way of life in the pre-Soviet era because people have fixed houses as opposed to tents, but it returned to a "loose" herding type, and they started giving fish to reindeer again.

Environmental use in subsistence complex

Placement of houses and seasonal migration

There are approximately 50 households in the forest around Lake Num-to. A household usually comprises a nuclear family and each household herds only its own private animals. Residences consist of a wooden house, pasture fence, raised granary, fish storage, houses for dogs, a mud oven for breadmaking, and a garbage pit in the forest. Each household has approximately

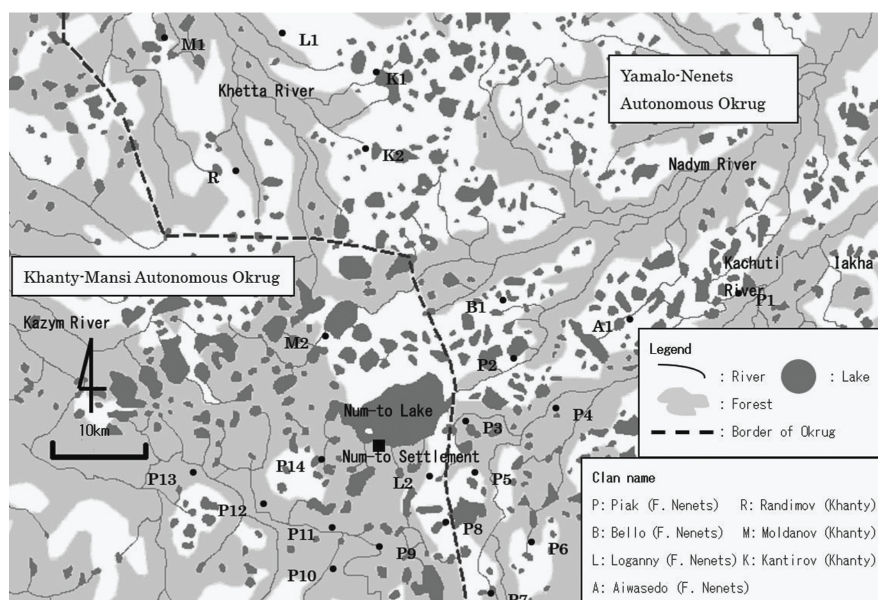

Figure 9.2 Arrangement of winter houses of each household around Lake Num-to (first appearance: Oishi 2014). ⏎

60–120 reindeer, on average. Figure 9.2 depicts the placement of houses around Lake Num-to. The black points indicate only the winter residences of each household and the letters show their clans. Winter residences are located 4–20 km away from each other. Twenty-three residences are shown on this map. Other residents live in the settlement or have been omitted because they are beyond the boundaries of this figure.

Num-to people herd or fish in household units, not with their neighbors and relatives. This section explains how they derive their livelihood in the forest and orients their subsistence from the perspective of reindeer herding models. Each household has between two and ten fixed houses, with each house 1–15 km away from each other and near the lake or small rivers. Residents migrate two to five times per year with their reindeer from house to house for seasonal grazing and fishing. Neighbors' houses are typically located 4–20 km, or even further apart.

The lives of Num-to people are, therefore, not entirely nomadic, as they have fixed houses, although they move seasonally within a relatively small area. The distance from their neighbors may be attributed to the fact that each household has its own land and resources for reindeer herding, hunting, gathering, and fishing.

Fishing–reindeer herding

The current annual and daily actual subsistence activities of the Num-to people are included reindeer herding, fishing, and hunting and gathering.

As part of their everyday grazing schedule, the reindeer are first released from their fence in the evening. The next morning, someone searches for them, guiding them home on foot with the help of a dog. After herding the reindeer through the fence, they capture some of them to hitch to sleighs. Members of the family take these sleighs to go fishing, hunting, or woodcutting in the afternoon.

Freshwater fish, a major food source in the taiga of Western Siberia and an essential part of people's staple diet, are also used as feed for reindeer and dogs. People fish in both lakes and rivers in one of two ways: using basket traps, which is done in all seasons, or fishing with a rod, which is done especially in autumn. Fish traps are set in the lakes and streams, usually within 5 km from the house, with a household usually having several weirs set at places where a stream enters into or emerges from the lake. One household typically uses several lakes or streams. People catch many different varieties of freshwater fish, including northern pike, European perch, pike perch, carp, and ide. Num-to is located inland and upstream where there are no migratory fish, so people can eat fish throughout the year.

The Khanty and Forest Nenets in this area capture mammals such as wolverines, otters, foxes, weasels, hare, and squirrels, as well as birds, such as swans, wild ducks, and snow grouses using two methods: one involves using hunting gear such as stones, branches, axes, and guns; the other is to trap them. Traps are usually set around the house or near the fishing place. Hunting is also an important livelihood, but is lower priority than herding and fishing. For example, when a man goes to look for his reindeer, if he finds animal tracks, he will not follow them but will return later to look for the animal when he has the time. Moreover, if he goes somewhere and encounters an animal by chance, he might be able to kill it with an axe on the spot. People hunt wild animals mainly during winter and migratory birds between July and September.

"Loose" exclusive and non-exclusive land use

The results of the author's study on how Num-to people use the natural environment show that the subsistence territories are expanding around people's houses. Figure 9.3 depicts a circle that represents the occupational territory of a household. The area close to the residence is used to procure water and wood, as well as to hunt, while the wider area, including the residence, is used for fishing and gathering. The area outside the circle is used for reindeer grazing. The grazing territories overlap with those of other households and territories are shared for subsistence activities.

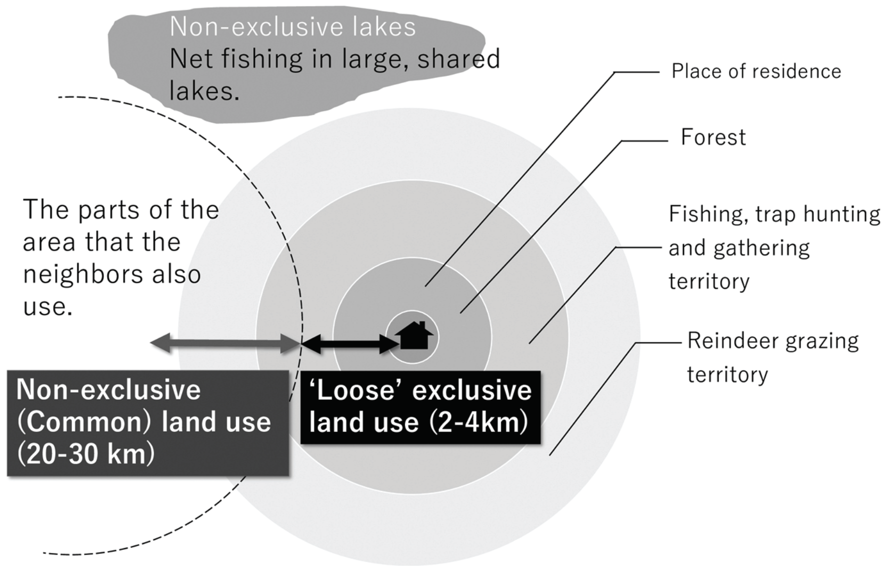

Figure 9.3 The fishing–herding territory (first appearance: Oishi 2018). ⏎

Figure 9.3 depicts the range of pasture, which is defined as the grazing territories of each household's reindeer, including changes associated with seasonal migration. The winter grazing activity in this area involves releasing the reindeer in the evening and searching for them the next morning by following their tracks in the snow. Most of the grazing area is not fenced and herders do not keep a close watch on their herds. Although this method seems to be very inefficient in that the reindeer have to be located and gathered each day, allowing them to graze freely on moss and grass in this area is a suitable grazing method for the reindeer within their natural and social environment. Indeed, with the changes in the seasons and the variation in geographical and vegetative features, wild reindeer can move a few thousand kilometers a year. The residents—the distance between neighbors is very small—share a large area of grazing land, which is necessary for the reindeer to grow. The grazing territory covers an area with a radius of several tens of kilometers beyond the households.

Within the territory used for reindeer grazing, there are two types of fishing grounds: the first includes lakes and streams within 4–5 km of a dwelling. Fishing baskets are placed at the mouth of the lake where waters flow out/in from the lake. Each household occupies several such fishing territories around the residence. If a lake is several hundred meters in diameter, it may seem as though one household occupies the lake. However, as shown in Figure 9.3, the fishing territory near the residence is for "loose, non-exclusive land use." As

the name suggests, this is not an exclusive form of land use. It is neither fully common land nor fully occupied land, as "you can set up your baskets and nets there if it is available, without having to ask anyone [for permission], but you must not touch the others' traps and catch" (Khanty male, born in 1990). Thus, the households use fishing grounds both in a "loose" and an exclusive manner, without touching other households' fishing baskets or gill nets. That is, although there is no sense of ownership of the fishing grounds, there is a clear sense of ownership of fishing tools. The second type of fishing ground is Lake Num-to. Here, gill nets can be set anywhere in the lake and anyone can fish if they follow the principles of setting up gill nets at a sufficient distance, such that they do not interfere with other nets. Some parts of the lake are considered sacred and women are kept away from these places. Unlike basket fishing, which results in the occupation of a stream or lake, Lake Num-to can be regarded as a common fishing ground. In terms of housing, determining whether the land is vacant (i.e., whether someone is already using the land) is one of the criteria for selecting a site for building a new house: "You can build a house anywhere if it [the land] is vacant" (Khanty woman, born in 1958). Another reason why environmental uses such as fishing and hunting are "loosely" exclusive is that in addition to the seasonal movement between fixed houses, the dwellings themselves may be moved and rebuilt every few years, based on the conditions of the grass, moss, lakes, and rivers in the area.

Animal resources (livestock, fish, wild animals, migratory birds), especially domesticated reindeer, move and cross the boundaries of household territories freely, which are spread around the dwelling of each household. Although dwellings are located at a distance from each other, the grazing range of domesticated reindeer overlaps with that of the surrounding households. The reindeer owned by one household often get mixed up with the herd of another when grazing. Especially in the winter, when there is less moss, lichen, and other plants to forage, reindeer are more likely to venture farther in search of food. Herders also must search wider areas to gather up their reindeer every day. Thus, when we look at herding, we see a contradiction between the need for large grazing areas and the seasonal movement between fixed houses in a relatively small area. However, when we look at fishing, we see that households secure fishing grounds in each of the places they move to seasonally. Fishing is an important livelihood for the Num-to people, who use meat and fish complementarily as food. In order to fish and allow reindeer to move all year round, the lakes and rivers around the dwellings are used both "loosely" and exclusively, and the land necessary for the growth of relatively small reindeer herds is used jointly with neighboring households.

Techniques to keep reindeer herds close to humans

What kinds of techniques are used for the free herding of reindeer in a small territory? This section provides a discussion of the relationship between fishing and reindeer herding, providing examples of specific practices.

Feeding fish to reindeer

The herders do not follow the herds and monitor them while grazing, allowing them a high degree of autonomy. Thus, one method of managing the herd during grazing is using freshwater fish, which are available in abundance in the region.

Reindeer are fed fish for two purposes: to guide them when driving them into fenced areas and to ensure that the herds are led to good foraging places. During the winter grazing season, the herders go out in the morning to search for their herds and drive them toward the vicinity of their residences. They throw frozen fish into fenced areas to encourage the herds to enter them. When a few reindeer notice the fish and run into the enclosure, the remainder will follow. Any kind of fish can be used for this purpose, as long as they are not too large, measuring up to about 30 cm in size. A small number of fish—a bucket or tray full—is used for this purpose; not all of the reindeer will be able to eat the fish. In this case, the fish is just used to lead reindeer to the fenced area.

When releasing reindeer from a fenced area, herders may let them roam freely, but they also occasionally try to lead them in a specific direction to forage. To do so, they carry dried or frozen fish in a bag and walk in front of the herd. Herders will lead the reindeer a few hundred meters, feeding them fish little by little, and then leave them in a mossy area before returning home. They use the same method when they want to ensure that the reindeer they have been herding follow them home. Figure 9.4 shows reindeer following their owner, who has a bag of dried fish. The herd of reindeer that had been left to graze freely over night was found on the opposite shore of a lake from the herder's dwelling; she led them across the frozen lake toward her house. At this time, the herd had dispersed into three groups and she wanted to ensure that she could bring them home. Therefore, one herder stood in front of the herd with a bag of dried fish while the other herder followed behind. Reindeer have a habit of moving forward when they are driven from behind, so if there are dozens of reindeer in a herd, two people can lead them, with one standing in front and one behind.

Another reason reindeer are fed fish is to create some leader reindeer that is accustomed to being fed by people so that the herd can be led. The owners of the reindeer prioritize the hand-feeding of a few reindeer with fish. After the reindeer are released in the evening they move freely as a herd and forage and sleep during the night in the forest, but sometimes they return to the herder's house by themselves the next morning. The well-acclimatized reindeer learn that if they return to their owners, they will receive fish and salt. In Figure 9.4, the herd had split into several groups more than 20 km apart. When the leader of the herd has wandered far, one owner said, "Reindeer don't come to a house without fish. The reindeer know very well that there are no fish in our house now" (Khanty woman, born in 1934). She attributed the dispersal of the herd to the fish stockpile

Figure 9.4 Reindeer following a woman carrying a bag of dried fish (photo by the author, taken near Lake Num-to in January 2012). ⏎

Note: The reindeer in the foreground is the leader of the herd, being fed fish by the owner.

being empty due to continuous poor fishing. Incidentally, reindeer seem to be able to tell by smell if there are fish in the storeroom. Some households build a fence around the fish storage area to prevent reindeer from getting inside and raiding the fish. Reindeer are so desperate for fish that they will even break down a fence and door panels to gain entry to a stockpile. However, it is unclear whether they crave the fish or the salt in the fish. It is possible that it is the salt they are attracted to, as salt for livestock, human urine, and dried fish is often used to guide reindeer.

The distance between people and reindeer in free grazing

By feeding fish, the Num-to people develop close relationships between some individual reindeer and humans. Num-to people do not make a clear distinction between animals bred for meat and service animals for towing sleighs. However, in Num-to, except for reindeer, which are not subject to slaughter, the distinction between meat and service animals for towing sleighs is unclear. In addition to training male animals for sleigh towing, herders feed fish to

some castrated males to produce individuals that are closer to people and can lead the herd. These reindeer are well-tamed and will voluntarily lead the herd home. With small herds of approximately 100 reindeer, the herd can be led by a few reindeer that are especially tamed and have a particularly close relationship with people. On the contrary, the Eveny, one household, has more than 300 reindeer, creating clear and various close or distant relationships with people (e.g. Takakura 2010).

It should be emphasized that fish play an important role in this kind of herd management. The environmental use of the territories for grazing and fishing with mobility is contradictory because people not only use liberated grazing even though their grazing territories overlap with those of their neighbors, but also loosely occupy several fixed fishing grounds while simultaneously grazing in a highly mobile manner. Reindeer used to liberate grazing do not tend to move away from people, despite being able to escape at any time. The reason for this is that the herd, including the lead reindeer, is well accustomed to people and therefore stays close to them. Feeding the reindeer fish allows them the freedom to graze away from the owner's dwelling, which is necessary for their growth, while simultaneously ensuring that they do not wander too far. Fish are necessary to form close relationships with these lead reindeer. Using the resources available in the environment, the limitations of the grazing territory are supplemented by fish.

Complementary relationships between fishing and reindeer herding

Reindeer mobility and fishing grounds

This section characterizes the nature of the herding and fishing complex in Num-to through the daily division of labor in a household. In winter, the basic grazing activity is to release the reindeer in the evening, search for them on foot the next morning, and drive them to the fenced area at the herder's home. In the afternoon, the herders use some of the reindeer to tow sleighs when going fishing or hunting. When they return, both the sled-pulling reindeer and those that have been waiting inside the fenced area are released before dark.

The following is an example of a typical day's work in winter for a household in Num-to. The household consists of four members: a father (Forest Nenets, born in 1955), a mother (East Khanty, born in 1958), and two sons (born in 1990 and 1992). The sons attended a boarding school in the village of Kazym; however, having returned from military service, they now live with their parents, helping them with day-to-day activities.

In the morning, after everyone has eaten a meal of tea and bread, one of the sons will go on foot with the herding dogs to look for reindeer. During this time, the other son is responsible for collecting firewood for the day, fetching water, and taking care of the dogs (cooking food for them and feeding them). The mother cooks and cleans, and the father repairs and makes implements,

such as sleighs and dishes. When the reindeer gatherer drives the herd into the vicinity of the dwelling, all members of the household work together to put the reindeer in the fenced pasture. The father prevents them from escaping and directs the dogs to round up any reindeer that try to escape, while the mother throws frozen fish into the fenced area. As soon as the reindeer are inside the enclosure, the father and sons lasso some of them and attach sleigh-towing equipment to them. After a meal, one of the sons takes a prepared sleigh to the fishing grounds, 4–25 km away. The other son takes a sleigh to gather wood or go hunting. In the meantime, the father goes in search of any stray reindeer by sleigh or on foot while the mother mends the fur garments.

Here I would like to focus on the use of reindeer for mobility. Reindeer are not just bred for food, fur, and other resources; they also provide mobility for hunting and fishing. The herders try to bring the reindeer back to their fenced areas by noon or thereabouts so that they can be used for transportation and hauling in the afternoon. Reindeer sleighs are by far the most convenient way to get to fishing grounds when they are several kilometers away, and as the catch can occasionally exceed 50 kg. In other words, the mobility provided by reindeer is necessary for efficient fishing at remote fishing grounds during the winter when boats are not useable, highlighting the complementary relationship between fishing and herding activities in terms of the daily division of labor within the household.

Mutual food supplementation with meat and fish

This section describes the winter diet of a household in Num-to to show the flexible complementarity of reindeer meat and fish. Fish are an essential component of the Khanty's food. Because there are abundant fish where the Khanty live, they eat more fish than reindeer or other meat, and fish is their primary food (Sokolova 2009, 263–267). Fish can be preserved and eaten in a variety of ways: raw, frozen, boiled, in soup, jellied, smoked, or preserved with salt.

Table 9.1 shows that a household that consists of a single widowed woman born in 1934, with one male relative in his 30s who lives with her to help her. At the end of the year, one of her sons and two male relatives in their 30s stayed with her to help. At the time of the survey, she owned about 90 reindeer. Her family came to assist her because between December 2011 and February 2012, her reindeer herd had begun to disperse widely, with portions of the herd going so far away that it had become difficult to gather them up and bring them to the fenced area at the house. The fishing grounds was 4 km from the house and they usually went to the fishing grounds by reindeer sleigh. However, since they could not gather the herd, they had no reindeer to pull a sleigh. In addition, the men of the household and the male guests who came to help would all go out to search for the herd, making it difficult for them to go fishing; as a result, their stock of

Table 9.1 Reindeer and fish dishes of the household M1 in Num-to in winter, 2012 (first appearance: Oishi 2018) ⏎

Date	*Fish and meat dishes on table*	*Notes*	*Date*	*Fish and meat dishes on table*	*Note*
2 Jan	Boiled reindeer guts and heart(M), rare reindeer leg and the marrow(F)	Young slaughter of young reindeer	19 Jan	Fish soup, frozen fish (V)	Visitors, visit to ancestors' sleeping place
3 Jan	–	Rituals after slaughter	20 Jan	Frozen fish (M), leftover soup	22 reindeer came back
4 Jan	Reindeer meat soup	Reindeer herd not found	21 Jan	Fish soup	Not found
5 Jan	Boiled fish, reindeer meat	Not found	22 Jan	Fish soup, boiled fish	20 reindeer came back
6 Jan	Boiled fish	Not found	23 Jan	Leftover soup, boiled fish	Went to fishing on foot
7 Jan	Reindeer meat soup	A few reindeer came back home. No catch	24 Jan	Boiled fish	3 reindeer came back
8 Jan	Reindeer meat soup, boiled fish	Not found	25 Jan	Boiled fish and the bouillon	Little catch, not seeing any reindeer
9 Jan	Boiled fish	Not found	26 Jan	Boiled fish and the bouillon	Little catch, not seeing any reindeer
10 Jan	Frozen fish, reindeer liver soup	Not found	27 Jan	Boiled fish and the bouillon	Little catch, not seeing any reindeer
11 Jan	Frozen rare reindeer meat and blood(M), reindeer meat soup	Not found	28 Jan	Reindeer soup stock (little meat)	Not found
12 Jan	Frozen reindeer leg, leftover soup	15 reindeer came back	29 Jan	Boiled fish	Visitors, not seeing
13 Jan	Reindeer meat soup	A part of herd came back	30 Jan	Boiled fish	Not seeing reindeer
14 Jan	Reindeer meat soup, frozen reindeer meat	20 reindeer found in forest	31 Jan	Boiled fish and the bouillon	Middle catch, not seeing
15 Jan	Fish soup	Visitors	1 Feb	Boiled fish	Many catch, not seeing

(*Continued*)

Table 9.1 (Continued)

Date	*Fish and meat dishes on table*	*Notes*	*Date*	*Fish and meat dishes on table*	*Note*
16 Jan	Reindeer soup	Not found	2 Feb	Boiled fish and the bouillon	Many catch, not seeing
17 Jan	Reindeer meat soup	Not found	3 Feb	Boiled fish and fried fish	Not found
18 Jan	-	A part of reindeer came back	4 Feb	Leftover fried fish, boiled fish	Body and clothes washing with boiled water

Notes: (M): male, (F): female, (V): visitors, – : no data. In this table, bread and tea with sugar at every meal were omitted. When they could not catch any fish despite going basket fishing, this was expressed as "no catch." When they could not find reindeer although they went to the forest to search for and gather them, it was expressed as "reindeer herd was hot found." When their reindeer came back by themselves, this was expressed as "reindeer came back." When they did not go to the forest to gather reindeer, it was expressed as "not seeing."

fish was running out. One of the characteristics of the household's meals is that the woman, 74 years old, likes to cook Khanty food. A typical Khanty supper consists of fish, meat of reindeer or other wild animals and birds, bread, and tea. In her house, Russian-style dishes (cutlets, plov, fish baked in oil, vegetables, etc.) are rarely prepared. In the village, people occasionally buy meat and fish from their neighbors and relatives using cash or the barter system, but in this household in the forest, they were basically self-sufficient. Meat and fish can also be purchased at stores in the village or hamlet, but the distance from the household to the nearest store is 40–100 km, and the reindeer were widely dispersed, making it difficult to get there without the use of a sleigh. Moreover, the head of the household is a woman who receives a pension with which she can only afford to buy flour, tea, salt, etc., not fish and meat.

The woman's son's family came to visit for the New Year and she slaughtered a reindeer for the grandson's birthday on January 2. The grandson and his mother returned to town on January 6 with some reindeer meat. The amount of meat in the soup began to decrease on January 10, and on January 19 they stopped consuming meat. They started eating fish instead, but near the end of January, they ran out of fish in the storage. From January 23, the woman [and the author] started to go fishing on foot. After the end of January, the fish catch increased and they were able to eat fish steadily.

There is no doubt that this household was in a unique situation, but they were quite flexible with their consumption of fish and meat. Even in winter, the slaughtering season, it is not always possible to gather the herd and secure meat. In such cases, they fish and eat their catch. In this way, they basically rely on freshwater fish resources while herding reindeer.

Discussion

Finally, I shall analyze the semi-sedentary herding of Num-to people, which emphasizes fishing, from the perspective of animal autonomy. Num-to herders feed their reindeer fish to encourage their herds to stay close to people. In addition, by feeding fish to docile reindeer, herders not only create a leader within the herd, but also teach the reindeer where their master lives. Making fish feeding a habit causes the herd to return to the herder spontaneously. Although herders' living territory overlaps with neighboring households, and their herds quickly tend to mix, this approach prevents this. In that way, herders tame their reindeer. However, during the winter when there is little food, the herd tends to disperse. So, the herders conduct "Checking" and "Captivity" (Stépanoff et al. 2017) such as gathering them up, putting them in fences temporarily, attaching them to sleds almost every day, and requesting their cooperation with humans. However, herders do not watch them at all during grazing. The grazing is relatively free and loose. The reindeer are free to search for their food, and humans follow them when the reindeer herd moves to new pastures. This is similar "Seasonal freedom" described by Stépanoff and others (2017). However, in Num-to, although the timing and location of seasonal migration are determined by animal autonomy, the fishing grounds are always secured for humans.

At first glance, reindeer seem to have close relationships with people. However, as shown in the case study in this chapter, "if there are no fish, it is possible to lose the reindeer." Although creatures live together, there is relatively little trust between them, and reindeer often disappear from herders. Herders need to do more to take care of the reindeer to prevent the herd from going far away, where most of them will be lost. So, herders fish, both for their own food and to attract reindeer by feeding them fish.

In this point, Stépanoff et al. (2017) argue that animal autonomy and their attitude toward cooperating with humans are keeping balance with each other's actions. However, for the Num-to people, the fluctuations are frequent and wide. This is because the ecological bond between humans and fish is more stable and substantial than that with reindeer. In this area, where many lakes and freshwater fish breed throughout the year, the freshwater fish attract humans, and humans determine where they build dwellings, considering each of multiple seasonal fishing grounds. Reindeer graze freely among these human dwellings and wander around particular households, attracted by the fish. And the herds are not homogeneous; there are gradations in terms of familiarity and non-familiarity in human–animal relations, as Takakura (2010) stated. Herders selectively give fish to some reindeer herd leaders, which then leads the other individuals to herders' residences. Thus, herders rely on animal autonomy and reindeer familiarity with humans in Num-to, where fishing spots are prioritized over pasture due to abundant fish.

In addition, I suggest that the importance of fish for the Num-to people is immense, and it is important to highlight fish as a resource that attracts

reindeer to humans in the inland Siberian Forest. Because their basic subsistence is still fishing, the Num-to people live along rivers or lakes; they choose seasonal migration spots mainly for fishing. Moreover, while reindeer are an essential source of food, fur, and mobile power for people in the region, humans can fish stably and efficiently; according to the dietary survey results in this chapter, their primary food is fish, which they complement with reindeer meat. The Num-to people do not have a system of exchange for fish and reindeer meat with neighbors, unlike that discussed by Stammler (Stammler 2010, 231–232), since each household lives separately in this area and manages fishing, hunting, and reindeer herding independently. Therefore, they have not become specialized as herders, but instead use a fishing–herding subsistence mode; even if they lose their livestock completely, they could survive with only fish. The abundance and attraction of fish limit humans' residence and migration, and feeding fish to reindeer stimulates animal autonomy and strengthens co-existence relationships. So, the two theories—animal autonomy and familiarity— also need to consider human–animal relations, including the environment in which fish live and the adaptive significance of fish.

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Note

1 This chapter is based on Oishi (2018), which was written in Japanese and has been re-examined with the addition of new data and discussion.

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Section IV

Cold Domestication beyond the Arctic

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10 Traditional Ecological Knowledge (TEK) of Steppe Land for *Dzud* Disaster Reduction in the Mongolian Nomadic Community

Takuya Soma

Introduction: Mongolian Nomads and *Dzud* Disaster

Traditional Ecological Knowledge Fostered by Mongolian Nomads

An old Turkish inscription found in the Orkhon Valley provides meaningful words that were used to encourage local nomadic herders in ancient times:

> Keep the nomadic way of life, without losing your mind to sweet temptation.

