reaching altitudes perhaps close to 1500 m above sea level; (3) they endured fewer frost-free days and longer periods of winter darkness. Nevertheless, North American saigas probably died out about 12,000 years ago (as they seem to have at the opposite extremity of their range in western Europe) because of rapid changes in climate and plantscapes occurring then, as former steppe-like terrain was replaced by spruce forest and tundra. What might have been most damaging to the survival of northern saigas were periods of sudden winter warming, creating tough ice crusts that severely checked herd movement and made foraging difficult.

A saiga head is clearly depicted in a French Paleolithic cave, and saigas were important prey for Paleolithic and Neolithic hunters as shown by exceptionally rich bone remains around their dwellings on the Eurasian Steppes. Indeed, the specimen from Bluefish Caves in the northern Yukon, although evidently not butchered, comes from the earliest-known archaeological site in North America.

C.R. Harington
April, 1998

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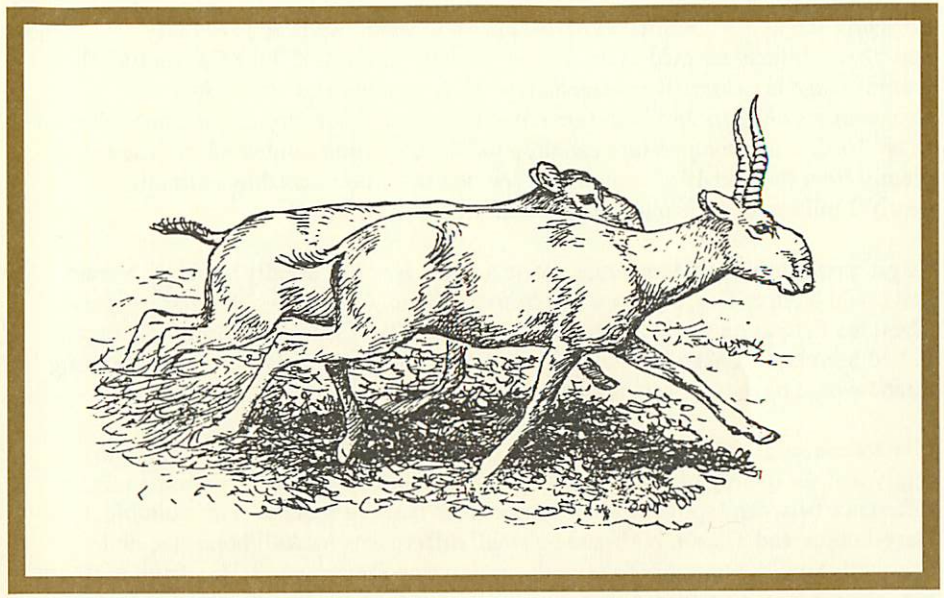

Figure 1. Saigas (*Saiga tatarica*) male with horns in front, female behind. Note lightness of build, expanded nose and lyre-shaped horns of male. Sketch by A.N. Komarov (Heptner et al. 1988:Fig. 147).

North American Saiga

Saigas (*Saiga tatarica*), presently confined to Central Asia, spread westward to England and eastward to the Northwest Territories of Canada during the Pleistocene (about 2 million to 10,000 years ago). The species is a valuable paleoenvironmental indicator of dry, steppe-like grasslands, and a saiga fossil proves that Eastern Beringia (unglaciated parts of Alaska, Yukon and adjacent areas of the Northwest Territories) extended east of the Mackenzie Delta.

Saigas are relatively small (60-70 cm shoulder height), light (26-32 kg) buff-coloured (almost white in its thick winter coat) animal about the size and shape of a pronghorn (*Antilocapra americana*). Their inflated, proboscis-like snouts apparently allowed them to breathe efficiently in arid, dusty conditions an excellent adaptation to the fine wind-borne dust (loess) common in Eastern Beringia during the last glaciation that extended from about 90,000 to 10,000 years ago. Males bear spindly, lyre-shaped horns with rings, whereas females usually lack horns (Figure 1). Their coats are heavy and wool-

like, so they can adapt readily to cold conditions. When alarmed saigas can reach speeds up to 70 km/hr, making it difficult for predators to catch them. Females frequently bear twins, enabling saigas to expand their populations quickly when conditions permit. Such fecundity, combined with an ability to cover distances of 80-120 km or more per day and a lack of permanent territory, allowed the species to spread rapidly from the steppes of Central Asia to the extremities of their Ice Age range in western Europe and northwestern North America.

Presently saigas are confined to dry steppes and semideserts and feed on xerophytes (plants adapted to dryness) especially grasses. Climate governing their present range is extremely continental, with warm summers (mean July temperatures of 22 to 28°C) and severe winters (mean January temperatures from -6 to -16°C ... and temperature can drop to -45°C). Their numbers have fluctuated greatly from the mid 1930s when they seemed to be threatened by extinction to nearly 2 million in 1958 and perhaps 1 million in later years.

Saigas prefer to live in open areas where ground is solid, usually avoiding terrain that could hamper their rapid escape from predators (mainly wolves and people). Thus, the flattish former sea bottom of the Bering Isthmus (broad, grassy land that linked Siberia to Alaska during the glacial periods) and broad river valleys leading inland would have been acceptable as new range.

