
SINO-PLATONIC PAPERS

Number 39

August, 1993

A Material Case for a Late Bering Strait Crossing Coincident with Pre-Columbian Trans-Pacific Crossings

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A MATERIAL CASE FOR A LATE BERING STRAIT CROSSING COINCIDENT WITH PRE-COLUMBIAN TRANS-PACIFIC CROSSINGS

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INTRODUCTION¹

For several decades there has been a continuing debate among Americanists regarding trans-Pacific contacts prior to the European invasion of the Americas. Scholars have tended to split on the issue of diffusion and independent origination, interpreting the sparse and uncertain data according to these viewpoints. A few Chinese scholars have entered the controversy on the side of diffusion. Arguments have included maritime technology, oceanography, and botany, but, in the main, have focused on art decor and motifs. Presumed Asian sources for these motifs in Meso and South America have ranged from northern China, through Southeast Asia to India, with a time span ranging from 3500 B.P. (Before Present) to 1000 B.P. (see Jett 1983 for summary).

On reflection, certain points can be made with a fair degree of confidence (predominantly in accord with Needham & Lu 1985). First, it has been adequately demonstrated that the technology existed for humans to travel by sea from both Asia and the Mediterranean to the Americas for the last several thousand years. However, no civilization in the Americas contained a core complex that can be identified with East, South or West Asian, or Mediterranean civilizations. Rather, there is enough archeological evidence to suggest that civilizations originated in the Americas based on the independent discovery of agriculture, metallurgy, and so forth. Furthermore, there is sufficient commonality in ideology to identify a uniquely American core of religious understanding, one that relates in its underlying concepts and practices to those of East and Northeast Asia, suggesting a common paleolithic ur-structure.² It is to be understood that the above points are controversial and part of an ongoing scholarly debate.

It is most probable that ships with living humans, either inadvertently or deliberately, reached the Americas from both the Atlantic and Pacific Oceans. However, given that they reached populated lands with their own well established cultures, influence would have been minimal at best. For example, it is certain that Japanese artifacts as well as shipwrecked Japanese fishermen were occasionally washed up on the shores of present-day British Columbia.³ Two-way travel, however, seems never to have been established; only the most imaginative of interpretations can find in either Chinese or Mediterranean texts references to such journeying.

Other probable trans-Pacific contacts have not been a major part of this debate. For example, given the pattern of Polynesian expansion, there is no reason to assume exploration stopped with Hawaii. If Polynesian ships did reach the American coasts, they came into contact with populated lands rather than the unpopulated islands of their previous experience. Hence, the crews of these ships are more likely to have been absorbed by the indigenous cultures, leading to the traditions fusing together. There are a number of diverse cultural correspondences between Polynesian culture and those of the northwest coast of North America, as well as possible genetic relationships between the respective populations.

Secondly, material artifacts are not the only source of data. It was demonstrated nearly seventy years ago that there are similar myths with quite specific details in early China and California (Erkes 1926), and Raven as a culture hero specifically related to the sun is a circum-Pacific mythic element from central China to northern California.

Last, as the dating for human migration across Bering Strait is pushed further and further back in time, there is a tendency to forget that such migration was not a single incident, but rather a continuing one. Until modern hostilities developed between the former Soviet Union and the United States, communication across the Strait was an ongoing process; it did not require a land bridge:

Similar cultural developments on both sides of Bering Strait suggest that the people had been moving back and forth across it for thousands of years. Indeed, human migration and interaction between Chukotka and Alaska probably have been more or less continuous ever since the straight was most recently formed, some 14,000 years ago. (Burch, Jr. 1988: 227)

It has long been accepted among scholars that proto-Athapaskan speaking people were the last Native Americans, excluding Polar peoples, to cross into the Americas. In this paper, it will be suggested that this migration took place within the time span covered by trans-Pacific contact studies, and a major Asian technical complex, the most advanced form of archery, among other cultural aspects was brought with them as far south as northern Mexico.⁴

LINGUISTIC, GENETIC, AND ARCHEOLOGICAL EVIDENCE

Edward Sapir (1925), Robert Shafer (1952) and Morris Swadesh (1952, 1962) have argued that Athapaskan languages are related to Sino-Tibetan. The latter suggested a four thousand year minimum separation and 5000 B.P. as the end to the migration of Athapaskan speaking people across Bering Strait. However, other linguists, excepting some Russian comparativists (see Krauss 1988: 148), have not found this theory to be satisfactorily demonstrated.

Less controversial are Sapir's theory (1915) regarding the historical relationship of Athapaskan languages per se. Continuing Sapir's analysis, Harry Hoijer (1956, 1963) divides the thirty-eight languages into three groups: (a) Alaska and northwestern Canada; (b) Canadian Pacific coast, southwest Oregon and northwest California; and (c) Apachean in the southwestern United States. He suggest that the Apachean speaking people began to move southward one thousand years ago, reaching their present area six hundred years in the past.

Michael Krauss (1964, 1965) found a relationship between proto-Athapaskan and Eyak (an Alaskan language), as well as between Eyak and Na-Dene Pacific coast languages (e.g., Tlingit). In further research, he found proto-Eskimo originally separate from proto-Athapaskan-Eyak (1979: 804-805), and "Eyak equidistant to all Athapaskan This requires total isolation of Eyak from Athapaskan for at least 3,000 years, probably with the Eyaks on the Coast" (1979: 846).