The steppe territory along Central Eurasia is indeed a severe, arid environment where it is difficult to cultivate agricultural land because of strong winds and drought. However, recent archaeological analysis has confirmed that domesticated sheep in the Altai region date back to 3300–2900 BCE (Hermes et al. 2020). Archaeobotanists reach even further back and suggest that grasslands in the northern Gobi Desert were established after 4300 cal BP (about 3800 years ago) as a result of anthropogenic factors related to nomadic pastoralism, which became more active after the late third millennium BCE (Rosen et al. 2019). From ancient times, Mongolian grassland herders probably suffered from a range of zoonoses such as cholera and lost mass amounts of livestock to plagues such as epidemic stomatitis (foot-and-mouth disease). At the same time, unescapable confrontations with wildlife, such as livestock loss due to wolf predation, also must have brought about a crisis. For example, livestock loss totaled more than 200,000 during the 1930s and 1940s, which was an amount equivalent to the annual consumption of all Mongolian residents (Toua Kenkyu-sho 1943, 38–39). Even today, nomadic animal herding activity, or nomadism in northern Asia, faces all types of crises every season, and there are ongoing phenomena that occur almost every year in Mongolia (News.mn 2017, 2020, 2022, 2023). Notwithstanding these challenges, herders living under cold steppe land conditions, such as in the Mongolian highlands, have developed a certain sensibility for environmental symbiosis with a deep understanding of the limitations of local natural resources and their carrying capacity (Soma

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2014, 2015, 2016a, 2016b, 2017, 2019). However, environmental disasters and natural resource deterioration (e.g., grass, water, pasture, wild prey for hunting) have always made nomadic life fragile and unstable. Over centuries of survival in Asian cold steppe territory, Mongolian nomadic animal herders have fostered unique strategies against environmental disasters by maximizing traditional ecological knowledge (TEK) in their harsh daily lives (Soma and Schlecht 2018). Specifically, among nomadic communities, there is a unique code of discipline known as "The Rule of the Steppe Land" (Soma 2022). This rule is neither the official law nor documented socio-political criteria, but rather centuries-old living practices based on conceptual cognitive sense among Mongolian nomads. It is a key concept to understanding what might be the only way to coexist with extreme coldness in the severe conditions of the steppe zone.

Following worldwide acknowledgment of indigenous peoples during the 1990s, the importance of TEK has been increasingly recognized for its wide range of adaptability as an integral part of agricultural sectors such as beekeeping in Korea (Park and Youn 2012), wildlife management in Botswana (Phuthego and Chanda 2004), benthic marine habitats and fishery management in Brazil (Schafer and Reis 2008; Teixeira 2013), and Satoyama conservation in Japan (Indrawan et al. 2014). Today, however, TEK and its substantial contribution to nature guardianship are vanishing among Mongolian herders alongside local elders (Fernandez-Gimenez et al. 2016). TEK has been considered a necessary component of environmental impact assessment since the 1990s (Stevenson 1996), and there is an empirical basis for locally fostered TEK to provide coping techniques or systemized forecasting methods in some cases to predict the effects of disastrous climate changes on nomadic livelihoods (Huntington 2000). Therefore, modern strategies for disaster prevention or reduction in the grasslands can be greatly attributed to the traditional awareness inherited from nomadic animal herders.

Such traditional knowledge is derived from various forms of knowledge about all things divine, developed from the accumulated experiences and perceptions among a particular people, group, or society. This chapter aims to pay tribute to, and build on, a series of pioneering scientific works on TEK research (Berkes 1993; Usher 2000, 185; Huntington 2000). Referencing Usher (2000) with some modifications, I re-evaluate four categories of roles and values for TEK:

1. Recognition of unique subjective facts about native ecosystems, environment, fauna, and flora
2. Guiding deeper understandings of the land and natural resources passing through the environment from the ancient to the modern world
3. Practices and beliefs for protecting mental and physical well-being, including the protection of wildlife to maintain the sustainability of local communities

4. Cosmological ideas as an intellectual scheme for guiding rational interpretation of all surrounding natural phenomena

Mongolian nomadic communities have developed various types of their own indigenous knowledge in harmony with their role in nature guardianship, which is an interactive practice involving a spiritual connection to the natural environment among people who must directly depend on local resources (Berkes 1993; Kimmerer 2002). The TEK system is shifting constantly and being perpetually renewed through the incorporation of new aspects and lifestyles from modern society. Today, Mongolian nomads in remote areas frequently exchange information on Facebook and use smartphones and social networking services to search for missing livestock. People have started holding uniquely modern beliefs that, for example, by calling family and close friends from various power spots around Mongolia (such as Otgon-Tengel, Tayhal stone, Zaisan-Tolgoi, Shanbariin-oron, etc.) they can share energy over the phone, or that personal information can be revealed from fingerprints or irises in photo images posted on social networking sites. Thus, a new system of modern beliefs and fears has been developed through the interplay of contemporary digitalized society and traditional ideas based on Mongolian folklore.

This chapter is based on my personal experience of living for 400 days together with nomadic herders in western Mongolia, where I found that winter in the steppe land is full of uncertainty and instability of life and of mind. During my long-term field survey in the nomadic herder communities in the Bayan-Ulgii, Khovd, and Ovs provinces in western Mongolia, I collected data mainly through participant observation with local families among the Durbud, Trugout, Uriankhai, and Kazakh ethnic groups. I conducted my principal fieldwork over the course of approximately 300 working days between 29 May 2013 and 28 February 2018. To collect various kinds of living TEK across Mongolia, I selected informant herder households from the following five major study sites (SS) (see Figure 10.1), which greatly differed in their living landscapes and animal-grazing environments.

SS1: Tsagaan Khairkhan [Ovs] (*n*=26 herder households)
SS2: Tess [Ovs] (*n*=17 herder households)
SS3: Tsagaan Chuluut [Khovd] (*n*=12 herder households)
SS4: Chandmani [Khovd] (*n*=18 herder households)
SS5: Bulgan [Bayan-Ulgii] (*n*=50 herder households)

I administered a questionnaire through structured interviews as part of a cross-sectional and longitudinal survey specifically on the oral history of traditional livestock management techniques and disaster reduction. At the same time, daily casual conversation with family members, local elders, and skilled herders was a great source for reaching a deeper understanding of their livelihoods. I found that the cornerstone of nomadic living strategies

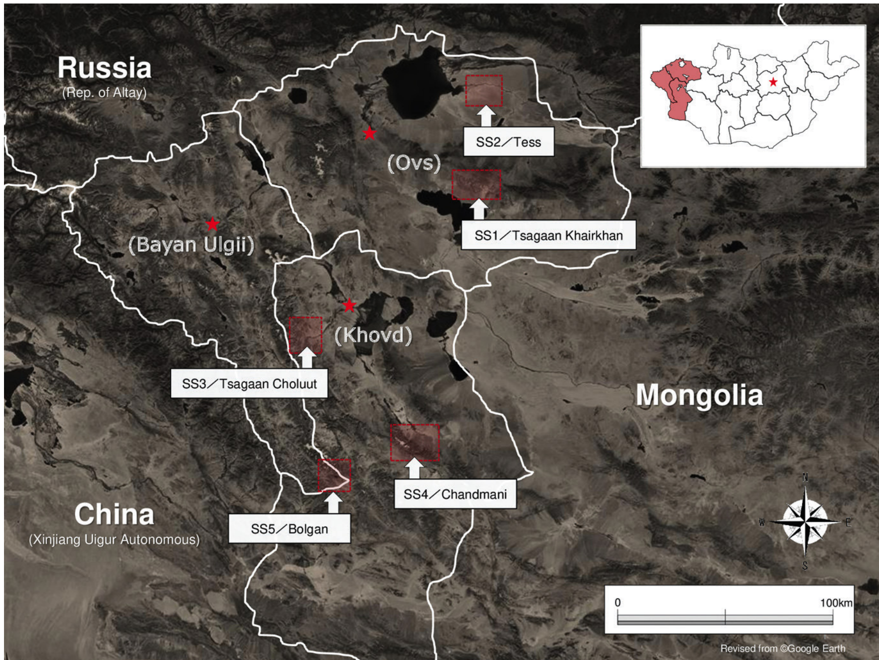

Figure 10.1 Map of Study Sites (SS). ⏎

for environmental adaptation could be defined as disaster prevention and reduction and that this has contributed to recent local environmental protection namely in accordance with The Rule of the Steppe Land, which is neither written record nor educational knowledge, but a native perception by Mongolian nomadic herders on how to coexist with the changing steppe land environment. It is similar to the "The Law of the Tundra" (*zakon tundry)* set forth by Stammler (2005, 83) through his own experiences, mistakes, and confusion, but has more of a survival-oriented sensibility that is melted into the daily discipline as a meta-perception of how to behave properly in the steppe land. The starting point of this study was also my passion for trying to understand the substantial meanings of TEK to reveal how local animal herders survive, that is, how TEK encourages a re-creation of forgotten perceptions based on the idea of environmental symbiosis, that "humans are a part of wild nature" (Soma, 2022).

Cold-Informed TEK

Humans have developed scientific awareness through careful observation of how their livelihoods confront and/or co-exist with the wild nature and environment by which they are surrounded. Some of this awareness has faded,

however, with the loss of TEK-centered survival strategies among Mongolian nomads and the "cognition" and "perception" that are directly related to local environmental conservation (Fernandez-Gimenez et al. 2016; Soma 2018, 2022). TEK has great potential for local disaster prevention and reduction and can be used to propose new standards for sustainable community development. TEK is accumulated through a special process of intellectual reproductions transmitted through various channels of cultural expression (e.g., literature, oral tradition, songs, dances, performances, paintings, discipline, norms). Since many local societies, including indigenous peoples, did not keep written records, indigenous knowledge was transmitted through the generations with a highly sophisticated "orality" (oral history). However, passing down intangible knowledge does not always have a clear ritual or format. It is often handed down in casual daily conversations with family members and elders, or in children's bedtime stories. In the Mushere culture in central Nigeria, for example, children acquire diverse knowledge about wild birds in their surrounding environment, and their ethno-ornithological knowledge is deepened by observation and transmission from mothers and grandmothers, particularly among girls, and similarly by oral information-sharing with siblings and friends for boys (Pam et al. 2018). Likewise, children of the indigenous Zeltal-Maya tribe of Mexico are said to be able to memorize the names of over 100 species of local plants and animals by the time they are nine years old (Stross 1973).

One reason why science has turned its careful attention toward TEK is the reappraisal of its many implications for the future of local flora and fauna. As an example, in Canada, an aggregation and biological understanding of TEK by the Inuit people specifically identified how fowl cholera outbreaks among wild birds, which mainly occurred in the Common Eider (*Somateria mollissima*), began after 2004 (Henri et al. 2018). This sort of extensive knowledge base can thus lend clarity to avian disease pandemics and their mortality rates dating back several decades. Among western countries, which became more sensitive to the need for the conservation of biological resources starting in the early 1980s, researchers have begun to accumulate early TEK studies conducted in the field of wildlife management (e.g., foraging site selection for woodland caribou (Polfus et al. 2014) and polar bear conservation in Quebec (Laforest et al. 2018)). Notably, the Taku River Tlingit Tribe, a North American indigenous group in British Columbia, is named as co-author in an academic paper by Polfus et al. (2014).

While the importance of TEK has been widely recognized, several difficulties and challenges in biological conservation have been observed when integrating TEK with policy practices. For example, for porcupine caribou hunting in Canada, the introduction of TEK in the form of "not hunting the first individual of the herd" reportedly caused disturbances in herd management (Padilla and Kofinas 2014). In Norway and Finland, the integration of TEK to address dysfunctional salmon resource conservation policies caused discrepancies between policymakers and indigenous Sami

in management policies (Brattland and Mustonen 2018). Furthermore, in Nunavik in northern Quebec, beluga whale surveys meant to integrate telemetry measurements and local TEK produced completely different conclusions (e.g., offshore and coastal habitat zone use, movement routes, attack patterns) (Lewis et al. 2009). These studies suggest that mutual collaboration between TEK and modern science is necessary for successful integration and that this should begin in the community at sub-theme levels, rather than involving a large number of actors and huge networks (e.g., government, industry associations, unions, local residents, consumers, companies) from the very beginning.

In this study I therefore particularly focus on (i) the role of Mongolian nomad TEK as an intellectual scheme for disaster prevention and reduction, with the horizon of its value defined as "folklore-based disaster reduction," and (ii) the efficacy of TEK for conservation of local ecosystems and sustainable pastoral communities in extreme cold environments. Mongolian nomad TEK has been informed by and benefited from the challenges presented by extreme cold conditions, and by drawing on my previous work as well, I aim to take a deeper look at survival ethnography from the lenses of oral history, coping strategies, and human ecology.

TEK for *Dzud* Disaster Prediction

Oral History for Disaster Prediction

For as long as their history can be traced, Mongolian grassland nomads have faced the serious threat of natural disasters referred to as *dzud* (see Figures 10.2–10.4). When I lived with a nomad family in the grasslands of Altai, I realized that many of the rules, disciplines, and jinxes that people expressed in their daily lives were related to overcoming impending *dzud* disasters. *Dzud* is generally understood to be a "cold and snow stormy disaster," but they are actually quite complex, consisting not only of heavy snowfall and cold temperatures but also synchronized and/or multiple occurrences of various disasters caused by weather events such as snowfall, cold, wind, drought, and grass resource shortages. *Dzuds* can be classified into seven types (see Table 10.1) according to their characteristics. The different types of *dzuds* frequently occur together, such as a *Tsagaan dzud* (Type 3) combined with a *Siren dzud* (Type 4), or a *Khüiten dzud* (Type 5) combined with a *Shuurga dzud* (Type 6). Even in the same region, the characteristics *dzuds* can be so diverse that nomadic herders need to engage in complex coping reactions accordingly. In Mongolia, the devastating *Dzud 2000/01* that occurred in the winter of 2000/01 is considered to be the most catastrophic crisis in Mongolian history. This *dzud* reduced the number of livestock from an estimated 34 million (1999) to 24 million (2003), resulting in a loss of approximately 30% of the total livestock in the whole country. Furthermore, following this *dzud*, over 65% of herders had not retained

Figure 10.2 Small livestock grazing (photo by the author, taken in February 2017). ⏎

Figure 10.3 Large livestock grazing (photo by the author, taken in February 2017). ⏎

Figure 10.4 Dead animals by coldness (photo by the author, take in February 2017). ⏎

Table 10.1 Seven types of *dzud* ⏎

Type	*Characteristics*
1. Gan Dzud	Drying and drought damage
2. Tuulain Dzud	Pasture biomass deterioration caused by overgrazing
3. Tsagaan Dzud	Snow damage caused by heavy snowfall
4. Siren Dzud	Ice damage caused by freeze-thawing
5. Khüiten Dzud	Cold damage caused by extremely low temperatures
6. Shuurga Dzud	Wind damage caused by intense winds and storms
7. Khar Dzud	Water source deficiency due to lack of snow

more than 100 heads of livestock (Nitta et al. 2005). During *Dzud 2009/10*, more than 10% of all livestock was lost across three provinces—Zavkhan, Övör-Khangai, and Gobi-Altai (Kamiya et al. 2011, 861). Over centuries of facing *dzud* threats, Mongolian nomadic herders have invented various forms of countermeasures to protect five species of livestock—goats, sheep, cattle/yaks, horses, and camels—on their own. Nomadic societies have been highly dependent on non-written communication to pass down TEK, which basically takes the form of maxims, proverbs, and oral history. The classical orientations of such an orality could still have a strong influence on the

actions people take today. Documentation of TEK related to predicting and reducing disasters could safeguard one of the most realistic coping strategies against *dzuds* and ensure the sustainability of local nomadic communities since of course almost all herders have an interest in protecting their own livestock.

Under variable weather conditions, Mongolian herders have observed the surrounding local fauna and flora carefully to predict an impending environmental crisis. Although scientific ecological knowledge such as weather forecasts, earthquake prediction, and volcanic eruption warnings have been adopted since modernization, in particular, TEK related to predicting weather conditions and climate change constitutes the most important type of awareness for life in the wild steppe lands. Such indigenous awareness was inevitably successful among various communities of hunters, nomads, fishers, and even agrarians, and especially in nomadic communities that adapted to extreme environments; TEK has often been fostered to predict the weather and even oncoming *dzuds*. TEK observations can be classified into the following six categories (Soma 2017):

1. Livestock
2. Wild animals
3. Plants (e.g., grass, trees, flowers)
4. Weather/climate
5. Moon and stars
6. Proverbs and folk tales

Nomadic herders enact disaster reduction and coping strategies based on careful observations in these six categories. Based on previous field surveys in Khovd and Ovs Province, I collected nearly 50 local oral histories, or so-called ecological narratives (from n=93 households in 2016–17). Herders living in Khovd and Ovs had experienced very different environmental conditions. Consequently, I collected very different folktales, legends, and oral histories at each study site.

One famous saying widely known among local herders was as follows:

> Give bog mal (small livestock) grass, and then let bod mal (large livestock) graze.

Mongolian herders faithfully adhere to this saying as part of local traditional livestock management. Small ruminants, such as sheep and goats, have difficulty walking in extremely cold temperatures and are not able to graze for grass under snow cover. Hay stored during the previous summer is therefore critical to overcoming a severe climate crisis. On the other hand, large ruminants (especially cattle and yaks) somehow survive by grazing. Horses and camels graze and find pastureland on their own, so frequent feeding

is not necessary in the winter except for milking females. The best-known Mongolian proverb related to *dzud* disaster prediction was:

> Years ending in "7" highly bring about dzud.

This is quite accurate since according to historical fact, significant temperature decreases occurred during the winters of 1937, 1947, 1957, 1967, 1977, and 1987 (Jirigala et al. 2013; Soma 2016). Another well-documented perception related to potentially disastrous weather was:

> Weather becomes cold in the year[s] of [the] sheep and monkey.
> (e.g., 1967/68, 1979/80, 1991/92, 2003/04)

Mongolian herders had a traditional awareness that severe cold weather occurs every 10–12 years. From living under extreme environmental conditions and surviving repeated *dzud* disaster experiences, they fostered various survival strategies by expanding their sense of awareness of the wild Mongolian steppe and passing down these maxims and proverbs locally. This wisdom, despite unknown origins, has protected communities and at the same time regulated human attitudes in the grassland.

Weather Predictions from Livestock Behavior

Another aspect of herder awareness was the cultivation of various beliefs related to predicting weather changes based on the behavior of livestock and wild animals. Livestock tend to respond more sensitively to environmental changes than humans do, and consequently, local herders have developed varied abilities to observe and recognize these signs through daily care and physical contact. For example, herders explained:

> When the hair around the belly of small ruminants becomes thick, the weather will become very cold.
>
> If there is a lot of undigested grass in the stomach of slaughtered livestock, the coming winter will be very severe.

It is widely known that domesticated animal hair becomes thicker as a physiological response to cold. In addition, a large amount of undigested grass remaining in an animal's stomach is thought to be a feeding reaction intended to preserve as much food as possible before a *dzud* disaster.

Extreme cold and massive temperature decreases are thus reflected in livestock behavior. Other abnormal signs included:

> "When livestock primarily move to watering places in the early morning at the summer pasture;" "When livestock try not to enter the pen until

late;" and "When livestock walk around from early morning until late and start to walk towards the foot of the mountain at the summer pasture."

These were worrying behaviors because they indicated that the livestock were trying to spend as much time as possible grazing in preparation for severe cold. One certain weather change before a *dzud* is a massive decline in the air temperature of the high-altitude summer pasture. Animals therefore sometimes try to avoid cold temperatures in the higher upland pasture and move toward lower land. Small ruminants especially will be unable to graze if there is long-term snow cover remaining from snow that did not melt sufficiently in October and November.

TEK related to understanding *dzud* signs is now thought to be rare, transmitted among only local elders. Among the relatively middle-aged generation, everyone stated with respect to various sayings that they "know the words, but don't know how to read the signs." TEK has not been transmitted as an intuitive awareness, that is, as "cognition" or "perception," that can be utilized for coping strategies. This is one-factor underlying serious concerns that TEK will not be carried over to the next generation and will be completely lost in the near future. In turn, this means that nomadic communities will face difficulties in retaining their shape and identity due to the loss of experience-based living strategies.

Preparation for Dzud Disaster Threats

In previous research, I surveyed actual livestock loss due to *dzuds* during the three periods (2000/01, 2009/10, and 2015/16) at three SS in the Altai region (SS1–Tsagaan Khairkhan; SS2–Tess; and SS4–Chuluut). I conducted interviews to tally the number of livestock that died in the three *dzuds* and asked for information on the "actual number dead," "date of death," and "total livestock owned" at each household (n=61). With respect to *Dzud 2000/01*, 47.4% to 64.5% of the total livestock was lost in SS1 and SS4, while the mortality rate remained unchanged from the previous year at 14.8% in SS2. The damage in SS4 in Khovd Province was very high at a 64.5% loss of total livestock. Local nomads noted that the Bayan Ulgii and Khovd provinces are the most remote areas, away from the capital, and therefore have less developed overall living standards and general welfare. My own experience living in these areas causes me to agree. Reportedly during the *Dzud 2000/01* disaster, very few rescue supplies arrived from the capital due to poor road conditions, and there were claims that members of government at administrative offices, including even the governor, took large amounts of rescue supplies for private use. There were several conflicts within the community and between households over rescue supplies after *Dzud 2009/10* as well. Moreover, much of the widespread damage could be attributed to herders not being conscious of the need to implement countermeasures.

This sort of social confusion is evidence enough of the need to re-evaluate the importance of being able to apply conventional TEK and prepare against damage from *dzuds*.

One important finding from my field research is that *dzud* damage ties into long-term livestock loss as opposed to being a concentrated event occurring at a specific point in time. Actual *dzud* damage tends to continue for several months from December to the following May, lasting for approximately six months (see Figure 10.5) (Soma 2022). Although the recorded peak for livestock death coincided with the coldest time of the year at around the second week of February, this figure shows how herders at SS1 experienced a long period of damage from December to the end of April with some sheep even dying in the springtime from April to May onward. In contrast, herders at SS2 experienced relatively little damage with a concentration of livestock deaths after March but less in February. The dangerous season for SS2 was from the end of March to mid-April and was clearly later than for SS1. For herders at SS4, the situation was similar to SS1 in terms of timing and the peak of livestock damage. Overall, livestock damage at my SS was concentrated toward the end of the severe weather season in February, although at SS2, the number of livestock lost was not especially high in February. Presumably, the total mortality rate could be reduced by implementing coping strategies to avoid livestock deaths peaking in February. Given that northern Ovs Province (SS2) is known as an extremely cold region even in Mongolia, its low mortality rate serves as a case in point for how the use of TEK in implementing coping strategies might reduce total damage. Further research may discover more TEK-based living practices in such a severe area.

In the South Gobi area, the mountainous region receives more precipitation than the surrounding semi-deserts, which results in a gradient of phytomass production and therefore higher forage availability (Retzer et al.

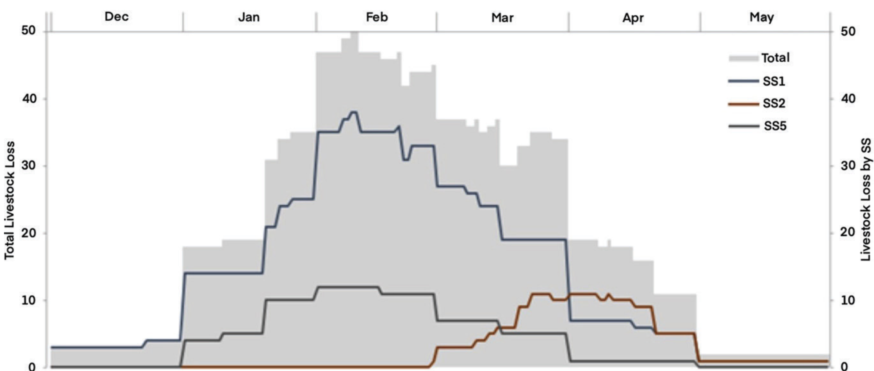

Figure 10.5 A season of *dzud* damage [average during *Dzud* 2000/01, 09/10, 15/16 at SS1, SS2, & SS5]. ⏎

2006). According to climate studies, westerly meandering causes extreme cold temperatures across the Mongolian highlands (Koike et al. 2014). Livestock mortality is also associated with the following three factors: (i) low Normalized Difference Vegetation Index (NDVI) values (i.e. poor vegetation) in August of the previous year; (ii) high Snow Water Equivalent (SWE) values (i.e. significant snow accumulation) in December of the previous year; and (iii) a high mortality rate and large livestock population in the previous year (Tachiiri et al. 2008). This suggests that *dzuds* do not occur only because of climate disasters (e.g., extreme heavy snowfall, low temperatures, strong winds, feed depletion), but are in fact a complex social-ecological phenomenon. Vulnerability to *dzuds* mainly occurs as a negative function of interactions among physical, biological, socio-economic, and institutional factors (Fernandez-Gimenez et al. 2012; Soma and Schlecht 2018). Thus, *dzuds* are complex sequences of socio-ecological disasters with catastrophic effects on all natural resources in the steppe land. Through my own personal experience living with a nomadic herder family, it was very clear that most herding efforts and activities (for both humans and livestock) were indeed undertaken to overcome the severe winter season.

TEK for *Dzud* Coping Strategies

Seasonal Movement As an Evacuation Strategy against Dzud

Together with TEK, seasonal migration is the basis of a nomadic way of life. It is truly an innovation by which people have adapted to the arid steppe land. It originally grew out of a dependency on grassland use, where herders had to move around and change their pasture lands to prevent deterioration of the grass-resource biosphere in any single place. In this sense, nomadic herders do not migrate on their own but are "migrated" depending on the grazing demands of their livestock. In my fieldwork, there were marked differences in attitudes regarding "mobility" and "moving distance" between SS1 and SS2 in Ovs Province (see Table 10.2). This was due to differences in the environments surrounding the living settlements. While the average number of annual migrations did not differ significantly between SS1 (mean = 5.8) and SS2 (mean = 6.3), moving distance in 2015 totaled 138.2 km for SS1 and

Table 10.2 Seasonal mobility in SS1 and SS2 (km in 2015/2016) ⏎

Study site		*Annual number of move*	*Annual moving distances*	*Average moving distance*	*Max. number of move*	*Min. number of move*
SS1	Tess	5.8	61.2	11.9	9	2
SS2	Tsagaan Khairkhan	6.3	138.2	24.3	15	2

61.2 km for SS2 (field survey in 2015). In other words, herders from SS1 traveled a distance of 2.25 times more than herders from SS2. As a point of comparison, the annual migration distance of herder families in the Gobi Desert averages between 3.0 km and 12.2 km (Hirata et al. 2005, 147). Mobility for herders from the Altai Mountain region (SS3, SS4, and SS5) was more in the style of seasonal transhumance between two points, a summer pasture and a winter pasture. Only three households maintained their own spring or autumn pasture in their migration territory among local herders (n= 50 households). In general, the number of seasonal moves tends to decrease among herder families living at high altitudes, perhaps averaging ten times annually for a total distance of about 100 km, as in the western Khangai region (Lkhagvadorj et al. 2013). According to recent GPS tracking research by Marchina et al (2022) in the Nogoon-nuur district in eastern bayan-Ulgii, herders used four to eight campsites with 7–14 seasonal moves in a year. This shows more active mobility patterns compared to the Kazakh transhumance seen in deeper Altai regions, but rather like the nomadic pastoralism of Ovs province. Along the Chinese side of the Altai Mountains, the potential main summer pasture land is located at altitude zones ranging from 1400 m to 2200 m in the middle mountains where the ecological vulnerable index (EVI) decreases due to improved climate and vegetation conditions. On the other hand, EVI values increase in ranges that are lower than 1500 m and over 2200 m, and reach a peak at altitudes exceeding 3000 m (Yang et al. 2023). This is site-specific and it is not certain whether the same applies to the Mongolian side as well, but herders might naturally recognize the lower vulnerable pasture land, especially in the transhumance pastoral style.

