The Gazelle's Dream

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The Gazelle's Dream

Game Drives of the Old and New Worlds

Edited by Alison Betts and W. Paul van Pelt

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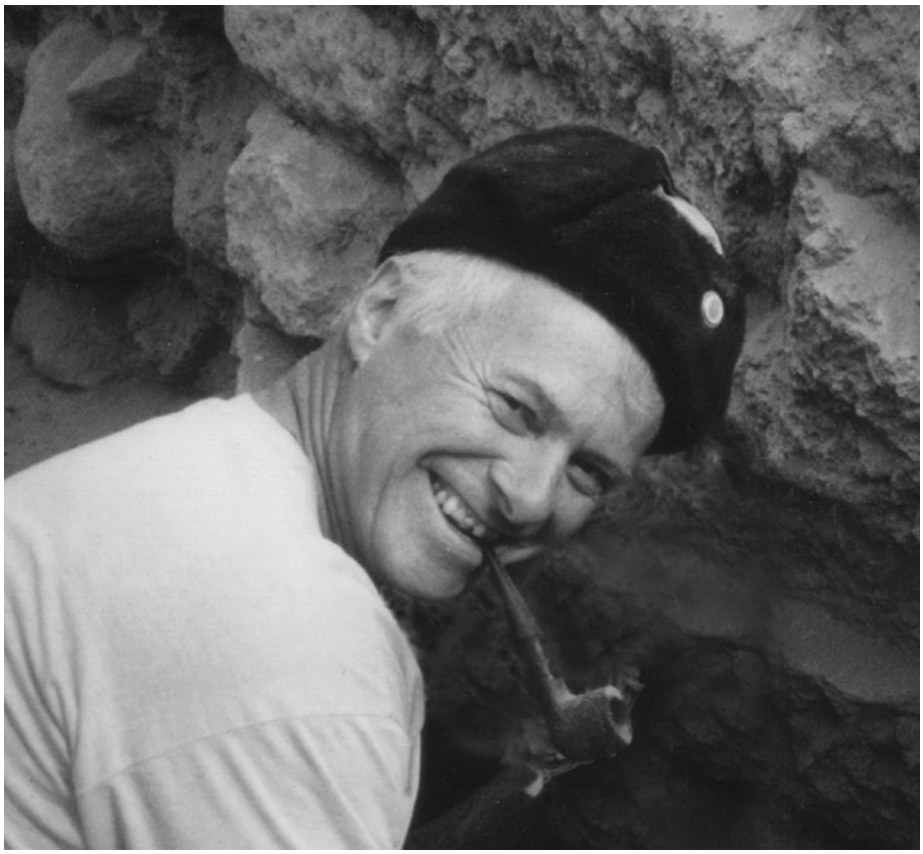
In memory of Svend W. Helms



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We acknowledge the traditional owners of the lands on which Sydney University Press is located, the Gadigal people of the Eora Nation, and we pay our respect to the knowledge embedded forever within the Aboriginal Custodianship of Country.

Contents

Preface

> the whole plain backgrounding into moving animals against the rise of the sun ... (Hemingway 1936)

Alison Betts

My father taught me to hunt as a young child. Among my earliest memories are those of crawling through wet heather in pursuit of red deer stags on the mountains of the Inner Hebrides. By then we did not hunt for survival, but as a necessary conservation activity, to maintain a healthy animal population on restricted territory. My mother made paté from the edible intestines and the meat was sold to Germany. However, if we failed to kill our annual quota, government officials would come and conduct a mass drive, beating the herds into a corner of the deer fences on the estate and firing effectively at random to reduce the numbers. My father, an early conservationist, worked hard to avoid this from occurring. Thanks to his efforts, I never had to witness the mass kill, but the image was impressed into my mind from an early age.