Joseph Greenberg has analyzed all Native American languages into three large families, Na-dene (Athapaskan) being separate from all other Native American languages as well as Eskimo-Aleut (Greenberg, Turner & Zegura 1986). Although the conflation of all sub-Polar languages, aside from Na-dene, into one macro-family is controversial, the distinct differences of Athapaskan languages from all others is not.

Findings of physical anthropology accord with these linguistic theories. Studies of dental morphology clearly distinguish Athapaskan speaking people from other Native Americans, save

for the Inuit,⁵ in their relation to East and Northeast Asian peoples. Leaving out self-inclusive groupings, the dental morphology of Athapaskan speaking people correlates closer to the morphology of the people of Central, East and Northeast Asia than they do to the native people of South and Meso America (Greenberg, Turner & Zegura 1986: Table 1). These results have led Christy Turner to posit a separate and later migration of Na-dene language groups to the Americas than other Native American peoples aside from Eleut-Eskimo (Turner 1983).

More recent physical anthropology studies have focused on blood type and DNA analysis. Again, Athapaskan speaking people have been found the closest of Native Americans to the peoples of North and East Asia, save for the Inuit (for summary, see Greenberg, Turner & Zegura 1986). However, the Inuit could be considered a Polar rather than a Native American people in that they live in northeastern Siberia and Greenland as well as Polar America, sharing a relatively similar culture in this large area. Prior to late twentieth century global hostilities containing their movements, they travelled back and forth across Bering Strait.

Hence, from both linguistic and physical characteristics, it is generally accepted that Athapaskan speaking people were the last group to cross Bering Strait save for the Inuit. Earlier linear analysis assumed that no group could migrate across Bering Strait after the Inuit; that the Inuit formed a "plug" to block subsequent migration. Therefore, the proto-Athapaskan speaking migrants must have preceded the establishment of Inuit culture. What is in question is the date of the crossing.

Archaeology as well as analysis of myth (Merkur 1991) indicates a series of Polar cultures, each following from the other, based on technical developments in response to climatic change. The Inuit and their predecessors have been in the Arctic for a very long time. Furthermore, there is no compelling reason to assume that people living in the low population density necessitated by the Arctic would organize to establish border patrols to block other people from passing through the areas which they inhabit; such assumptions are anachronistic. While isolated strangers might well be killed, and there were organized attacks as well as trade by native peoples across Bering Strait (see Burch, Jr. 1988), migrating groups may well have been treated differently, so long as they did not attack or threaten the livelihood of established peoples. Moreover, as will be argued below, the migrating proto-Athapaskans had arms superior to the inhabitants of Alaska several thousand years ago. Accordingly, it is far from necessary to assume that proto-Athapaskan speaking migrants could not have crossed Bering Strait even though Alaska was already loosely populated.

Glottochronology as well as genetic drift chronology are far from precise. Dating with regard to Athapaskan speaking people has been based on the assumption, with no evidence, that they must have preceded the Inuit. For example, Turner (1988: 115) links the Paleoarctic microblade tradition of ca. 10,000 B.P. with proto-Athapaskan speakers, but there are no human physical remains nor other evidence to suggest, let alone justify, this conclusion. With the assumption of the Inuit being the last people to migrate removed, the dates lose any potential validity. It is to be noted that the earliest clear archeological evidence for Athapaskan speaking people in the interior of British Columbia is but approximately a thousand years ago (Dumond 1983: 90-92). (Earlier sites have been linked to Athapaskan speaking people simply because these people now live in the geographic area of the archeological sites.) It is to be further noted that this culture, the Aishihik Culture now dated from 1300 to 200 B.P., differs from previous

material remains in being the first to indicate archery, and more important, points of beaten copper nuggets, along with small notched stone points (McClellan 1987: 55-56).

Since it is generally accepted that Athapaskan (Apachean) speaking people reached the southwest of the United States and northern Mexico after leaving northwestern Canada at most six hundred years ago (Hale & Harris 1979), it is possible to speculate that proto-Athapaskan speaking people crossed Bering Strait as little as four thousand or even but two thousand years ago. This dating would coincide with the material cultural aspects to be discussed below.

BERING STRAIT CROSSING MYTHS

Several northeastern North American Woodland cultures, as well as the Tuscarora, have migration myths involving the crossing of wide bodies of water or ice (Wallace & Reyburn 1951) that have been interpreted by Euroamericans as Bering Strait crossing myths (Voegelin *et al* 1954).⁶ Such interpretations of these migration myths are not compelling; there are many wide bodies of water which freeze over in the winter across northern North America.

Contemporary Native Americans tend to react negatively to Bering Strait crossing theories as they understand them to negate their rights as native peoples in ongoing political negotiations with the American and Canadian governments. Hence, when a Native presents the migration myth of his people as including an account of a Bering Strait crossing, it must be seriously considered.

