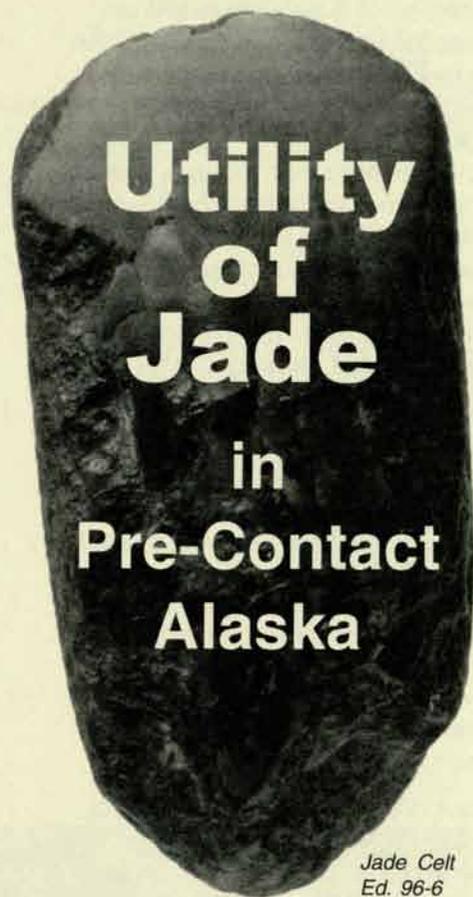


CONCEPTS

Spring 1999

Technical Paper Number 9



Jade Celt
Ed. 96-6

by Patrick Montgomery

Before contact with Europeans in the 18th century, Alaska Native people used naturally occurring materials such as wood, shells and hide to make shelter, tools and other items needed for their day-to-day survival. They also employed gems indigenous to Alaska for survival purposes, honing them into items

ranging from harpoon heads to adze blades.¹

The archaeological record tells us that among gems, jasper, obsidian, ivory and jade were used by Alaska Natives for utilitarian purposes.² Of these, jade was the first choice for work that required the most durable tool or weapon; this gem now prized mostly for decorative purposes was valued by Alaska Natives primarily for its resilience.

CHARACTERISTICS OF JADE

Worldwide, there are two minerals known as jade: jadeite, which occurs primarily in Asia, and nephrite, the mineral most often found and used in Alaska.³ While both types of jade are extremely tough, nephrite is a tougher gem material due to its fibrous structure versus jadeite's granular composition.⁴ Nephrite jade is the toughest known gem material and outranks even diamond in this category.⁵ Nephrite's toughness made it ideal as a material for tools and weapons.

George T. Emmons, a 19th century explorer, ethnographer and naval officer, made the following observation about jade in the Tlingit culture:

Great value was attached to jade on account of its physical properties. Its strength and toughness combined to make it highly suited to the manufacture of keen-edged tools for carving, as the working of iron was unknown on the coast before the coming of Europeans.⁶ Jade had no religious significance, nor was it regarded

with superstition; but aside from its material worth, a certain sentiment seemed to attach to it wherever found. (Emmons 1923:16-17)

Emmons commented that jade was considered quite valuable by the Tlingit:

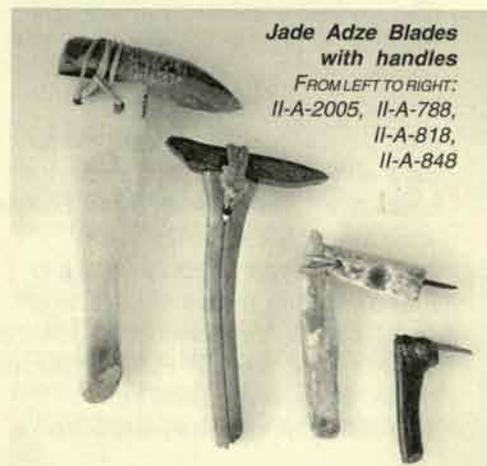
...The value of a jade-adze blade two or three inches in length was from one to three slaves.