While seasonal migration is directed by the seeking of grass resources, it can sometimes become an important coping strategy as a means of evacuation from a settlement facing extreme conditions. Under the threat of a weather disaster, one traditional way of protecting livestock is called *otur*, in which a weak flock subgroup is removed to graze away from the main flock group. The main purpose is to concentrate on fattening the weak livestock so as to avoid annihilation and increase the overall survival rate. Herders reported that "going to *otur*" (n = 11) is the principal way to avoid serious grass resource deficiency. When facing a serious deterioration of local grass resources, the head of a local village or community will occasionally contract with neighboring villages to allow herders to *otur* (evacuate) there. In such cases, the village pays some appropriate tax to the destination based on the number of livestock and households evacuated. In the southern region of SS1, there was a specific kind of *otur* to Khyargas Lake. Even though *otur* is the most important disaster evacuation strategy for the nomadic livelihood, a recent outflow of young generations from rural nomadic communities makes it difficult to enact (Soma 2020) because *otur* requires skilled herders who must work alone in detached pasturelands. Local resilience against *dzud* disasters has thus been weakened by recent depopulation and loss of labor.

As a coping strategy, mobility sometimes depends on unique strategies based on instinctual animal habits:

> Herdsmen also follow to change the settlement where horses [free range] have moved.

Sometimes, horses can distinguish good pasturelands by themselves. This can serve as an important basis for settlement choice. In fact, stable horse mortality rates were attributed to separate *otur* grazing during *Dzud 2000/01* (Soyollkham et al. 2010). Herders might thus move to places where their horses have settled, and as reported in an ethnography of horse and herder interactions by Marchina (2016), they might train for and expect autonomous behavior from their horses. Horses are highly adapted to the severe Mongolian environment and will spontaneously break through ice and snow to graze, thereby helping small ruminants such as sheeps and goats that often die because they cannot reach grass under snow cover (Kindstedt and Ser-Od 2019, 25). From a multispecies perspective, even livestock help each other in this way, and Mongolian herders recognize animals for their subjective agency (Maurstad et al. 2013, 324) in a process of "co-shaping" partnerships with each other (Marchina 2016, 112).

Herders also observed the migratory behaviors of wildlife:

> If wild herbivores, such as deer, argali, and ibex come from far away, their destination place will be warm and calm weather during winter.

Wild herbivores are believed to avoid cold temperatures by instinctively moving to a calm, warm pasture during the winter. In one case, GPS tracking showed Mongolian gazelles (*Procapra gutturosa*) migrating more than 18,000 km in five years (Dejid et al. 2022). Thus, both wild and domestic animal migration is understood as instinctive detachment and evacuation from severe weather conditions to warmer land. This phenomenon is therefore also a useful sign for determining the destination of migration. Both livestock and wild herbivores share feeding territory in the steppe zone. Increased domestic animal grazing in pasture lands has brought about massive pressure on the habitat zone of wild herbivores (e.g., argali and ibex). A *dzud* is a weather disaster that can have devastating effects not only on human communities but also on all wildlife. Since the early 2000s, however, herder attitudes suggest a downward trend in seasonal mobility owing to the economic burden of effort and labor; *otur* does not seem to be positioned as an evacuation strategy among more recent nomadic communities.

Livestock pens and sheds for protection from extreme cold

In addition to seasonal movement, careful attention is paid to the improvement of livestock sheds and pens before a severe cold season. Tess village in

Ovs Province (SS2), for example, known as the coldest place in Mongolia, sees severe cold and snowfall that continue until around 20th April every year. Gaps and holes in pens and sheds are carefully repaired by filling them with cow manure to prevent cold air from flowing in. Livestock sheds are constructed with about 30 cm to 40 cm of space between the inner and outer walls. This space is normally filled with livestock manure and soil to help prevent cold air from flowing directly into the shed. In addition, bamboo timber is spread out on the roof and covered with manure on top to keep the inside warm. Extremely cold temperatures can cause frostbite on the hooves of livestock. For this reason, frozen urine on the pen floor needs to be frequently removed. Salt is also sprinkled on the ground where livestock lie down to prevent frostbite. This is the concept of spraying sodium chloride on tarmac roads to prevent freezing. The most effective measure against cold temperatures is *khikhtel*, which is the accumulation of livestock manure on the pen floor. This is a traditional method for blocking cold air from the soil in which livestock manure is packed at a height of 50 cm to 100 cm on the pen floor (see Figure 10.6).

Grazing is a daily activity even during cold weather and snowfall. However, during severe cold days, daily grazing does not begin earlier than 10:00 am, when the morning sunshine begins to provide warm air. Grazing distance and orbit also tend to be shortened during cold weather (Soma 2014, 2017). Furthermore, instead of a free-roaming grazing style, livestock are oriented to a fixed place, such as a relatively warm pasture or a place with little snowfall. Some households do not allow livestock to go farther than 5 km away from the settlement. In the Altai Mountains, a small forest zone might be used during cold winds, with herders expressing some reservations that they could "graze livestock in the wood of porcupine (ulias), but not later than around 16:30," or that "inside the woods, wolves can easily prey on small ruminant flocks" in winter. Care must also be exercised to collect livestock immediately after grazing and return them to their pens before their bodies cool down from sweat. Some local maxims warned about letting livestock sweat in the cold air (Yoshida 2015, 209):

Figure 10.6 Khikhtel the accumulation of livestock manure on the pen floor. ⏎

"The horse gets sick and the physical condition deteriorates due to sweat."
= expressed as *khəls aldakh*
"When leaving camel sweating, they are less fattened next year."
= expressed as *khəls tsokhikh*

Local Mongolian herders believed that all of a sheep's physical strength and nutrients were contained in its tail. Therefore, they took special care not to let the tail get cold. Herders also had to make sure to provide enough rock salt and natural soda salt (*khozhil*) for the animals to lick. During the midwinter season, milking was also limited in extreme cold and snowy weather. Many households restricted milking to only once a day in the evening, and some households did not take milk at all. Particularly, mother cows (with calves up to two years old) and pregnant cows were not to be milked until spring. Some nomadic families had to go without milk in their tea, or *khar tsay*, and whenever I drink black tea now, I am always reminded of the ongoing hardship I saw them endure during my fieldwork.

Livestock Consumption and Food Security

Annual livestock consumption is directly linked to the evaluation of living standards among households. Mongolian nomads will never eat livestock that has fallen dead. This is because customarily they suspect disease or virus infections. When serious damage is predicted from a *dzud*, herders would engage in coping strategies based on an old saying:

> Weaker livestock should be slaughtered first for eating meat.

This was expressed in a local Mongolian term as *mal tseverlekh*, meaning "cleansing livestock." Weak and skinny livestock were initially selected for slaughter to secure meat consumption. In general, the number slaughtered tended to correlate with a household's total livestock possession. Generally, the minimum consumption at one general nomadic household was said to be "two small ruminants in a month, and one cow in a winter." This was equivalent to approximately 30 heads of sheep when converted to sheep equivalent units (SU value). The amount of livestock consumption differed by herd size for each site. For example, in my previous studies (Soma and Schlecht 2018; Soma 2022), the annual consumption of livestock was 34.6 heads and 36.9 heads, respectively, at SS1 and SS2 in Ovs Province, showing almost no regional differences (overall average: 35.7 heads/years). For both large and small ruminants, sufficiently grown livestock aged around seven years tended to be consumed. In contrast, significantly different living standards in Bayan-Ulgii (SS5) were reflected in average consumption of 21.9±1.8 heads maximum and 13.1±1.2 heads minimum (overall average: 18.6 heads/year). Livestock consumption at SS5 was significantly lower than at SS1 and SS2, where consumption was almost double that of SS5. The meat self-sufficiency rate and

provisional stability for SS1 and SS2 appeared to be quite high. However, at SS5, livestock of approximately four years of age was also slaughtered for meat supply, regardless of sex. Due to the lower living standard and limited grass resources, herders in SS5 could not afford to keep livestock for fattening for a long period. There was no significant difference in the social stratum between groups; however, there was a significant difference in the livestock birth rate. This data suggests that small herder households (total possession of less than 100 livestock) face particularly lower living standards in terms of livestock consumption.

Livestock slaughter can only take place at certain times of the year in Mongolian herding life because of meat preservation issues. Meat cannot be kept under warm conditions, and frequent seasonal mobility does not lend itself to keeping large stocks. Therefore, the slaughter is normally conducted in the middle of November when cold temperature allows meat to be kept frozen outside. Interestingly, contrary to Islamic Kazakh and Kyrgyz nomads, Mongolian herders would not spill livestock blood on the ground when slaughtering. This is the custom among Yamal reindeer herders as well (Stammler 2005), and it is believed to be derived from a discipline imposed by the *Zasag* order of Chinggis Khan in the 12th century. At this time, several households work together to slaughter all of the necessary livestock at the same time, that is, approximately 10–20 sheep and a horse or a cow. Nomads also keep food reserves during the summer, when seasonal migration is active. When I examined food reserves (4 categories, 28 items) at each region (SS1 to SS4) (see Table 10.3), the maximum value of 54.42 kg was observed at SS1, and the minimum value of 29.27 kg at SS4 (Soma 2019). The overall average food reserve was 43.64 kg. SS1 was a single household of a mature couple in their 50s, and SS4 was a settlement of two households, including an older couple in their 60s. However, there were no significant differences between regions (P = 0.44). My examination of correlations among stockpile ingredients and quantity of cereals (flour, rice, brown rice, millet) indicated a strong positive correlation with stockpiles of other cereals. Mutton stocks had a strong positive correlation with stocks of leeks (r = 0.87) and flour (r = 0.86), and

Table 10.3 Food stocks at herding households (kg/HHs) ⏎

Category	*SS1* *n = 5*	*SS2* *n = 5*	*SS3* *n = 3*	*SS4* *n = 2*
A. Dairy products (9 items)	28.857	23.592	3.608	1845
B. Meat (5 items)	4.674	6.541	7.623	2.993
C. Vegetables (7 items)	0. 647	3.332	3.270	3.848
D. Grains and seasonings (7 items)	20.246	23.262	19.645	20.588
Average(g)	54.424	56.727	34.147	29.273

F(3, 9) = 3.86 < 5.60 / P = 0.01 < 0.05 S.
F(3, 9) = 3.86 < 0.97 / P = 0.44 > 0.05 N.S.

conversely with beef stock.[1] I recorded these figures in the summer, so there was almost no beef stock left from the mid-November slaughter. Essentially, the diet became quite simple in the summertime, and some of the more "dyed-in-the-wool" herders, so to speak, would eat only once at dinnertime and get by on several liters of mare's milk wine during the day.

The milk-based distilled spirit *shimin-arkhi* is a traditional homemade product exhibiting various characteristics from household to household. It is produced in the summer when enough milk can be collected and boiled down (yogurt). Reserves of *shimin-arkhi* were almost completely positively related to reserves of wheat flour, fried bread *Bhotsag*, and rice. Since the production of *shimin-arkhi* requires a large amount of fresh milk and fuel, it is sometimes difficult for low-income families to produce. Because of this, I believe *shimin-arkhi* could be part of an index of foodstuffs that measures economic circumstances among herder households. Although it is not possible to draw conclusions just from my limited case study, I estimate that each household kept approximately 40.0 kg–50.0 kg of food stock, even in the summer pasture. I should stress that the nomadic way of life prevents people from keeping large amounts of food during spring and summer and that winter puts constraints on the availability of grains and vegetables. Nomadic animal herders therefore face food security issues throughout the year.

Food security is a common concern for livestock as well. Almost all households reported "preparation for hay-stocking" as the most significant activity preceding winter. Some households stated that "a single winter requires more than three large maximum truckloads of grass." This was difficult for some low-income, small-scale households to achieve considering the labor and expense required for *otur* and hay-stocking. In this case, they would allocate hay to the weak livestock first in an effort to keep the balance of the flock unit. There is also a reliance on locally developed rescue foods:

> When there is a shortage of grass resources and hay-stock in the winter, bark from aspen, poplar, and birch trees is given to livestock as a rescue food.

According to herders, the most unique rescue food was horse manure produced in September (Figure 10.7).

> Horse manure is regarded as a rescue feed resource, and mainly given to pregnant cows and sheep and goats by mixing it with concentrated feed. This early autumn horse manure is specially termed "sirin khomol".

Since horses only eat near the growth points of fresh grass, local herders believed that the manure would still contain undigested edible grass fibers. Other examples of TEK to address a shortage of feeding resources included:

> I gave a piece of a horse's liver to livestock.
> I gave hot milk tea mixed with a tiny amount of vodka to livestock.

Figure 10.7 Autumn horse manure called *sirin khomol* (photo by the author).

These examples very clearly demonstrate that local herders devote themselves to protecting their livestock under extreme environmental conditions by maximizing limited local food resources.

Livestock Disease and Medicinal Plant Use

In connection to food security, local herders used native plants as indigenous medicine both for themselves and their livestock. Livestock diseases are common in Mongolia and very little modern veterinary treatment is available in remote rural communities. Therefore, the use of naturally grown medical plants, called *zhor* is very crucial in rural herding communities. In Mongolia, there are roughly seven types of traditional medical treatments—oil massage, acupuncture, herbal prescription, diet, aromatherapy/hematology, and sutra reading. These treatments were rapidly revived after the collapse of the socialist system and became universal remedies (Takano et al. 2003). Wild medical plants in the steppe land are used for both humans and livestock. At SS in Ovs Province (SS1 and SS2), I identified seven primary types of frequent livestock diseases: coenurosis, grass-poisoning, contagious agalactia, distomiasis, eye disease, hemorrhagic septicemia, and myiasis. The most common disease was coenurosis, which may also occur in humans after eating food contaminated with dog feces. Especially in the case of livestock, the brain tissue is destroyed, which results

in walking disability and sudden death. Several cases of "grass-poisoning" were also reported on the local steppe land due to the accidental consumption of certain types of flowers. Specific flower species were not clearly identified by herders, but the colors were reportedly white, blue, pink, or green, suggesting that flowers such as aconite, daffodils, and digitalis were highly poisonous for livestock.

Local herbs and medicinal plants are used for not only livestock but also human diseases and general health. There are 40 species of medicinal plants known for daily use in Ovs Province (SS1: 27 species; SS2: 13 species). Out of these plants, 20 species are only for human use, 4 species are only for livestock, and 16 species are used for both humans and animals. Per household use averaged 4.04 species of medicinal herbs at SS1 and 2.88 species at SS2. The most frequently used plant at SS1 was *Yumduzin* (unknown family genus), which was decocted and given to livestock "when the placenta of aborted livestock was not discharged well." At SS2, the most common plant was *chatsargana* (Чацаргана), or wild seabuckthorn fruit (*Hippophae* L.), which was used as a natural panacea for various purposes. It grew naturally everywhere in the region, which reportedly accounted for nearly 80% of national production. Local species of medical plants at SS2 were not as diversified as SS1 due to a desert-like dry environment and arid climate. One remarkable point is that there were no medicinal plants that were reserved specifically for livestock in these areas. Both humans and livestock in Ovs Province shared and were quite dependent on local medical herb resources. This sort of extensive knowledge of local medical plant resources can also contribute to coping strategies against natural disasters.

Discussion: Resilience against *Dzud* Disaster

Disaster Reduction by Herders and Communities

From my field surveys, I found that local TEK played an intellectual role much like The Rule of the Steppe Land, which defines how to regulate human activity and concurrently enable it to coexist with local nature and wildlife. The systematic use of TEK among herders also suggested that proper resource utilization has been a prominent concern since very old times and that oral traditions have contributed to sustainable community development even in modern nomadic communities. Overall, the principal coping strategies for *dzud* disasters among Mongolian herders can be understood as follows:

(S_1) Hay-stocking
(S_2) Fattening
(S_3) Maintenance of pens
(S_4) Mobility and separate grazing
(S_5) Milking regulations

These are all responses implemented by individual herders and are quite common to all herder households. Generalized seasonal reactions by steppe land herders can summarized as follows:

Summer Coping: During the summer season, the essential preparations are S_1 hay-stocking and S_2 fattening, which need to be thoroughly implemented before September to overcome the severe cold season. In particular, "frequent rotation of pastures" in this season will also contribute to fattening and maintaining good health conditions. Before the arrival of the severe cold season, herders need to increase the number of sufficiently fattened livestock to improve the total survival ratio of the flock unit.

Autumn Coping: In autumn, S_3 maintenance of pens is necessary before the weather grows cold. "Birth control and mating management" is also inevitable to avoid the birth of infant animals during the severe winter season. "Sale and slaughter of weak livestock" is prioritized to improve the overall survival rate of the herd. Mono-flock units, limited to only goat or sheep, are vulnerable to disaster. Therefore, livestock diversification is also recommended for local herding in the steppe land (Zhang et al. 2013).

Winter Coping: S_4 mobility and separate grazing (*otur*) becomes increasingly important during the winter and serves as an "evacuation" from *dzud*. S_5 milking regulations are carried out to limit the amount of milk yield given to juvenile livestock. The use of forage is indisputably a key function for livestock management, which is quite common among pastoralist societies in Kazakhstan (Milner-Gulland et al. 2014) and Inner Mongolia (Wang et al. 2013). In addition, "supplying hay-stock to weak individuals" and "keeping livestock warm and calm in the pen" are also commonly practiced principal countermeasures. In facing an actual *dzud* disaster, one herder simply yet profoundly stated:

> Grazing and milking must be adapted to local nature and landscape variability. Herders need to identify weak livestock, then lead them for separate grazing (otur), feed them well in winter, and put them in a warm pen… .

These coping strategies should be prioritized in working with local institutions to stabilize herder livelihoods and wellbeing. While the true rule for nomadic people is to achieve a humble life with a herd size appropriate for the local steppe land biosphere, I personally felt that there were certain limits to efforts by individual herders to protect their families and livestock. Li et al (2022) found in a case study of the Qinghai-Tibetan Plateau that overall low buffer capacity and livelihood capital limited the resilience of pastoralist livelihoods despite pastoral populations with high self-organization abilities and high learning capacities. This suggests that while certain geographical traits allow for better access to town, market, and natural and human resources by herders

as individuals, there must also be ways to confront *dzud* disasters through the efforts of the herder community as a whole. These efforts included namely:

(H_1) Labor force management
(H_2) Hay and concentrate supply
(H_3) Livestock feces stock

In the contemporary steppe zone, traditional nomadic communities are facing a transitional period due to an eroding population. A successive influx of migration from rural territories to Ulaanbaatar accelerated after *Duzd 2000/01*, especially from the central and western regions (Tsutsumida and Saizen 2014). Physical labor is critical to sustaining nomadic animal herding livelihoods, so a population outflow and a lack of young herders make it difficult to secure sufficient hay-stock, collect livestock manure, and maintain animal pens for the coming winter. If the population balance continues to deteriorate, the demands of daily herding activities will easily exceed the labor capacity of individual households. These social factors may further exacerbate the risk of *dzud* disasters. Population outflows stemming from "escapistic migration" and "quitting nomadism" among the younger population have fundamentally reshaped the traditional pastoral community. This has become a wide-ranging contemporary social issue of utmost concern for Mongolian nomads. Some have proposed creating new opportunities for income generation after *dzud* occurrences so that local herders have a way to both absorb the social shock and decrease pressure on their grasslands (Nakamura 2013). In discussing fundamental differences between coping and adaptation, Walker et al (2022) explain how depopulation is exceeding the capacity for flexible adaptation by nomadic pastoralists and how the disaster is a gender issue, citing, for example, how Samburu pastoralist women are more vulnerable during drought crises. This is something that must be further considered in policymaking. Since Mongolian and Kazakh herder women normally do not engage in livestock slaughtering or daily grazing, there has been very little discussion of issues of gender in the face of disaster. These women would potentially be strongly affected if the men in their households were absent (died or moved to *otur* grazing) in winter, and for this reason also, it is essential to establish a coping–adaption-integrated model for sustainable survival strategies in modern pastoral society by rejuvenating old traditional practices of human-to-human cooperation among neighbors and relatives in local communities.

Adaptations Derived from the Cold Steppe Land

TEK regarding livestock management skills and techniques is like a certain invisible force that sustains the homeostasis of traditional Mongolian nomadic communities. Perhaps it can be called community-specific homeostasis, along the lines of the biological term "social homeostasis" that has mainly been

applied to "the maintenance mechanism of stable organization within a large group of animals and insects" (Matthews and Tye 2019). This organizational mechanism is suitably applicable to local small human communities, which we can be defined as a place-based shared identity (Kruger 2003, 89), in a broader sense, expressed as a forum connecting people with memories, tradition, and heritage together with sharing experiences (Plieninger et al. 2023, 8). The Rule of the Steppe Land contributes to delineating the shape of a community by both regulating and encouraging human behavior. It is also characterized by a unique perspective on nature–human mutualism, which has developed in harmony with local beliefs regarding environmental conservation. This mutualism unites all community members in a shared destiny. As times change, contemporary nomadic herders need to realize that the classical nomadic lifestyle, while on the verge of being forgotten, has strong implications for effective coping strategies against disaster and could shape a more resilient herding community. Mongolian herder TEK is truly a gift from the severe cold steppe land and I very much would like to stress that the biggest problem facing the herder community in western Mongolia is a lack of internal awareness of the need to re-evaluate precious prospects for nature/wildlife guardianship and protection of the local environment for future generations.

Mongolian nomadic pastoralism is indeed a precarious livelihood, similar to what Stammler (2010) writes of the reindeer pastoralism that is practiced under unstable carrying capacity in the natural environment, always on the edge of use and abuse of limited local resources. It is what we can call an ecosystem-adjacent livelihood, always reconciling a fragile balance between human livelihood and an ecosystem greatly swayed by the local natural environment. It is also almost a counter-concept to modernization and its distortion of every natural environment to expand the territory of human living. Mongolian herders demonstrate the interactive agency between humans and animals that counters nature-culture dualism, or similarly, the opposition between the wild and the domestic (Anderson 2014). A nomadic animal herding society must have various types of unrecorded intellectual resources at its core but constantly updated with the unique survival strategies, environmental adaptation techniques, and living skills fostered by cross-generational experience. TEK has informed survivability in the nomadic world across the harsh Eurasian steppe land. Not only has it enabled herders to survive in a very arid land with scacre resource availability, but it was once the basis for the emergence of expansive nomadic empires (such as Turks, Uyghurs, Mongols, etc.). Centuries-old TEK formed from in the cold reaches of the steppe land has provided strategies for nomadic ways of life and is part of an intangible cultural heritage that has truly made an intellectual contribution to human history.

Conclusion

By providing an overview of TEK among Mongolian nomads, I wanted to illustrate how ideas for disaster prevention and reduction originated in

The Rule of the Steppe Land that pre-dates contemporary society. Pastoral society has been studied through various models such as temporal discontinuity, symbiosis, protective domination, and pure control, all of which can be seen demonstrated in every corner of the nomadic animal husbandry system. “Symbiotic domesticity” (Stammler 2010) is a very useful concept in the meta-perception of contact between humans and livestock, and “intermittent coexistence” nicely encapsulates the sequence of connection and disconnection between herder and livestock (Stépanoff et al. 2017). Not unlike “The Law of the Tundra” and the issues of flexibility and gender it raises (Stammler 2005), The Rule of the Steppe Land seems to be a more sentient, survivability-oriented discipline. In the nomadic living landscape, a *dzud* disaster becomes a prominent environmental determinant for human–livestock reproductions. Coping strategies define the interaction between Mongolian nomadic herders and livestock as a system of “cyclical interdependency.” The recent declines in close intimacy with livestock, or what is called “domestic syndrome,” have resulted in the loss of contact with centuries-old, accumulated nomadic perceptions of TEK. In nomadic communities, a herder’s living standards, economic status, skills, and enthusiasm for husbandry are all evaluated based on the condition of his sheep and goats. Mongolian herders often comment critically on the appearance, body size, and other conditions of livestock owned by other herders, and talk about the aptitude of fellow herders more frequently than they talk about themselves. This sort of (non-)material dimension within the discussion of human–animal interactions also informs a broader sense of nature relationships (Plieninger et al. 2023).

The Rule of the Steppe Land is also important to understand in identifying specific vulnerabilities and resiliencies in each herding community. It can be a starting point for combining old traditions with modern concepts of disaster prevention and reduction. Even if the widespread use of hazard maps and geographic information systems has improved the accuracy of disaster prediction, all humans, nomadic or otherwise, must always be aware of the hazards and risks of natural disasters. Documentation and sharing of disaster memories will make the human community more resilient in the future. Returning to my idea of community-specific homeostasis through the systematic use of TEK in shaping resilient nomadic communities, we can observe how, in preparation for, and in response to *dzuds*, nomadic society adjusts itself internally just as if it were a biological homeostatic reaction inside a human body. It is a kind of physiological and biological plasticity that tries to maintain the social shape of its outer fringes through flexible change and the use of resources. This presents an opportunity to re-foster an idea of environmental symbiosis—that we are a part of nature—that is often forgotten by people in the modern world. The re-evaluation of disaster prevention and reduction and community sustainability using TEK will enable new eco-adjacent standards for community development worldwide, not only for Mongolian nomadic societies but also for other communities living with traditional ways of life.

Dzuds are devastating disasters that sometimes destroy almost all the resources on which a nomadic lifestyle depends. They occur every 10–12 years and play a very important role in modifying the local ecosystem, including through the natural selection of livestock (and sometimes humans), and, ironically, resetting the lives and property of herder communities (Fernandez-Gimenez et al. 2012). Population reduction among livestock and herders results in a reduced burden on the grassland and consequently maintains the homeostasis of the grassland (biosphere). Such cruel ecological destruction physically encourages the reproduction of livestock populations and the rejuvenation of natural resources to maintain the grassland biosphere for future generations. The carrying capacity threshold of the grassland will be easily exceeded if nomadic herders recklessly try to expand their herd size and populations, and in a philosophical sense,

> dzud is indeed the tyrant, the real change agent, and the law of the steppe land itself.