D.C. Cole, a Chiricahua, notes that only the Chiricahua of Mexico among the Apaches have a crossing myth. His summary of this migration myth is as follows:

Apache people were hunters held in captivity by farming people who built the pyramids and had both horse and bow. Legend told of a revolt and flight to the east through dark forests and across water larger than any river. Having left the Old World and entered a new world, the people moved east and south. Bands at the forefront of the movement became known as People of the Rising Sun, "Chokonen," Chiricahua . . . movement of the people south along the forest flanks of the Rocky Mountains "between the treeless heights and the treeless plains." During this movement many bands turned aside and became "not N'de," not Apache . . . Between the Gila and the Yaqui Rivers on the flanks of the mountains, they found a land very like that they had left over forty generations earlier. There they chose to stay. So says the legend.

In that land for four hundred years, they fought Aztecs, Pimas, Tarahumaras and their allies. With the coming of the Spaniards, they fought them, too. Central and Southern Chiricahua legends, repeated over at least five generations, placed the people in the Rio Yaqui-Gila area during the late twelfth or early thirteenth century, A.D. (Cole 1981: 11-13)

Of migration myths that have been interpreted as Bering Strait crossing accounts, as this has by Cole, this one contains a number of details that accord with geography. Furthermore, it accounts for the Athapaskan speaking peoples who remained in Alaska and migrated down the coast. It also explains the split between the Dene of the Canadian northwest, with whom the Southern Athapaskan speaking people can converse, and the Apache-Navaho. The timing places

the migration to the Yaqui-Gila area within a century of glottochronological theories (which are more precise when the time-span is not great) and the movement from northeast Asia within the later range of linguistic assumptions.

While the description of the reason for the migration is congruent with Exodus of the Old Testament, one must also consider that the Chiricahua of Mexico were among the least assimilated Natives of North America and had not been Christianized. Horse (with the war-chariot), bow and farming would fit the northern fringes of proto-Chinese cultures in the area that came to be known as Manchuria at least 3500 years ago. The pyramids would accord with burial tumuli that have since eroded from an early date and the many extant pyramidal shaped ones of the last 2250 years in northern China. More important, the archery complex to be discussed fits the culture generally described in the migration myth.

HISTORY OF THE REFLEX-COMPOSITE BOW AND ARCHER'S THUMB-RING

(For those unfamiliar with archery technology, an introduction is provided in an appendix.) Possibly the earliest evidence for the reflex-composite bow are the finds from the second stage (Serova) of the upper Angara River in the Lake Baikal area dated by Russian scholars to 5000-4500 B.P. and American scholars, without certainty, to 4500-4000 B.P. (Chard 1974: 77). The later dating is relatively congruent with finds from Shang dynasty China (3500-3000 B.P.) of archer's thumb-rings, associated with reflex-composite bows, of bronze (White 1956: 70, pl. 33B; see fig. 1) and stone (Institute of Archaeology 1980: pl. 164, 3-4; see fig. 2). Given that pre-historic horn, wood and leather manufactures of northern China have all perished, pre-bronze equivalents would certainly have been earlier.

Horse-drawn chariots and carts have been in use in northern China since at least the mid-Shang period, approximately 3200 B.P. for Shang culture and earlier for bordering cultures to the northwest (Shaughnessy 1989). Horseback riding is understood to have diffused from the Central Asian steppes from the same approximate date to being well established in Siberia by 2700 B.P. (Chard 1974: 153). Horse-drawn chariot and horseback riding would have encouraged the use of the recurve bow for at least two reasons. First, horseback riding demands

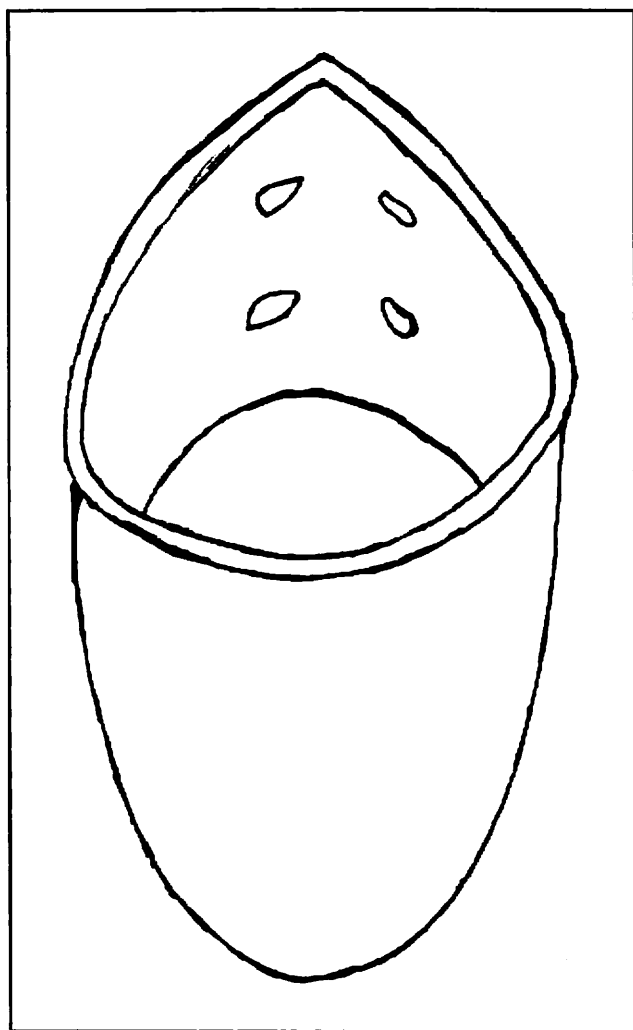


Figure 1: Early Chinese cast bronze thumb-ring (outline drawing based on White 1956: pl. 33B).

a short bow and the reflex-composite bow allows for a powerful bow with a short strung length. Secondly, chariot warfare, which necessarily takes place on relatively unwooded, level ground, such as the plains of north China, at relatively high speeds would have led to interest in longer ranged, that is, more powerful bows, effective against armored warriors.

