THE LATE PLEISTOCENE PALAEOECOLOGY OF BERINGIA: DECONSTRUCTING AND CONSTRUCTING BORDERS

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ABSTRACT

The sometimes controversial Late Pleistocene paleoecology of Beringia affords an excellent opportunity to examine how research and reconstructions of full-glacial vegetation may have been influenced by the Alaska-Yukon border. A review of published conclusions, based mostly on pollen data, demonstrates that national origins have had little influence on this controversial topic while revealing other areas where borders do have apparent effects, such as the study of macro- versus microfossils, the profession of botanist versus geologist, a focus on lacustrine versus alluvial sediment, the significance of mammal fossils, small- versus large-scale palaeoecological reconstruction, Canadian versus American funding and infrastructure, and National Park Service versus Parks Canada policies. However, quantitative indicators—authors and citations—indicate minimal Canadian participation and content in recent archaeological syntheses. This may be attributed to differences in American and Canadian attitudes. While Alaska-Yukon border influences are not apparent, it must not be assumed that this will be the case in the future. Succeeding generations must have the opportunity to benefit from cross-border educational and research experiences.

KEYWORDS: Beringia, paleoecology, Late Pleistocene, Alaska-Yukon border

INTRODUCTION

At a time of rampant globalization, including of science, it is of interest to examine the effects that an international border might have on the style and results of scientific activity. Here attention is directed to the border between Alaska and the Yukon that divides two nations and, for our interests, the paleogeographic entity of Late Pleistocene Beringia. A variety of opinions and conclusions, even controversies, exist concerning the paleoecology of full-glacial Beringia, so it becomes a good focus for an examination of the role of the international border on research design and outcome. The border and the paleoecology of Beringia will be "deconstructed." But what should one look for? That is, how does one determine qualitatively or quantitatively if the border has had an influence? Aside from comparing researchers and their results—i.e., the science itself—comparisons will be made of participation in conferences, publications, joint research activities, funding, infrastructure, and administration of science in the Yukon and Alaska. In the process I will call attention to several different types of borders, not just those of a geographic/political nature, as these probably had more effects on the outcome of research than the sign marked "Entering Canada, Handguns Not Allowed." To begin, a quick comparison indicates that the subject itself is spelled *palaeoecology* in Canada and *paleoecology* in Alaska.

At the height of late Wisconsin glaciation, the whole of Canada was mostly ice-covered, except for a relatively small portion of the central and northern Yukon (Duk-Rodkin

1999). Canada is proud of this region, as here one can see the most deeply weathered soils of the country, complete with polygenetic characteristics and sand wedges, as well as pediments, deposits of miners' "muck" and tephra, and, perhaps most importantly, abundant fossils of megafauna such as mammoth, saiga, short-faced bear, horse, and bison, all of which draw attention to the extraordinary changes that have occurred here over the past thirty thousand years. The Yukon refugium (not the best word to describe the region) is a special place—for the tourist, the romance of the Klondike Gold Rush is mixed with Ice Age deposits, while for the scientist it is Canada's unique window on the Pleistocene. These interests have come together in the establishment of the Yukon Beringia Interpretive Centre in Whitehorse. Westward, crossing two international boundaries involving three countries (Canada, the United States, and Russia), the Yukon's limited refugium expanded to become the easternmost province of Ice Age Beringia. During the late Wisconsin period, lowered sea levels exposed the Bering and Chukchi marine shelves, welding northwest North America to northeast Asia. With the rest of Canada under glacial ice, the Yukon underwent a dramatic turn of geography and ecology, becoming part of Alaska and the Asian landmass.

PALEOECOLOGY OF BERINGIA

The paleoecology of Beringia has been treated in various summaries and syntheses (Barnosky et al 1987; Colinvaux 1997; Guthrie 1990; Hopkins et al. 1982; Lamb and Edwards 1988; Ritchie 1984; Schweger 1997) punctuated with numerous journal articles and chapters. At some level each summary, and most of the papers, discusses the range of opinions concerning the nature of the vegetation of Beringia. It is appropriate that discussion, speculation, and debate be centered on the primary producer trophic level. After all, tons of vertebrate fossils have been recovered through the course of placer mining and river erosion, and there is great interest in the Bering Land Bridge as a route for the migration of Asian human populations to settle North America. The debate focuses on whether the vegetation of Beringia was an arctic grassland or steppe sufficiently productive to support herds of grazing mammals through the Late Pleistocene full-glacial period or whether climatic conditions at this time were so severe that unproductive tundra vegetation dominated. This juncture seems to be an ideal place to begin an examination of the significance of the international border. Supporters of one side or the other of the vegetation debate may be confined behind their side of that border.