I developed an interest in the archaeology of hunting, and in particular the mass kill, through fieldwork for my PhD thesis in the Black Desert, the basalt strewn semi-arid regions of eastern Jordan. Here, with my long-term research colleague Svend Helms, we stumbled over the harsh terrain mapping the so-called desert kites, a remarkable and highly prolific feature of the steppe regions of large swathes of the Arabian peninsula. Long stone walls meander across the landscape or run for kilometres towards often highly elaborate enclosures designed to trap herds of wild animals, primarily gazelle. This technique is one that occurs in many and diverse forms across the world in places where large herds of animals congregate or migrate.

Since such structures tend to have been built, or at least to have best survived, in the more arid and inaccessible regions of the world, fieldwork is necessarily a demanding process and therefore often rather limited in scope. It is only recently, with the advent of freely available satellite imagery and sophisticated GIS mapping systems that a renaissance in the study of game drives has taken place. This in

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turn has stimulated fresh fieldwork, often in areas where such structures had not previously been recognised. This volume brings together the largest collection of original field research reports on animal drives ever to be published for the Middle East, Central Asia, Europe, and North America. There have been a good many individual studies, but this is the first time that the available evidence from all relevant sources, including history, iconography, ethnography, biology, geomorphology and archaeology, have been brought together in a major review.

In bringing this volume to publication I must and foremost first thank Svend Helms to whom this volume is dedicated. He taught me so much about the craft of archaeology and introduced me to the Black Desert. Our work together there on desert kites formed the foundation of my work in this field. I need also to offer my deep gratitude to Vadim N. Yagodin, with whom I shared a common interest in game drives. It was his inspiration, foresight and enthusiasm that brought me to Central Asia to work there on game drives and many other things besides. My co-editor Paul van Pelt has provided unstinting energy and effort in bringing this volume to press. Don Cleveland has helped greatly with editing for this and other manuscripts. Finally, I will always thank Nicola Gazzana for his constant support, understanding, and patience at long absences in the field.

W. Paul van Pelt

Working on this book and fascinating subject has been a true privilege. I would like to thank all contributors for taking part and providing a comparative perspective to the study of game drives. I hope the research presented here will enhance current understandings of how game drives functioned and affected the lives of the peoples that built them. In addition, I hope it will stimulate research on game drives in places where current scholarship on the subject is still limited. Special thanks are due to Tessa de Roo who supported me throughout this project with her advice. I also wish to express my gratitude to my College, Trinity Hall, for providing the support and opportunity to work on this volume. Finally, I owe an enormous debt of gratitude to my co-editor Alison Betts for sparking my interest in game drives and inspiring me to undertake work on the topic.

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Introduction

Alison Betts and Paul van Pelt

> The gazelles at first advance quietly, but later on, becoming scared, they run along the two walls and try to penetrate as rapidly as possible through the narrow opening ... It is said that the gazelles even dream of the narrow opening ... through which they rush to certain destruction. (Musil, 1928:27)

Hunting is the principal means by which animals and humans acquire animal protein for nourishment, and, in the case of humans, secondary products for various other purposes. For humans the hunt has many complex social attributes. It may be associated with power, skill, and bravery and is often guided by ritual and spiritual beliefs. The hunt itself, the processing of the catch, and the distribution of the spoils are all commonly subject to specific rules, traditions, and practices. Before the time of guns, there were only two techniques for the hunt: first, stalking and running; and second, trapping.

Stalking and running might involve either humans alone or with dogs, a very early domesticate (Davis 1978). To stalk an animal, the hunter or hunters carefully position themselves downwind, then move silently towards the prey using the cover of the natural landscape until close enough to risk a good shot. If they miss, they and their family may go hungry for some days. An ancient variant of this technique, used in combination with poisoned arrows, has been practised into modern times by the Kalahari Bushmen (Carrier et al. 1984; Liebenberg 2008). Known as persistence or endurance hunting, hunters, who may be slower than their prey over short distances, wear the animal out by pursuing it for many hours, using a combination of running, walking, and tracking to chase it until it is exhausted or collapses from the slow-working effects of the poison.