It is the later shift to an infantry with the end of aristocratic warfare that influenced the development of the crossbow at least 2600 years ago.⁷ This military invention allowed foot-soldiers to outrange the reflex-composite bow armed, mounted nomadic warriors of the steppes, a cultural complex that began at that time. The crossbow, which cannot be drawn while mounted on a moving horse (excepting the pistol crossbow used against small game), in effect, helped create the Chinese empire.

The full reflex-composite bow spread throughout northern Asia and into the polar region of the Americas as far east as southern Greenland (for the latter, see Birket-Smith 1918: 1-25); but in the Asian Arctic and east of Asia it is found without the thumb-ring.⁸ In northern India, it appeared with the thumb-ring (Pant 1978: 224-25) during the Indo-Bactrian period, from the third to the second centuries B.C.E. (Pant 1978: 106). One could surmise that it was introduced by the Yuezhi when they moved into that region from Central Asia bordering China at that time. The reflex-composite bow is also found in Egypt about 3500 B.P. with a simpler design than the Asian recurve (McLeod 1958, 1962), but it never reached Europe, except with invading Turkic and Mongol peoples, and it never took hold in western Europe. A presumably independent development of a compound bow, made of horn, on the North American Plains took place after the adaptation of the horse (Rogers 1940).⁹

The two earliest thumb-rings found (figures 1 & 2) are of cast bronze and stone from Yin (Anyang), the last capital of Shang dynasty China (the stone ring is from the Fu Hao tomb, ca. 3150 B.P.). Probable horn precursors of the bronze rings would not have survived.¹⁰ They are of a wide ring design with a triangular extension on the string bearing side. The thumb-ring not only allows a more powerful bow to be pulled but the cleanest possible release for accuracy prior to the crossbow. At least by the late Zhou period (from ca. 2500 B.P.), thumb-rings were made of jade of a different design. Instead of the triangular extension, they have a hook projection for securing the bow-string. It has been suggested that the hook projection is linked to the development of the crossbow lock (Payne-Gallwey 1907: 14), a suggestion reinforced by the dating of this style of thumb-ring in China.

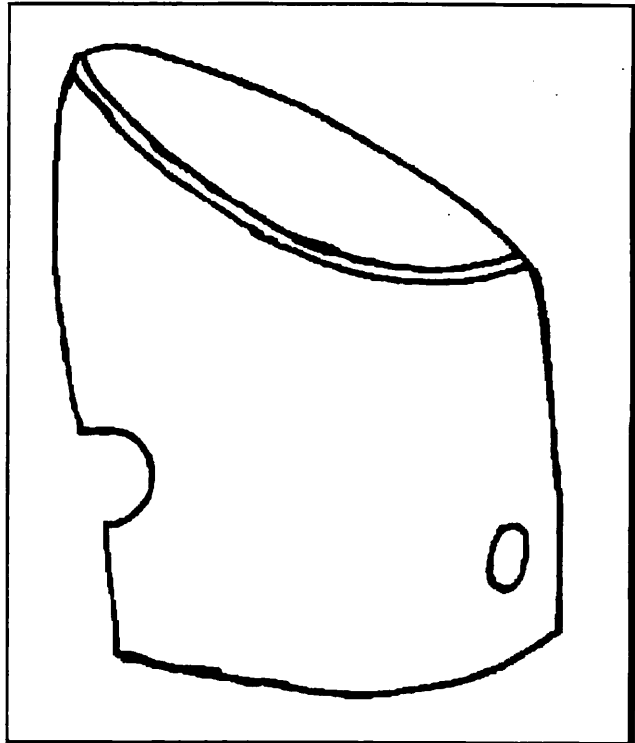


Figure 2: Early Chinese stone thumb-ring (outline drawing from Institute of Archaeology 1980: pl. 164, 3; incised taotieh design not illustrated).

In China, the archer's thumb-ring became symbolic of the aristocratic, that is horse-drawn chariot riding or, later, mounted, warrior. As the Chinese aristocracy slowly shifted from hereditary warriors to scholar-officials chosen through examinations, the thumb-ring continued as an emblem of aristocratic rank until the early part of the twentieth century. Most are of a simple wide circular design without extension, the functional ones having a concave surface or groove to secure the bow-string.¹¹ Jade thumb-rings, often non-functional, were hung from girdles by the civil-service elite and are at present common antiques in China.