(Emmons 1923:18)

SOURCES OF JADE

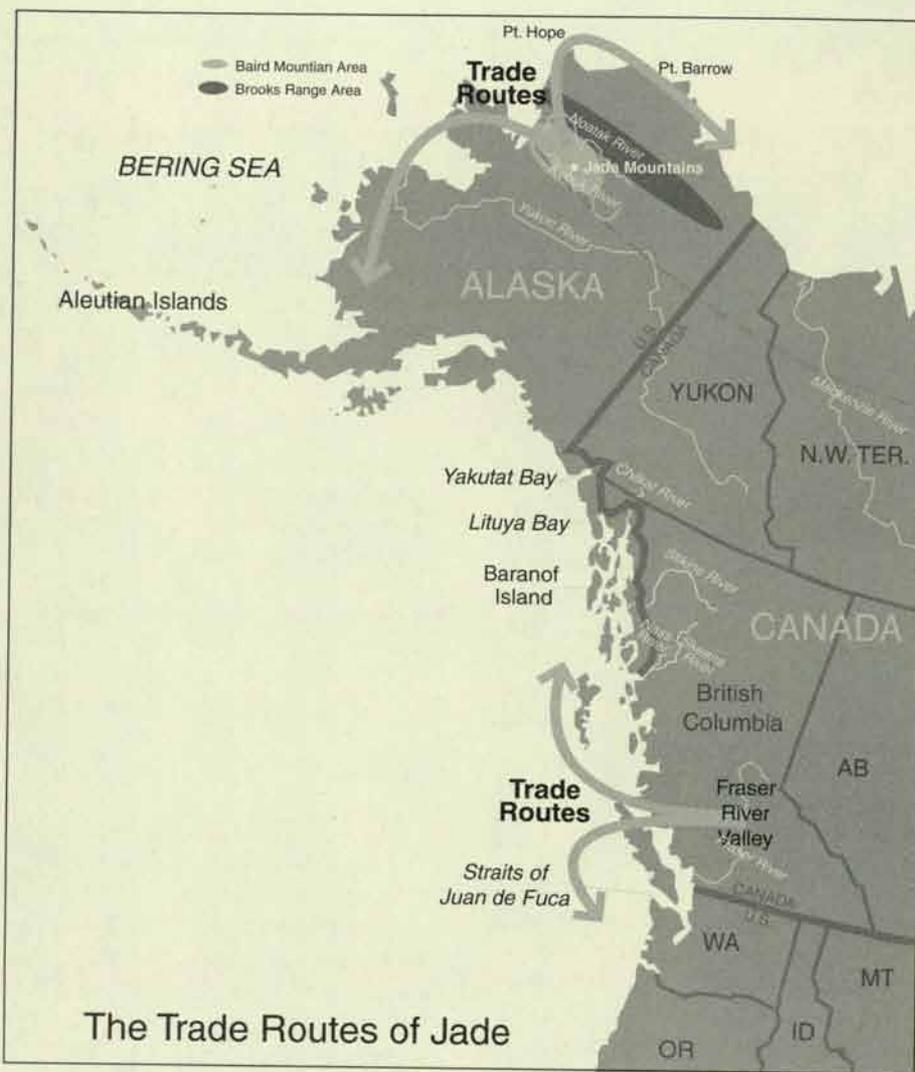
The archaeological record and anthropological studies indicate that jade was used by the Tlingit, Haida, and Tsimshian peoples of Southeast Alaska, and by the Inupiat along the Arctic coast of Alaska and the Yup'ik along the Bering Sea.⁷ The early European explorers of Alaska were aware that the indigenous peoples used jade for numerous applications, but could not find the source of this jade until Alaska and British Columbia were further explored.

Dr. George M. Dawson, of the Geological Survey of Canada, located



Jade Adze Blades
with handles

FROM LEFT TO RIGHT:
II-A-2005, II-A-788,
II-A-818,
II-A-848



a source for jade in 1887. Dawson's report on the occurrence of numerous cut jade boulders and celts (pronounced "selt," and meaning a prehistoric stone or metal implement shaped like a chisel or ax head) in British Columbia along the Fraser and Kowak indicates that these rivers were not only major sources but probably major trade routes of jade for the Northwest Coast.