The second ancient technique was trapping. This might involve a passive form, such as digging a pit along migration trails, or an active form: driving an animal or group of animals into a pit, a box canyon, a river or lake, a snowdrift, over a cliff (Figure 0.1), or into an ambush. When the animal or animals are trapped or injured, they can fairly easily be dispatched. Stalking can be used by a lone hunter; trapping often requires several people working together. Humans are a social

A. Betts and P. van Pelt. 2021. Introduction. In A. Betts and P. van Pelt (eds), *The gazelle's dream: game drives of the Old and New Worlds*. Adapa Monographs. Sydney: Sydney University Press.

species and co-operation to enhance hunting success is common throughout the world. It was probably practised by our hominin ancestors and is also a recurring feature among contemporary non-human primates (see, for example, Boesch 2002; Bunn 2019). In the case of humans, the efficiency of the communal hunt is often enhanced by use of various structures and items of equipment. These include pits, nets, enclosures, hides, drivelines, long walls, or similar impediments that gradually narrow towards the intended kill site.

This volume concerns the particular use of driveline structures in communal hunts. It is possible that these practices go back at least as far as the Upper Paleolithic (see, for example, Mellars 2004; Sacchi 2018). Aurignacian communal hunting was believed to be attested in France at Solutré, where horses and reindeer seem to have been driven over a cliff, but recent studies have cast doubt on this interpretation (Bemilli and Bayles 2009). There is no doubt that this is an ancient practice. Driveline structures are best suited to the pursuit of herd animals, normally in places where they gather in large numbers, such as steppes, prairies, moors, tundra, and grasslands. The aim of this volume is to bring together some of the main questions and findings of research conducted in the Near East, North America, and other parts of the world concerning the social, economic, and environmental implications of the use of large game drives. It addresses topics such as the construction, use, and function of game drives across vast distances in time and space. It also highlights important cross-cultural differences and similarities between them.

The most fundamental features of game drives are drivelines that gradually converge towards an enclosure or kill site. Such structures are usually placed carefully within a landscape to take advantage of local topography. Drivelines vary in form to include walls, lines of cairns, brushwood fences, regularly spaced flags, and other obstacles. They may start in a small valley, gulley, or wadi with vegetation suitable for grazing, or near a pool where animals gather to drink. The point at which drivelines meet an enclosure is commonly at a break of slope, so that the enclosure is not visible to animals approaching it until the last minute, while the enclosure itself is sometimes moulded to the shape of the landscape (see, for example, Barge et al., this volume). The size of structures may vary greatly, and the enclosures are often complex in form and quite elaborately constructed (Figure 0.2). Sometimes the enclosure is replaced by other forms of structure, or by natural features such as box canyons or lakes to impede animals' flight.

The principle of corralling animals by driving them down an increasingly narrow defile into an enclosure or pitfall is one found widely across the world. It is most common in areas of steppe, semi-desert, and open plains where large herd animals congregate, but variations have also been used in mountains and forests. Plains, prairies, steppes, and grasslands are often not considered as anything more than peripheral to the social and economic history of settled regions. However, these wide open areas cover a much greater landmass by far, and have their own rich and unique ecology that throughout the prehistoric and historic periods has supported an extensive human population specifically adapted to living in marginal environments. These regions have also been important to the settled populations for many kinds of resource exploitation. At one time many of these lands were home to herds as large as those still occasionally seen today in the

Figure 0.1. Head-Smashed-In Buffalo Jump, Alberta, Canada. (Photograph 454250173, Shutterstock.com.)

Figure 0.2. Bighorn sheep trap, Fremont County, Wyoming. (Photograph by Peter Faris, 1998)

African savannah, as Hemingway described in the 1930s (Hemingway 1936). Like the people living in these regions, the herds moved throughout the year, often following specific patterns of migration. Ethnographic accounts suggest that most game drives were placed strategically to take advantage of such mass movements.

The study of game drives is thus a much broader topic than the mere investigation of an unusual structure or set of structures. It brings a rich new perspective to bear on the social and economic complexities of vast swathes of the semi-arid regions of the world, the history of which is, as yet, poorly understood and the socio-economic importance greatly underrated.