In summary, the reflex-composite bow seems to have developed in the area of present-day northern China in conjunction with first the war chariot and simultaneously or subsequently the mounted archer to the northwest and north of China. It is to be noted that the early Chinese glyph for bow is a pictograph of a strung composite-reflex bow. The archer's thumb-ring developed either concurrent with or relatively shortly after the development of the full reflex-composite bow. From this core area, this complex, generally accepted as the most highly advanced mode of archery (Rogers 1940), spread throughout most of Asia and through the Arctic as far as Greenland. Except for the anomalous case that is the subject of this paper, the reflex-composite bow is found without the thumb-ring in northern Siberia and across Bering Strait. In China, the thumb-ring was so pervasive that it remained a common symbol of elite status into this century.

CHIRICAHUA APACHE ARCHERY

Sinew lined composite bows, not fully recurved, along with the simple bow, are found throughout western and central North America from south of the Arctic to the northwestern fringe of Mexico (Rogers 1940). The Southern Athapaskan speaking groups are among those using the sinew lined, elementary composite bow. The origin of these sinew lined bows could either be independent or a devolution of the Asiatic reflex-composite bow, which continued in use among the Inuit until this century. Either explanation is equally plausible; backing a simple bow with sinew would be a logical evolutionary step.

What is remarkable about the Chiricahua use of the bow is their utilization of the archer's thumb-ring. D. C. Cole (personal communication) found two thumb rings, one of horn and one of bone, in a Chiricahua burial cave in northern Mexico, among other Chiricahua artifacts. Both were worn and

smoothed from wear. They were of a shape similar to those of Shang dynasty China but differed from those from the sixth century B.C.E. onwards. As A.L. Kroeber (1927: 285-86) pointed out, the "occurrence of the thumb ring may properly be taken as evidence of the custom of the Mongolian release [see Appendix] when attitude of the hand is unknown."¹²

The thumb-ring is unlikely to have independently developed among Southern Athapaskan speaking people because there was no necessity for its development. As already discussed, the archer's thumb-ring is of north Asian origination in combination with the full reflex-composite bow and the use of the horse in warfare. Except in the case under discussion, the thumb-ring seems not to have been carried over into the Americas along with the Asiatic reflex-composite

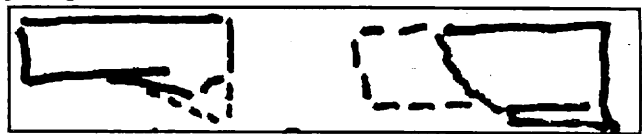


Figure 3: Horn (R) and bone (L) Chiricahua thumb-rings (outline drawings of original artifacts by D. C. Cole).

bow; the thumb-ring is not used by the Inuit. Where independent development seems to have taken place, such as the compound bow, it did so in areas where suitable wood of sufficient length was difficult to obtain. In the northern North American Plains, the compound bow developed with the use of the horse and in an area with limited wood resources. Bison hunting on the Plains after the introduction of the horse by the Spanish necessitated a short, powerful bow shot from very close range on a galloping horse. There is no indication of thumb-ring use in this context.

If the use of the thumb-ring by the Chiricahua is due to diffusion, it has to have been from sub-Arctic Asia, not from the Inuit who were contiguous to their culture prior to their moving from the McKenzie River area less than a thousand years ago. Furthermore, the thumb-ring shape suggest a date of diffusion from Asia of 4000 to 2500 B.P. or later, if the Shang design remained as a conservative element among cultures to the north of China. The fact that northern Athapaskan speaking peoples use the secondary type release (Rogers & Smith 1981 -- the Dogrib utilize the primary release) could be understood as devolution in a wooded environment that precluded the need for the Mongolian release.

CONCLUSIONS

Any single factor discussed above in regard to southern Athapaskan speaking cultures, and in particular, the Chiricahua, would be of little import in isolation:

- 1) The linkage between proto-Athapaskan and Sino-Tibetan, although proposed by highly respected scholars, has not met general acceptance among linguists. A relationship with Sino-Tibetan would suggest a time depth of 3500 to 5000 years.
- 2) The glottochronological dating for the separation of Eyak and Athapaskan to at least 3000 years ago is imprecise as is all such dating, nor does such analysis demand a northeast Asian progenitor.
- 3) The physical anthropological data clearly indicates that the Athapaskan speaking people entered the Americas long after other Native American peoples, save for the Inuit. It is quite possible that those speaking proto-Athapaskan reached the Americas after the Inuit, since the American Inuit never became separate from the Asian Inuit. The later distinction is a European and Euroamerican one, not a distinction made by the Inuit, who speak the same language on each side of Bering Strait. A time depth of perhaps 5000-4000 years or less would be sufficient to explain the genetic separation from northeast Asia. It is important to note that such genetic separation could have taken place prior to a migration to the Americas, if a group were already relatively distinct from the ancestors of various contemporary northeast Asians.
- 4) The archeological evidence suggests that Athapaskan speaking peoples did not settle in the interior of British Columbia until approximately a thousand years ago. When they arrived in this area, they and they alone were familiar with the bow and metal arrow points. Apachean speakers then, according to linguistic and ethnohistorical data, would not have remained for any length of time, but continued their journey southwards to reach their present locale approximately 600 years ago. This scenario accords with oral traditions (D.C. Cole 1981: 12).
- 5) The Chiricahua migration myth accords with a Bering Strait crossing interpretation, although this is not a necessary one. That this interpretation comes from the Chiricahua themselves, however, strengthens the possibility. The Chiricahua migration myth contains an internal time depth of at least 1600 to 2200 years, and its details suggest a date of 2750 ± 750 B.P.