The almost poem-like dialogue between nomadic herders and local grassland must be continued to create sincere and inspiring responses to the surrounding ecology of fauna and flora. In the Mongolian herder community, abiding by The Rule of the Steppe Land means showing humility toward one's surrounding natural environment. The nomadic view of environmental mutualism is more like a plea for a safe life in the fragile balance between the human niche and grassland conditions. From personal experience, it would not be an exaggeration to say that the greater part of daily life for Mongolian herders is dedicated to undertaking preparations to overcome the severe winters, including *dzud* disasters. Throughout history, nomadic communities have evolved through the continuous improvement and renewal of self-defined survival strategies and environmental adaptation in a changing ecosystem. The nomadic way of life is unstable and full of compromises between human life and environmental tolerance. If the ecosystem's threshold is exceeded due to excessive human interference in natural resource utilization (through expansion of human territory and excessive consumption of grass resources), the grassland itself will no longer allow people to live there. This was certainly an insight I gained from this study and my personal experience of living for 400 days with nomadic people in the middle of the Altai Mountains.

My intensive field survey on survival and coping strategies for *dzud* disasters showed that TEK is indeed The Rule of the Steppe Land, where absolute compliance is required for all who make their livelihood in the steppe land. TEK-based action plans will be able to protect both human dignity and local environmental resources in accordance with traditional herder criteria. As we learned from the Nomad Sedentarization Project (NSP) conducted in China in the 1980s, top-down action offered very little improvement in living standards for herders and instead caused ecological damage and the collapse

of local indigenous culture (Fan et al. 2014). In the Chinese sedentarist's imagining, pastoralists, or *mumin* in Chinese, were negatively juxtaposed with farmers, or *nongmin* (Tan 2019, 284), not only on the productive level but as a historically and politically defined lower stratum that suffers from homelessness and disaster. But the world is now realizing that pastoralist ideas indeed contribute to the historical depth of indigenous awareness. To prevent nomadism from becoming simply a demonstration lacking in any true substance, we must re-evaluate traditional knowledge systems. The nomadic wisdom, knowledge, and perceptions that have been uniquely cultivated across centuries of survival in the harsh cold of the Mongolian steep land are an intangible cultural heritage, so to speak, and a great intellectual contribution to human history.

Note

1 A Pearson's coefficient (*r*) higher than 0.8 is considered a strong correlation.

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11 Revisiting the Distinction between Wild and Domestic

The Relationship between Herders and Camelids in the Central Andean Highlands of Peru

Asami Tsukuda

Introduction

This chapter, mainly by referring to Japanese scholarship, discusses how herders and camelids coexist in the extreme environment of the Central Andean Highlands and how the relationship between the two has transformed in the modern context. The chapter also describes how domesticated and wild camelids are managed. People herd camelids in the Central Andean Highlands of South America, where the elevation can reach nearly 5,000 m above sea level. The Andean Highlands are located in the low latitudes; however, they are classified as an alpine tundra (i.e., an extreme environment). Like the Arctic, the Andean Highlands are unsuitable for agriculture, and animal husbandry is critical for survival.

Scholars once believed that there was no tradition of pastoralism in South America, that pastoralism did not develop as an independent economic system in the Andes, and that it emerged with the introduction of sheep by the Spanish (Forde 1934, 394). Webster (1973, 115–118) suggested that Andean pastoralism had been ignored in international pastoral research. Japanese scholars also assumed that pastoralism did not exist in South America (Yoshida and Terada 1974, 104; Umesao 1976, 94). Therefore, the region was excluded from the general classification of pastoralism (Fukui 1987, 11). Flores Ochoa (1979) disproved this idea through his ethnography of pastoralists in southern Peru. Since then, more research has been published on contemporary pastoralist societies in this region (Flores Ochoa 1975, 1977; Flores Ochoa (ed.) 1977). Moreover, Dransart (2002) published an ethnography focusing on South American camelid wool and fabrics. Inamura (1995, 10–11) argued that pastoralism in South America had been neglected for two reasons. Firstly, due to its harsh natural environment and the dispersion of pastoralist settlements over a wide area, detailed cultural anthropological surveys were not conducted until recently in the high-altitude Andean

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Highlands. Hence, ethnographic materials regarding the region are scarce. Secondly, Andean pastoralists traditionally have not used milk, an essential resource in other parts of the world. As a result, it has not been recognized as legitimate pastoralism.

Andean pastoralism is similar to that in the Arctic because it is practiced in extreme environments and has been excluded from general pastoralism. In addition, livestock live in the same area as their ancestral species, and herders have a different relationship with each species of animal, similar to that found in the Arctic. Therefore, examining particular human–animal interactions in the Andean Highlands could offer new perspectives for studying human–animal relationships in the North.

Based on ethnographic fieldwork, recent studies have analyzed human–animal relationships, particularly in the Arctic and North Asia. These studies have challenged leading anthropological theories that characterized pastoralism as the protective domination of livestock (Stammler 2010; Takakura 2010; Stépanoff et al. 2017) and attempted to develop a more comprehensive theory of pastoralism incorporating its previously excluded forms. Therefore, it is critical to describe the relationship between herders and each species of camelids in the Central Andean Highlands and examine whether the new theory of pastoralism can be applied to Andean pastoralism, which is typically regarded as exceptional. Moreover, I re-examined how livestock are distinguished from wild animals in Andean pastoralism.

Overview of Andean Pastoralism

Camelid species were domesticated in South America before the Spanish conquest. South American camelids can be classified into four types: alpacas (*Lama pacos*), llamas (*Lama glama*), vicuñas (*Vicugna vicugna*), and guanacos (*Lama guanicoe*). The former two species are domesticated, whereas the latter two are wild. Alpacas are classified into two varieties, huacaya and suri (Figures 11.1 and 11.2). Huacaya alpacas are more common than suri alpacas. The fibers of huacaya alpacas are relatively short, highly dense, and tender. Suri alpacas have long fibers and well-defined locks that hang down. The main product of alpaca is wool. Alpaca wool is superior to llama wool in strength, warmth, and texture. Alpaca meat is also an essential source of protein for herders.

The llama is the largest camelid in South America and is a little bigger than the wild guanaco. Llamas are classified into two varieties: *k'ara* and *chaku* (Figures 11.3 and 11.4). Llamas have been used primarily for transportation. A mature llama can carry approximately 46 kg on its back and travel about 20 km a day (Inamura 1995, 85). The loads placed on a llama generally range between 25 and 60 kg and vary based on the distance to be covered, with smaller loads carried on long trips and larger loads on short trips (Browman 1974, 194). The wool fibers of llamas are thicker than those of alpacas and

Figure 11.1 Alpaca huacaya (photo by the author). ⏎

have a much lower market value. Hence, most of it is consumed by the families that shear it. Llama meat is also used as food.

Vicuñas and guanacos are the wild camelids of South America. Vicuñas (Figure 11.5) are the smallest camelid. Although relatively limited in quantity, vicuña wool is superior to alpaca. Guanacos are bigger than alpacas. I never spotted guanacos during my fieldwork. Alpacas are closely related to vicuñas genetically, whereas llamas are closely related to guanacos (Kawamoto 2007, 380).

The Andean Highlands is unique in two respects. Firstly, domesticated animals cohabit with their wild ancestors. Secondly, it is possible to cross each of the four camelid species with each other, and the hybrids do not lose their fertility. Crossbreeds of alpacas and llamas are often produced in traditional herding methods, where alpacas and llamas graze together. However,

Figure 11.2 Alpaca suri (photo by the author). ⏎

Figure 11.3 Llama k'ara (photo by the author). ⏎

Figure 11.4 Llama chaku (photo by the author). ⏎

Figure 11.5 Vicuña, the smallest of the camelids of South America (photo by the author). ⏎

the crossbreeding of alpacas and llamas is currently considered undesirable because the quality of the hybrid's wool is inferior to that of an alpaca. One informant stated that wild vicuñas sometimes cross with alpacas to produce vicuña-alpaca hybrids, but I did not find any during my research. During mating, the male camelid rides up behind the female and prompts her to sit down. The size of the male's body and the force he exerts on the female are critical for mating. It is said that the female will not accept mating if the force is not strong (Hongo and Toukura 2007, 320). Since llamas are larger than alpacas, it would be relatively easy for a male llama to mate with a female alpaca. However, it would be more difficult for a female alpaca and a male vicuña to mate because vicuñas are smaller than alpacas. These unique considerations affect how herders rear animals. Furthermore, the significance of animals to herders has changed due to the influence of globalization.

Andean pastoralism has three prominent features. The first is the absence of milking. Native herders in the Andes do not milk their domestic camelids for food. The second is its close relationship with agriculture. Their principal foods are agricultural products, including potatoes and maize. As mentioned, herders primarily use alpacas for wool and llamas for transportation, and they consume both types of meat. Traditionally, pastoral and agricultural communities in the Andean Highlands have shared a symbiotic relationship. Herders go down to farming villages with caravans of llamas and obtain agricultural products in exchange for pastoral products and merchandise from other regions. Herders also help farmers transport crops during the harvest season and receive a part of the harvest as remuneration. The third prominent feature of Andean pastoralism is its sedentariness. The Central Andes lies at a low latitude with a relatively mild climate with small temperature differences throughout the year, despite extreme differences between daytime and nighttime temperatures. Therefore, herders can have their pasturelands, and the livestock can graze firmly within a limited area throughout the year (Inamura 1995, 211–212). The environment in the Andes varies considerably based on altitude. Different landscapes can be observed in the Central Andes with different altitude variations. The eastern slopes of the Central Andes have a wet climate, whereas its western slopes have an arid climate. The area ranging from 4,000 to 4,800 m above sea level is a cold grassland known as the *puna* (Pulgar 1996), consisting of gently sloping hills and plateaus where alpacas are mainly herded. The cultivation limit in the Central Andes reaches 4,300 m above sea level. In contrast, the upper limit for alpacas' and llamas' pasturage reaches nearly 5,000 m above sea level (Yamamoto 2007, 26). Browman (1974, 188) pointed out that camelid pastoralism represents a cultural adjustment to a semiarid grassland ecosystem that can support grazing animals but is poorly suited to cultivating crops.

The herders leave to acquire agricultural products during the dry season (May to October), and shearing, lambing, and mating occur during the wet season (November to April) (Inamura 1995, 70–71). The herders leave around 8:00 in the morning for day-trip herding and graze the herd approximately

20–30-min walk away from their homes. The herders whistle to guide the animals when departing. The herders hold back the herd leaders when they arrive at the day's grazing area, or they follow the herd to keep it together if the rear of the herd is too broad. Over time, the herd gradually moves to its grazing areas, and the herders intervene if any animal is about to stray too far from the herd. In addition to whistling, the herders may swing a sling, bang the sling to make noise, throw stones, and shout to control the herd. From around 2:00–3:00 p.m., the herder follows the herd for some time on the way home and subsequently passes them to go home first. The remaining herd slowly returns to the house by the evening. At sunset, around 6:00 p.m., the herder looks around the day's grazing route to take any animal still in the pasture back home. Some herders put the animals in enclosures at night, whereas others gather them near their houses.

Inamura (1995, 78) stated that Andean pastoralists typically live in an extended family. However, more recent reports have indicated that the basic unit is a nuclear family consisting of parents and children (Toritsuka 2009, 4–5), both of which are found in Community X. However, the number of men and young people from the community migrating to the town for work has been increasing, whereas those living in pasturelands throughout the year has been decreasing. In many cases, women are responsible for day-trip herding due to the absence of men because of migrant work. Families owning much livestock but not having enough human resources for grazing occasionally hire herders who do not have much livestock of their own. Pre-school children are involved in the process as well. Even children that have moved away from the community for schooling return during their vacations to help with herding.

Fieldwork

I have been conducting fieldwork in Community X since 2009. Community X is located in the Department of Cusco, Peru. Its average elevation is 4,950 m above sea level, above the limit that can sustain agriculture. About 110 families inhabit the region, and 95% of the inhabitants are engaged in rearing alpacas and llamas. The average annual temperature ranges from 2.5°C to 8.3°C, with a maximum temperature of 17°C in March and a minimum temperature of −8°C in June. The average annual rainfall is 889 mm.[1] Cusco is located in the southern hemisphere, so the temperature is lowest during the dry season. The rainy season is relatively warmer, but it is cold throughout the year due to the region's high altitude.

Houses, churches, assembly halls, schools, stores, restaurants, and a hospital are concentrated in Community X's center. However, most inhabitants do not live in the center permanently. Pasturelands with houses are spread throughout the vast region, and every family pastures a herd. Town Y is the nearest town to Community X (approximately 3,500 m above sea level), located between Cusco—the capital of the Department of Cusco—and

Table 11.1 The number of domestic animals in community X ⏎

	The median
Alpaca	**135**
Llama	**8**
Sheep	**40**
Horse	**1**
Cattle	**0**

Note: Data from 75 families.

Puno—the capital of the Department of Puno. Private transportation services are available for the journey from Town Y to the center of Community X, which takes approximately 4 h. Town Y has markets, banks, schools, restaurants, stores, and a bus terminal. There are scheduled buses from Town Y to neighboring cities such as Cusco, Puno, Arequipa, and Juliaca. People in Community X can buy merchandise in Town Y, and some have a second house in Town Y to provide a more suitable educational environment for their children.

Table 11.1 presents the statistics on the number of domestic animals owned by each family in Community X. All families have alpacas, the most common domestic animal in Community X (Median: 135). Llamas were essential livestock for herders, but the number of reared llamas has decreased in recent years. Some herders have relinquished all their llamas. Most families also have sheep (median: 40). The main products of sheep are meat and wool, which are consumed at home or sold. Sheep can be bred more quickly than alpacas, and selling their meat is an essential means of acquiring quick cash. Some families have horses that can carry goods and humans, unlike llamas. A few families have several cattle for milking, but the Andean Highlands are unsuitable for rearing cattle.

Alpacas: Domesticated, Commodity, Intimacy

Alpacas have become the most significant domesticated animal for herders in recent years. Alpaca wool has traditionally been a critical commodity traded for agricultural products. Later, it was exported abroad, which resulted in a surge in its price. Since the late 1960s, alpaca wool has been sold mainly for cash (Inamura 1995, 99–100). Furthermore, the export of alpaca wool became such a thriving business that herders began to introduce methods of improving the quality of the wool.

The export of Peruvian wool to England began in the 1830s (Orlove 1977, 21). England was the leading buyer of alpaca wool in the international market by the end of the 19th century. The British preferred white to colored wool and purchased the former at a higher price because it was easy to dye, which led to the practice of "improving" the alpacas by

breeding white ones (Flores Ochoa 1988, 278). Recently, it has been argued that the genetic improvement of alpacas is necessary for overcoming poverty among people rearing camelids in South America. Alpaca smallholders have been forced to sell their wool to middlemen for less than the fair market value. Moreover, 90% of the families involved in camelid rearing are poor or extremely poor. Another problem is that the quality of alpaca wool has deteriorated (enlarged fiber diameter) during the last 20 years because its price is decided based on quantity rather than quality (Manabe 2009, 28–37). Poor smallholders who own flocks of 50–100 animals rear 85% of alpacas, and the effort to improve their quality is indispensable to overcome the alpaca's low productivity and the herders' poverty (Torres and Quina 2007, 7–12). Enhancing the quality of alpaca wool through genetic improvement and trading the wool at a fair price without middlemen would help overcome the poverty among herders.

The local governments and NGOs have attempted to promote the improvement of the alpacas in Community X. Herders call this practice "genetic improvement" (*el mejoramiento genetico*), which involves managing alpacas' reproduction. The herders select good males and mate them with females corresponding in color and variety (huacaya/suri) to those of the males. For example, white huacaya males are made to mate with white huacaya females, and colored huacaya males are made to mate with colored huacaya females. The herders aim to produce high-quality wool through this practice (i.e., wool with a small fiber diameter).

I observed two such genetic improvement methods. In the past, the herders pastured alpacas after separating just the males and the females. However, currently, they divide a herd of alpacas into three groups, huacaya females, suri females, and huacaya and suri males, during the breeding season from January to March. Then, they let a few good males into each female group based on their varieties (huacaya/suri), which enables huacaya females to mate with huacaya males and suri females to mate with suri males. This method requires additional manpower because more alpaca groups are pastured simultaneously. A herder told me during an interview that he would ideally like to divide alpacas into five groups: white huacaya females, colored huacaya females, white suri females, colored suri females, and males. However, he divides them into fewer groups due to the labor shortage.

Other families practiced "controlled breeding" (*empadre controlado*). They made special corrals for mating, placing only one male and one female based on their color and variety (Figure 11.6). Mating females and males were recorded by individual identification number tags attached to their ears. Although traditional corrals were made of stones (Figure 11.7), these were made of wood and wire nets. Therefore, this method requires an outlay of equipment and significant time and effort. When breeding, the herders have to round up alpacas, select appropriate males and females, put them into the corrals, and record their identification number tags. They must repeat this procedure because the reproductive efficiency of alpacas is low, and females

Figure 11.6 Male and female alpacas separated in special wooden corrals for mating (photo by the author). ⏎

might not be impregnated by mating only once. Thus, significant manpower and capital are necessary for either of these improved breeding methods.

Furthermore, some herders also participate in Peruvian Livestock Fairs—*Feria*. At the fairs, veterinarians judge alpacas according to their physical features and wool quality. Based on these judgments, herders can ascertain whether their improvement strategies succeeded. In addition, they utilize the fairs to access the market for "improved" alpacas. If a herder's alpaca receives a prize at a fair, he demonstrates that he has good alpacas. Consequently, other herders seeking to improve their herd might want to purchase alpacas from him. "Improved" alpacas are traded at a much higher price in the market. For example, an average alpaca is priced at 150 soles,[2] whereas an "improved" alpaca fetches at least 800 soles. Hence, some herders actively strive to manage their alpacas' reproductive practices and genetically improve them. Early adopters of alpaca genetic improvement strategies

Figure 11.7 Traditional corrals made of stones (photo by the author). ⏎

made an enormous profit by trading "improved" alpacas. However, participation in fairs also requires money and manpower because the herder must transport alpacas from the pastureland to the fair, employ people to care for alpacas during the fair, and buy feed. Many herders do not have enough capital to build new corrals or employ people, so they cannot improve their alpacas (Tsukuda 2014).

Alpacas have thus become crucial for herders because they can earn money by selling alpaca wool and trading "improved" alpacas. Currently, alpacas are the most common livestock in Community X. Herders who attempt to improve their alpacas tend to name the good alpacas in their possession, such as those participating in fairs, as if they were pets, for example, Roberto. Even among these alpacas, the ones that receive awards are regarded as superior. The herders build close relationships with these alpacas. I observed that one alpaca responded and came closer when their names were called out.

However, the intimacy between alpacas and their herders does not appear to contribute to making grazing easier. The relationship between the alpacas and herders also involves dominance over the alpacas because herders actively attempt to control the alpacas' reproductive activity. When alpacas were driven into a corral for reproduction, the herders would hit those who did not behave as they were expected to.

Llamas: Domesticated, Former Significance, and Currently Low Market Value

Llamas were critical to herders in the past as beasts of burden because they enabled herders to acquire agricultural products through exchanges with farmers. "Herders did not give each alpaca a name, but they had an attachment to llamas and gave each llama a name because herders shared the pleasures and pains of caravan journeys with llamas" (Inamura 1995, 86–87). Llamas were trained from the age of two as pack animals. First, llamas were added to caravans without a load to get them used to such travel. Subsequently, sandbags were placed on them. The caravan needs a leader (*delantero*) chosen from among the llamas that naturally stood out and wanted to lead the caravan. The herders trained them to always lead by throwing stones or chasing them with slings. Once llamas become accustomed to this, they learn how to lead other llamas (Inamura 1995, 85). It is believed that such llamas develop a close, individualized relationship with herders that train them. Because herders acquire their staple food through llamas, a herder equated his llamas to "cultivated land" (Tomoeda 1986, 1).

However, the significance of llamas has gradually diminished. Market developments and transportation decreased the need for llamas (Inamura 2007, 34–36). People in Community X now purchase most of their daily goods and foodstuffs from Town Y and no longer travel to the farmers' villages in llama caravans. Additionally, the fibers of llama wool are thicker than those of alpacas. Therefore, llama wool has a much lower market value and is less profitable than alpaca wool. Herders do not sell it but use it to make sacks and ropes. Herders also find it problematic that llamas can mate with alpacas because the resultant hybrid gives poorer quality wool than alpacas. According to some herders, llamas negatively affect efforts to improve alpacas genetically. Herders actively engaged in practices to improve alpacas typically reduce the number of llamas they rear. Some of them do not have any llamas.

The llamas continue to be used as beasts of burden. Herders who have pastureland far from the community center or trunk roads still use llamas to carry goods they purchase in Town Y to their pastureland. However, a herder who has pastureland near the center of the community told me that "llamas are just decorations." They are no longer the subject of primary interest, and herders generally leave them alone. When they pasture a herd of livestock, they leave llamas to wander away from the herd of alpacas because llamas prefer drier areas and walk around a wider area than alpacas. Herders do not worry much about their llamas. In some peripheral areas, llamas of both sexes graze together and might be allowed to roam at will for up to a month (Browman 1974, 192). In the past, llamas were loosely controlled. However, they tend to be neglected now as their role as beasts of burden has diminished. When herders urgently need cash, for example, when a family member has an illness, they typically sell the meat of their llamas.

Some herders continue to rear llamas for exhibitions at fairs. I asked herders who still rear llamas why they continue rearing them. They responded, "to participate in fairs." However, the economic value of a llama does not increase even if it receives an award at a fair. Participating in a fair thus appears to be an end in itself. Some herders also boast that llama meat is healthy because it has little cholesterol. Therefore, the significance of llamas has changed in contemporary society. Improving the genetic quality of llamas is not actively promoted by the government or NGOs compared to alpacas. However, the value of llamas might increase again in the future, which could renew the herders' interest in them.

Vicuñas: Wild, Commodity, Neither Too Close to Nor Too Distant

Vicuñas are wild animals, and their populations are divided into male groups and family groups. Vicuñas' family groups consist of an adult male and several females. They have permanent feeding and sleeping territories between which they move daily (Franklin 1982, 477–479). Oyama (2007) described that family groups typically consist of one male and up to four females (sometimes as many as nine). All females belong to a family group, whereas males spend their early life, up to one year of age, with their mothers in the group before moving to a young male group. Young male groups consist of 10–80 members who repeatedly separate from each other. Vicuñas habitually drop their feces in predetermined locations, and there are multiple dropping sites within a family group's territory. At night, vicuñas often sleep near dung sites (Oyama 2007, 346).

Vicuñas produce extremely fine wool that is even finer than alpaca wool. The vicuña population decreased significantly after the Spanish conquest due to uncontrolled hunting. Approximately 2,000,000 vicuñas once inhabited the region in the early 16th century when the Spanish conquered the Inca empire. However, less than 10,000 vicuñas remained in Peru as of 1965 (Wheeler et al. 1997, 284). In 1967, a national reserve was established to prevent vicuñas from going extinct (Wheeler et al. 1997, 284). Also, in 1975, Peru ratified the Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora. In 1987, vicuñas were reclassified from a Category I species (commercial trade prohibited) to a Category II species (commercial trade allowed with an export license or certification), facilitating the international trade of vicuña wool. In 1991, the right to manage vicuñas in vicuña habitats was transferred to regional communities, and herders came to possess the legal right to use them, which motivated local people to preserve vicuñas. Subsequently, *chaku*, a form of hunting that originated in the Inca Empire, was revived (Inamura and Kawamoto 2005, 131–136; Inamura 2013, 161–164).

Chaku is a form of hunting involving driving and enclosing wild animals. In the past, 20,000 or 30,000 Indians—the number increased or decreased based on the scale of the hunt—formed enormous human fences to drive

any animals they came across. Then, they would gradually narrow the fences and capture the animals by hand. Vicuñas were released once they were sheared. Female deer were also released simultaneously. Aged, sterile deer and male deer were usually killed for their meat, but healthy males that could breed were released alive. The Incans maintained a record of the animals they captured as if they were domesticated (de la Vega 2006, 45–47). "Thus, under the control of the Inca emperor, the wild animals were not only used rationally, they were also protected and preserved" (Inamura 2013, 162).

In modern times, people drive vicuñas into nylon net traps by holding a rope attached to colorful pieces of cloth (Figure 11.8). These new tools ensure that *chaku* can be conducted by fewer people. Contemporary *chaku* is said to be a revival of traditional Incan knowledge (Inamura 2013, 165). Before its revival, people usually killed vicuñas to use their wool. However, through *chaku*, they could get the wool without killing the animal. In other words, they could utilize the animals' resources while simultaneously protecting them. *Chaku* is known as a method that ensures the "rational" use of vicuñas. Therefore, the general concept that wild animals are preyed upon, whereas domesticated ones are preserved, does not apply in this region (Inamura and Kawamoto 2005, 141–143).

Figure 11.8 Nylon net trap used for driving vicuñas (photo by the author). ⏎

There are many vicuñas in the region inhabited by Community X, and *chaku* is commonly practiced there. Principally, teachers and students participate in *chaku*, and the resulting income is used for the community. Locals have a particular affinity for vicuña because of their usefulness. A local once proudly told me that the national flag of Peru includes the design of a vicuña because it is a symbol of Peru. Vicuñas are also not much afraid of people. They do not panic and stay quiet as if they were domesticated animals, even when driven into a small enclosure for *chaku*. Inamura (2014, 298–300) observed that the animals remained docile even when left in their enclosure overnight.

It is possible to crossbreed vicuñas with alpacas. To produce better wool, some institutions have attempted to crossbreed them to produce hybrid paco-vicuñas (Figure 11.9). *Pacocha* is the term for alpaca in Quechua—in the native language. The deliberate breeding of such hybrids further blurs the boundary between wild and domestic animals in the region. The locals sometimes capture stray infant vicuñas and treat them as pets (Figure 11.10). Even in such cases, the vicuñas cannot be considered domesticated because the locals do not know how to rear vicuñas. As far as I could observe, the infant vicuña soon perished, despite their best efforts to feed it.

Figure 11.9 Hybrid paco-vicuñas (crossbreed vicuñas with alpacas) (photo by the author). ⏎

Figure 11.10 Captured stray infant vicuña kept as a pet (photo by the author). ⏎

Thus, while the herders are familiar with the vicuña and sometimes intervene with them, the vicuña is still wild. Herders do not graze vicuñas. Vicuña and alpaca habitats overlap. Therefore, vicuñas compete with domesticated animals for pasture. When alpacas and vicuñas occasionally graze in the same area (Figure 11.11), the herders drive the vicuñas away from their pastureland to secure grass for their livestock. That is, herders and vicuñas remain neither too close nor too distant from each other. Although the herders temporarily "manage" the vicuña by way of *chaku*, they do not intervene with them much, leaving the vicuña to be "wild."

Vicuñas are wild animals but managed, sometimes managed but still wild; this is an excellent example of rethinking the distinction between domesticated and wild animals. The fact that alpaca and vicuña can interbreed blurs this distinction biologically, which is interesting. The relationship between people and vicuña might change even more if it becomes technically feasible to create paco-vicuña, a hybrid that produces better wool.

Conclusion

This chapter examined the relationship between humans and animals in the Central Andean Highlands and described how the three camelid species have

Figure 11.11 Alpacas and vicuñas grazing in the same area (photo by the author). ⏎

different relationships with herders in the contemporary context. The higher international market value of alpaca wool has increased alpaca rearing. Herders have strengthened alpaca management practices by adopting new scientific knowledge to improve the quality of alpacas genetically. The alpacas that are ascribed names become individualized. Moreover, genetically "improved" alpacas have high commercial value as breeding stock.