The paleoecology of Beringia has attracted a spectrum of international researchers starting with Swedish botanist Erik Hultén, who defined Beringia through his work on circumpolar biogeography, drawing attention to the flora of the Ice Ages (Hultén 1937). Dan Livingstone, who initiated Quaternary pollen analyses in northern Alaska in the 1950s, was a Canadian at birth and educated at Dahlhousie University before acquiring his PhD at Yale. He first documented the herb and birch pollen zones and postglacial arrival of major forest elements in lake sediment cores from south of the Brooks Range, Alaska (Livingstone 1955). Englishman Paul Colinvaux, whose pollen analysis of Imuruk Lake, western Alaska (Colinvaux 1964), brought focus to the paleoecology of the Bering Land Bridge, studied with Livingstone at Duke University. Pioneering pollen analysis in the Yukon was carried out in the mid-1960s by Jan Terasmae, a geologist of Estonian birth with the Geological Survey of Canada (Terasmae and Hughes 1966). James Ritchie, University of Toronto, of Scottish heritage, has devoted most of his career to the paleoecology of Northwest Canada, arguing strongly against the arctic-steppe hypothesis (Ritchie and Cwynar 1982). Mary Edwards, whose work on Alaskan lakes (Edwards 1985) has contributed much to documenting patterns of full- and late-glacial climate and vegetational change, is of English background and was a staff member at the Universities of Alaska and Trondheim, and now Southampton. John V. Matthews Jr. and myself became Canadian citizens after graduating from the University of Alberta and starting to work in Canada. Americans Paul Matheus and Scott Elias live in the Yukon and England, respectively, yet work on both sides of the border. These few biographies of paleoecologists make the point: Pedigree does not necessarily determine upon which side of the border one works. This fact is strengthened when we look at research collaborations. Russian paleoentomologist Svetlana Kuzmina, for example, lives in Canada and works in the Yukon and Alaska (Zazula et al. 2007), while Patricia Anderson of the University of Washington works in Siberia with Russian Anatoli Lozhkin of the University of Magadan (Anderson et al. 2002). But does national affiliation influence one's conclusions?

Both sides of the border have contributed significantly to our understanding of the paleoecology of Beringia and there does not appear to be an easy breakdown of the issues and controversies (Table 1). In other words, those

Table 1. Full-glacial vegetation of Beringia quoted from selected sources and employing a variety of approaches