Emmons, in an attempt to corroborate Dawson's thesis, made extensive excursions inland from the coast along the Skeena, Nass, Stikine and Chilkat rivers. He found no evidence of local deposits known to the inhabitants, no evidence of rough or worked boulders, and little evidence of celts in the area. The lack of jade in these river systems, and the abundance of it in the Fraser River

Valley and its tributaries, indicates that the most likely source of jade for the Northwest Coast area was in the mountains bordering the Fraser. Emmons' work supports Dawson's contention that the Salish traded jade via the Fraser River tributaries, all the way from the Straits of Juan de Fuca to Yakutat Bay.

Dr. Frederica de Laguna, ethnologist and editor of Emmons' *The Tlingit Indians*, mentions two other possible sources of "jade-like" minerals in Southeast Alaska. Tlingit oral tradition indicates that some jade came from a place called *tsu geyi* (Tlingit meaning "Greenstone Bay") on the eastern side of Baranof Island. However, this material was not positively identified as nephrite jade and may have been serpentine, green basalt or green chert. Oral tradition

also mentions that the northern Tlingit found their "jade" at a location in a small glacial stream thirty miles north of Lituya Bay. This stream is known as *Klukheen* (Tlingit meaning "milky water or stream"). The identity of this material is also in question as no actual specimens have ever been identified as coming from that area.

The Inupiat and Yup'ik peoples' source for jade was a mystery to archaeologists and geologists until the discovery of the Jade Mountains in 1883 by George M. Stoney, a naval officer working for the Smithsonian Institution. The Jade Mountains are located approximately 150 miles from the mouth of the Kobuk River in the Baird Mountains in the southeast region of the Brooks Range.⁸ The trade routes radiating from this jade source spread the material from the Aleutian Islands north and east to the Mackenzie River in Canada. John Murdoch, naturalist on the International Polar Expedition to Point Barrow in 1881, described in his 1892 report a corroboration of this source:

*Dr. Simpson was informed that the stones for making whetstones were brought from the Kuwuk [Kowak, now known as Kobuk] River, so that this jade is probably the same as that which is said to form Jade Mountain, in that region.*⁹ (Murdoch 1892:60)

Some researchers suggested that neither the Inupiat nor the Yup'ik mined or gathered the jade from the mountains themselves. Stoney's

Jade Adze Blades with handles
From left to right:
II-A-804, II-A-798,
II-A-816, II-A-794



assistant engineer, S.B. McLenegan stated:

...It appears that these mountains have never been visited by the natives. There are many superstitions connected with them. (Emmons 1923:42)

Emmons continued:
The fear that must have been inherited through generations might indicate that the Eskimo had never reached the mountains, but, like the southern Natives, had procured all the mineral that they required from float and boulders [sic] in the riverbeds, as those who have ascended these rivers [Kobuk and Noatak] speak of the abundance of greenstone in sight. (Emmons 1923:42-43)