Llamas have become less critical and have decreased due to market developments and transportation infrastructure. Herders do not intervene with llamas because they are relatively less important to them. However, herders have ascribed a new significance to llamas recently. For instance, they are exhibited at livestock fairs, and their meat is regarded as "healthy" food, which has motivated some herders to continue rearing llamas.

Vicuñas are quite valuable as their wool is superior to alpaca wool. Even though vicuñas are wild animals, the locals have managed their numbers and utilized the resources they have provided since the Inca Empire. Vicuñas might blur the boundary between wild and domesticated animals in animal management. At present, people loosely manage vicuñas. However, they might be domesticated as paco-vicuñas in the future.

Thus, the relationships between each of the three camelids and herders differ significantly due to the features of each species and the influence of

globalization. The degree to which the species are managed varies based on their contemporary significance. Modern Andean pastoralism is market-oriented, and each species' contemporary relevance is based on its value in the international market. Alpacas have a high demand in the international market and are the most highly managed animal. The intimacy between a herder and a particular alpaca also depends on the market value of each alpaca. Llamas, whose market value has declined, are currently not highly managed. However, there are signs that new market value can be added, including that for meat. The wool of vicuñas has a high market value and is of great interest to herders. However, vicuñas are also valuable because they are a rare species of wild animals kept in the wild. Herders balance their status as a commodity and a wild animal. Therefore, the notion that livestock is protected and wild animals are not protected does not apply to Andean pastoralism.

Stépanoff et al. (2017), who revisited the distinction between wild and domestic animals, challenged the interpretation of pastoralism as a relationship in which humans protect and dominate livestock. They proposed the balance between autonomy and cooperation by referring to North Asia. Pastoralists respect the autonomy of animals and appreciate their disposition to work in cooperation with humans. They stated that a balanced relationship of "intermittent coexistence," in which herding styles based on human dominance alternate with those that rely on animal autonomy, is characteristic of North Asian domestication practices (Stépanoff et al. 2017, 68–69). This relationship also seems to apply to Andean pastoralists, especially to llamas and vicuñas. Llamas are allowed to roam relatively freely in pasturage and are only used as beasts of burden when necessary. Vicuñas are wild and initially run away from humans during the *chacu*. However, they do not panic and remain calm in their enclosures once captured, which indicates that they are largely cooperative.

Livestock improvement in recent years has simultaneously intensified the seemingly contradictory tendencies of individuality and substitutability of alpacas. Improved alpacas build individualized intimacy with herders. However, they are a substitutable commodity. Takakura's examination of reindeer herding revealed how herders achieve close familiarity with particular livestock and control the movement of their herds by placing them in spaces adjacent to their habitats (Takakura 2010, 34–35). In contrast, familiarity with alpacas is unrelated to herd control. A close relationship is established with a particular alpaca because it possesses high commercial value. Alpacas cared for like pets become "tame" animals among livestock. Stammler (2010) argued that domestication is a truly reciprocal symbiotic process involving both animals and humans. He termed the intimate relationship between humans and their animals "symbiotic domesticity." He insisted that humans dominate the partnership between tame animals and humans compared to the equal partnership of symbiotic domesticity (Stammler 2010, 218). Stépanoff et al. (2017, 68) stated that too close control might result in

fusional dependence and that symbiotic fusion is deemed undesirable because livestock animals must not become family members or pets. For the Khakas, it is just as forbidden to have a tender and caressing attitude with livestock as it is to beat them (Stépanoff et al. 2017, 68). This resembles the situation where some alpacas are made to compete in livestock fairs and are loved like pets but are also beaten when they do not behave as the herders expect.

Pastoralism in Northern Asia is subsistence-oriented. In contrast, Andean pastoralism is "intermittent coexistence," which can be observed even in contemporary Andean pastoralism, which is rapidly becoming a market economy. In particular, llamas (livestock) and vicuñas (wild animals) maintain a balance of autonomy and cooperation. Interestingly, in the case of vicuña, the traditional Incan "intermittent coexistence" is being revived in the current global context. In contrast, there is a slight tendency toward fusional dependence (symbiotic fusion) in the relationship with alpacas (livestock) that is strongly market-oriented and subject to increased livestock improvement. The relationship with vicuñas is also market-oriented, but increased management might have been restricted because they are wild animals. However, it is possible that a shift to symbiotic fusion might occur if the market for an animal grows, such as the use of llamas for meat and the use of paco-vicuña for wool. The Andean example demonstrates how symbiotic fusion could occur in contemporary market-oriented situations.

What eventually distinguishes the domesticated from the wild? Arctic and Andean pastoralism are similar in the coexistence of livestock and their wild counterparts in extremely cold environments. Reindeer in the Arctic are morphologically similar to domestic animals in the wild. In contrast, camelids in the Andes are genetically similar enough to reproduce with one another but have different morphologies and uses. Wool is the primary resource obtained from vicuñas and alpacas. In contrast to the Arctic, the wild counterparts (vicuñas) are only hunted for their wool and are released once they are sheared. Vicuñas are thus protected despite being wild animals, but this does not mean that the local people consider vicuñas domestic animals. The herders know which alpacas they own exactly, but they do not consider any vicuñas as their own, which is evidenced by the herders' chasing away vicuñas that graze in their pastures. It is critical to note that vicuñas are not essential for the survival of pastoralists but are a rare and valuable resource. In the Inca Empire, vicuña wool served as a gift for the emperor that common herders did not use; the same is true today, which might have motivated them to keep the vicuñas in the wild. In other words, enabling them to remain a wild species reduces the labor and fixed property required to exploit their resources (Stepanoff et al. 2017, 63). Additionally, it further increases the scarcity of the product itself. Everyday needs are met by alpacas, whereas vicuñas provide added value.

Llamas appear to have a relationship of "intermittent coexistence" with the pastoralists. They have developed a closer relationship with the pastoralists because of their status as pack animals that travel with herders in caravans.

Crops were the primary food source for the pastoralists, and caravanning with llamas was necessary to obtain crops, making llamas essential livestock. Inamura (1995, 211–214) pointed out that in the Andes, where high mountain ranges rise at low latitudes, diverse ecological zones exist within a relatively small area, and agricultural and pastoral areas are adjacent to each other, which is probably why Andean pastoralists have been able to rely on crops through agriculture.

In conclusion, "intermittent coexistence" is a concept that applies to Andean pastoralism, and pastoralists have developed this form of relationship with livestock and wild animals. Whether animals are essential to the pastoralists' daily survival and consequently necessitate daily interventions distinguishes domesticated animals from wild ones in Andean pastoralism.

Notes

1 Basic information about Community X was taken from a booklet published by a development organization called Programa Regional BioAndes.
2 *Sol* (pl. *soles*) is the Peruvian currency. 1 US$ was equal to approximately 2.8 soles.

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Section V

Domestication beyond Animals

Of Culture, Nature, and the Law

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12 Laws of domestication and domesticating the law in Yakutian human–animal relations

Aytalina Ivanova and Florian Stammler

Introduction

Since the early domestication studies, relationships between humans and their domestic animals have been considered crucial for human cultural diversity to survive and thrive. Animal husbandry is a food-producing livelihood, possible in areas where growing plants is not feasible due to harsh climates. Scarce and scattered pastoral resources can be accessed by animals due to their mobility, which gives humans the possibility to inhabit areas that would otherwise not be inhabitable, as the other case studies in this volume show. The domestication of animals for this purpose and pastoralist livelihoods have been formative for human cultural diversity, especially in areas with harsh continental climate, large temperature fluctuations, and little precipitation. Among such areas, the Arctic is best known as a region for reindeer pastoralism, where livelihoods depend on the relationships and mobility of people and reindeer. On the other hand, even though not thoroughly covered in scholarship, reindeer are not the only pastoral animal in the Arctic. Hence, human pastoral livelihoods there can rely on several pastoral animal species sharing the same habitat. This risk-diversifying strategy has long been known and studied in Central Asia (Krader 1955) and Africa (Davies and Hatfield 2007), but less so in the Arctic, as has been noted before (Stammler 2010).

In such anthropological and economic studies, the focus is often on the relationship between humans, animals, and the environment; rangeland studies; and the economic and cultural significance of pastoralism. However, even in the planet's most remote areas, pastoralism is no longer practiced autonomously, as Khazanov's landmark book has established (Khazanov 1994). Animal husbandry is always part of a governance mechanism in state legal systems, often designed by people who are not necessarily from a pastoralist background themselves. To date, studies of pastoralist governance have focused more on land use, or rangeland management (Herrera and Davies 2014). Obviously, pastoralism is not possible without pastures, but the state also steers pastoralism through multiple other instruments of governance, which have substantially influenced pastoralism in all Arctic countries. Additionally, the profitability of food production and the climate

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footprint of agriculture have been the subject of intensive recent discussions, most of which have been based on research contributed from other regions (e.g. Jacobs and Msulwa 2019), largely because the Arctic is usually not on researchers' radar for agriculture (Unc et al. 2021).

In this chapter we shall focus on the particular example of legislating pastoralist livelihoods and animals in the East Siberian region of Yakutia (the Republic of Sakha, RSY hereafter). The choice of the region for this study is due to the prominence of Arctic pastoralism there with multiple species beyond reindeer, as horse and cattle herding are also culturally significant for the local population (Takakura 2002, 2015; Crate 2006; Stammler 2010; Stammler-Gossmann 2010). The herders have specific relationships to each of their pastoral animal species, and those who own horses, cattle, and/or reindeer simultaneously perceive these relationships also comparatively, as has been previously shown by Takakura (2002) and confirmed by our own fieldwork in the Eveno-Bytantay and the central districts of the RSY (2016–2021). Therefore, a certain mismatch can be identified between the lived experience of the pastoral livelihood with different animal species and the governance regimes for this animal husbandry, which treats each of the human–animal relationships separately, through separate laws on reindeer husbandry, on horse herding, and on the Sakha cattle, respectively.

The aim of the legal analysis in this chapter is therefore to clarify the justification for this legal separation of those three human–animal relationships and explore whether and how the current setup influences the human–animal livelihoods in practice; but also vice-versa, how people's practices with their animals influence the way in which laws are implemented, in other words the social life of these laws in Siberia. In order to show this relationship both ways, we shall employ the concept of domestication in its more recent theoretical orientation toward partnerships between humans and animals, and as a process in flux. We then draw a parallel between the relationships of people to their animals and those of people to their laws in a way that, in both cases, the character can change from domination to partnership, and the theoretical conception from stable state to fluid process of both domestication and the law. The cases from the RSY can show us how people re-enact domestication relationships to their animals and to their laws alike in an ongoing dynamic and never-finite process.

Arctic multi-species pastoralism in Sakha

The Arctic is portrayed too frequently as a region of 'deficit': an area where agriculture is not viable, an area where pastoralism is only about reindeer, an area where the cold limits life in general. In line with the counterargument in this book 'the benefits of the cold,' the example of the RSY is a living proof: in the area with the most extreme climate, with the coldest inhabited places on earth, and extreme summer heats, leading to temperature differences of up to 100 degrees Celsius per year, people have over the centuries developed

sustainable livelihoods based on their relationships to multiple pastoral animals. This process can be best understood as one of mutual domestication and adaptation: both humans and animals learn about the environment and each other's needs for thriving there. For such livelihoods, the surroundings are not characterized by deficit, by low diversity, but by abundance: abundance of cold, heat, mosquitoes, and moisture, and diversity of niches and micro-habitats that can be best harnessed through a mobile livelihood. Hence, this animal diversity, and the different niches of significance for each animal (Stammler 2010), has contributed to a specific cultural landscape tied to the particular conditions of life there.

Due to a number of historical and ethnic factors that go beyond the scope of this chapter, today in the RSY there are approximately 168,700 reindeer of the Eveny, Evenki, and Chukchi (*Khargin*) breeds, 182,000 horses (almost all of which are native Sakha breed), and around 170,800 cattle, of which under 2,000 belong to the native Sakha breed (2022).[1] Before the 20th century, the cattle population was almost exclusively of the Yakutian breed, with 494,000 cattle in 1928 (Koryakina 2013, 44). This native breed is exceptionally sturdy and cold-resistant (Granberg, Soini, and Kantanen 2009). However, in the last 50 years agricultural policies have favored agro-industry (*agropromyshlennyi kompleks*), where the imported high-production cattle outperform the native breed, although they are more expensive to sustain and more prone to diseases. The social, economic, and cultural significance of all three animal species is reflected in their numbers in the area, which we shall trace through the three corresponding laws and their implementation programs. The specific Arctic breeds of these domestic animal species point to what has elsewhere been called symbiotic domestication (Beach and Stammler 2006); that people and animals have developed there jointly. Most reindeer in the RSY are from the Eveny and Evenki breeds, which are still milked by people in summer in some places. The horses are almost all of the Yakutian breed, which are locally divided into different subpopulations (*Megezhekskaya, Prilenskaya, Verkhoyanskaya, Kolymskaya*). They all share with reindeer the capacity to feed from pastures under the snow in winter at even the lowest temperatures. As we shall see, this has had an influence on the way of life, as well as how the law is composed.

Today all three of these animals compose a combined livelihood mainly in the Eveno-Bytantay region, where the Eveny and Sakha and their animals have been living together since at least the 17th century (Bakhrushin and Tokarev 1953, 71–96) and relying on reindeer, horses, and cattle in a semi-nomadic livelihood. During the Soviet Union era, this was the only area where the native Yakutian cattle breed was not replaced by more industrial breeds (Granberg, Soini, and Kantanen 2009). While the cattle and horses are still symbolically associated more with the Sakha as an ethnic group, reindeer are considered an Eveny animal. However, we find today that not only did ethnic identities become blurred through centuries of intermarriage—more people who consider themselves Eveny also have horses or cattle, while people of

Sakha origin also own reindeer. In addition to that, hunting the wild Arctic snow sheep *chubuk* (*Ovis nivicola*) symbolically unites the inhabitants of North Yakutia. This livelihood, with multiple animals belonging to native breeds, has spread since the end of the Soviet Union further beyond the Eveno-Bytantay region, as our own fieldwork on the shores of the Laptev Sea among reindeer and horse herders has shown (2018, 2019). Specifically for the native Yakutian cattle, a regional government program has funded its re-introduction to more areas in the RSY beyond Eveno-Bytantay (Tarasova 2020, 77–78).

The animal diversity in this area concerns not only the three different domesticated breeds of animals, but also the ways of relating to them and keeping them. In some cases, the reindeer and horses become feral, and thus change from a domestic to a wild state. This turns them from being herded animals to hunted animals, particularly in the northernmost areas of the RSY. For example, this happened in 2018 with half of the horse herd of the 'Primorski' reindeer herding enterprise, which has its headquarters in Nayba and grazing land in the Bulunski Ulus of the Sakha Republic, when the animals became feral and established themselves in the valley neighboring the herded horses. Since then, herders have been undertaking hunting trips to harvest some of the foals for meat in the fall, on their way to and from their reindeer corrals. Even among domestic horses, some are fed in winter, while others are left roaming free and acquire their forage from under the snow (*tebenevka*) like reindeer do. More than during Soviet times, horses are now entering reindeer herding as working animals for transport and grazing supervision during the snow-free season in places where the terrain is not too swampy. The herders have thus extended the habitat for Yakutian horses all the way North to the shores of the Laptev Sea (Arctic Ocean). As we shall see in our analysis below, this evidence supports our argument of domestication as a fluid process, but it poses additional challenges for the legislators that design laws that do not have such a processual understanding.

In the same area by the Laptev Sea where feral horses populate some valleys, the mountain ranges are grazing grounds for *chubuk*. The reindeer herders are convinced that their *chubuk* is of a special character, the population is rather local and does not migrate far. This was confirmed by a team of scientists from Russia who registered this population as a sub-breed of *O. nivicola* with the Russian Ministry for Natural Resources. A special conservation regime for which a wildlife reserve is supposed to be established under the participation of the indigenous reindeer herders could be the result of this research cooperation.[2] Herewith the herders factually become managers of the local *chubuk* population. Is this undomesticated animal then still 'wild' if managed by the same people and in similar ways as half-domestic and feral horses and domestic reindeer in the same area? Thus, the reindeer, horse, and *chubuk* cases blur the borders of what is a wildlife population. The *chubuk* and feral horses are managed and hunted by herders at the same time that domestic reindeer are herded by the same herders on semi-domestic

horses and are slaughtered for meat in a slaughterhouse. The same herders also hunt wild and feral reindeer to eliminate them from their domestic herds. Thus, different species of domestic and wild animals make up the herders' livelihood with significance that varies seasonally. This echoes David Anderson's theoretical findings in this volume, challenging the separate silos of domestic reindeer and wild caribou, which leads him to advance his theory of 'convivial knowledge ecology.' We shall return to this challenge when it comes to legislating human–animal relations in light of this diversity.

For cattle, the time and amount of feeding, as well as the kind of fodder, varies greatly depending on breed, individual preferences, and micro-climate. The longer in the fall the cattle can graze freely in the forests, and feed on a diverse diet of green plants not restricted to hay, the more likely is it possible to get meat with what is called a marble structure, meaning that the fat is not only on the outer side of the animal between the meat and the skin, but inside the meat. Such meat requires special feeding techniques, which are very labor intensive for humans: when it gets cold in the fall, people must move the cattle to different places in the forests, where human living conditions are much harder than in a village. Therefore, not many people in the RSY engage in this special, semi-nomadic way of cattle husbandry anymore.

This baseline information on the different grazing animals in the area with the world's harshest climate will inform our mutual domestication analysis of how people 'domesticate' laws in the area to suit their own livelihood, and how human life changes in response to such legislation.

A legal anthropology of human–animal legislation in the Sakha Republic

This section will analyze the laws that govern the husbandry of the above-mentioned three principal pastoral animals in the RSY and then discuss their significance for the lived experience of domestication on the ground, using evidence from the authors' fieldwork in 2019 and 2021. The RSY is known to be at the forefront of legislative activity within Russia, as well as within the Arctic. Several conversation partners in the capital Yakutsk proudly counted up regional laws that exist only in the RSY. For example, regional laws have been passed on the protection of permafrost (Law № 1571-V, 2018), on the ethnological expert review for development projects on indigenous lands (Law № 2299-3 № 509-VI, 2020), or on the production of *kumys*, a drink of fermented horse milk (Law № 465-II, 2002), as well as the traditional Sakha cattle summer transhumance *Sayylyk* (Law №52-3 № 107-III), and many different laws in the spheres of indigenous rights outlined elsewhere (Stammler, Ivanova, and Donahoe 2022). This regulation—or over-regulation as some of our research partners argue—significantly impacts the relationships of people to their animals and hence their livelihoods. In her chapter on juridification, Sieder (2022, 702) noted that the "turn to the jural is assumed to transform identities and subjectivities," a postulate to which we shall return in the discussion.

The main focus of the laws on domestic pastoral animals is on creating conditions for breeding particular RSY breeds of animals that are recognized as important for the people in this Arctic region, as well as supporting the livelihoods for which these animals are significant. Stammler-Gossmann (2010) has highlighted the political importance of these animals for projects of regional identity making. In the following sections we shall analyze these laws, comparing them in their orientation toward economic, social–cultural, and genetic importance.

Horse herding law

The current horse herding law was adopted in 2003 (Law № 109-III), with the most recent changes in 2021 (Law № 607-VI). From the outset, the text introduced horse herding as a traditional agricultural livelihood of the Sakha people (preamble) and argues for the conservation of the Yakutian horse breed as belonging to the heritage of the Republic (RSY, Preamble and Article 7). Beyond the RSY, the law is also supposed to facilitate the spreading of the Yakutian horse to other regions of Russia (preamble), because this particular breed of horse is best adapted to extreme climatic conditions (Article 3). The law is directed toward creating conditions for horse herding as a viable livelihood for the pastoralists, and for preserving the special gene-pool of the Sakha horse (Article 10). Different from keeping horses elsewhere, here horse herding is specifically tied to grazing the animals on a year-round basis in herds (*kosyak*, meaning one stallion and 'his' group of females, Article 8), with free grazing in winter under the snow (*tebenevka*). Hence, the law stipulates the seasonality of pastures and the rights and duties connected with having free-range grazing of animals on land to which the animal herders do not have ownership rights (servitude, Articles 1 & 3), including the pastures on state or municipal lands (Article 19). Winter pastures for horses are forbidden from access by other animals, including cattle in the summer and the fall (factually the snow-free period, Article 19).

In its initial form, the law stipulated a much more comprehensive set of state support measures than in its most recent version, from which state support for horse herders' clothes, financial welfare by the state, and compensation for working in extreme climate all disappeared. Instead, state support is now more directed toward meat production, selective breeding work, and educating herders in best practices (Article 4 in the 2006 version compared to the 2018 version). Nonetheless, Article 4 of the law still specifies a list of 12 directions in horse herding, to which funds from the RSY yearly agricultural budget are allocated. Some of these are similar to the ones described further down in the laws on reindeer herding and Sakha cattle, namely the responsibility for research and implementation related to selective breeding, but also young horse herder support, animal insurance from natural hazards, co-funding of horse herding base camps, and support for capacity building (*povyshenie kvalifikatsii*) of horse herders (Article 4).

Reading the text leaves the impression that the original version of the law has a more narrative character that emphasizes the social–cultural importance of horse herding, while the new version reads as much more technical, with lists of items for state support in the form of bullet points (Article 4). On the other hand, new additions in 2021 specifically permit horse slaughter for ritual purposes, teaching, and subsistence even outside slaughterhouses. This change is made specifically for preserving the traditions and culture of the Sakha and indigenous people of the North (07.04.2021, Law 2348-3 № 607-VI).

Moreover, the cultural significance of the horse is very prominent in the law on mare's milk, *kumys* (Law № 465-II, 2002), which states in its 2014 preamble, "Due to the high social significance of *kumys* made from mare's milk for the population of the Republic of Sakha (Yakutia), the revival, preservation and development of *kumys* production is an important state task." Much more than for horse herding in general, the state promises to subsidize mare's milk twice as high as the subsidy for cow's milk, completely finances special construction needs for its production, and pays for feeding mare's milk to patients in hospitals and children in institutions (Article 2). The latter is because mare's milk is considered to be healthy for preventing and treating diseases such as tuberculosis, as well as stimulating the human immune system in extreme climatic conditions (Preamble).

While this reads like continued dedication by the state to horse herding as a culturally significant livelihood in the area, the change in tone and content of the horse herding law indicates less attention to the people engaged in horse herding and more to the products that come from these animals. Hence, Article 7 of the law dedicates one paragraph each to the three officially recognized subtypes of the Yakutian horse, of which the *Megezhekskii* and the *Prilenskii* are registered cross-breeds with Russian cargo horse breeds. The law does not consider this level of detail for the diversity of management practices in horse herding, which are in fact connected to human in-depth traditional ways of knowing the animals and the land in the diverse landscapes of the RSY, e.g. in the tundra, on the shore of the Arctic Laptev Sea, and in the forests and thermokarst landscapes of central Yakutia. It is also worth noting that the health benefits of mare's milk (*kumys*) led to separate stipulations in the above-mentioned law on child nutrition in kindergartens, while the health benefits of the Yakutian foal meat are not mentioned in the law. Local medical–nutritional research has claimed that the meat of 8-month-old Yakutian foals has the best balance of amino acids, protein, and polyunsaturated Omega-3 fatty acids (Gomboeva and Plotnikov 2014).

Sakha cattle conservation law (2001, 2017)

The RSY law on Sakha cattle conservation (law № 291-II, 2001) is even more directed toward the animals and even less toward the people. Like the horses, the law emphasizes that the Sakha cattle breed is a result of long

folk breeding practices (*narodnaya selektsiya*, Article 1), making this type of cattle the fittest for extreme Arctic conditions. Unlike the law on horse herding, the cattle law does not start with a preamble that outlines the social or cultural importance of this animal. The law gives no attention to the specific livelihood connected to this breed of cattle in the Arctic, which the edited volume by Granberg, Soini, and Kantanen (2009) addresses and which Tarasova (2020) described most recently in detail for the importance of Sakha ethnic identity. The owners and preservers of this breed of cattle are only recognized in Article 11 of the law, which outlines their duties to engage in selective breeding and observing the basic techniques of transport, slaughter, processing, and storing of animal production.

Also, unlike the horse law, there are no specific methods of grazing or feeding cattle included in the law. This is a missed opportunity, because if traditional seasonal rotation of pastures and grazing techniques are observed, the meat resulting from these cattle may become marbled, and thus become potentially very sought after in the market. However, hardly any herders practice this complicated feeding method anymore (interview, March 2017), because it involves a semi-nomadic life where the herder stays in the forest in the autumn where the cattle graze on forest pastures. An incentive in the law would have had the potential to preserve that kind of traditional knowledge and livelihood of the people in northern Sakha. This incentive could easily have been incorporated into the law on Sakha summer grazing transhumance (*sayylyk*, Law № 52-3 № 107-III). Somewhat similar to the idea of *Alm* in the Alps, the law establishes the *sayylyk* as traditional way of organizing a pastoralist livelihood and a way of non-commercial subsistence (Article 1). However, the *sayylyk* law does not specify any breeds of either cattle or horses.

Instead, the Sakha cattle conservation law focuses mainly on methods of breeding native cattle. It regulates scientifically controlled breeding work, and its inventarization and reporting (Chapter 3, Articles 6–13). Owners of these native cattle who observe all these rules are eligible for state subsidies that are higher than for other breeds of cattle (Chapter 4). The bureaucratic documentation is outlined in great detail. Mainly, the law stipulates the production of a "state book on the gene-pool of the Yakut cattle" (Article 6), in which specific qualities of this breed of animals are registered. Only genetically pure-bred animals get a special certificate of their belonging to the native Yakutian cattle breed (Article 7).

The regional state assumes responsibility for the genetic conservation of the cattle, by organizing state genetic conservation farms. The task of these farms is only conservation and development of the number of native cattle, and not the production of meat, milk, or other dairy products, let alone preservation of culturally significant traits of the livelihood connected to such animals. There is a difference in the subsidy that the state pays for maintaining these genetic farms and the subsidy that herders get for agricultural production in general. The comparison with mare's milk is evident: while the former is

double-subsidized for its cultural and medical significance, the latter does not enjoy a special legal status, although the fat content of native Yakut cattle milk is around 5½% and it is supposed to be rich in vitamins and minerals (Eliseeva, Martynov, and Gogoleva 2019).

Even more so in its most recent 2017 version, the Sakha cattle law basically isolates the native breed into state farms, which are fully financed by the state as outlined in Chapter 4 of the law. Before 2017, there were two gene-pool farms: one in the Eveno-Bytantay district west of the Verkhoyansk mountains, where native cattle are most intimately linked still to people's livelihood, and one in the more central district of Namski. Since the renewal of the law, the RSY enlarged the number of what they call 'base farms' to a total of five, with branches in 11 different districts. The animals in these farms are state property. Individual owners are entitled to a 15,000 RUB yearly subsidy per head of cattle if they opt for this native breed, on top of the 45,000 RUB they get for each head of milking cow they keep.[3] Tarasova (2020, 84–87) highlights that it is more the intellectuals and politicians that opt for this 'isolationist' breeding policy, while many farmers think that cross-breeding would increase the adaptability of the cattle in the entire RSY and raise the popularity of the native breed. This is a relevant aspect in an area where out of roughly 171,000 cattle, not even 1%, namely around 1,500 animals, are of the Sakha native breed. Before the conversion of cattle herding to highly productive industrial breeds during the Soviet Union, the population of Sakha native cattle was 494,000 in 1928 (Koryakina 2013, 44).