Author	Location	Method	Vegetation Description
Livingstone 1955	Brooks Range, AK	pollen	herbaceous tundra
Colinvaux 1964	Seward Peninsula, AK	pollen	sparse grassland, arctic tundra, "vegetation reduced to the most frigid form of arctic tundra, a tussock-less, grassy expanse, spotted with frost scars and loess deposits and devoid of all trees except willow" (p. 323)
Colinvaux 1967	Seward Peninsula, AK	pollen	tundra, much like that of the modern Alaska arctic coast at Barrow, "*Artemisia* pollen maxima in Alaska represents an abundance of dry sites" (p. 227)
Guthrie 1968	interior Alaska	vertebrates	grassland
Rampton 1971	southwest Yukon	pollen	fellfield or sedge-moss tundra
Matthews 1974a	interior Alaska	pollen & beetles	steppe-tundra
Mathews 1974b	Seward Peninsula, AK	pollen & beetles	steppe-tundra
Matthews 1976	Beringia	pollen, vertebrates & miscellaneous	arctic-steppe
Cwynar and Ritchie 1980	eastern Beringia	pollen influx	"sparse, discontinuous vegetation of herbaceous tundra on uplands and local sedge-grass meadows on lowlands" (p. 1377)
Colinvaux 1980	Bering Land Bridge	pollen	"tundra; different in subtle ways from all modern tundras and with rather more *Artemisia*—but definitely tundra" (p. 15)
Ager 1982	western Alaska	pollen	herb-dominated tundra (or tundra-like)
Cwynar 1982	northern Yukon	pollen influx	"discontinuous herbaceous communities…sparser than that of modern fellfields…upland vegetation was sparse and discontinuous, similar but not identical to modern fellfields" (p. 15)
Ritchie 1982	northern Yukon	pollen influx	"sparse, unproductive herb tundra on lower mountain slopes and a sedge-grass marsh complex in poorly drained sites" (p. 563)
Anderson 1985	northwest Alaska	pollen influx	meadow-like tundra [in lowlands]
Anderson et al. 1989	Alaska—western Canada	pollen & cord distance analysis	analog to modern arctic and mid-arctic sites
Guthrie 1990	Beringia	vertebrates	steppe, fine-grained mosaic, mammoth-steppe
Anderson and Brubaker 1994	Alaska	mapped pollen data	herb-dominated tundra, with mesic graminoid tundra in lower elevations of western area and more xeric, sparse tundra comminities in the east and at higher elevations
Elias et al. 1996	Bering Land Bridge	pollen, insects & plant macrofossils	mesic shrub tundra
Schweger 1997	eastern Beringia	miscellaneous	mosaic of vegetation types [due to elevation and moisture] in an arid-climate environment
Eisner 1999	northern Alaska	pollen influx	steppe-tundra
Ager 2003	St. Michael Is., AK	pollen	grassy herbaceous tundra
Bigelow et al. 2003	circumpolar, above 55ºN	"biomization" of modern and fossil pollen	a mosaic of erect dwarf-shrub tundra, prostrate shrub-tundra, and graminoid and forb tundra
Zazula et al. 2006	northern Yukon	plant macrofossils & pollen	xeric steppe in mosaic that included fens, mesic meadows, steppe-tundra and herb-tundra depending upon elevation
Zazula et al. 2007	west central Yukon	plant macrofossils, insects & pollen	steppe-tundra

who work in Alaska are not wedded to the arctic-steppe reconstruction, any more than those who work in the Yukon are confined to discontinuous herbaceous tundra. Over-the-border qualitative comparisons are revealing but do not point to any significant differences in conclusions. Nevertheless, they do document something of the historical dimensions of the controversy.

Following the biogeographical work of Hultén, fossil pollen recovered from lake sediments became the major paleoecological research method and led to discovery of herb-rich pollen spectra dominated by grass, sedge, and sage (*Artemisia*) dated to the full-glacial period, ~21,000 to 15,000 ^{14}C yrs BP. Livingstone (1955) interpreted these spectra as representing herbaceous tundra vegetation, while Colinvaux (1964, 1967) was more certain from the pollen record of Imuruk Lake that the vegetation was "the most frigid form of Arctic tundra." He went on to say, however, having used the term *tundra-steppe* in the 1967 volume *The Bering Land Bridge* (Hopkins 1967), that "following Cwynar and Ritchie, the term [tundra-steppe] will no longer be used in my laboratory" (Colinvaux 1980). Documenting the dominance of grazers in the Late Pleistocene vertebrate communities of interior Alaska, Guthrie (1968) concluded that a grassland vegetation prevailed. This paper gave focus to early discussions on the grass-*Artemisia*-dominated pollen assemblages. Fossil pollen and beetles led Matthews (1968, 1970, 1974a, 1974b) to conclude that the vegetation of interior and western Alaska was a "steppe-tundra." He later renamed this vegetation "arctic-steppe" in papers that attracted much critical attention (Matthews 1976, 1982). Cwynar and Ritchie (1980) attacked the arctic-steppe interpretation, using a deductive research design and employing pollen-influx values to conclude that a sparse, discontinuous herb tundra (fellfield) vegetation dominated. This paper tended to polarize the issue, with steppe people and fellfield tundra people lining up across rather than along the Alaska-Yukon border.