The widespread reduction or total extinction of large herd animals across much of the world over the last century means that hunting with game drives is almost entirely a thing of the past. Data on who practised these types of hunts and how they were conducted has been derived from a variety of sources, including historical accounts and archaeological, ethnographic, and biological data. Variations on game drivelines were widespread (Amirov et al. 2015: 200). They have been recorded from the Arctic; across North America; in the Andes (Moreno 2016); Scandinavia and northern Eurasia; in Britain – particularly the *tainchel* on the Isle of Rum in the Inner Hebrides (Carruthers et al. 1913); in the Nile Valley; the Yemen; across the steppes and deserts of the Arabian peninsula; Turkey; Armenia; the Ustyurt Plateau between the Aral and Caspian Seas; Siberia; and Tibet. There are many individual studies of these regions, but this is the first time available evidence from all relevant sources, including history, iconography, ethnography, biology, geomorphology, and archaeology, has been brought together in a major review. This volume is not exhaustive – that would require an encyclopaedia. However, it contains chapters on a wide variety of game drives from three continents, across a broad range of periods and prey animals.

Game drives are problematic to research archaeologically. They are often located in areas remote from habitation and difficult to access. Planning the whole structure requires a dedicated surveyor, working in harsh and awkward conditions, over sometimes very long distances. For example, game drives found in eastern Jordan may have walls over a kilometre long, and are frequently linked in chains stretching for tens of kilometres across rough, boulder-strewn landscapes (Betts and Burke, this volume). Over the various regions where they are found, enclosures vary in size from one or two metres to well over 100 metres across. In the latter case, it is difficult to decide which parts might be most useful to excavate. Their function means such drives are unlikely to contain cultural deposits to help date them, and excavation does not always provide clear indications of the ways they were used.

Despite these difficulties, a body of evidence is gradually building up, supported by extensive mapping from satellite imagery. Significant ethnographic and historical accounts describe the use of game drives from late medieval times to the early 20th century. There is also rock art (Figure 0.3), and 'kill sites', where large numbers of bones have been found in circumstances suggesting they are associated with some form of communal hunt (Zeder et al. 2013). Finally, animal behaviour is an important factor in trying to understand the use of game drives. Until fairly recently, steppe-desert lands supported a rich faunal population, but unfortunately the large herds that might have been driven into such traps have long disappeared. Now their seasonal behaviours can only be inferred from historical accounts and environmental mapping.

Figure 0.3. Rock engraving of Bighorn trap. Indian Creek near Newspaper Rock, San Juan County, Utah. (Photograph by Dell Crandall, 2003)

Communal hunting

The use of game drives for hunting is varied and complex, and merits broader consideration. For animal predators, herds are easy to find but animals are hard to kill. The reverse is true for humans. In the case of reindeer and caribou, wolves will constantly follow herds. Humans cannot do this, and so must find the herds first before hunting (Ingold 1980: 53). The communal hunt is one method of combatting this problem, particularly in the case of passive hunting techniques, where the animals may already be moving into traps before the hunters catch up with them. The underlying principle in herd interception is funnelling moving animals between converging barriers, driven from behind by a crescent-shaped line of people positioned downwind. The animals are pushed towards a narrow opening where they are met by hunters waiting in ambush. The traps may be permanent or temporary.

Diversity in game drives is largely dependent on three key factors: the type of animal hunted, the environment in which the hunt takes place, and the social organisation and economic needs of the hunters (Driver 1990: 13). Each animal species has a distinct pattern of behaviour that should be reflected in the specific form of built game drives (Frison 1987). Successful communal hunting depends on the ability of hunters to predict the reactions of animals to their environment. This requires an in-depth knowledge of landforms, rainfall, vegetation cover, animal behaviour in response to their surroundings, and patterns of animal movement over time, both diurnally and annually. Communal hunting using built structures

may broadly be defined as procurement operations planned ahead of time and requiring that some individual be given temporary authority to coordinate the efforts of a number of persons. These forms of leadership may have lasted only until the immediate resource needs of the group had been met (Frison 1987).