These numbers make it obvious that agricultural industrialization had marginalized the native breed of cattle to the verge of extinction—a problem not unique to this animal and a great concern of biodiversity worldwide, as the Nagoya Protocol shows (*The Nagoya Protocol on access and Benefit Sharing of Genetic Resources* 2014). The existence and orientation of the Sakha cattle conservation law show that decision makers have become aware of the conservation value of the animals as genetic heritage and biodiversity with specific properties. However, unlike with the horse herding law or in the Nagoya Protocol, this awareness does not extend to the value of the livelihood and the indigenous ways of knowing the environment, which are connected to raising this breed of animals.

Sakha Law on reindeer herding (1997, 2009)

The RSY law on reindeer herding (Law 3 №179-I) was adopted when reindeer numbers in the Republic were sharply declining. While the law mentions that the state is responsible for the preservation of the native breeds of reindeer (Article 9), the main orientation throughout is on preserving reindeer herding as a livelihood for the people in the RSY, including but not limited to the indigenous minorities (preamble). Thus, different from the orientation of the cattle and horse herding laws, the focus is here on the social, cultural, and economic importance of not just the animals, but the livelihood and people

connected to those animals. In 1997, when the RSY law was first adopted, reindeer herding had experienced a heavy decline not only in the Republic, but in most of Russia (see Stammler and Ventsel 2003, 350), and hence the law's purpose was stabilizing the reindeer numbers.

This was to be achieved through a subsidized salary for the herders, independent of any production. They are paid for preserving reindeer herding as their livelihood and are entitled to compensation for expenses related to this way of life. For example, the law allows a 50% subsidy for the maintenance of basic infrastructure related to reindeer herding, 80% subsidies for getting food from the villages to the herders, 75% subsidies for petrol, 50% for additional feeding at times of disasters (icing-over, bad pastures, hard snow), and insurance against reindeer death from environmental hazards (all in Article 7). Additionally, reindeer herders, as employees of state structures, are entitled to all other benefits of state staff, such as free transportation for the entire family once every two years to any place within the Russian Federation. Hence, in contrast to the cattle and horse law, in the law on reindeer herding, the state promises to allocate a yearly budget from RSY funds to cover almost all costs of reindeer herding, even though Article 7 of the law specifies what percentage of the total cost of various expenses will be paid by the state.

Like in the horse herding law, the reindeer herding law also mentions the technique of grazing the herds, differentiating between closely monitored, fence-based, or half-free (*poluvolnyi*, Article 11). Interestingly, a carrying capacity for grazing land is established by law not only for domestic, but also for wild animals (Article 13). However, the law does not say how this carrying capacity for wild reindeer should be regulated, referring only to the responsibility of the authorities for this. Thus, reindeer herders are not made responsible for controlling the number of wild animals in their living areas, although many of them hunt wild and feral reindeer, in addition to herding domestic reindeer. In the latter sphere, reindeer herders have the duty to observe pasture rotation and carrying capacity (Article 23).

Under the reindeer herding law, the property regime for reindeer is regulated in detail: the municipality has to have a registry of earmarks; reindeer have to be counted twice a year under municipal supervision; that markings have to be completed by December 1; and unmarked reindeer get sold and the revenue goes to a special fund for reindeer herding, which is supposed to help in unforeseen cases, e.g. natural hazards (Article 18).

The law also stipulates that reindeer herders themselves are responsible for saving their animals from predators, but they can claim related expenses from the state (RSY budget), e.g. for the shooting of wolves (Article 19). Herders also do not need a license for hunting non-predator animals on their reindeer pastures, within limits connected to their subsistence. The same applies for fishing (Article 24). Thus, they can hunt wild reindeer, moose, and the highly valued *chubuk* (*O. nivicola*) legally.

While in the other two laws on cattle and horse herding there is no mention of the social welfare for herders, reindeer herders have the right of monthly compensation for a nomadic way of life, better pension schemes, medical care (Articles 26–28), free college and university education for their children, and starting subsidy for young reindeer herders (Article 30). The welfare aspect is one where the difference between the reindeer herding law and the two aforementioned herding laws stands out very clearly.

Discussion: Laws on domestication and domesticating law

This section comes in two parts: first, we discuss the codifying of human relations of 'symbiotic domestication' in laws comparatively across all three pastoral animal species in the RSY (reindeer, cattle, horse), and then second, we link this evidence to legal anthropological theory making.

Comparative legal analysis

All three laws concern a set of human relationships with three different pastoral animals, all of which are important for traditional and contemporary life in rural RSY. (Vitebsky 2005; Maj 2006; Granberg, Soini, and Kantanen 2009; Tarasova 2020). Considering the differences between the animals, their management practices, and the corresponding laws, the above-mentioned similarity of their numbers in the RSY stands out—170,800 cattle (of which around 1,500 are of the Sakha breed), 168,700 reindeer, and 182,000 horses, according to the regional Ministry for Agriculture. This is different from the late Soviet years when reindeer by far outnumbered the other two pastoral animal species, and again different from the pre-industrial Soviet Union when cattle—back then of the unique Sakha breed—outnumbered, with almost half a million, the other two pastoral animal species (Koryakina 2013, 44). Numbers play a role in contextualizing the three laws under analysis here: All of them were adopted by the regional parliament due to a rapid decline in numbers after the Soviet Union. Horses had gone down to around 120,000 in 1998 from 200,000 at the end of the Soviet Union, reindeer had decreased to about 150,000 down from more than 300,000 at the end of the Soviet Union, and Sakha native cattle had gone down to around 1,000 from almost half a million in the early Soviet Union.[4]

Nowadays the state actively supports animal husbandry for all three animals but based on different principles for each species. Basic funding from the Ministry for Agriculture is calculated for all three animals as a per-head subsidy per year. Most of the financial support for animal husbandry goes through the budget of all three principal levels of state administration in Russia: The Ministry for Agriculture at the Federal level (Moscow), the regional level (Yakutsk and RSY), and the municipal level. In many of Russia's Arctic regions, and particularly in the RSY, the financial investments in agriculture on the regional level are higher than the funding coming from

the Federal level. The implementation of the regional laws reviewed here can also be measured by the amount of funding allocated by the region for those measures stipulated in the laws.

Comparing the animal numbers with the funding that supports the keeping of these three pastoral animals, it is worth noting that the RSY spends much more per year to subsidize reindeer and cattle herding, while horse herding receives barely half of the amount spent on the others. In 2022, funding for reindeer herding was 1.045 billion RUB in total making the subsidy per head of reindeer approximately 5,300 RUB. Funding for cows (not even all cattle) owned privately by the 9,715 private owners in the RSY in 2022 was 1.278 billion RUB resulting in an amount per animal of 45,000 RUB. For horse herding 590 million RUB is planned in the 2023 budget of the RSY, from which 5,000 is allocated for each mare (female horse).[5] Regardless of this difference, the number of horses and the popularity of horse herding as a livelihood is on the rise, in contrast to reindeer and cattle herding, and nowhere in Russia is the population of horses larger. This is exclusively due to the cultural importance of the horse for the Sakha: foal meat is the preferred meat of ethnic Sakha. It is closely related to Sakha identity and the dominant version of their ethnogenesis as the descendants of Central Asian nomads who rode on horseback (Gogolev 2004). Moreover, there are the above-mentioned (see section on Horse Herding Law) dietary benefits of Sakha foal meat.

Turning to the analysis of legal texts, two of the three laws (reindeer, horse) are called laws on herding—i.e. oriented toward the human management of the animals—while one (cattle) is on the conservation of the animals themselves. This imbalance holds through the entire analysis of the legal texts. In practice, however, all three animals provide important contributions to the livelihood, tradition, politics (Stammler-Gossmann 2010), and even spirituality of their herders (Vitebsky 2005 [for reindeer]; Maj 2006 [for horses]; Crate 2008; Tarasova 2020 [for cattle]); hence they are connected to a specific way of knowing and living with the animals. We argue here that it is problematic to put each animal into its own silo, as all three animals, in their partnership with people, together form cultural landscapes, of which the presence of humans alongside the three animal species is an important, if not unique factor. Taken together, relationships of the Sakha with all three animals are instrumental in Sakha identity. Along this line, the law on Sakha cattle falls short on the human–animal relations aspect and the cultural significance of the livelihood in comparison to the laws on horse and reindeer herding.

Turning to the available scholarly literature, each of these separate human–animal relationships has been covered in much greater detail than the combined relationship of people to the combination of all three of these pastoral animals and livelihoods, which are in quite a few cases and areas embraced by the same families (Stammler 2010; Stammler-Gossmann 2010; Takakura 2015). For example, the reindeer herders featured in Vitebsky's book (2005) do much of their travel on horses, and while the horses are

mentioned, the focus in the book is clearly on people's relationships with reindeer. A livelihood-based approach in both the scholarly debates and the legislation on human–animal relations would place more consideration on the implications of all three different animal species grazing on the same land and being managed by the same families. Important for this volume, such a comparison also shows the difference in domesticity, tameness, and 'wildness' of the three animal species in their relationships to humans. An important argument that we put forward in this chapter is therefore the benefit of the cold for Arctic pastoral livelihoods in Sakha, which comes from people's careful navigation and weighting of their three pastoral animal species for their life in the region with the world's greatest annual temperature difference.

The tendency of both the law and the scholarly literature to separate the three principal pastoral animal species—treating them as separate, unconnected units of analysis—does not reflect people's real life where they herd several animal species at the same time. We would suggest that the special needs arising from the different care needed for each animal species could be best addressed by policy programs and budget headlines, rather than by separate laws. For example, cattle herding is most labor intensive in comparison to managing the two other pastoral animals, and recently, the number of cattle have been decreasing most significantly. In our fieldwork, we also revealed that in comparison to reindeer and horse herding, cattle herding is more considered to be female work, and dirtier than the two other animals, due to the fact that cattle stay in barns (*khoton*) over winter, where dung needs to be tidied up daily. This influences the closeness between the animals and their human counterparts.

Special startup funding for young cattle farmers is aimed to stop the negative trend in herd numbers, from which 224 herders benefited in between 2019 and 2024.[6] A similar subsidy is also available for young horse and reindeer herders; however, hardly anyone can make use of the horse subsidy because a certain level of formal education is required, which many horse herders do not have.[7]

Unlike for horse or reindeer, in practice the main state investments for the Sakha cattle go to the genetic inventarization of the animals and to subsidies to the farms that keep the animals in what are called the 'gene-pool herds' in the law (*genofondnoe stado*), rather than to the people who herd these animals privately as part of their multiple-animal livelihood. The latter 'only' receive the subsidies stipulated for general cattle herders in the agricultural budget, regardless of any specific breed of cattle. Thus, more attention and funding for selective breeding and keeping the animals 'genetically pure' is available for cattle than for reindeer and horses.

On the other hand, our fieldwork has shown how selective breeding techniques have been applied for all three species by their herders, regardless of the law. Based on people's needs for their livelihood, we consider these breeding techniques as direct human agency in their partnership with the animals to mutually support each other in the livelihood on the land that

unites them. For people, this is more important than the genetic purity of the breed that the ministry funds for the Sakha cattle. The principal selective breeding technique applied for all animals (cattle, reindeer, horses) is negative selection. With this technique all those animals that perform poorly in the livelihood on the land are prevented from reproducing, either through slaughtering or castration in the case of males. For example, horses that are not be able to clean themselves of wet snow, reindeer whose character creates too much unrest and wild movement in the herd, or cattle that would not remain in the herd during the free-grazing period on the ranges or in the forests would be prevented from reproducing. We argue that these 'folk selection practices' (*narodnaya selektsija*) have contributed significantly to the domestic human–animal relationships in all three pastoral animal species in the area.

Although all three laws acknowledge the importance of human selection for the specific Arctic breeds of these animal species, in their current form, the laws reveal a rather traditional view of human–animal relations and domestication as a process of human control and superiority over the animals. Conversely, the 'folk selection' process bases much more on the human–animal partnership characterized in the recent below-mentioned literature. It is the scientists and administrators who establish genetic pureness and make an inventory for the sake of the genetic heritage (and not for its value for human livelihood). This recalls the classical path of domestication from trust to domination of humans over the animal that Ingold so pointedly described decades ago (1994). Different from this, the human–animal partnerships that we can observe during anthropological fieldwork have given rise to an alternative body of theoretical literature (Vitebsky 2005; Beach and Stammler 2006; Stammler 2010; Takakura 2010; Anderson et al. 2017; Stépanoff et al. 2017) that may be described as partnership instead of domination. However, the Sakha cattle law remains within the domination paradigm, where animals figure mainly as a gene-pool rather than as nonhuman persons with their own agency. Our fieldwork revealed that herders view their animals as their partners in their livelihood.

Unlike for the Sakha cattle, reindeer—including the Eveny, Evenki, and Khargin breeds populating the RSY—are not endangered, and thus need a law focused less on preserving the animals than on the livelihood of those people engaged in herding them. Nonetheless, the negative trends in numbers quoted above show that apparently even if the orientation of the law on the livelihood addresses the problems, the law seems to miss its objective—to regulate reindeer herding in a way that it becomes attractive for both the herders and their animals. Therefore, numerous support measures are being realized under the umbrella of 'state programs' rather than laws. Much of this support is on the regional level, and greatly varies between the regions, as it was enacted more than 20 years ago (Stammler and Ventsel 2003).

In the case of reindeer herding, fieldwork has confirmed the formula of partial funding of infrastructure actually works: on top of the regular

expenses for the salary of reindeer herders, the awards for shooting of wolves by herders, and the federal subsidies for live reindeer and selective breeding efforts, between 2019 and 2021, the RSY Ministry for Agriculture allocated 227.5 million RUB (2.2 million EUR) for reindeer herders. This sum covered the cost of 34 mobile houses for the reindeer herders, plus the funding for 16 corrals, four passenger and cargo tanks (*vezdekhody*), and 11 quad bikes, as well as two brand new slaughterhouses and three reindeer skin processing and sewing workshops in herder villages.[8] This is the result of constant, skillful lobbying of bureaucrats and local politicians by practitioners, in order to tweak the law in the directions needed for the practical day-to-day work of reindeer herding.

In one case, the chairperson of the Primorski reindeer herding enterprise, located in the isolated settlement of Nayba, lobbied for the funding of a state-of-the-art Finnish-style slaughterhouse after a visit to Finland hosted by the authors of this chapter. The location of the slaughterhouse on the shore of the Arctic Ocean could hardly be more remote from any population center on this planet. In order to provide off-season transportation to the nearest port and airport, he also lobbied for a new ATV, which would be the lifeline between the slaughterhouse in Nayba and the municipal center of Tiksi. The implementation process for these measures and the support from the Ministry (referring to the reindeer herding law) took a total of two years between the Finland inspiration and the inauguration of the slaughterhouse. During a field trip in autumn 2019, none of this was there; however, in 2021 we drove from Tiksi to the inauguration of the new slaughterhouse in Nayba on one of the new passenger tanks. This successful lobbying serves as evidence for our argument of people skillfully 'domesticating' the law to suit their own agenda.

However, these efforts could not stop the negative trends in reindeer herding in this part of the Arctic, for example, the reduction in numbers in the RSY of both the herds and the herders. The officially registered number of herders diminished from 2,060 to 1,295 between 2014 and 2020, while the number of reindeer diminished according to statistics from 177,000 to 152,000,[9] before the stabilization in recent years. This shows that the principal direction of the law on preserving the livelihood through support of living reindeer by paying reindeer herders is still timely but is not enough to keep the livelihood attractive for people. On the ground, our research partner, from the Primorski reindeer herding enterprise, clearly identifies the availability of workforce as the principal bottleneck of reindeer herding in the area: he could easily increase the herd numbers, if he had more people do to the herding work. Few in the younger generation envision themselves as future reindeer herders, even though the herding enterprise is the only productive employer in Nayba.

The director, jointly with a responsible manager at the regional Ministry, constantly upgrades infrastructure and living conditions of herders, equipping them with additional items such as state-of-the-art mobile solar

power modules, satellite phones, TVs, transportation, more comfortable mobile houses instead of the traditional nomadic tents (*tordokh*), and even staple food so reindeer herders would not need to spend their own salary for feeding themselves at work. The director even engaged in 'wife-hunting' for his herders in other villages. But none of these measures have led to an increase in the desirability of reindeer herding as a profession and livelihood. Indeed, during a fieldwork lecture in the local school in Nayba in 2021, none of the students answered the question of whether they would consider themselves as future reindeer herders with a 'yes.'

Thus, even good intentions and implementations in a law may not solve culturally embedded problems on the ground. Previous research from other areas has identified the shortage of labor as a significant bottleneck for the development of reindeer herding (Beach, Anderson, and Aikio 1992; Vladimirova 2006). Moreover, longer term political and economic framework decisions can lead to changes that are impossible to reverse later even with ample good will, such as, for example, the decline of fully nomadic pastoralism in herding and the transition to a sedentary way of life, as happened among the Saami in Finland (Mazzullo 2010, 2017) and Russia (Allemann 2020), and the gender shift in tundra and taiga life in the Soviet Arctic that led to the de-facto end of family life outside villages in most Russian Arctic areas (Vitebsky and Wolfe 2001; Vitebsky 2002).

The horse herding law, even though it is also livelihood focused, is not even remotely comparable to the reindeer herding law in its level of detail and support for the herders. However, here the above-mentioned socio–cultural component in the RSY plays a crucial role: the high symbolic importance of the horse for ethnic Sakha has led to a stable customer demand for products from horse herding, most importantly foal meat. Moreover, most of the horse population is much closer to the larger towns inhabited by the main ethnic Sakha customers, making logistics from slaughter to market more feasible. Even with less financial incentives and support measures enshrined in laws, horse herding is more popular than reindeer and cattle herding. Even though the Ministry proudly announces that each new horse herding station can get 3 million RUB of state support, and 277 such stations are already supported, we know from our fieldwork of horse herders that live almost completely without state support and prefer to spend their time on direct marketing of their horse products instead of paperwork and fighting with bureaucrats for funding. Our closest field partners, a family horse herding business in Pervyi Khomustakh (a village an hour drive from Yakutsk) is an example of such an approach.

Thus, analysis of the three laws with the situation on the ground and the scholarly literature on domestication of pastoral animals reveals that the law on Sakha cattle is most distant from the lived experience of cattle herding in the RSY and aligns more with the domestication as domination paradigm that was identified 30 years ago (Ingold 1994). The reindeer herding law considers much more the human–animal partnership on the land, but

nonetheless the numbers in the RSY and fieldwork in Nayba reveal that the law does not support the livelihood as well as intended. On the contrary, for horse herding we see that even with less elaborate regulations in the law, the cultural importance of the horse for ethnic Sakha seems to be so strong that the livelihood can thrive with much less state support. Coming back to our title, we could thus argue that in the case of the Sakha cattle, the law domesticated the people and they stopped believing in the partnership with their own breed, either switching to global high-output cattle breeds or abandoning cattle herding altogether. In the case of reindeer, we get the impression that people attempt to domesticate the law by accessing funding from all angles to keep the livelihood alive. However, the outcome remains behind the expectations, due also to the legacy of Soviet policies of sedentarization and elimination of family nomadism. For horse herding, it seems that while the law acknowledges domestication more as a process than a fixed stage, and thus is in line with recent advances in domestication theory, the horse aspect of the Sakha human–animal livelihood flourishes even without the need of elaborate legal protection.

'Living Law' and beyond

In the early 20th century, Eugen Ehrlich (1913) coined the term '*lebendes Recht*' (living Law) and argued for research focused on the lived experience of the law by people on the ground, thus establishing legal sociology as a field in the social sciences. We show in this contribution how such an orientation can still reveal new insights after more than 100 years. Basing on Ehrlich's agenda, the example of human relationships to their domestic pastoral animals shows how the implementation of laws on the ground is also part of the process of domestication. While in some cases, as with the RSY cattle law, people let themselves be domesticated by rules, views, and values external to their own lifestyle, in other cases, such as the reindeer herding law, people domesticate the law by tweaking in the direction necessary to get the kind of support they need for their human–animal lifestyle, as the example of the passenger tank and the slaughterhouse in Nayba shows. Yet in the third case, the Sakha horse herding livelihood, domestication as a yearly process between free grazing and a close feeding–riding relationship can happen independently of the law even though the document is there and acknowledges the partnership of humans with horses.

This view of relations and regulations between humans and their pastoral animal livelihoods in the RSY leads us to observe processes of the entry of the legal sphere to areas where an anthropological field worker would not necessarily expect it: for example, the level of detail in which reindeer herding regulations specify state support, with the link in the law that the herding of reindeer (and also horses) as a livelihood, is an important part of the cultural heritage of the peoples in the RSY. We can therefore argue that the RSY government follows a specific identity policy with these laws,

juridifying human–animal livelihoods to strengthen senses of belonging. This process marks the initially mentioned "turn to the jural [which] is assumed to transform identities and subjectivities" (Sieder 2022, 702). In our case it may be less a transformation of identities, but a strengthening of what the lawmakers assume is already there. In this sense, juridification is what Eckert and colleagues in the introduction to their edited volume have called a "wide range of social processes through which law itself is socially constituted, characterized by dialectics of norm diffusion and adaptation" (2012, 15–16). This becomes particularly evident in our fieldwork example from Nayba, but also in how "the Sakha's tendency towards juridification" (Stammler, Ivanova, and Donahoe 2022, 144) compares with other Russian Arctic territories where juridification is less evident.

The lived experience of people with the law and the ways in which this resembles processes of domestication leads us to identify two tendencies that go to different directions.

Firstly, hand in hand with juridification of the human–animal domestication process goes also the legal standardization of indicators for culturally carefully composed livelihoods. As Comaroff and Comaroff (2006, 32, introduction) have observed, law standardizes in similar ways as money. In our analysis, we have seen how this standardization is expressed in numbers of state support for the different animal husbandries associated with the three laws that we analyzed in this chapter. Standardization in our case thus happens not only through juridification, but also monetization, and expression of animals in numbers in the agricultural bureaucracy. For many people involved on the ground, their animals are their identity, as well as their daily life and even their connection to the spirits of the land. Standardization through quantification reduces these relations to numbers that can be matched with figures in the annual budget. However, at least two of the laws recognize the heritage aspect of the livelihood. People's enactment of the domestication relationship on the ground may therefore be viewed as juridification of heritage and identity politics, but not necessarily as a form of capitalist expansion, which is what Comaroff and Comaroff (2006) had observed in their fieldwork. The RSY reindeer herders, as well as employees of the Sakha cattle gene-pool farm, receive a state salary for keeping live animals that are classified as cultural heritage in the respective law but not for producing any monetary output. This makes the herding of reindeer and of Sakha gene-pool cattle stand out from the herding of horses and of non-Sakha cattle. The development in the last 30 years nonetheless shows that such a juridification and monetization of cultural heritage does not necessarily save a livelihood, as the stagnation or decline in numbers of cattle and reindeer as well as their owners in the RSY indicate. Thus, even laws with best intention might not save endangered livelihoods.

Secondly, we have described another direction that runs against this tendency, emphasizing the animal husbanders' own agency in two different ways, either through domesticating the law, or through the refusal to juridify. As

in the example of the Primorski reindeer herders, this led to people 'domesticating' the law for their own purposes, i.e. tweaking and lobbying within the law to get the support they need. Different from this is the example of horse herders who refuse any standardization and prefer to live just from the production that their own human–animal relationships yield. This could be further classified as a refusal to juridify. This one example, however, is not yet enough for a general statement that Arctic human–animal livelihoods thrive better without the law than within it. Rather, we could emphasize that the cultural significance and culturally embedded human preferences for the horse and its meat in the RSY have proven to be more powerful than the best intended laws to keep human–domestic animal relationships afloat.

In this legal human–animal triangle (with reindeer, horses, and cattle), the Sakha cattle and its related law remain an outlier to the other two to some extent. The law, focusing on genetic heritage and the purity of the animals rather than the associated livelihood, has not helped to raise the above-mentioned profile of Sakha cattle herding as a livelihood involving harder work, more dirt, and classified as something for women. This image prevails in spite of the well-documented cultural significance of the Sakha cattle, both regionally (Chomchoeva and Chomchoev 2017) and internationally (Crate 2006, 2008; Granberg, Soini, and Kantanen 2009; Tarasova 2020). Also locally, the recent law on the summer grazing (*Sayylyk*) has not improved the prestige of cattle herding in general in the 20 years since its adoption.

Why then do the Sakha have such a preference for meat of their own horse breed, while they are less picky about the beef and largely raise and eat beef from other breeds? Like for the horse, the cultural argument might offer an explanation for the cattle too, but from another angle: the politics of cultural assimilation carried out by the Soviet Union in the 20th century promoted highly productive cow breeds that complied better to the Soviet Russian-dominated model of agriculture. This is why the population of Sakha-breed cattle decreased from nearly half a million to less than a thousand. There was no such agricultural assimilation policy with the horses, as there was never a Soviet Union–wide culture of horse meat consumption, which was not promoted as a national agricultural product at all. One might speculate that had the Soviet Union been run by Mongols, maybe they would have promoted the spread of their own horse breeds rather than of their cow breeds.

Conclusion

This chapter has attempted to demonstrate the benefit of applying legal anthropological approaches in spheres initially distant from law, such as human–animal relations and domestication. We have contextualized the analysis of laws on three principal pastoral animals of the Republic of Sakha (Yakutia, RSY) with the lived experience of herding horses, reindeer, and cattle in this coldest inhabited place on earth. Such a contextualization of

law, domestication, and human–animal relationships as processes emplaced in a dynamic socio–cultural–environmental context helps us understand the success and failure of livelihoods with domestic animals. It also enables us to show the difference in outcomes between seeing laws exclusively as texts requiring doctrinal analysis and analyzing law as a process of lived social and cultural experience, including but not limited to the texts codified in laws and reaching out to incorporate the entire social milieu from implementation programs to culturally embedded practices. Such a holistic approach allows us to contextualize long-term demographic quantitative development of human–animal relationships, as well as understanding mutual processes of domestication between people and animals, as well as between people and the law.

Both domestication and the law are thus processes dynamically embedded in their specific social and cultural context, which is significantly shaped by people's notions of identity and personhood. We have argued in this chapter that seeing animal husbandry laws separately from each other and only focusing on the animal as the principal object of analysis does not capture the complexity and lived experience of real human–animal livelihoods. The same goes for a narrow understanding of domestication as a one-time event that establishes a stable relationship of domination between humans and animals. In the Arctic part of the RSY, even the notion of what constitutes a domestic animal is as fluid as human–animal livelihoods and escapes codified law's tendency to create standardized silos (Comaroff and Comaroff 2016): both reindeer and horses can become seasonally or temporarily feral, and while feral they are hunted by people who otherwise herd animals of the same breed.