6) The material-technological complex of a composite bow with thumb-ring suggests diffusion rather than independent origination. Such diffusion would have to be from Asia south of the sub-Arctic. The thumb-ring shape suggests a date of between 3500-2000 B.P.

The remarkable aspect of this list of differing characteristics is that they all coincide in postulating a migration of proto-Athapaskan speaking people from the area north or northwest of northern China proper (Han China) between 2750 ± 750 years ago. The minimal time depth of 2000 years accords with mounted archers using a thumb-ring, the oral tradition generational count, the non-loss of technology (the thumb-ring), pyramidal burial tumuli, and the archeological-ethnohistorical time sequence (approximately 600-700 years each: north of China to the Bering Strait area, to the McKenzie River area, to northern Mexico). The maximum time depth of 3500 years accords with controversial glottochronological possibilities, theories of genetic drift (assuming proto-Athapaskan speakers did not have to precede the Inuit and genetic separation had already begun prior to moving from the north of China), the earliest appearance of the thumb-ring/horse technological complex, and the probability but not certainty of eroded burial tumuli. This range, of course, is quite different from the previously cited dates of from 11,000 - 6000 B.P.

An hypothesis regarding the time and place of an ancestral Chiricahua migration from Asia, despite these significant coincidences, raises certain questions:

- 1) Did only the Chiricahua among Southern Athapaskan speaking people maintain the archer's thumb-ring? Its disappearance in the woodlands of the Canadian northwest and along the coast is understandable, as it is most useful in the terrain of the southwest necessitating longer distance archery. The loss of the technologically complicated full recurve bow is not unexpected; only the Inuit maintained continued contact with Asia and hunted very large animals over long distances. Also, the use of the bow tends to disappear with the introduction of firearms. Only those cultures that did not readily have firearms available until the late eighteenth century would have fully retained their archery complex until the beginning of modern ethnology.
- 2) How is it that only the Chiricahua among the Apache have a migration myth that has a possible Bering Strait crossing component? This is an essential question.
- 3) Following from the above question, in what other ways do the Chiricahua differ from the other Apachean sub-cultures, and what would account for these differences?
- 4) Is there any other aspect of Chiricahua culture -- material, myth, symbolism, rituals -- that can be specifically linked to early Central or North Asian cultures? This would be difficult, not only because of the inevitable changes that have taken place in Chiricahua culture but also because of the many changes which can be documented to have taken place in the respective Asian cultures. It is to be noted that scholars in various disciplines have found differences between Athapaskan speaking and other Native American cultures. For example, the eminent historian of Native American religions, Åke Hultkrantz (1992: 19), has recently written: "From the evidence we have it would seem that the Athapascans have been only weakly integrated with Circumpolar culture, probably because they had received decided influences from the emerging East Asian cultures before the time of immigration."

Until the above questions are researched, the time of proto-Athapaskan migration must remain conjectural. Nevertheless, this potential contact with early Chinese culture via a migrating people is within the time span of some proposed theories of trans-Pacific contact but has a far greater number of coinciding factors. Scholars have focused on ocean crossings from

complex civilizations but attention should also be placed on the possibility of some relatively late migrating cultures that had been influenced by such cultures. (This point should not be interpreted to suggest that other people had not reached the Americas as long as 20,000 to over 30,000 years ago.) Since the Chiricahua reside in northern Mexico, albeit with considerable friction, this may be a topic of interest to Mexican scholars.

Other related topics are of equal importance. For example, the themes of Raven in sun and sun-shooting myths, given that they are specifically circum-Pacific, are more likely to be due to diffusion than independent origination. Little study has been done on these important correspondences.

APPENDIX

Archery Technology

To base an argument with regard to archery on diffusion rather than independent origination requires an understanding of archery technology. Since the majority of contemporary scholars are not archers, the following is intended to provide a minimal background in this regard. This brief summary is primarily based on my own experience with different types of bows, arrow releases, crossbows, and bow-hunting.

The bow and arrow presumably developed from the use of the spear and spear-thrower (*atlatl*), itself an advancement from the thrown as opposed to the thrust spear.¹³ The spear-thrower extended the range and thrown power of a light spear using the principle of the lever and fulcrum. The bow derives from the spear-thrower, a device to hurl a spear as a projectile, by curving the ends of the hurling device, or more practically a stave, and tying them together with a cord or thong. The projectile must then be reduced further in size in order to be cast by the released bow-string: the light spear becomes the even lighter arrow. Reduction in size allows an increase in velocity. The striking force being a combination of velocity and mass, reducing the weight while increasing velocity can result in an increase in striking energy and penetration.

The bow and arrow have several advantages over the spearthrower: greater range, more rapid shots, flatter trajectory, and better accuracy, since the bow can be more exactly aimed. However, the lighter projectile means a change in the trauma of the recipient of the projectile; rather than imparting injury through shock as does the spear, the arrow is designed to penetrate deeply, cutting more blood vessels and causing massive bleeding. Hence, effective shots require striking the lung-heart area, unless rapid-acting poison is utilized.