Given the variability in prey, environment, and human needs, it is not surprising that there is great variability in the kinds of game drives documented in both Old and New World contexts. There are many ways to drive animals into some kind of trap and many ways to kill them once there. This volume focuses on the methods that are archaeologically visible or ethnographically documented. However, the use of cliff drives or dead-end canyons cannot be dismissed, and direct archaeological evidence for portable organic structures has not survived. In some cases, we know how the animals were killed. In Central Asia they were forced to leap onto pointed stakes, which impaled them (Yagodin et al., this volume). Ethnographic records in the Middle East describe gazelle being driven to jump into pits where they broke their limbs or were crushed by the weight of panicked animals behind them (Chambrade and Betts, this volume). In North America, pronghorn antelope were sometimes driven along brush fences into a corral, then chased until they dropped from exhaustion (Frison 2004: 131).

Game drives are of advantage in hunting fast animals in open country, where the lack of cover makes traditional stalking difficult. They are also a good strategy to deal with large herds, where many eyes and ears make it difficult to approach individual animals. This method of killing often takes advantage of the seasonal abundance of migratory species and ensures a supply of meat and other products when animals are absent. It is an energy-efficient means of hunting, as the effort is shared among many individuals. While hunting is usually restricted to adult males, in the communal game drive, the young, elderly, and child-bearing women can also play valuable roles.

Game drives can be employed throughout the year where game is regularly present in the territory of the hunters. However, in the case of dependence on migratory species, they may only be of use once or possibly twice a year (see, for example, Yagodin et al., this volume; Huber, this volume). If hunting groups are dependent on the acquisition of meat only during one or two short seasons, success in the hunt is critical. Under these circumstances, the success of the hunt is so crucial that, in certain ethnographically documented cases, spiritual and ritual activity has been associated with the hunt (e.g. Binford 1978; Frison 2004: 33 ff.; Insoll 2004: 49–50). There are also advantages in this pattern of exploitation. While seasonal mass killing may have a severe impact on herd numbers, it avoids constant regular disturbance of the animals throughout the year. If it takes place outside the mating season, it will not disrupt the breeding cycle. It also frees the population to pursue other activities, while maintaining a supply of animal protein through consumption of meat preserved by drying, salting, or smoking. The period of the hunt can be combined with other social activities as small groups aggregate for a short period.

The three main reasons for seasonality of communal hunting are to take advantage of seasonal prey density during migration, to utilise animals when the fat content is highest, and to obtain high-quality hides for clothing and shelter (Driver 1990). In sub-arctic regions and temperate zones with cold winters, fat

was of great importance in the prehistoric diet. This was best obtained in summer when the hides were also in prime condition (Ingold 1980: 70; Pilø and Finstad, this volume). It has been suggested (Hayden 1981) that communal hunting might yield lower meat returns per unit of energy invested than individual hunting. However, the fact that communal hunting was so widely practised around the world indicates there must have been good economic reasons to hunt in this manner. Two key factors are that such hunting takes advantage of seasonal prey density and provides surplus resources during times of plenty, which are essential for survival in the lean seasons (Driver 1990). North American estimates of daily food requirements for adult males are around half a kilo of dried meat or one and a half kilos of fresh meat (Frison 2004).[1] This means a historic population relying on migrating herds needed to kill a great number of animals to sustain themselves through winter if their diet consisted largely of meat.

Who practises communal hunting?

The practice of communal hunting may be carried out by four main kinds of communities. One of the most common is the hunt as practised by hunter-forager groups, both in the prehistoric past and in the ethnographic present. Rather less common is the hunt as practised by settled communities. There are ethnographic accounts from central Syria of communal hunts carried out by villagers living on the edge of the steppe (Chambrade and Betts, this volume), while archaeological evidence from Tell Kuran in Syria (Bar-Oz et al. 2011; Zeder et al. 2013) fits with communal hunting under similar circumstances in a prehistoric context. The Yemeni kites may also have been built and used by settled populations (Brunner, this volume). Then there is the communal hunt carried out by nomadic pastoralists who move about the steppes and grasslands where the choicest prey can be found, shifting with the seasons as do the wild animals they hunt. The best documented examples of this practice are the game drives in Central Asia (Yagodin et al., this volume). Finally, there is communal hunting practised by the elites, normally with an entourage of servants, beaters, and other camp followers, as well as dogs or possibly tamed felines. This kind of hunting is documented on the Qasr 'Amra murals from Jordan (Fowden 2004) and Assyrian and Egyptian carved reliefs (Grayson 1972; Houlihan 1996: 42–5). Elite hunting may be more often associated with mobile traps than with fixed ones.