If any border were to exist, it would be over the extent to which nonbotanical information, particularly the record of fossil mammals, should be used in reconstructions of Beringian paleoecology. Colinvaux (1980) clarified his position, arguing that this vegetation was a tundra with rather more *Artemisia* but still definitely a tundra. What to do with the large amounts of *Artemisia* pollen in full-glacial spectra became a key issue in the interpretations. Ager (1982) concluded that herb-dominated tundra vegetation dominated western Alaska. Cwynar (1982) produced what must be one of the most detailed pollen records in Beringia, concluding that discontinuous herbaceous tundra, similar to but not exactly like modern fellfields, dominated the northern Yukon. Ritchie (1982) reconstructed a sparse, unproductive tundra on lower mountain slopes, with sedge-grass marsh vegetation in poorly drained areas. Introducing alluvial palynology, Schweger (1982) concluded that vegetational mosaics were controlled by multiple ecological factors with emphasis on elevation and drainage, a reconstruction that seems to have influenced subsequent researchers. Anderson (1985) concluded that pollen records from northwestern Alaska indicate mesic, meadowlike tundra existed during the last glacial maximum (LGM) and postulated a west-to-east, moist-to-dry gradient across Beringia. Large modern pollen data sets assembled by Anderson and Brubaker (1986) have facilitated multivariate comparisons with fossil pollen spectra to identify modern analogs. Results indicate that the herb-dominated modern tundra of northern Alaska and Banks Island may serve as an analog to the full-glacial vegetation, although *Artemisia* in modern pollen spectra is consistently lower than in the fossil records (Anderson et al. 1989, 1991). Going further, Bigelow et al. (2003) employed a "biomization" method based on groupings of plant taxa known from modern and fossil pollen records into functional types with identifiable sets of traits and distinctive climatic requirements. Best fits between the two data sets, for the LGM, identified "prostrate dwarf-shrub, erect dwarf-shrub, and graminoid and forb tundra forming a mosaic in Beringia. Graminoid and forb tundra . . . was far more extensive . . . while low- and high-shrub tundra were greatly reduced." This project united the skills, insights, and data of twenty-seven multinational specialists.

The 1979 discovery in Alaska of a frozen bison, Blue Babe, led to the publication of Guthrie's (1990) award-winning *Frozen Fauna of the Mammoth Steppe*. This book carefully builds a strong case for the existence of a Late Pleistocene mammoth-steppe, a fine-grained mosaic that provided many more mammalian habitats than at present, extending through unglaciated terrain from southern England to the Yukon. Its publication may have softened polarized positions but raised serious questions on how any paleoecological reconstruction can be done without including the influence of a grazing fauna. Schweger (1992, 1997) argued for using ecosystem models to generate hypotheses that could be tested with paleoecological data. A model of full-glacial soil development (Schweger 1997) was tested with modern soils and primary production measurements by Laxton et al. (1996). The notion of testing specific hypotheses about biological production in the glacial marginal environment was advanced by the work of Turner et al. (1999), who traced nitrogen pathways from glacial ice to loess deposits. Coming full circle, Eisner (1999) reexamined her extensive north Alaskan pollen research to reconsider the tundra-steppe vegetation hypothesis. Of interest, Eisner had been a postdoctoral researcher in Colinvaux's laboratory at Ohio State University, where the words *tundra-steppe* were never to be used!

New methodologies are currently being developed and employed in reconstructing LGM Beringian paleoenvironments. While pollen microfossils are still important and widely employed, data from macroremains, specifically insects and plants, are much needed as they represent the paleoenvironment in very different ways, offer significant taxonomic detail, and can verify or challenge existing reconstructions. Elias et al. (1996), relying on macrofossils recovered from marine sediment cores, provided the first record of mesic shrub tundra from the Land Bridge itself. Zazula et al. (2006) recovered 6,240 macrofossils from dated alluvium in the northern Yukon that represent fens, graminoid meadows, steppe-tundra, and herb-tundra congruent with pollen and Bluefish Cave vertebrate remains. The frozen middens of dated Arctic ground squirrels have yielded very well-preserved plant remains indicating their adaptation "to the open, steppe-tundra vegetation, loessal soils and glacial climates of the mammoth-steppe biome" (Zazula et al. 2007). Abundant *Artemisia* flowers, particularly *A. frigida* (prairie sage), have now been recovered from several Yukon sites, including stomach contents of a frozen horse. This supports conclusions reached by some researchers on the basis of high *Artemisia* pollen frequencies. *Artemisia* or sage was in fact widespread in the Yukon and Alaska, more so than in any modern tundra of northwestern North America (Zazula et al. 2003). Western Alaska may be the exception, as *Artemisia* pollen frequencies in lake cores are generally lower (Anderson 1985, 1988; Anderson et al. 1994), and no *Artemisia* macrofossils have yet been identified (Elias et al. 1996, 1997; Goetcheus and Birks 2001).