The bow is most effective on herbivores who run when startled. The running, under the condition of major bleeding in the lungs, causes rapid blood loss and death. The heavier hurled or thrust spear remains more effective on large, dangerous animals, when quick incapacitation is of the essence.

The simple (see below) bow has a practical range of approximately forty meters, with regard to a combination of accuracy and penetration. It is most effective in forested areas where game can be stalked to within twenty-five meters. In other types of terrain, other technologies are more effective; for example, the blowgun with poisoned dart in tropical forests, particularly against game which inhabits tall trees (a complex which in the Americas indicates diffusion from Southeast Asia -- Jett 1970). Therefore, in cultures which have the spearthrower and reside in a conducive terrain, the development of the bow could be expected over time; diffusion is not a necessary explanation.

The spearthrower was a simple mechanical enhancement of the human throwing arm; the bow is a more complex enhancement with greater potential to augment human strength. Two major factors determine the power of the bow: the ability of the bow to store energy and the ability of the human skeletal-musculature to transmit energy to the bow.

By pulling the cord joining the ends of the bow, which causes the bow to bend, while pushing the bow with the non-pulling arm, energy is transferred to the bow from both arms, shoulders and relevant back muscles. Releasing the cord allows the bow to rapidly return to its original shape, quickly freeing the stored energy, which is transferred to the temporarily attached arrow. The bow's ability to store energy is effected by the material of which it is composed and its shape.

The simple bow is made of a single piece of suitable wood. The longer the simple bow, the better it is able to store energy; hence, the success of the English longbow. However, a long bow is awkward in heavily wooded areas and difficult to use on horseback.¹⁴ The power of the bow can be enhanced by reinforcement through backing the wood with sinew (as distinct from selected reinforcement by wrapping the grip or other parts with leather or sinew); this is termed the elementary composite bow. The bow can be made even more powerful by composing it of several layers, each with different, compatible characteristics; hence, the development of the complex composite bow, usually composed of one or more types of wood, horn or bone, and sinew, glued together under pressure. A third type of bow, the compound bow, is one composed of several parts, usually separate arms and grip, that are joined together.¹⁵

The technological progress that allowed the development of the complex composite bow is almost invariably found in a highly advanced bow design: the recurve or reflex bow. In this design, the bow is constructed to remain when unstrung in a complex curve (differing degrees of curvature in different parts of the arm) which almost reaches a full circle. This curvature is reversed upon stringing. The composite structure of the bow allows for the substantial strength and flexibility required by this design. The design permits the bow to be under enormous tension when strung which in turn allows for the storage of considerable energy and much faster release of this energy. While a simple bow, skillfully manufactured from appropriate wood, can effectively be made to store up to eighty foot-pounds of energy, a forty to sixty pound range is more common. However, the reflex-composite bow can be made to store well over one hundred and fifty pounds of energy. Because of its superior mechanics, a reflex-composite bow will outshoot a simple bow of similar draw weight. It is also shorter for an equivalent draw, due to its reflexed arms, enhancing its use on horseback or in a charriot.

A strong, trained person can theoretically pull a bow to transmit well over a hundred foot-pounds of energy. The practical limitation is the strength of the fingers to pull and hold the cord. The natural grip of the string is with thumb and forefinger (primary release), or the thumb and the first two or three fingers of the pulling hand (secondary release); the natural grip on the bow of the pushing hand is with the web between the thumb and hand, kept in line with wrist and forearm. An advance on this pull is with the first three fingers only (Mediterranean release), allowing the pull of a more powerful bow.

With the Mediterranean release, it is still very difficult for fingers to pull with a force of much more than sixty pounds, even when cushioned with some sort of device to counter the pain of the endeavor. Furthermore, the shorter the bow, the sharper the angle of the drawn string and the more distressing the effect on the fingers. The relatively short length and longer pull

of the strung full recurve bow causes the string to be at an acute angle when drawn and causes considerable, uncomfortable finger pinch.

Changing the natural pull of the cord with the fingers to a pull with the ball of thumb, covered by a smooth, hard device, locked into place with the forefinger (Mongolian release) allows a pull closer to the potential of the reflex-composite bow, as well as a very quick and smooth release (the quicker and smoother the release, the greater the potential accuracy). Such a pull also configures the wrist and arm differently from the finger pull, bringing stronger muscles into play, and allows a draw past the ear which utilizes the full draw-length and entire potential effectiveness of the reflex bow. The hard device was a thumb-ring, undoubtedly first made of bone and horn and later, in China, of cast bronze and carved stone. Eventually, a mechanical release replaced the thumb-ring, leading to the crossbow and the trigger-release of modern archery.

For normal hunting, there is no need for so much power. Forty to fifty pound pull bows are generally considered sufficient for killing medium-sized *cervidae*, such as the white-tailed deer, with properly placed shots, and fifty to sixty-five pounds for the largest, such as the moose (European elk). Greater power is only needed to kill humans wearing protective devices, that is, armor.