HUNTER-FORAGER GROUPS

Hunter-foragers are known best from the ethnographic record, which shows a high diversity in lifeways (see, for example, Kelly 1995, 2013; Binford 2001). It is likely that there was even greater diversity in the past, when this mode of

1 According to the Food and Drug Administration/Centers for Disease Control and Prevention standards one kilo of beef provides 2365 kilo-calories. The daily recommended intake for active males is 3000 kilo-calories.

living was widespread across the world. Hunter-foragers practise an economy without domesticated plants and animals, with the exception of dogs. They generally live in bands or small groups in an egalitarian manner, with flexible membership and differences between individuals based mainly on age, gender, and charisma. Some hunter-foragers are highly mobile, others more sedentary, while the balance of animals and plants in the diet is also highly variable, both seasonally and regionally (Lemke 2018). Many band-organised peoples exhibit a pattern of concentration and dispersion. They spend part of the year spread out into small foraging units, and from time to time aggregate into much larger units of perhaps as many as 100 to 200 individuals (see, for example, Lee and Daly 1999). The times of aggregation normally coincide with a seasonal abundance of particular resources and associated activities, such as the communal hunt. Aggregation is likely to have been necessary for such hunts as a small band on their own might be unable to supply a sufficient number of fit adults, allowing for children, the elderly, and women expecting or caring for infants. In understanding the social and economic role of the communal hunt in hunter-forager societies, it is important to take into account that the hunt may have been the primary factor in the decision to aggregate, and would provide food to support the presence of larger numbers of people in one location. This brought with it other important benefits, such as exchange of information and goods, establishment and strengthening of personal relationships, and reinforcement of spiritual beliefs and practices.

SETTLED COMMUNITIES

In the ethnographic present, the communal hunt in settled communities seems to have been a quite prosaic affair. It would have provided a useful meat supplement to people who rarely slaughtered their domestic animals, and a ready supply of hides and other by-products for trade. The archaeological record, for which we have Tell Kuran and the rock art of the Hemma Plateau (Betts and Burke, this volume), may show that there was an associated cultic significance to the hunt (Van Berg et al. 2004: 97) from the Bronze Age into historic periods. The Yemeni desert kites were most probably built and used by settled communities (Brunner, this volume). There is evidence from Southern Arabia of a ritual hunt undertaken to secure good rainfall (Serjeant 1976), but this is not linked explicitly to the communal hunt using desert kites.

NOMADIC PASTORALISTS

For nomadic pastoralists, the hunt would provide supplementary meat for their diet. Pastoralists do not routinely slaughter their animals as their wealth is tied up in the living herds. They may often exist for long periods of time on secondary products, such as milk, cheese, yoghurt, or blood, and only kill to provide meat for special-event feasting. Nomadic pastoralists are frequently well integrated into long-distance trade networks. The communal hunt could provide an important economic resource in the form of meat, hides, bone, horn, and other side products (Yagodin 2019: 199–212). The traps, too, were occasionally an economic commodity