Höfle et al. (2000) reported on a full-glacial paleosol from the Seward Peninsula. While modern analogues cannot be identified, the paleosol does have attributes of the ecosystem described by Guthrie (1990); however, to call it steppe would be misleading, and Höfle et al. (2000) conclude that a cold, seasonally dry tundra, with more consumable plant material than modern tundra, existed during the LGM. The plant remains indicate "a closed, dry, herb-rich tundra grassland with a continuous moss layer, growing on calcareous loess that was continuously supplied with loess" (Goetcheus and Birks 2001:135).

Finally, research methods used to document the full-glacial paleoecology of Beringia have continued to diversify. Elias (2000) developed and employed the Mutual Climatic Range method, the first application to Beringia of a transfer function method, yielding maximum and minimum temperature estimates for the region. Seismic reflection profiles and core transects were employed by Abbott et al. (2000) to reconstruct paleohydrology and lake levels in interior Alaska. A series of papers at the Third International Mammoth Conference (2003) in Dawson City, Yukon, demonstrated new methodologies being applied to understanding the importance to the Beringian ecosystem of the woolly mammoth (*Mammuthus primigenius*) and other megafauna that knew no borders. Of particular importance was the demonstration by Matheus et al. (2003) that stable isotope composition of fossil mammal bones provides evidence of habitat and niche partitioning.

OTHER BORDERS

The above discussion reveals boundaries of method and theory in paleoecological reconstruction that have nothing to do with the political boundary between the United States and Canada. For example, pollen recovered from lakes versus alluvial sediments differ in how they record pollen sources, long-distance and extra-local versus extra-local and local, respectively. Other boundaries include a focus on microbotanical remains such as pollen versus macrobotanical remains such as seeds; the role of animals, whether they are fossil insects or mammals, versus exclusive use of plant remains in reconstructions; the work of those who come from a geological background versus those with a botanical or zoological background. It would be wrong to assume that either side of any boundary has the correct answer. The paleoecology of Beringia can best be accomplished by integrating data from as many methods as possible within a framework of herbivore ecology. At this point one would be remiss for not citing the excellent collaborative research between Americans, Canadians, and Russians conducted on the unique yedoma landscape of the East Lena Delta, Siberia. Using a multiproxy approach, Sher et al. (2005) concluded that, during the Weichselian, "the changing subtypes of the tundra-steppe environment were persistently favorable for mammalian grazers."

In contrast to the above, Ritchie (1984) recognized a difference between the paleoecological research done in Alaska and the Yukon in a developmental and temporal sense. He undertook research in the Yukon a decade or two after the pioneering work of Livingstone, Guthrie, Colinvaux, Péwé, Hopkins, and others who worked in the decades of the 1950s and 1960s.

> It so happens that developments in Quaternary plant ecology in Alaska and in northwest Canada are out of phase.... Now we are ready, at least in plant palaeoecology, for a first summary, while our colleagues in Alaska have moved on to a second phase of research, using the new approaches and techniques [research design and pollen influx] that we have found so effective in addressing the problems raised by Hopkins (1972). (Ritchie 1984)

His conclusion established yet another border, that between research as a narrative construction versus problem solving (hypothesis testing) through application of the methods of Quaternary plant ecology (Birks 1985). Cwynar and Ritchie (1980) initiated this approach in attempting to test the narrative models of others, including Hultén and Matthews. This approach is advocated with hypotheses generated through GCM climate simulations (Anderson and Brubaker 1993; Barnosky et al. 1989), ecosystem models (Schweger 1992, 1997), and soil models (Laxton et al. 1996). Such developments mean that one can no longer do research in Beringian paleoecology from a strictly descriptive narrative perspective.

Scale is important to a discussion of other borders. Our understanding of the paleoclimate of Beringia is reconstructed by dozens of temporally and spatially constrained observations and studies, some no larger than a sand wedge and host sediments or the catchment area of a small lake. For example, Zazula et al. (2006) limited their detailed full-glacial paleoecological reconstruction to the Bluefish River watershed of the northern Yukon. On the other hand, Bigelow et al. (2003) have synthesized the vegetation of the entire circumpolar region north of 55° N. Computer-based GCM simulations barely resolve the paleoclimate of this vast area. Finally, Guthrie's (1990) mammoth-steppe biome is of a truly intercontinental scale, hypothesized as extending from southern England eastward across Europe and Eurasia, through Siberia, over the Bering Land Bridge into Alaska and the Yukon.