We can therefore argue with Clifford Geertz (1983, 170) that "law and ethnography are crafts of place: they work by the light of local knowledge." These local ways of knowing and living with animals reveal that both—domestication and law—can be best understood as processes in what Anderson (this volume) has called a 'convivial knowledge ecology,' rather than as silos that we humans make to standardize lived experience in our attempt to simplify complexity and eliminate context. This shows us that recent advances in two initially very separate fields of social theory have gone in parallel directions: namely to move beyond dogmatic silos that create static situations toward a processual understanding of both law (see Griffiths 2022, 301) and domestication (Stammler 2010; Takakura 2010; Anderson et al. 2017; Stépanoff et al. 2017) as fluid concepts emplaced in a relational environment animated by lived experience.

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Notes

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13 Domesticating Wolves while Colonizing Their Hunters

Related Patterns of Categorization to Promote Supposed Sustainability in Northern Sweden[1]

Hugh Beach

Introduction

The term "Anthropocene" has drawn attention to the increasingly altered condition of the world due to human activity. However, while we might attempt to reverse some of humankind's harmful impact, we must acknowledge that the attempt to do so affects how we think about our world and the ever-increasing power of our actions upon it. If our way of thinking about and acting upon our world lies at the root of its disease, then further purposive human endeavors to reverse this condition, even if well-intended, can themselves prove counterproductive. In short, there are risks inherent in any attempted cure.

This chapter concentrates on particulars related to the small world of reindeer-herding Sámi people of Fennoscandia and other *Rangifer tarandus*-herding peoples of the North. At the same time, incorporating a political ecology perspective strives for generalized propositions to inform our conception of domestication and indigeneity. I shall discuss two cases of constructed change. There are striking points of similarity between the fraught categorizations—at times bordering on gerrymandering—of distinct animal subspecies, on the one hand, and the social programs applied to indigenous peoples, on the other. At the same time, government efforts to develop rational policies, ostensibly designed to increase flexibility in the management of producer–consumer relations, can also lead to further arbitrary recategorizing of both animals and indigenous peoples.

Moses in the Wilderness

Let me begin with an old Jewish midrash about Moses wandering in the wilderness. This fantastic narrative recounts how he was forced to confront the insuperable conflicts setting creature against creature within the natural world.[2] The tale goes something like this: Moses—or in other versions, some

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other spiritual leader—is meditating alone in the desert when suddenly a terrified dove comes flying out of nowhere and lands on his shoulder.

The dove says to Moses,

> Please protect me. A hawk is after me, and he's going to try to eat me. I can't get away from him. If I can't make it back to my nest with these few sheaves of grain, I won't be able to feed my children. It will be the end of me, and I will not be able to sustain my family.

Moses thinks this is a worthy cause, so he promises to protect the dove. A few minutes later, a hawk comes soaring out of the air and lands on his other shoulder. The hawk says to Moses, "How can you make such a promise? My kids are starving, and I cannot sustain them unless I eat this dove. You've got to help me out. I'm desperate. What am I going to do?" What does Moses do in the folktale? What can mere mortals do in such a situation? In the midrash, Moses reveals transcendent altruism to which ordinary people cannot begin to aspire: He cuts a piece of his arm out with a knife and gives his flesh to the hawk, thereby saving the lives of both the contending creatures. The two birds later reveal themselves as archangels, sent to test Moses' commitment to God.

This may appear to be a simple myth of the supernatural, but its chief insight consists in the demand that we reevaluate our central values. In modern terms, what do we mean by the concept of "sustainability?" We can pretend it to have stand-alone, scientific meaning; but in fact, it is deeply ambiguous unless coupled to the unit whose sustainability we are addressing. It is a term that implies purpose. But what is the goal? The sustainability of doves or hawks? And how "sustainable" is the life even of a wise prophet, if bleeding badly from a self-inflicted wound? How can these various strands all fit together to make an allegedly "sustainable world?"

The above midrash featuring Moses, the dove, and the hawk may also be taken as illustrative of the key principles of "domestication" and "domesticity," as well as "symbiosis" and even "parasitic symbiosis"—all of which have received so much attention in anthropological research over the last half century (e.g. Ingold 1994; Vitebsky 2005, 26–27). But these are all, I suggest, highly charged and often debatable constructs needing more careful analysis. In the following pages, I shall raise some of the difficulties attending them and consider alternative models. One of the purposes of this chapter will be to show how our increased "analytic refinement" of categories may be as much a product of questionable contemporary power constructs as it is a result of increased scientific acumen.

Evolving Reciprocities of Domestication

In a world of constant change and adjustment required for survival, the ability of one interconnected unit to resist change only necessitates that other

entities must change even more. If the units are to survive, their higher-order context must also survive. Without enough doves, hawks will starve. And if the population of doves were to increase regardless of predatory pressure, the number of hawks might also increase manyfold, releasing all manner of ecological repercussions. Critics are inclined to point out that while this may be so, it does not follow that hawks cannot survive without doves or the reverse. True enough, life systems are not composed merely of the shifting balance of reciprocities between paired variables. If the hawk population should decline precipitously, then over time the dove population might become prey to other, still more significant threats, such as overpopulation, mass starvation, or new pernicious diseases. Even in the limited case of dualistic relationships, forms of symbiosis range from complementary to predatory. In real-life conditions, we confront the continuous integration of relations, branching into numerous chains of supportive or constraining values for any individual entity, as prominent anthropological research has highlighted in the last 20 years (Ingold 2004, 2011, 2019; Strathern 2020). An immediately negative relationship might also have positive value when brought into play with future repercussions from other chains of connections.

Moreover, these relations are hierarchically embedded. Anthropologist and cyberneticist Gregory Bateson's work (1972), especially on the role of somatic change in evolution, is seminal to this chapter. As he was wont to say, "Change at one level occurs to maintain, unchanged, more primary relationships" (Bateson 1971, personal communication). It is logical to assume that matters such as these pertain to our consideration of what we deem to be sustainable. Furthermore, as I shall argue here, these points also have a significant bearing on our conceptions of *domestication* and *indigeneity*.

Let me begin with some reflections about wolves. About 50 years ago, when I came to Sweden, there was allegedly only a single pair—at most!—of wild wolves there. Since then, a small breeding population has begun to grow; but almost all the wolves in Sweden are derived from a single breeding pair, causing vulnerability from the adverse effects of inbreeding. Environmentalists were enthusiastic about the possibility of establishing a sustainable wolf population in Sweden and demanded that Sweden take legal measures to "save the wolf." For many Swedes and members of international environmental protectionist movements in general, the wolf has become a symbol of unfettered nature, a living equivalent of *terra nullius* (unoccupied land), The Wild, a species to be protected. The pro-wolf lobby belittled anti-wolf sentiments as stemming from false fears instilled in early childhood by stories like Little Red Riding Hood.

Certainly, Sámi reindeer herders grow up with numerous anecdotes about the cunning of the wolf. However, for herders, the wolf is a foe with understandable objectives, not an evil, perverted creature with suggestive sexual overtones intent on harming humans. There is no need to posit psychological brainwashing to grasp why herders have no desire to host wolves on their

reindeer ranges. To do so only adds insult to their injury. Wolves can destroy a herder's livelihood overnight. The ensuing debate over the existential status of the wolf, and the justifications given for either maintaining or terminating a "viable" wolf population in Sweden, parallels the folktale of the dove and the hawk closely—except for the ambiguous role played in the Swedish version by its closest analog to the "Moses" character.

During this turmoil of awakened environmentalism and its clashes with indigenous rights, suddenly, a wolf later named "John" wandered across the border between Finland and Sweden. The story of John the Wolf has been told in detail elsewhere (Beach 2001; Dahlström 2003). Only a few essential points critical to the current discussion require illuminating here. The Swedish equivalent of "Moses," in the form of the State government, took the side of the hawk—or wolf, in this instance—granting it the status of a protected species with the ability to feed upon Sámi reindeer stock with impunity.

But to what extent is the wolf indeed an endangered species? In Russia, not far to the east, hunters receive bounties for shooting wolves. The wolf is far from endangered globally, but its distribution is not uniform. In Sweden, the terminology of location clothed as biology promotes the vulnerable-species argument for the protected status of the rare, so-called Scandinavian Wolf—what many herders view as a case of deliberately manipulative nomenclature, or species gerrymandering. In this broad sense, gerrymandering refers to the act of shaping the *conceived form of a given entity* to suit a particular, inherently biased purpose—be it the shaping of a voting district, a species, or, as I shall argue below, ethnic categories.

Nonetheless, one must acknowledge that the prevalence of objects in different locations influences their value, especially if they carry political clout or prestige. There are legitimate reasons for wanting to preserve the "Scandinavian Wolf" under any name, regardless of the multitudes of wolves in Russia.

Of course, no terminological sleight of hand, like defining the "Scandinavian Wolf" as if it were a unique biological breed rather than simply a population assembled by locality, can rectify its inbreeding problem. One might, of course, contend that it is precisely this inbreeding problem that justifies crediting the Scandinavian Wolf with special biological status. Yet, inbreeding is a problem only for an entity that one wishes to sustain, and furthermore, it would be circular reasoning to rely exclusively on the bare definition of an entity in order to justify its maintenance by special protective measures.

Environmentalists had devoutly hoped that John, presumably coming from Russian territory via northwest Finland, might turn southward to find and mate with the limited pool of extant wolves in Sweden. John would thereby help sustain the Scandinavian Wolf population by incorporating his genetic material from afar. It is questionable, however, whether reinvigorating a narrowly limited genetic pool through expanding its genetic base should count as "sustaining" the pool. Arguably, insofar as this "sustaining"

would involve diluting the genetic basis on which one had defined the so-called Scandinavian Wolf, the latter type of wolf would soon, by definition, disappear. Therefore, such "sustaining" might be better characterized as supplanting the original species. If the purpose for protective legislation is merely to sustain the "Scandinavian Wolf," then the cure to the problem becomes a contradiction to its purpose.

However, there would be no contradiction should one regard the Scandinavian Wolf merely as a population described by its locality, not its biological uniqueness. Adding Russian wolf genes to the gene pool of wolves in Scandinavia to combat the deleterious effects of inbreeding and help maintain wolves' existence in Scandinavia becomes non-problematic within such a framework. However, this might come at a cost to the logical foundation of the "Save-the-Wolf" program—at least, to the extent that the latter were presented without reference to the other implicit reasons for maintaining a viable wolf population. In any case, it would surely jeopardize the concept of the Scandinavian Wolf as an endangered species.[3]

The same issue of biological uniqueness versus local specificity evolves also around the concept of "Arctic peoples." Are we talking about any people who happen to live in the Arctic? Or do we mean to imply that there is some kind of shared evolution of biological nature particular to Arctic localities? Suppose we believe in this latter concept and wish to sustain the uniquely Arctic category of peoples (or animals) spawned by Arctic localities. In that case, we should be committed to preserving these unique localities as much as to the organisms and "traits" (genetically understood) that they foster. But we must recognize that the same kind of relationships (even those conceived of as constructed rather than genetic) pertain everywhere between localities and their various denizens.

To protect John's valuable semen from illegal hunters, the government spent a fortune tracking him with a GPS sender collar and following him with helicopter support. But unfortunately, the story did not end well. John never turned south to fulfill his breeding role. Instead, he suddenly disappeared, the environmentalists accusing Sámi hunters of sniping, and the Sámi charging John's supposed protectors with running out of money and patience.

The attempted protective measures for the wolf relate to the Swedish government's broader desires of demonstrating a general environmentalist stance for the support of maintaining pristine nature. Above all others, the wolf epitomizes "wild" animal species, and hence the success of the State's program to sustain the Scandinavian Wolf carries a significant international payload. However, as I shall argue, such protective legislation implicitly constitutes an act of domestication. By its protective legislation supporting the sustainability of the Scandinavian Wolf, the State is working at cross-purposes with its own stated agenda in order to preserve the wolf as "wild." Naturally, we might still choose to support protective measures under the banner "better domesticated than extinct," but we should be aware of the issues and consequences of our actions.

The traditional concept of domestication regards it as "the biologically traceable subordination of animals under human control." It is a definition increasingly challenged by anthropologists. Beach and Stammler (2006) discuss what can be termed "symbiotic domestication" with respect to humans and reindeer. David Anderson et al. (2017) launch the idea of "convivial spaces,' Charles Stépanoff et al. (2017) speak of "intermittent coexistences," and Hiroki Takakura (2010) mentions "familiarity between humans and animals." Naturally, we might wish to limit our understanding of the larger process at hand in order to rescue this comfortable definition, but in fact this definition is riddled with problems. Of course, one cannot deny that there are clearly selectable genetic differences. Some of these might be perceived to comply with the changes we (the human purposive domesticators) wish to foster in more pronounced forms.

Yet these differences might also derive from non-human purposiveness, that is, the relations of our chosen object of domestication with other species. Unintended human relations are also likely to play a role. Furthermore, not all of the results of the "biologically traceable subordination" derived from purposeful human selection upon which the evolutionary process acts will demonstrate recognizable relation to the original human selective purpose.

To return to our canine example: Whose agency lies behind the domestication of dog, reindeer, or wolf? How does agency relate to the reason for selection? How does the will of the selective agent relate to its result? Does the proven evolutionary impact of one species upon another necessarily entail domestication? If so, how does domestication differ from any unintended or otherwise indirect (though perhaps powerful) evolutionary impact of one organism on another?

The permutations of change, agency, and purposiveness are dazzling in their complexity. One thing seems certain: Our concept of domestication needs expansion to include an appreciation of the pathways connecting constructed differences, genetic differences, and quasi-essential changes. As a first step, it is helpful to distinguish at least three types of adaptive accommodation to changing environmental conditions: (1) the genetically encoded essence, or "whatness" of an organism's nature, or "what it is to be a thing of a certain kind"; (2) the constructed developments or modifications of the organism's lifestyle, including its regular habits, acculturated patterns of behavior, and vocal repertoires or calls; and finally (3) the progressively rigidified, virtually ossified, and involuntary (originally constructed) patterns of behavior, such as somatic changes, unbreakable habits, and deeply ingrained modes of vocalization (*regional* bird call or human *dialect*). For the purposes of this chapter, I have coined the term "quasi-essential" to denote this third class of adaptive accommodations. For the human species with such a long period devoted to post-natal development prior to maturity, this is a far more pronounced phase than in other species. It is a period that hones our genetic determinants through constructed external relations. What we have become

feels to be beyond our command, although we know full well we might have become someone else growing up in another physical and social environment.

Although we recognize parasitic symbiosis analytically as an extreme form of symbiosis, it is not the commonplace expression of symbiosis one thinks of at first blush. Similarly, but taking the opposite point of departure, we are prone to conceive of domestication in its most generalized core meaning as the subordination of any organism, species, or breed to the purposes of another—to the extent that such subordination becomes "essentialized" in the domesticated. More recently, as pointed out by critical anthropological research, we have come to view domestication as a partnership between species for mutual benefit. This is certainly in line with the reciprocal relations between species evident in indigenous cosmologies. Still, I believe the time has come to divest ourselves of comfortable common usage and instead to seek analytic clarity in the relations confronting us. It leads to a broader understanding of the processes at play, even if it deprives us of well-contained truths and convenient terms. Domesticators and their domesticated entities are always involved in a continual interplay among the deliberately constructed, the quasi-essential, and the essential (genetic) aspects of their interaction. But even their constructed and quasi-essential aspects can evolve into essentialized forms when influenced over time by purposeful action.

A purposeful domesticator can breed newly essential (genetic) traits into the domesticated. Indeed, this is the path of what we commonly mean by domestic breeding. However, it is less apparent how the intentional selection of essential traits within the domesticated can often be accompanied by unintended or undesired developments resulting from this same process of breeding. Here it is crucially important to keep in mind that the overtly more powerful and controlling "domesticators" (as, e.g., the human "owners" of their animals) can always themselves be reciprocally modified—in different degrees and varying speeds of change—by the introduction of newly acquired essential traits within the domesticated. Thus, the ostensibly controlling "domesticators" can often themselves be implicitly "domesticated" to a certain degree, by the animals in their charge.

In a sense, domestication builds upon a kind of symbiotic biological communication, even if—as is usually the case—the reciprocity involved is not necessarily equipotent. The degree of essential changes generated, for example, in inherited genetic code is unlikely to be equal in degree between the seemingly "domesticated" and the ostensibly "domesticating" partners involved. In other words, we find that the relatively more passive roles position themselves along a continuum of variability alongside of the more overtly controlling agencies of change. Since, however, the mix of purposive versus unintended impacts ranges along a scale binding each partner in a relation of reciprocal domesticity, any attempt at a rigid distinction of the "domesticated" as opposed to the "domesticating" roles proves to be *in principle* futile. We are left with a term whose meaning hinges on degree, as Takakura has emphasized (2010), and whose significance is subject to

the shifting co-determinations of political ecology, cultural norms, and *anthropo*centricity.

Within the symbiotic relationship of domestication, different degrees of "somatic stress," in Bateson's formulation, cause variation in the determinative power of purposive versus unintended changes. Legal protection declared for the Scandinavian Wolf originates, of course, from humanly constructed purposes. However, as Bateson (1972) has suggested, and after him, Ingold (2004), in a relational world where any purportedly absolute borders between biology and culture are regarded as questionable, such laws can, in time, cause essential (genetic) changes in the wolf along a path of which neither the wolf nor the State is necessarily aware. Granted that herders have sought to eradicate the wolf, I speak here of the actual ability to do so, not just the desire.

How can it be possible for domestication to occur by purposeful action, on the one hand, and by purposeful inaction, on the other? It would take us too far afield to grapple with the conundrums between destiny and free will, but the notion of an omnipotent God in relation to the particular lives of each of us seems analogous to the role of a powerful State, which might be seen as nurturing and empowering particular species of animals by means of restricting certain actions on the part of humans. The analogy may hold important implications for the possible interplay of domestication and wildness. What I am arguing here, in effect, is that our conceptions of the domestic and the wild are intimately linked through the web of controllers or potential controllers. Such considerations lead us to consider different *degrees* of the domestic and the wild within the same entity, depending upon the positioning of its different controllers. For example, one domesticating agent might apply a strict "hands-on" policy—meaning the practice of selective breeding in the pursuit of generating specific desired traits among the offspring—while another agent might apply a more detached, "hands-off" stance, meaning that animals lacking the desired properties would simply not survive to reproductive maturity.

Where there is a full ability to control nature, different alternative policy goals may be achievable, depending on whether the control is exercised or not. After all, the impact of its deliberate omission also manifests the ability to control. Hence, concerning wolves, for example, it is reasonable to hold that the last completely *wild* wolf will have disappeared once it can no longer remain unchanged despite the meddling interference of a purposeful humanity bent *either* (1) on its outright destruction *or* (2) on its solicitous protection. The wild wolf has not survived when "it" (with the same supposedly "resilient" genetic structure) is *permitted* to live and breed within the confines of a carefully maintained nature preserve. Its sustainability as a *wild* animal—that which makes it wild—hinges precisely on its ability to continue the same, *despite* people's concerted efforts to control it.

If we are to maintain a conceptual distinction between the wild and the domesticated, it must be to the extent the animals and the landscapes survive

with a significant degree of their former independence intact. Exerting their own purposive actions becomes the measure of what can be dubbed "wild." From within this framework, every entity should be viewed as both wild and domesticated in variable proportions related to each other.

It is only from this perspective, rather than from any born of biology alone, that I would agree to credit the term the "Scandinavian Wolf," or even more aptly, the "Swedish Wolf." It is the small group of wolves in Sweden whose existence is determined by the desire of Swedish legislation. These wolves may be termed "wild" only in a partial or relative sense.

The era of the Anthropocene has brought our planet to a situation where any "wildness"—be it of animals or another part of the natural environment—exists only at the mercy of human management (including its managed omission). Hence, even purposeful restriction of contact with humans to preserve wildness, and even more so "rewilding" in its multifaceted definitions (Pettorelli et al. 2018), are parts of the process of humans domesticating their surroundings.

Intentional versus Unintentional Forms of "Domestication"

Those who have designed the legislation protective of both landscapes and wolves have caused changes they did not intend and about which they are likely to be entirely unaware. Their ignorance is understandable. Stress to the somatic flexibility of any unit of survival can trigger numerous routes of adaptation that operate in ways unrecognizable to the purposeful agent whose actions aim toward a specific result. To exemplify this point in our current discussion, I shall argue that the constructed Swedish wolf legislation can prepare the way for totally unintended genetic changes within the wolf population. One can note similar patterns of deployment in different contexts.

When unknowingly domesticated because of legal protections, the wolf might initially have only a constructed domesticity, if even that. Indeed, the Scandinavian Wolf will not demonstrate immediate essential (genetic) change. It is hardly surprising that the wolves that enjoy protection by Swedish law and can attack Sámi reindeer without adverse consequences have never, to my knowledge, been observed to throw all caution to the wind, to sneer disrespectfully at the herders while consuming reindeer inside their corrals. The wolves may enjoy protection, but they are not aware of it, at least not at first. I suggest, however, that the process of evolution will move them inexorably in the direction of closer and less fearful contact with humans—and that this change might well become essentialized in their genetic makeup. Should competition with other predators for reindeer meat become so stressful as to be determinative for survival, those who can draw benefit from legal impunity will do so; and those who, through random mutation, come to possess less fear of humans may then have a selective advantage. "The Legend of the Dog," as recounted over a hundred years ago by the famous Sámi author

Johan Turi, parallels, in fable form, some of these evolutionary themes (see Mazzullo 2018, 254 ff.).

Now, what I find of compelling interest in the case of the Scandinavian Wolf and our grasp of nature, in general, is not that the wolves themselves are (at first) unaware of the contextual change that promotes what I consider to be their domestication. Most significant is the fact that the humans themselves—i.e., the environmentalists and legislators intent on preserving this wild wolf population in Sweden—cannot fully understand the repercussions of their own actions. What may have begun as a form of external legal control to sustain a wild species could become internalized by the species, eventually developing into a part of its essential structure, thus sliding the species along the scale from the wild to the domesticated.

The more the wolf unconsciously relies upon this advantage, the more it may come to appreciate and realize its protected status. The wolf may eventually learn to count on its ability to kill stock with impunity. Ironically, should a Sámi herder undertake to defy the law and hunt the wolf to protect his reindeer stock (even at the risk of imprisonment), he may unwittingly be helping to preserve the wildness of the wolf—a prime reason the wolf was granted protective status in the first place! My purpose here is not to argue for rescinding the protected status of wolves under Swedish law. However, I think it is worth reflecting on significant flaws in our current conceptions of the "wild" versus the "domesticated."

These perspectives generate further questions: Where is the agency of domestication situated? Can one justifiably locate it only in the behavior of one group of purposive initiators? Did humans once upon a time tame the wild wolves to use them as draft animals, for herding, or for hunting? The origin of the current domestic relationship might well have been motivated by an entirely different design. It is tempting to speculate: Could it have been the wild wolf that initially approached humans in a desperate move—even if not deliberately planned—to gain survival advantage in a cruelly competitive world? By becoming less fearful of humans than their competitors, they might have acquired distinct benefits in being permitted to consume the stock of animals under human protection. Perhaps it all began as humans tolerated the wolves' initial overtures for help in cleaning their campsites of offal, excrement, and other debris. We have little idea and cannot assume that the current benefits of domestication of any species derive from the past purposive selection of these same benefits.

Some insist on defining domestication to pertain only to essential changes, that is, where a genetic alteration in one species results from the purposeful selection of another species. They may even choose to ignore somatic changes of development—i.e., changes within the present flexibility limits of the existing system (read in this context, genome). They may choose to ignore as well matters of "quasi-essential" learning, be they intended or not, as irrelevant. However, I believe this would come at the cost of a vastly narrowed appreciation of the vectors in play. As Bateson (1972) has convincingly

argued, it is somatic change that leads the way for the adaptations of essentialized encoded mutations.

The case of the Scandinavian Wolf illustrates the problem of agency in the process of domestication. Could the concept of a selective reindeer breeder conflate two roles, that of the unintentional and that of the purposeful selector? As noted in the wolf case, the protective legislation might lead to the evolution of wolves who lack any fear of humans. Yet one of the primary purposes of the legal mechanisms has been to sustain the Scandinavian Wolf as we distinguish it today. Granted, the two means of selection operate within vastly different time frames. The determinative influence of a rifle shot is probably far more significant than that of hands-off Swedish protection. It would likely take a long time and high inter-predator competition over reindeer meat for the selective advantages of being more brazen when confronting humans to generate genetic changes in wolves. But again, we find ourselves discussing issues of degree rather than distinct logical categories.

Evolving Categorizations of Sámi

One commonly regards the domestication of other species by humans as a worthy cause, at least to the extent that these domesticated animals and plants visibly contribute to the "rationalization" of human livelihoods, especially when such rationalization is considered to be progressive (cf. Beach 1979, 1981).[4] I shall argue in this section that this process bears a strong resemblance (and probable structural parity) to the colonization of indigenous peoples and landscapes. In other words, I am suggesting that dominant human societies often tend to treat indigenous peoples similarly to the way that they treat domesticated animals.

Nowadays, almost no inhabitants of northern Sweden, including reindeer herders, live in poverty. On the contrary, virtually all maintain a comfortable, if sometimes modest, standard of living. Their current way of life, in turn, necessitates a secure minimum of municipal job opportunities also for non-Sámi Swedes and the tax revenues they generate to ensure the necessary infrastructure for the continued residency of Sámi—herding and non-herding Sámi, alike—in their local communities. However, many of the job opportunities derive from extractive industries such as logging and mining that often erode herding land even though they may support the continuity of the national economy.

Interestingly, Swedish law prohibits all but approximately 15% of the Sámi from practicing their herding rights. These government regulations are justified in terms of environmental sustainability coupled with the sustainability of Sámi society and culture. State herding authorities designate a specific maximal herd size, tailored for the grazing range of each Sámi village to guard against over-grazing.[5] The norms of the Swedish Welfare State promote a minimal income for each family, and obviously this requires maintaining adequate family herd sizes to generate that income at least. However, when

one divides the grazing range's maximal herd size by the number of families it can support according to Swedish norms, it is plain that only relatively few families have "room" to survive sustainably on any given territory. To limit their number, the Grazing Act of 1928 legislated that only those Sámi descending from a herding parent or grandparent could practice the herding right of all Sámi.

By what many perceive as a kind of perverse logic, the Swedish State sees fit in effect to legislate access to the business livelihood of its indigenous people.[6] It thereby curtails the main form of expression of their cultural identity and social cohesion—on the grounds of protecting them from ruin. The rest of the Swedish populace shares problems akin to possible over-grazing for Sámi reindeer ranges. There may be too many restaurants for all of them to profit from selling food to a limited community, or an over-abundance of barbershops for the hair that needs cutting. However, these problems are habitually left to sort themselves out by "the school of hard knocks," the businessman's equivalent to natural selection. Businesses may fail, but nothing is inhibiting their right to free establishment.

Sweden may recognize the Sámi as indigenous people and ratify international conventions to protect their rights. Still, these rights fall short of those bestowed by land ownership and can easily be altered. Furthermore, as conferred privileges, Sámi land use can be continually adjusted by the government to suit other interests.