The simple bow can be understood as a development on the spear-thrower and the spear-thrower a development of the hurled spear. It does not compel an argument for diffusion as independent origination is plausible. However, the reflex-composite bow with thumb-ring is a very specific complex requiring both advanced materials and design technology and the invention of an unusual, unnatural archery technique. Such a complex argues for diffusion rather than independent origination.

NOTES

1. This paper was originally delivered before a symposium on trans-Pacific contacts with the title, "Una travesía tardía del Estrecho de Bering y sus implicaciones para el problema de contactos transpacíficos precolombinos en general," at the VII Congreso Internacional, Asociación Latino Americana de Estudios de Asia y Africa, Acapulaca, 24-28 November 1992.
2. This ur-structure would comprise the basis for the ideology and practices of shamanism (as defined by Hultkrantz 1973) found in Native American cultures and in northern Eurasia, prior to influences from Buddhism and southern Chinese mediumistic practices (see Paper 1990).
3. In this manner, Japanese armor must have early reached the Tlingit (whose language is related by most linguists to Athapaskan). While vertical slate and rod armor are found from Japan through Bering Strait to the North American Northwest Coast, Tlingit armor alone is virtually identical with the predominant Japanese style (for example, see Fitzhugh & Crowell: 231, pl. 308 left). Tlingit helmets are similar to those used in East Asia, as are their woven conical hats of reeds.
4. This paper is a result of a serendipitous meeting. D. C. Cole, a Chiricahua ethnohistorian, and myself, a sinologist, were attending a summer symposium on Native American religions in 1982. One evening we were chatting about a subject of mutual personal interest, weapons, and

came to the topic of archery. He mentioned finding in a Chiricahua burial cave located in Mexico two thumb-rings, a device I happened to be familiar with from my interest in early Chinese archeology and art history, as well as archery. The rings he described were identical to one of the two extant from the Shang period in the collection of the Royal Ontario Museum in Toronto with which I was familiar. I had long been interested in trans-Pacific contacts, and both he and I were intrigued by the implications of the similarity in archery techniques and their relationship to the Chiricahua migration myth. Hence, this study.

5. In Canada, it is common to use the name by which the Inuit identify themselves. In the United States, it is still common to use the word, "Eskimo," a pejorative Cree term for the Inuit.

6. Migration myths and their variant, emergence myths, function in Native American cultures much as cosmogonic myths in West Asian and Judeo-Christian cultures, as well as clan origin myths in early Chinese culture.

7. Barbara Stephen (1991) of the Royal Ontario Museum has recently discussed the possibility of a much earlier date for the crossbow in China and Southeast Asia, possibly in conjunction with poisoned bolts and set as a trap. I am grateful to her for discussing aspects of this paper and making several valuable suggestions.

8. The farthest north use of the thumb-ring may be among the Oroqens who live in the border region between China and Russia in southern Siberia (see Qiu 1983: 26).

9. Compound reflex-composite bows are to be found in two areas of the far north of America among the Inuit, using two or three pieces of wood. It is generally assumed that this development took place because of a lack of suitable lengths of driftwood.

10. Since writing this paper, I have come across a possible third Shang dynasty thumb ring in the collection of the East Asian Museum in Stockholm (K12254, unpublished). The shape is typical of those of latter periods, that is a concave circle with no projection, but its internal diameter is too narrow for it to be worn on the thumb. It is made of white jade, partially calcified from burial, and is incised in a typical Shang *taotie* design. The ring was obtained from a dealer and no similar object has been scientifically excavated. Hence, although the ring fits expectations of Shang period manufacture, its dating is open to question.

11. The importance of personal experience in interpreting technical aspects of archery is indicated by the misunderstanding of twentieth-century Chinese art historians in designating the function of the different thumb-ring designs.

12. Prior to this paper, the only reference to the Mongolian release in the Americas was among the remnants of the Yahi, a small California group, whose last member, Ishi, died in the early twentieth century. A.L. Kroeber (1927: 286) wrote: "The Yahi variety of the Mongolian release differs in that no thumb ring is used, that the middle finger instead of the index finger reinforces the thumb, and that the arrow is held between the distal knuckles or phalanges of thumb and index, the latter bent double." This describes a relatively inefficient release, verified by a photograph of Ishi drawing a bow (Kroeber 1925: pl. 78). Here is illustrated a highly ineffective slight draw to the body. It is suggested that Ishi's release was independently developed in a period of rapid culture decline.

13. This presumption assumes a logical sequence; actual development rarely follows an orderly sequential pattern. From the standpoint of archeology, such a sequence cannot be demonstrated. In the Americas, for example, use of the spear-thrower continued among the Inuit and the Aztecs long after the bow was utilized by the culture, in regard to the former, and knowledge of the bow had long been in use in neighboring cultures, in the case of the latter. Conservative tendencies may be responsible for the continuation of archaic technologies.

14. The Japanese bow is a unique and unusual solution: a reflex-composite bow of long length with the grip offset towards the bottom creating unequal length arms and allowing the bow to be shot from horseback. As discussed above, the reflex-composite bow allows the arms to be of different configurations.

15. The use of the term "compound" here, as found in turn of the century texts on archery development, is to be distinguished from the contemporary use of the term for the modern bow which employs pulleys connected by cables on the bow arms that allows for quicker storage of energy with resultant longer cast and an easier hold at full draw for superior aiming potential.

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