WORKING THE JADE

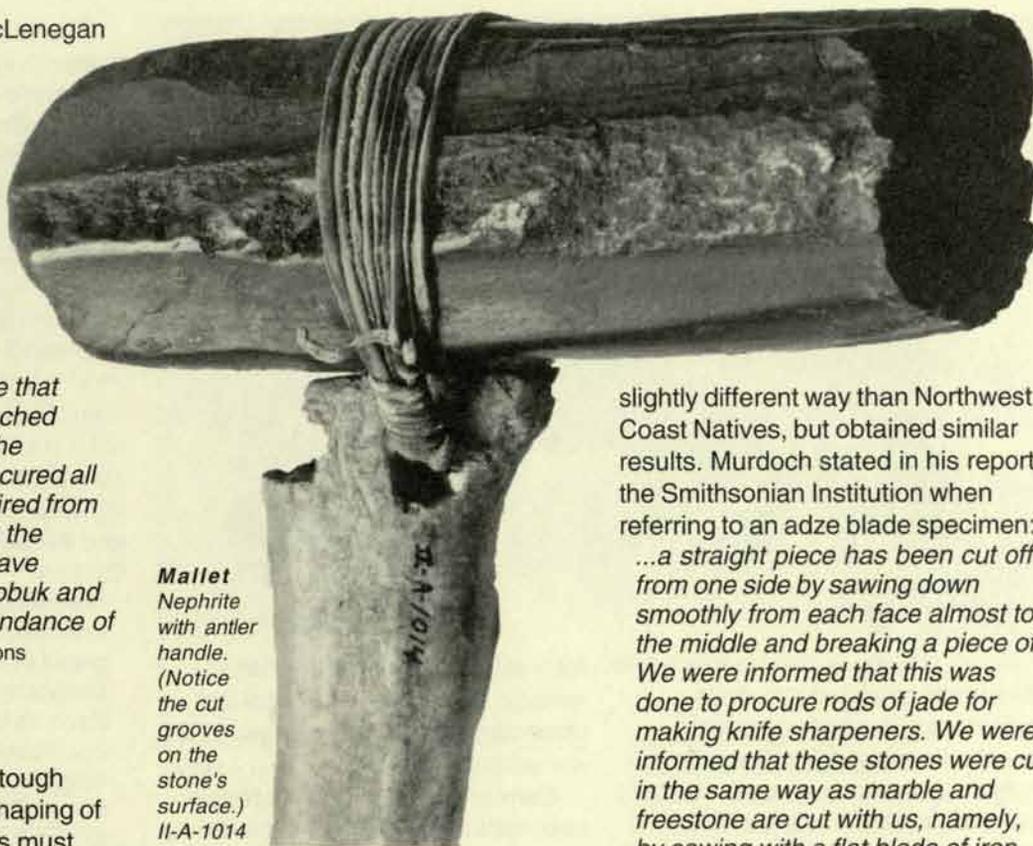
As jade is an extremely tough material, the working and shaping of jade into tools and weapons must have been a very difficult and labor-intensive operation for Alaska Natives. There were basically two methods that the Northwest Coast people employed in the shaping of their jade implements.

Emmons described one of these processes:

The heavier, thicker, more irregularly shaped boulders [sic] were sawed longitudinally [with a piece of sharp sandstone and water] in parallel grooves, two or three inches deep. In one of the grooves a wedge was fitted in such a way that, when sharply struck the impact bore on the entire length of surface with equal pressure, resulting in a lengthwise cleavage. But that this fitting was not always perfect, may be seen in certain fractured ridges. This, of course, was a great loss, as the value of an implement depended largely on its length. (Emmons 1923:22)

Another method was employed for thinner pieces and at times larger boulders as well. Emmons states:

Flat, thinner boulders [sic] were cut by scoring a deep groove in each face, and broken apart by a sharp



Mallet
Nephrite
with antler
handle.
(Notice
the cut
grooves
on the
stone's
surface.)
II-A-1014

blow or with a wedge driven in the groove. (Emmons 1923:23)

Hilary Stewart, ethnographer and author, also describes this method for separating large pieces of jade. Deep saw cuts were made on opposite sides of the boulder, and then the boulder was struck against another rock and broken in two. To make a section to be used as a blade, another vertical parallel cut was made and then the piece was cut from the main boulder by sawing it off at its base.

The Northwest Coast people made their saws from sandstone or basalt flakes. They used either water or saliva as a lubricant when cutting or grinding jade. After they cut the jade from a larger piece, they worked it with a sandstone sharpening stone. Different grades of sandstone were used to obtain a perfect edge. These grades corresponded to today's sandpapers, ranging from coarse to extra fine for the final touches on the tool's edge.

The Inupiat and Yup'ik peoples worked their pieces of jade in a

slightly different way than Northwest Coast Natives, but obtained similar results. Murdoch stated in his report to the Smithsonian Institution when referring to an adze blade specimen:

...a straight piece has been cut off from one side by sawing down smoothly from each face almost to the middle and breaking a piece off. We were informed that this was done to procure rods of jade for making knife sharpeners. We were informed that these stones were cut in the same way as marble and freestone are cut with us, namely, by sawing with a flat blade of iron and sand and water. (Murdoch 1892:167)

Edward W. Nelson, naturalist from the Smithsonian Institution, in his report from his expedition to the Bering Strait between 1877 and 1881 stated:

Celts and axes of nephrite or other hard stone are fashioned by grinding into shape and sometimes by pecking, and are finished by grinding or friction with other stones. Knife blades, lance points, and whetstones are also made from these substances in a similar manner. (Nelson 1899:91)

Natives from Point Barrow used cottonwood sticks with a sharp edge that were occasionally dipped in water and then in dry sand. Noatak people used thin slabs of flint dipped in water and then in dry sand. Eskimo people apparently finished their pieces with grinding stones in the same way as those on the Northwest Coast.