Of course, historical and infrastructural differences between Alaska and the Yukon constitute another series of borders. Alaska has had a university system since 1915 which has served to foster research through its resident staff, libraries, laboratories, and museum. Yukon College maintains both academic and vocational programs, with support for Yukon research coming from the affiliated Northern Research Institute. The Yukon Beringian Interpretive Centre effectively serves both local and tourist interests. John Storer, Paul Matheus, and now Grant Zazula have staffed the Yukon Paleontology Program; archaeologists Ruth Gotthardt and Greg Hare are employed by the Heritage Branch, Yukon Government. The notable infrastructure differences between Alaska and the Yukon clearly create another and very significant border. Alaskan researchers can access National Science Foundation (NSF) grants that carry overhead costs; Canadian researchers may be funded through grants from the Natural Science and Engineering Research Council (NSERC) or the Social Sciences and Humanities Research Council (SSHRC), but this funding carries limited overhead costs and is only a fraction in dollar value of what is made available through NSF. Both Canadian research councils have abandoned policies that promote or provide supplemental support for northern research. Even the Polar Continental Shelf project, which is the flagship organization supporting northern research in Canada, only nominally serves the western Arctic. Since so much of Alaska and Yukon lands are controlled by the U.S. National Park Service and Parks Canada, respectively, their differences in policy towards research forms another border. In contrast to Parks Canada, the National Park Service appears to have an enlightened attitude about research on lands under their control. Parks Canada shows little interest towards research and has actually created impediments to research on lands under their control. As more land is "locked" up by Parks Canada, research opportunities continue to decline. Ironically, this is the case in the Old Crow Basin where the very research that identified the significance of the area has virtually disappeared following much of the region being designated as Vuntut National Park. Similar comparisons can be made with Native land claims. Differences exist between Alaskan and Yukon Native lands in terms of provisions for and acceptance of research.

QUANTITATIVE MEASURES

In light of the above, there does appear to be a strong theoretical and methodological border effect, one that can be measured quantitatively. For example, textbook maps labeled "Archaeological Sites of North America," or something equivalent, should in fact read "Archaeological Sites of the United States," as the Great White North above the U.S.-Canadian border is often left blank. Maps of key pre-Clovis sites rarely show the Bluefish Caves or position them well away from their actual locations. Another case in point is the book *American Beginnings: The Prehistory and Palaeoecology of Beringia*, a spectacular compendium conceived and edited by Fred Hadleigh West (1996). Its 576 pages are indeed "a very full representation of the basic scientific data relating to Beringia" (West 1996:ix), but while the preface mentions Siberia, not one mention is made of Canada. In fact, of the fifty-six contributors, forty-two have affiliations in the United States, with the remainder from Russia. There are no Canadian or even Canadian-affiliated contributors. A check of the many bibliographies yields fifty-eight references involving Canadians (broadly defined and as senior authors), cited seventy-five times. Altogether there are 1,091 literature citations in the book, of which only 7 percent are Canadian. Even the title, *American Beginnings*, conveys latent American nationalism so ingratiating to other New World nations. The area from Chile to Canada is subsumed beneath America's umbrella. Of course, one can always argue, as pressed Americans usually do, that the term *American* refers to the countries of the Americas. Mandryk (1992) examined the same phenomenon in regards to the so-called "ice-free corridor" which, it is hypothesized, channeled migrants through Canada to the bountiful cornucopia of America south of the ice sheets. It is the immigrant tale retold, with Canada passively participating by supporting the lifeless glacier ice. Why would any immigrant take root in Canada when the good life lies just over the next hill in the United States?

The compilation *Terrestrial Paleoenvironmental Studies in Beringia* (Edwards et al. 1997) includes nineteen authors and coauthors, of which three are Canadian. The well-organized, timely, and informative Beringian Paleoenvironments Workshop, held in Florissant, Colorado, and published as a special issue of *Quaternary Science Reviews* (Elias and Brigham-Grette 2001), listed ninety-two participants of which fourteen, or 15 percent, were Canadian. Russian colleagues fared much better, making up 25 percent of the authors in *American Beginnings*, 42 percent in *Terrestrial Paleoenvironmental Studies in Beringia*, and 13 percent at the Beringian Paleoenvironments Workshop. The most recent synthesis, *Human Ecology of Beringia* (Hoffecker and Elias 2007) builds on earlier sources, particularly West (1996), but fares much better. The Bluefish Caves' archaeological and paleontological record is well reviewed, even though its significance is largely dismissed when discussing the abandonment of eastern Beringia during the full-glacial period. Of the nearly five hundred citations in the book, only 11 percent involve Canadian or Canadian-affiliated authors. Russian sources do considerably better.