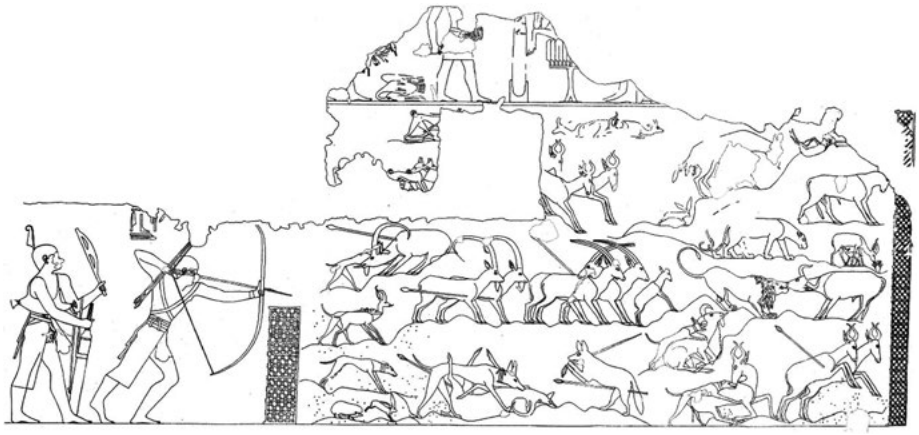

Figure 0.4. Drawing of an ancient Egyptian hunting scene in carved relief. The tomb-owner, Senbi, stands outside a fenced enclosure and shoots with his bow a variety of game, including Scimitar-horned Oryx, Nubian Ibex, Striped Hyena, Dorcas Gazelle, Bubal Hartebeest, Barbary Sheep, Cape Hare, and Leopard. From the rock-cut tomb of Senbi at Meir in Middle Egypt, Twelfth Dynasty, reign of Amememhat I (c. 1985–1956 BCE). (After Blackman 1914: pl. VI)

(Behnstedt 1994; Chambrade and Betts, this volume: Appendix 1). Hunting might also have had a recreational aspect, providing opportunities for the men to show off their skills.

ELITES

Allsen (2006) has drawn together numerous examples of hunting by elites in Asia, from Late Antiquity to the Medieval period, with game slaughtered on a massive scale. Some of the clearest descriptions come from accounts of Mongol and Chinese hunting, but the practice was common too among the Islamic caliphs (Capel 2012). There are also well-documented Mesopotamian (Barnett 1959) and ancient Egyptian (see, for example, Leclant 1981; Decker 1992: 150–3; Houlihan 1996: 42–5) images and texts.[2] In many cases, these hunts involved the use of nets or other temporary barriers (Figures 0.4 and 0.5) (cf. Allsen 2006: 28 ff.; Buquet 2015), although rarely fixed structures. The reason for this is that hunts had to take place in locations suiting the hunters, not necessarily in a place where the most animals were to be found. This meant beaters were needed to round up game and chase them into nets, or secure them within controlled areas such as parks, where the success of the hunt could be assured (Capel 2012). Elite hunting was a sport of kings, used for propaganda and political purposes. The practice showed the ruler to the people, emphasised his control over nature and the rural

2 In addition to texts and images, the remains of an ancient Egyptian royal hunting preserve, dating to the reign of Amenhotep III (c. 1390–1352 BCE), have been found in Soleb, Nubia (Leclant 1981).

Figure 0.5. Akbar's ring hunt near Lahore, 1567. Akbarnāma. (©Victoria and Albert Museum, London)

areas of his kingdom, served to entertain guests, and provided opportunities for granting favours to his subjects. His subjugation of wild beasts could be seen as evidence of his ability to control both his subjects and his enemies. It might also hint at the divine blessing that granted him these powers.

Building the game drive

Much ethnographic data is focused on the hunt itself, and less information is available to describe the means by which drives were constructed. Accounts of game drives in the Syrian desert seem to imply that the structures were built by a collective of hunters who came out from the villages to use them (Chambrade and Betts, this volume). Egan's account of Indians in Utah hunting antelope describes clan ownership of a hunting structure that was used sporadically and repaired by the group in preparation for their hunt (Egan 1917: 238–41). Only in Behnstedt's (1994) account of the Sleyb trading desert kites to a father-in-law is there a sense of individual ownership (Chambrade and Betts, this volume), although it seems unlikely that one man would have built such a structure single-handed. Quite possibly they were the work of an extended family, the members of which would all benefit from a suitable marriage alliance as well as the produce of the hunt.