USES OF JADE

Both the Natives of the Northwest Coast and the Eskimo of Western and Northern Alaska had a strong tradition of using jade for a multitude of purposes.

Bonecrusher "Chow Hammer"

Nephrite with wooden handle II-A-1013

Large Mallet

Nephrite with antler handle II-A-1014



Alaska Natives worked raw jade into implements or traded jade in its finished form, depending primarily upon the location of the jade deposits. Emmons indicated in his reports that it appeared that the Northwest Coast Natives did not work the jade into tools or weapons; rather, the peoples of the Fraser River Valley traded it to them in its finished forms. This undoubtedly would have made the finished jade tools and weapons worth a considerable amount. However, it seems unlikely that all jade tools used by the peoples of the Northwest Coast would have been worked in the Fraser River Valley exclusively. Some of the jade must have been worked by the people living along the Northwest Coast from rough pieces received from the Salish. Emmons stated:

It [jade] was valued from a utilitarian standpoint on account of its toughness and the fine edge it would take. They worked out the canoes with it, the ornamentation of boxes, carved interior house posts, etc., and it is even claimed that they worked other stone implements with those of jade.

(Emmons/de Laguna 1991:171)

Eskimos and the Native people of the Northwest Coast are renowned for their woodworking skills. The archaeological and artifactual record in cultural institutions throughout the world confirm this. Today, Alaska

Natives are revitalizing their artistic heritage by creating traditional and contemporary sculptures in wood, as well as other media.

Before iron was common, Native peoples worked wood with mussel shells and tools made of stone. Among stone tools, those made of jade were the most important, according to Emmons. Jade adzes, knives, chisels, drills, and hammers were used for woodworking. These tools, except for drills, consisted of a wood or bone handle with a jade blade attached by leather thongs or tree roots. Drills were made of a straight stick with a jade drill bit embedded in the tip. The drill was worked by using a bow with the leather bowstring wrapped around the drill. It was held steady with one hand or by the teeth, to free both hands to work. The drill had a cap on the top to protect hands or teeth from friction. Moving the bow with a back and forth motion caused it to spin, thereby drilling a hole in whatever material was being worked.

Some war picks had striking heads made of jade. These weapons, whose length varied from 8 to 17 inches, were valuable and owned only by a few of the most important leaders.

The Inupiat and Yup'ik used jade for a greater variety of implements than the people of the Northwest Coast and displayed more diversity when making different forms of the same type of object. This may have been due to the fact that the northern peoples had greater access to a larger quantity of the raw material.

While jade was occasionally used for harpoon heads, spear points and arrowheads, it was generally considered too valuable a commodity to be used on weapons that could be easily lost. Murdoch raised an interesting point about the use of jade and the concept of its value by the Eskimo:

We saw only one stone blade for a seal harpoon. This is of light olive green jade, and triangular, with peculiarly dull edges and point. Each face is concaved, and there is a hole for a rivet. It appears to have been kept as an amulet. We also collected three stone heads for such lances...a beautiful lance head of polished olive green jade. The hole in the tang is probably not intended for a rivet, as none of the lance heads which we saw were fastened in this way. It is more likely that it was perforated for attaching it to the belt as an amulet. (Murdoch 1892:233)

While conducting his studies in Point Barrow, Murdoch discovered another interesting use of the stone for whale hunting. During the 1880s, Eskimos in this region had obtained iron harpoon heads from Europeans. While using these new "whale-irons" the Eskimos experienced some bad



Mitliks

TOP TO BOTTOM:
Jade with mammoth ivory
handle II-A-560

Nephrite blades and antler handles
II-A-973, II-A-972

luck and were not killing enough whales. Murdoch wrote:

Now, the bad luck of the season of 1882, when the boats of both villages together caught only one small whale, was attributed to the use of these "irons," and it was decided by the elders that the first harpoon struck into the whale must be a stone-bladed one such as their forefathers used when they killed many whales. (Murdoch 1892:240)

Murdoch stated, that while in Point Hope,

...the beluga [a type of whale] must always be struck with a flint spear, even if it has been killed by a rifle shot. (Murdoch 1892:244)

Flint appears to have been the stone of choice for harpoons, most likely because of jade's high value and flint's relative abundance and sharper edge.