Pleistocene saigas averaged about 10% larger than living ones, which may only imply that the quality of range was better then than now. However, there is a difference between "splitters" and "lumpers" in naming species. For example, Baryshnikov and Tikhonov (based on small differences in skull bone size and angularity) use the term *Saiga borealis* to describe Pleistocene saigas from northern Eurasia, whereas I prefer the term *Saiga tatarica* for both Pleistocene and Recent saigas.

Saigas seem to have originated in the steppe region of Central Asia in the late Tertiary or Pliocene (about 5 to 2 million years ago) or early Pleistocene (slightly less than 2 million years ago). The saiga's closest-known relative, the chiru (Panthalops), also lived there during the Pleistocene and still occupies the region (Tibet), but at much higher altitudes (3660 to 5500 m). Probably Qurliqnoria, an extinct member of the Bovidae (horned, cattle-like animals) from early Pliocene deposits of China, belongs to the saiga group (Tribe Saigini) too. It was smaller and had shorter horns set slightly farther apart than the chiru, which might be expected in its ancient relative.

The earliest evidence for dispersal of saigas westward (to western Russia, Germany and France) from their core range is in the Middle Pleistocene perhaps less than 700,00 years ago. During the last interglacial (relatively warm interval in the Pleistocene that reached its peak about 130,000 years ago) saigas seem to have withdrawn to their core range (for example, tar pits of Binagadi near Baku, Azerbaijan). During the last glaciation a second spread of saigas occurred even broader in east-west extent than during the previous glaciation.

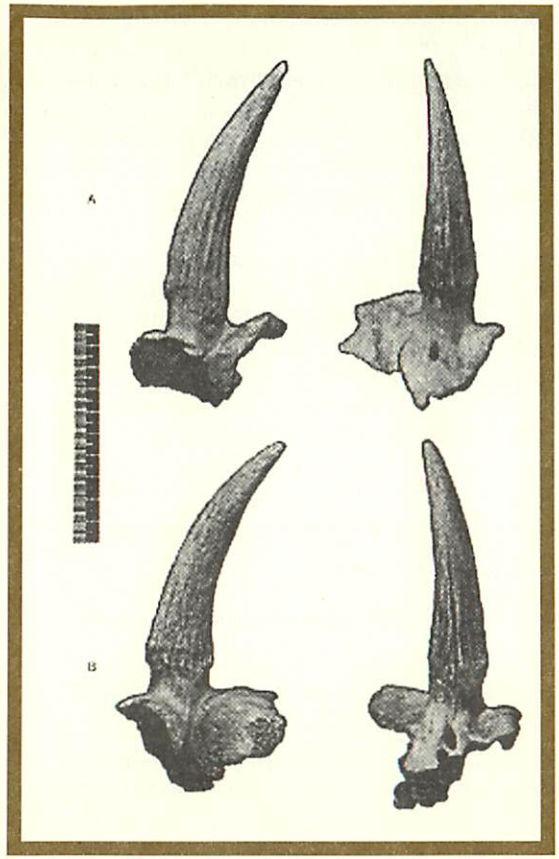

Figure 2. Left side and front views of saiga *(Saiga tatarica)* horncores with attached cranial bones from A: Bluefish Cave III, Yukon Territory; B: Baillie Islands, NWT.

The fertile, highly-mobile saigas moved rapidly with the expansion of fresh, steppe-like range, reaching as far westward as Somerset in southwestern England via the English Channel (plains in the English Channel area exposed during glaciation), and as far eastward as Baillie Islands, east of the Mackenzie Delta, in Canada via the Bering Isthmus. In fact, the Baillie Islands specimen (Figure 2) proves that Eastern Beringia extended into the Northwest Territories, a point often overlooked.

The oldest radiocarbon-dated saiga known is about 37,000 years old from Usuktuk River northern Alaska, whereas the latest survivor, also from Alaska dates to about 12,200 years ago. Of the three Canadian specimens, two left horncores of males with adjacent cranial bone from Baillie Islands, Northwest Territories and Bluefish Cave III, Yukon yielded dates of about 15,000 and 13,400 years ago, respectively (Figure2), whereas a right lower foreleg bone (radius) from Old Crow Basin, northern Yukon was dated at about 13,200 years ago. When combined with other radiocarbon-dated specimens from Alaska and Siberia, two spikes on the graph suggest that saigas may have been most numerous before (about 40,000 to 25,000 years ago) and after (about 15,000 to 12,000 years ago) the peak of the last glaciation. Were conditions too forbidding then for even the adaptable saigas? We know, for example, that mass mortality of saigas occurred on the right bank of the Volga River in 1953-54 as a result of excessive snowfall and severe winter conditions resulting in a drop in numbers from about 180,000 to about 100,000.

"Northern" saigas may have been more adaptable than previously thought, because: (1) their putative steppe-like range in northern Siberia, Alaska, Yukon and Northwest Territories was peppered with unfamiliar arctic plant species; (2) in reaching Lost Chicken Creek, Alaska they probably had to travel over unusually rough ground