The labour required to build large game drives is considerable (cf. Kempe and Al-Malabe 2013). In the case of hunter-forager groups, this might have meant that they were built during times of aggregation, but this presumes there was a sufficient food supply to sustain the group. It might have made most sense to build new structures or repair older ones after the hunting season concluded. This would have had the dual advantages of ensuring food for the labourers, while also not disturbing the herds before the hunt took place. There are numerous documented game drives with signs of rebuilding to improve the effectiveness of traps, as presented in many of the papers in this volume.

Prey animals

The types of animals suitable for hunting by use of built drives share certain characteristics. They congregate in herds and move in groups when frightened, rather than scattering across the landscape. In northern zones, the primary animals hunted were reindeer and caribou; in more temperate zones, in North America, bison, and in Central Asia, antelope, gazelle, and wild ass. In rocky areas wild sheep were widely hunted using traps (Figures 0.2 and 0.3), while in desert areas, gazelle and wild ass were the favoured prey. It is not certain whether oryx were ever hunted in this way. There is also an account of Indians in Utah engaging in a mass rabbit hunt using nets to form an enclosure and drivelines (Egan 1917: 263–5). The only non-mammal that might possibly have been hunted using drives is the ostrich. There are occasional images of ostrich in rock art that might hint at this, but the evidence is uncertain.

After the kill

The ethnographic record indicates the existence of a wide range of different butchering strategies in response to variables such as season, weather conditions, distance from camp, method of transport, nutritional state of animals, and other factors (Binford 1978). Processing must be done quickly to avoid spoilage, and this is another advantage of hunting during times of aggregation. Carcasses are often moved from the kill site to a processing area to avoid contamination of the enclosure. In some cases, there may have been initial butchery at the kill-site to reduce the carcasses into portable segments. If this was the case, gutting and skinning would have also taken place here. At the processing area, the joints would be further reduced for conservation or consumption. The meat could be wind- or sun-dried, smoked, salted, or consumed raw. Fats might be rendered down if suitable containers were available. More complex processing may have taken place as well. The Paleoindians of North America produced pemmican using pounded dried meat, mixed with fat and berries placed in skin bags along with liquid bone grease (Zedeño and Jansson, this volume). Bone grease was obtained by boiling smashed-up bones in a hide-lined, water-boiling pit (Reeves 1990: 169). This produced a highly nutritious concentrated food that was long-lasting and easily transported.

Other by-products, such as hides and sinew, also had to be processed quickly. Such processing could take several days to complete and would have required the group, if normally mobile, to stay in one place during this time. Given the abundance of food, this would not be a problem. There is little evidence for processing in the archaeological record except from the site of Dhuweila (Betts et al. 1998), where massive concentrations of fire-cracked rocks and hearths strongly suggest extensive processing took place there. Simple roasting of meat for communal feasting could have been possible, but activities such as drying or smoking meat could also have been carried out. The site sits on a hilltop well exposed to the prevailing wind.

Game drives in the Old and New Worlds

The papers in this volume cover a broad range of game drives over vast geographical areas, illustrating both the diversity and commonalities of this mode of hunting. David Attenborough's remarkable wildlife films for the BBC have shown how a surprising number of species are capable of developing tools to enhance the task of acquiring food. Our ancestors must have learned very early that pursuing animals may under certain circumstances lead to them becoming trapped in natural enclosures or falling over precipices and injuring themselves. It is only a small step to further replace some of the hunters with stakes, cairns, and flags to compensate for a small group size, and from there merely another small step to formalise such arrangements into complete and permanent structures. Therefore, independent invention and convergent technological evolution may well account for some of the diversity and similarities of such practices, but cultural and technological transmission may also have played an important role. This volume provides an exhaustive account of game drives in the Middle East, together with a broad selection of material from North America, the Nile Valley, Scandinavia, the Caucasus, the Aralo-Caspian region, and Tibet. It is hoped this book will provide researchers with a useful comparative perspective and stimulate research on game drives in other places across the world where current scholarship on game drives is still limited, especially in Siberia, South America (Barge et al. 2020), and Africa.

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