Until recently, scientists of the former Soviet Union working in Beringia were not encouraged to contact Western colleagues and certainly were discouraged from traveling in the West. The last-minute cancellations of Soviet colleagues was a great disappointment to the organizers and participants of the 1979 Wenner-Gren Foundation–sponsored Paleoecology of Beringia conference. We have all welcomed the wonderful new opportunities that have become available for Russian exchanges—contributions from Russian colleagues have added significantly to our knowledge of Beringia, and it is important that conference organizers and editors have seen to it that their voices are now included. The issue here, however, is the lack of Canadian participation in conferences, workshops, and comprehensive publications, and even in international research projects such as PALE (Paleoecology of Arctic Lakes and Estuaries). But whose fault is it? Canadians love America since America allows us to forget or neglect responsibilities for our own problems and stupidities; we have a neighbor to blame. America becomes a target for what are really Canadian issues. Likely Canadians find it more convenient to blame Americans than to account for their own lack of visibility in Beringian science.

BERINGIAN PALEOECOLOGICAL RESEARCH: PRESENT AND FUTURE

Given my experiences in recent years, I believe our research is being done in increasing isolation. The Alaska-Canada border may be solidifying. From 1975 to the late 1980s, dozens of Canadian researchers focused on the stratigraphy, paleoecology, and archaeology of the Yukon refugium, largely driven by the promise of "early man" archaeology. That work greatly advanced our understanding of the Quaternary of the Yukon, and for a while Canadian researchers were challenging their American counterparts. It became apparent, however, that real progress required a cooperative effort between those working in Alaska and the Yukon. Joint workshops were held (Carter et al. 1989; Matthews et al. 1990) and a joint U.S. Geological Survey–Geological Survey of Canada field project was conceived.

This project saw researchers share field experiences and undertake joint research on both sides of the border. Admittedly, this work really focused on the stratigraphy and environments of the Late Tertiary/Early Pleistocene, but its coming together was an outgrowth of the earlier interest in early man research in the northern Yukon. The search for evidence of early human occupation and technology could only progress when the ages of all deposits were known. Joint fieldwork, undertaken in 1990 and 1991, involved nearly two dozen researchers with a wide range of specializations and held great promise. But before significant benefits could be realized, government cutbacks on both sides of the border, as well as firings, retirements, and deaths, eroded these partnerships.

However, it is important not to be too pessimistic. In the Yukon a new generation of Quaternary scientists have developed strong collaborative ties and trans-boundary research. Canadian Duane Froese and his University of Alberta graduate students work between Alaska and the Yukon. John Westgate of the University of Toronto, now retired, works on both sides of the border, and collaboratively with Duane Froese, Grant Zazula, Scott Elias, myself, and others. A new project on early archaeology of the Alaska-Yukon Borderlands, focusing on the joint excavation of the Late Pleistocene Little John site near the U.S.-Canadian border, is a collaborative effort of Norman Easton of Yukon College in Whitehorse and David Yesner of the University of Alaska Anchorage, and a host of paleoecological studies on faunal and floral assemblages at the site are planned on both sides of the border (Yesner et al. 2008). This mix of "old-timers" and new scholars has revitalized our picture of Quaternary paleoecology in Beringia, and holds promise for the future.

Finally, while the border between Alaska and the Yukon has not been a significant factor up to this point in our understanding of the Late Pleistocene paleoecology of Beringia, there is evidence that Canadian research and researchers have not been cited or featured in international publications or workshops. This is not necessarily anyone's fault, but it does raise significant issues about the xenophobia and centrism of Americans, as well as the reticence of Canadians and their willingness to take the role of the victim. I see no reason why any of these liabilities need to persist, but we must continue the dialogue and attempt to discover ways to pursue and benefit our mutual interests. Some years ago I participated, along with a mixed group of Nordic graduate students and researchers, in soils and plant macrofossil workshops in Norway and Sweden. Specialized, weeklong, joint-learning experiences such as these are frequent offerings at Scandinavian universities. A similar arrangement between Alaska and Canada might tear down some barriers and initiate research contacts for new generations of Quaternary paleoecologists.

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