Many Sámi object to the law, which grants selective access to practice their special rights even within the category of Sámi. Naturally, those who have the right to practice herding are prone to condone this law for fear that without it, the grazing lands would overflow with countless herders, and none might make an adequate income. One source of herder overflow could occur if Swedes as well as Sámi had the right to herd. This overflow has been blocked by the still current, racially discriminating law limiting the herding right to those of Sámi ancestry. Another perceived threat for herder overflow derives from allowing too many Sámi onto the pastures. As noted, this was largely blocked by the imposition of the "grandparent clause" initiated by the Grazing Act of 1928 and maintained until termination by the Sámi Parliament Law of 1991/92.

However, overflow control was not relinquished by the Sámi Parliament Law. All Sámi were now granted the right to herd, regardless of the occupations of their parents or grandparents, but the matter of which persons of Sámi descent might be admitted or rejected has simply been put in the hands of the existing sameby membership. Given the dwindling grazing lands, the increasing number of reindeer needed for a herding family to maintain the same living standard, and the demands of rationalization policies, one can be sure that the admission of a new herder to a sameby (beyond the growth of herders from within the ranks of member families) is a rarity indeed. These developments are a far cry from the principles of property inheritance within the old understanding of immemorial right.

One way or another, most Sámi have been or still are proscribed by law from exercising their herding rights, so it is not surprising that they think such rules are unfair. On the other hand, these Sámi objecting to the restrictions are rarely opposed to the restrictions that bar the Swedish majority from having any reindeer-herding rights at all. One may wonder whether such restrictions are fully analogous—and if so, whether the Sámi attitudes on these matters reveal an implicit double standard on their part.

One might consider the extent to which Sámi feel trapped by the contradictions and apparent hypocrisy grounding their special herding rights, as encoded by the State in racial terms, as a measure of the colonization and effective "domestication" of the people's culture. The conflict is manifest both within the indigenous group itself and especially in its dealings with the ambient majority population of Swedes. There is no happy balance pleasing to all.

The transformation of Sámi immemorial rights *confirmed* by the State to adjustable privileges *constituted* by the State is a remarkable story to be read in political propositions, the protocols of Swedish Parliamentary debate, and its subsequent legislation.

Reindeer herding and the lifestyle it necessitates are based on the continuity of experience and transfer of skills through the generations. Any break in this development or hindrance to its transfer is an egregious blow to the Sámi—both to those who herd and those barred from the herding practice. Even if the breeding and culling of reindeer can be learned in textbooks or from farming scenarios of other kinds of livestock, this is not the same as *Sámi* reindeer herding with all the accompanying historical context and culture that imbues both the landscape and its people.

The desire to sustain a robust reindeer-herding foundation for the Sámi on limited grazing resources creates a difficult balancing act. Based on what Swedish herding authorities term "structural rationalization," not only are the majority of ethnic Sámi precluded from engaging in herding, but they are thereby, in addition, excluded from much of their traditional culture—all to ensure that those who *do* herd can obtain a sustainably decent living standard. At the same time, however, the continually rising number of reindeer needed to keep the same living standard only exacerbates the problem. The Swedish State has designed a system of so-called production rationalization in its reindeer-herding regulations, similar to those imposed on farmers and forest owners to maximize sustainable profit from their lands. Nonetheless, those Sámi who are not allowed to herd derive indirect benefits from herding continuity and its rationalization in the form of associated cultural preservation, links to traditional lands, and solidarity in the struggle for Sámi land rights with their herding brethren (the same who may have blocked their sameby membership). The fracturing of Sámi legal categories has always been a prime method for the State to diminish Sámi land use for the benefit of others.

As noted above, "rationalization" in general means the most profitable use of resources without transgressing sustainability limits (with no regard

for the preservation of cultural norms). When applied to reindeer herding, rationalization practices range from the composition of age and sex distribution within the herds, the predominant slaughter of male calves, the use of artificial fodder, and above all, the holding of actual herd sizes at the maximal limit allowed for each grazing range. Note that, although partial utilization of the grazing lands might still be sustainable, it is not "rational" to utilize them in any other way than to the full extent possible to maximize benefit—according to State ideals—for the herding people. Ironically, however, using the grazing lands to their fullest rationalization potential eliminates all flexibility and positions the herding system perpetually on the brink of disaster through over-grazing. Over-grazing, in turn, can have dismal repercussions for all Sámi and for the continuity of Sámi culture.

The local Swedish population might well support Sámi interests to some extent to protect their monopoly rights to herd on grazing lands—except, of course, when Sámi herding land rights appear to infringe on the rest of the population's right to hunt or obtain jobs. The mining or timber industries, for example, offer forms of employment that generally sustain far more people than herding can. To make ends meet, some Sámi herders may have to accept part-time work within the same extractive industries that are inexorably destroying their grazing lands.

Moreover, the reindeer-herding right is all that remains with respect to material resources that treat the Sámi as an essential (genetic) ethnic group distinct from others in the Swedish population. Hence, the Sámi herding right adds a layer of legal protection—though weak—on lands like National Parks and World Heritage Sites that even many non-Sámi wish to exclude from the ravages of extractive industry.

The Swedish State has chosen to inscribe the rights that the Sámi are said to possess (but only a minority of them can practice) as based on collective essentialist, racial terms. Yet this is not the only possible basis for such differential rights. Sámi argue that the rights to their grazing ranges are (or should be) regular property rights, no different from those granted other Swedish settlers whose children are perfectly able to inherit from them without invoking racial ideology—in the way that children inherit their parents' house. The State's principle of immemorial right was admittedly based on ancestry, but it followed individual lines of descent, not ethnic categories, to secure rights to property held in continuous possession.[7] Indeed, this was the prior conceptual basis expressed in the law governing people's immemorial rights. From this perspective, sameby grazing ranges can be viewed as the conglomeration of grazing zones (e.g. "Taxlands" cf. Hultblad 1968) held by different families choosing to join forces for shared work and social interaction.

Exactly how land was portioned as property or use, among what perceived groups of people, and according to what principles cannot be known for more than a period of shallow historical depth. All we can know for sure is that the transformations have been profound, and since the advent of a

colonizing power, increasingly so. Early on, the Swedish king was dependent on having a Crown-friendly population of Sámi in the North to support his territorial claims with respect to other powers (e.g. Norway/Denmark) and to trade valuable furs. The Sámi were granted land securities, which dwindled in keeping with the growing population of Swedish agriculturists from the South and along the Baltic coast. As one might expect, the introduction of regulations based on race and collective ancestry emerged rapidly toward the close of the 1800s and the advent of social Darwinism, culminating in the Grazing Law of 1928 with its criteria of Sámi ancestry to herd.

Indeed, the principle of family inheritance was the prior conceptual basis governing both land and water (for fishing, invoked for Swedes as well as for Sámi) expressed in the law governing people's immemorial rights. One might consider the extent Sámi feel trapped by the contradictions and apparent hypocrisy grounding their special herding rights, as encoded by the State in racial terms, as a measure of the colonization and effective "domestication" of the people's culture. The conflict is manifest both within the indigenous group itself and especially in its dealings with the ambient majority population of Swedes. There is no happy balance pleasing to all.

A new dimension has been added to this scenario by the establishment in 1992 of a Swedish Sámi Parliament with particular responsibilities for language, education, and cultural expression. As discussed further below, Sámi *indigeneity* determines its constituency, as per international praxis. However, the Sámi Act of Parliament stipulates that parliamentary Sámi status alone is insufficient to win the ancestral herding right and to be a stakeholder in limited Sámi land resources. Nor can the Sámi Parliament oppose the State on land issues in a court of law since it was formally created as a branch of government. Nonetheless, the advent of the Parliament has had enormous repercussions for the concept of Sámi ethnicity and internal Sámi politics (see Beach, 2007).

Most Sámi support the Swedish essentialist conception of Sámi ethnicity, as reflected in the Reindeer Herding Law of 1971, and see this categorization as a just reason for their special rights. This law, together with its ever-expanding amendments, acknowledges inherited Sámi ethnicity relying on descent, "blood," or in today's terms, inherited molecular entities called "genes." While modern science readily acknowledges that different populations can host a particular blend of genetic material, very few of the genetic components are unique, nor can they be found distinctly isolated within any geographical region or population. Most importantly, there is no justification for any ranking of superiority and inferiority among population groups, what we term racism. How is it, then, that the Sámi can embrace a legal construct in support of their land rights based upon racial discrimination—they who, through generations, have been victimized by racial stigma?

I believe it to be a reflection of the degree to which they have been forcefully colonized during their long and ongoing struggle to hold onto their

land. Ironically, the racial ideology under which the Sámi have suffered for centuries has now turned around and become weaponized to a degree in their hands in the conflict over natural resources. Hence, though originally devised by State laws, the criterion of Sámi ethnicity is today widely blamed upon the Sámi as demonstrating their unjust racist ideology. How did this come about? I argue that the colonization of the Sámi has followed much the same pattern as has the domestication of the wolf in Sweden. In neither case are State motives purely altruistic or what they are purported to be.

My own experience for many years among the Sámi leads me to believe that, while most of them will not condemn the State-crafted legal definition of their land rights, they do not believe at all in any ancestral or ethnic superiority. The Sámi have emphasized in their Political Program in 1968 that "We are Sámi and want to be Sámi, without therefore being any more or less than other peoples in the world." Yet the Swedish State has seen fit to apply its ethnic and racial categories without first consulting with the Sámi themselves. Hence, they implicitly remain objects of colonization, even when at certain times, and in particular contexts, they can provisionally turn the tables for their own purposes. Even so, and despite such minor victories, when viewed within a larger frame of reference, we see the State imposing the same pattern of fractioning the Sámi category as it has done when categorizing the wolf into different local types. With the wolf, the State has charted a course of domestication. With the Sámi the course is set on increased colonization.

A significant step toward a population's "domestication" lies in the concept of ethnically composed "indigenous peoples." For a brief summary of the broad range of meanings underlying this term, see Beach (2012). Like the wolf, the so-called indigenous population can become progressively redefined into a spectrum of distinct categories subject to different agendas. Valkonen and Koivurova (2017) have usefully addressed the applications of group and category to the indigenous concept. However, they provide little *intrinsic motivation* for the shifts in conceiving indigeneity (with the possible exception of the refinement of scholarly theory). I believe there has always been a *motivational pattern* propelling the transition from identifying a group, on the one hand, to defining a category, on the other. Most likely, the source of the shift is linked to the competing purposes that drive the conceptual shifts. As a number of anthropologists have recently emphasized, the concept of the "indigenous" is an ongoing construct, rather than a timeless principle with fixed characteristics. While one might well contest the shallowness of the historical time frame they suggest, Chandler and Reid (2020), for example, have pointed out the relatively recent emergence and development of this concept:

> It is important to note that "Indigenous peoples" are a relatively recent construction, emerging from struggles for rights and recognition in the 1970s, primarily led by the American Indian Movement (AIM) and the Canadian Indian Brotherhood. Indigenous struggles in the 1980s became more overtly political as Indigenous movements were able to gain national

> and even international political support for increased rights and recognition and for opposition to ongoing resource extraction, dispossession and displacement.
>
> (Chandler and Reid 2020, 487)

It is evident that struggles to oppose resource extraction have continued to mobilize existing ethnic categories. But it is less plain that the categories fractionating the definitions of ethnic peoples have been (and still are) also crafted to a considerable degree by the extractors and colonizers. Nor are these categories necessarily always created by insidious divide-and-conquer schemes. For example, Swedish lawyers and State administrators firmly believed they were saving the Sámi culture by distinguishing the rights of Sámi herders from non-herders and the Sámi in general from the rest of the Swedish population. Similarly, there are lawyers, administrators, and environmentalists who believe strongly today that the only way to save the "Scandinavian Wolf" is to impose protective legal measures for them as a separate category of wolves and set tolerance limits as to how many such wolves are to populate the grazing ranges.

Yet even when motivated—as on occasion they surely were—by altruistic goals—the use of essentialist ethnic categories when referring to the Sámi people has on the whole been deleterious. Thoughts of Sámi racial inferiority permeated Swedish society and were undoubtedly used to justify their unequal treatment. However, I have rarely found such racial argumentation expressed explicitly in the protocols of the Swedish Parliament concerning Sámi land use and the fractioning of Sámi user categories. To be sure, on the level of practical bureaucratic regulation of the Reindeer Herding Laws, the treatment of Sámi as inferiors was compact and long-lasting. But the pattern of Sámi category fractioning I wish to emphasize here moves beyond the distinction of Sámi and Swede as so-called racial types. It partitions the larger Sámi category itself into different user groups with changing privileges and identity constructs. Then, when useful for compliance in the international arena, Sweden has melded them all together without concern for its own distinctions under the vague term "indigenous peoples." Given this situation, it is understandable that Sweden will not comply with the most basic international convention articles acknowledging land ownership rights of indigenous peoples.[8]

As with the Scandinavian Wolf, the legal construct of a category like "the indigenous" can at times benefit the Sámi. Still, it is also a categorization that comes at a cost. Nation-states differ in their perceptions of who qualifies for indigenous rights. For some, they rest firmly on essentialist, genetic grounds; for some, they require a mixture of essentialist and constructivist criteria. For still others, constructed differences can suffice to secure similar legal rights and classificatory status. For example, it is well known that in Finland herding rights accrue to all those living in particular localities. On the other hand, in Russia many of the same rights accrue only to specifically

recognized ethnic groups practicing traditional lifestyles, living in specified localities, and with a population not exceeding 50,000.

In this connection, it is useful to recall that Darwin's theory of evolution provided no understanding of the mechanism of inheritance. It was evident that children took after their parents long before Darwin, but how children could inherit qualities from each parent was impossible to discern. There was no genetic concept by which to explain such characteristics. Indeed, differences in clothing and culture alone often sufficed to identify ethnic groups. Old Swedish records distinguished between settlers and nomads, not Swedes and Sámi, when establishing legal rights, even if society took the latter ethnic division for granted.

Of course, most people, colonists included, have long recognized that many social groups cherish profound feelings of unity with the land inhabited by their past generations, as well as a sense of kinship with the spirits of the land, however conceived. At the same time, it is equally evident that these local people—whether categorized on the basis of having been there first or as holding a certain form of livelihood—can experience strong bonds of partisan kinship, not on the basis of any similar genetic structure, but in relation to the political agendas of those in power.

Constructed forms of categorization were used from early times. For example, one of the main distinctions between Sámi and Swede was precisely the matter of livelihood. Early Swedish settlers who began to have conflicts with the Sámi over land were, on the whole, agriculturalists. In those times, the Swedish Crown granted special legal provisions to those following an agricultural lifestyle because they were credited with carrying the torch of civilization, could supply the Crown with loyal military conscripts, and justified Sweden's land claims, when necessary, against those of neighboring countries. The rise of genetically based conceptions of ethnicity set in motion the recognition of indigenous peoples via essentialist categories.

The Sámi of today confront a tricky kind of logical dilemma. On the one hand, they decry the racial discrimination that has subjected them to disrespectful biometrics: e.g. the trading of their ancestor's skulls to museum collections, and the insulting racial hygiene propaganda that once claimed marriage between a Sámi and a Swede to be injurious to Swedish racial purity. On the other hand, they feel compelled to defend their herding monopoly based on racial distinctions (even while they do not consider themselves genetically superior or inferior to other people). They worry, not without justification, that were they to abandon the Sámi descent criteria in Swedish law that currently serve to distinguish which category of people has herding rights, perhaps no legal principle would remain to sustain the continuity of their traditional livelihoods on their ancestral lands.

Reverting to the old principle of immemorial right might give rise to increased vulnerability. Securing them from the start was commonly a matter of being in possession and not knowing when one's forefathers first arrived. But this did not guarantee rights in all perpetuity. It was a principle designed

to secure rights of use for sustenance for as long as the resources were utilized. If those who held the rights did not exercise them for generations, a condition termed "passivity," and the resources thereby were lost to other potential users, it was only logical and fair that the right to a defined fishing lake, hunting ground, or grazing range be lost and re-assigned.

One can easily sympathize with the consternation and destitution of many hunting, fishing, and herding Sámi shorn of their former immemorial association with their lands by State-enforced passivity when made to comply with the Herding Laws. These laws, especially the Grazing Law of 1928, cared nothing for immemorial rights but were instead intent on drastic reduction of the herding population to ease conflicts caused by reindeer on the crops of the rapidly expanding agriculturalists. Suddenly *all* Sámi property rights (privileges) were concentrated to this decimated herding sector of Sámi, and soon thereafter, as discussed above, the program of herding rationalization was implemented, reducing the number of herders still further, supposedly for their own benefit. The State effectively diminished the number of Sámi able to pursue their livelihoods on their traditional lands. Unless the herders cling to the racial herding monopoly, all Sámi fear that the lands on which they herd would be opened for herding by any and all. The racial herding monopoly is considered by many to be indispensable for keeping at bay forms of land exploitation injurious to Sámi cultural continuity as a whole.

On the other hand, another set of troubles would result were the Sámi monopoly on herding rights to be founded exclusively on the basis of constructed criteria—like language skills, facility with traditional herding techniques, and mastery of indigenous handicrafts, for such skills could be acquired by other Swedes, or even foreign nationals, without any claim to immemorial rights.

Although it is easy to cavil at the apparent arbitrariness of these regulations, devising a viable alternative set of criteria for membership in a herding collective is far from easy. The Sámi herding livelihood and Sámi traditions might be too vulnerable to survive "the school of hard knocks" no matter how fairly the blows of fortune or misfortune are dealt.

Those of the ambient majority population who might resent the special rights enjoyed by the Sámi tend to view them as a kind of false, gerrymandered ethnicity analogous to that of the "Scandinavian Wolf." They maintain, not implausibly, that neither genetic nor quasi-essential (encoded after birth) human differences should ever justify discrimination, be it positive or negative. Since the law responsible for the Sámi reindeer herding monopoly is expressed in ethnic terms, one cannot ignore the element of racism, with all its weight of historical and humanitarian condemnation.

Taken together, all these arguments and counterarguments highlight the increasingly problematic nature of employing the very term "Sámi" with any concreteness or objectivity. Indeed, it seems to be a label saddled with an oversupply of hidden agendas, variously pointing in different directions according to the aims of the speakers. Under the circumstances, therefore, one should be careful when employing the term "Sámi," so as not to let

oneself be misled by covert presuppositions. Indeed, it is worth raising the question of whether the legally devised and externally imposed concept of Sámi ethnicity as used today is itself a product of the intellectual "domestication" of a proudly independent people. Thankfully, as with the wolf, government control has not proven to be 100% effective. Although heavily colonized, the Sámi continue to be "wild" with respect to Swedish society.

Will the benefits of adhering to international indigenous rights or nationally constructed privileges of native peoples in the long run outweigh the costs of losing majority empathy? Globally, there is no clear consensus about how the concept of indigeneity hinges upon that of ethnicity. That there is a strong connection, however, is taken for granted by all parties involved in these discussions. Moreover, should the world abandon the concept of an "essential" ethnicity as meaningful in order to end its most grotesque expressions in terms of racism, then there is a risk that the rights and protections for indigenous peoples as well as their homeland could also disappear. Those whom we now term "indigenous peoples" must find a foundation to protect what they (and the non-indigenous majority as well) consider most valuable. In the long run, therefore, it may prove more helpful to create an alternative conceptual model, in order to avoid using essentialist notions altogether when seeking to justify any special rights for particular peoples. The exclusive allocation of privileges to any genetically defined group may eventually have to give way to the higher purpose of preserving unique cultures.

Sweden has ratified a number of international conventions protecting the rights of indigenous peoples. Still, in my experience, the empathy for the Sámi, where it exists, does not derive merely from the fact that they were supposedly "here first." Temporal priority *per se* elicits little empathy among the majority of non-Sámi citizens—especially when they see an ethnically defined group of herders maintaining their flocks by means of helicopters, snowmobiles, and GPS senders on their animals, i.e., by manifestly non-traditional means.

Another prime reason so many local people express waning support for indigenous rights is the perception that the indigenous have become "too well off." Sámi seem to gain legal and political support to the extent they are perceived as impoverished and needy, not when seen as wealthy business entrepreneurs. Similarly, formerly poor Native Americans have often encountered resentment after becoming successful tycoons from running profitable gambling casinos permitted only on indigenous reservation lands. It is an attitude that reflects the conviction that Sámi land use is a privilege conferred by the State, not the immemorial right of landowners to use as they please. Arguably, in my view, the entire complex mélange of seemingly arbitrary, *ad hoc* policies and regulations defining Sámi rights (and/or privileges) is itself symptomatic of an implicit process of "domesticating" the Sámi people. The confiscation of Sámi rights and deftly substituted "privileges" are not unlike the protections given the Scandinavian Wolf.

Damage by the wolf, which was once considered a natural disaster, has become a legislated form of adversity for the Sámi, and at the same time part of a process of unintentional wolf domestication. But the domestication process does not stop there. The Swedish State, to its credit recognizing its moral obligations to the Sámi herders whose property it has, in effect, expropriated, pays the herders (albeit insufficiently) for reindeer stock consumed by protected predators. Herders I have asked about this admit freely that without government compensation payments, at least half of them—already a small minority within the Sámi minority—would fall below the income requirements to maintain a position as active herding members of their herding units. They would then risk expulsion from the field by their sameby herding comrades, according to the regulations of the Reindeer Herding Law.

The Relational Symbiosis of Domestication

For the light it sheds on the nature of domestication, the story of John the Wolf is instructive. The purposive *management of the wilderness* necessarily involves an oxymoron (Beach 2004, 118). For what is managing the wilderness if not domesticating it? Further: Can a creature like John be both domesticated and wild?

The mere recognition of an *ability* to exercise such management, prior to its actual implementation, already constitutes the first step, setting in motion the long, drawn-out domestication process. Concerning the story of John, I suggest that the Swedish State implicitly enrolled John in its process of wolf domestication as soon as it prescribed the monitoring of his movements and life under the protective canopy of Swedish laws. *Whether or not John—or even local human observers—was aware of his special treatment*, his domestication was effectively already underway. Nor need the State itself have been explicitly aware of the full repercussions of its wolf domestication policy, or of the possible implications even had John survived and the Swedish plan to add fresh genetic material to the stock of the Scandinavian Wolf proven successful.

In a previous paper (2006), Florian Stammler and I presented a case for the symbiotic nature of domestication. Similar points and further development of the subject have followed: e.g. Stammler (2010); Takakura (2010); Anderson et al. (2017); Stépanoff and Vigne (2018). While the agency of domestication might strive for an intended purpose as, e.g. with selective breeding, I wish to emphasize that it might also bring about all manner of unintended consequences. For one thing, the intended purposes of deliberate domesticators might change over time. Furthermore, unforeseen shifts might well transpire within the bivalent influences exercised by one member of a mutually domesticating dyad upon another.

Moreover, any organism is part of a vast number of interconnected relationships with other organisms, thereby holding various positions on

the domesticating-to-domesticated scale regarding each, all at the same time. Following upon the far earlier and pioneering work of Bateson (1972), anthropological research of the last decade has given much attention to raising our awareness of the relationality of beings and of the world in general (Ingold 2011, 2019; Strathern 2020). Domestication is one of the key processes determining this relational world. Recognizing that we have long moved beyond any strict distinction between humans and other animals, as well as between culture and biology in general (Ingold 2004), it follows logically that domestication as an interactive process must not be limited to relations between humans and other animals. It is for this reason that I have sought to highlight the parallelism between these two processes, namely (1) the domestication of wolves by humans, and (2) the analogous domestication of humans by other humans.

Concerning purposiveness, therefore, a domesticator might sometimes start by unconsciously setting in motion the very direction of the changes upon which she then exercises purposive selection. Alternatively, she might apply a discerning eye to spot suitable preexisting processes of change upon which to build. It is difficult, if not impossible, to mark the start of a domestication process or to know the precise course or basis of its inception. Any agency of selection is likely to be piggybacking upon another creature's unintentional or purposive evolutionary tendencies.

As confirmed by a general axiom of systems theory, a potentiality or somatic flexibility that goes long unused eventually becomes unavailable and inoperative. Indeed, *destructed* traits (such as that encoded in the concept of "passivity" of land use in the law of immemorial right) are the perspectival counterpart of *constructed* characteristics. As the colloquial expression goes: "Use it or lose it." In other terms, as discussed above, any resource, if not utilized consistently, will be consumed by the "needs and greeds" of other purposive agents. Within the vast universe of purposive agencies, if any particular organism leaves a capacity unused for an extended period of time, then competing entities will eventually take over that resource by the processes of natural selection.

I cannot conceive of a system more ingeniously contrived than the principles of evolution, not only to accommodate change but also at the same time to maintain a necessary continuity of vitality. Indeed, the mechanisms of evolution within living entities must themselves have developed from the inorganic world by something akin to natural selection. For this continuous developmental process is patently immanent within the relations of all material existence as such.

The laws of energy and matter are inherently relational—a mutual intertwining of entities across the eternal fabric of space and time. Therefore, it is reasonable to conclude that evolution does not simply *act upon* life; rather, it is *inseparable* from it. Individuals come and go, and new species emerge before eventually becoming extinct. But as viewed from a cosmic perspective, life itself never dies. What we term "domestication" cannot reflect other than

a highly focused relation of purposive power, of the kind that entangles the entire natural world in accommodating change. For a change in any part must inevitably have ramifications throughout the whole.

Where there is matter, any sort of existence, there is also relation. Life is immanent in relation, and the evolution of any part as well as of the whole is the very breath of life.

Notes

1 In original form, the arguments presented in this chapter stem from a keynote address to a seminar about Northern Domestication in Sendai, Japan, 2019.

2 The earliest known version of this story was an old Jewish midrash, elaborating on the symbolic meanings contained in the Torah and Talmud, probably composed sometime between 400 and 1200 CE. See ***Moses: A Life***, by Jonathan Kirsch (New York: Ballentine Books, 1999), pp. 106–107, citing Angelo S. Rappoport, ***Ancient Israel*** (London: Senate, 1995), vol. 2, pp. 262–263.

3 A recent article by Smeds et al. (2020) argues that they are indeed not different from eastern wolf populations: www.ncbi.nlm.nih.gov/pmc/articles/PMC7980305/ in *Evolutionary Applications* 2021 March; 14(3): 721–734.

4 As commonly used in Europe, the term "rationalization" does not primarily pertain to logic. Rather, it pertains to the maximization of a particular item (usually monetary profit) within a sustainable context. Hence, in the realm of animal husbandry, it refers to the ways of maximizing the production of high-quality meat without over-grazing pasturelands. However, it is not "rational" to allow pastures to go under-utilized, either.

5 The Swedish term "sameby" designates not only a specified grazing territory but also the group of herders permitted to utilize that range, forming a business enterprise. As such, it is also a judicially defined entity.

6 Reindeer Grazing Act 1928, followed by the still current (with amendments) Reindeer Herding Law of 1971.

7 A description of immemorial right (Sw. urminneshävd) can be found in Jordabalken's (Swedish Code of Land Statutes) 15th chapter. See Undén (1969: 142 ff.) and the Promulgation of the new Jordabalken, SFS 1970:995. For a later discussion, see Beach (1994: 67–69).

8 See Article 14 of the ILO Convention of 1991 which Sweden has refused to ratify.

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