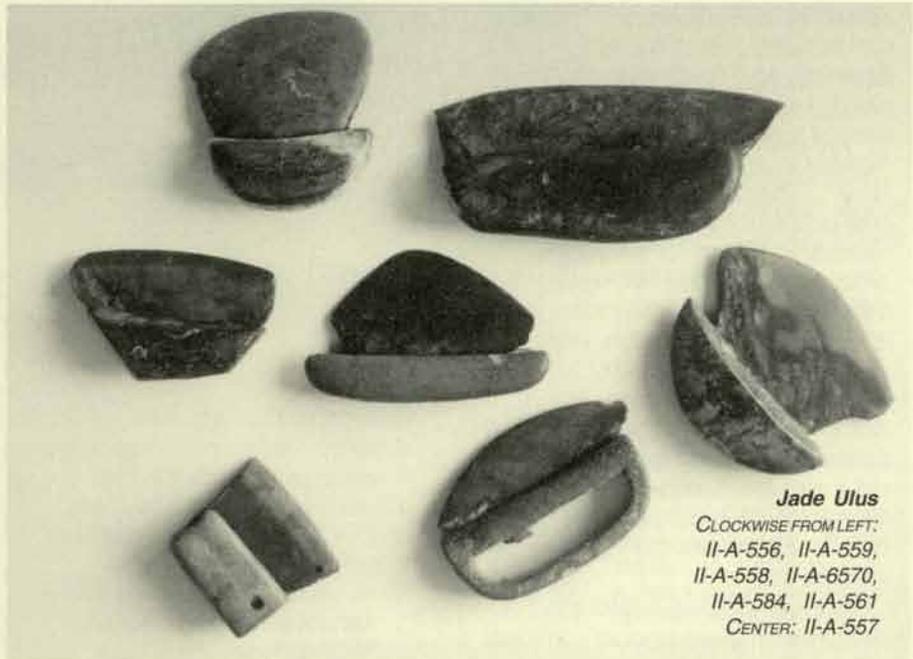
While some Eskimo tools resembled those of the Tlingit, the Eskimo also used additional types. The Inupiat and Yup'ik made and used skin-dressing tools, whetstones, bodkins, burnishers, ulus, mitliks, harpoons, spear tips, fishing lures, arrows and barbs made of jade.¹⁰ Of all the jade tools used, the most important by far was the adze, as it was the one tool that needed to be incredibly strong to withstand demanding use.

ORAL TRADITIONS OF JADE

Even oral histories of Alaska Natives mention jade's value and hardness. Emmons stated it was believed among the Tlingit that while, *...working an adz or ax [made of jade]...they must work without eating for four days, or the stone would grow so hard that they could do nothing with it. (Emmons/de Laguna 1991:171)* and, *...when its owner used it [jade adze], his wife should refrain from all frivolity, as any unbecoming conduct on her part might cause the blade to break. (Emmons 1923:18)*

This was similar to what a wife was expected to do, or not do, when her husband was hunting.

A Tlingit oral tradition tells the tale



Jade Ulus

CLOCKWISE FROM LEFT:
II-A-556, II-A-559,
II-A-558, II-A-6570,
II-A-584, II-A-561
CENTER: II-A-557

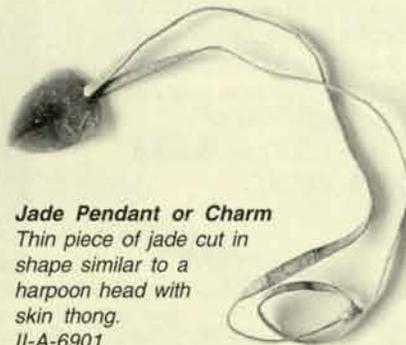
of Raven and his use of a jade adze:

After a while he (Raven) came to an abandoned camp where lay a piece of jade half buried in the ground, on which some design had been pecked. This he dug up. Far out in the bay he saw a large spring salmon jumping about and wanted to get it but did not know how. Then he stuck his stone into the ground and put eagle down upon the head designed thereon. The next time the salmon jumped, he said, "See here, spring salmon jumping out there, do you know what this green stone is saying to you? It is saying, you thing with dirty, filthy back, you thing with dirty, filthy gills, come ashore here." Raven suddenly wanted to defecate and started off. Just then the big spring salmon also started to come ashore, so Raven said, "Just wait, my friend, don't come

ashore yet for I have some business to attend to." So the salmon went out again. Afterward Raven took a piece of wild celery, and, when the salmon did come ashore, he struck it with this and killed it. Because Raven made this jade talk to the salmon, people have since made stone axes, picks, and spears out of it. (Swanton 1909:5)

An Inupiat story is told of a hunter and his encounter with three shamans:

A man by the name of Ataogoraachuak is out hunting marmots and sees a giant animal walking along barely touching the ground. He trails the animal and soon notices that three men are trailing the animal and they too are floating above the ground. Soon, two of the men approach Ataogoraachuak while the third one continues to follow the animal. The two fellows say to Ataogoraachuak, "Our companion will catch up with that mammoth just up ahead." "I don't want to go see it," Ataogoraachuak said. The two men thought Ataogoraachuak was lazy and offered to pay him to go down and see the mammoth. "If you go down there to the mammoth," they said, "you'll become a great shaman. You'll always know where bears hole up in the wintertime. You'll be a great seer." But Ataogoraachuak didn't want to go



Jade Pendant or Charm

Thin piece of jade cut in shape similar to a harpoon head with skin thong. II-A-6901

down. He said, "If you will fix it so I can cut jade and drill it with my little finger, I'll go." To Ataogoraachuak's great surprise, the men said, "Sure, okay, it's done. From now on, you'll be able to drill jade with your little finger." They all went down to the lake and looked at the huge mammoth. The three shamans proceeded to divide the mammoth meat and sent Ataogoraachuak after firewood... After they were done eating...they packed up the rest in their pack-sacks...When Ataogoraachuak got home, he took out some jade and found he could cut it and drill it with his little finger. Everyone in his village knew then he was a great shaman. (Norman 1990:269-270)

The most famous Inupiat story of jade (of which there are two versions) is called "The Jade House."

A boy was born to a rich couple, but during the birth of their second child, the mother died in labor. The husband soon followed her in death because of his grief. The boy was now all alone and traveled in search of food and company. He came upon a house which, as it turned out, had living there the boy's

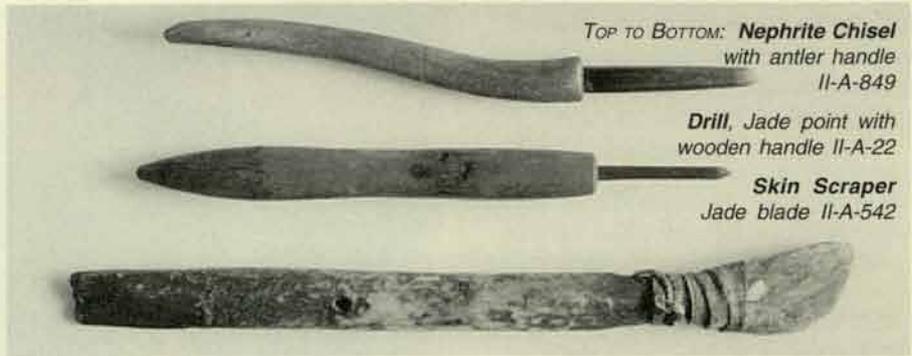
younger brother who had survived the labor that had killed his mother. The man of the house told him where he could find his grandmother and cousin to live with, which he did for many years. After he grew up his grandmother said, "You boys should build a better house. You should build a jade house." She said, "Go get some jade so that you can make your house. When you get on the sled and go, don't open your eyes until you land." They went, using her jaws for a sled. They got on the jaw sled, closed their eyes, and left. When they landed they opened their eyes and found they were on Jade Mountain. They loaded up their sled, closed their eyes, and ended up at home. They went back to Jade Mountain again. While they were loading their sled this time the jade man found out they were there. They got in the sled and went home, never going back. They made a jade house. When the grandmother got old she died. Before she died she said, "If you plan to leave the house break it down because people might fight over it." The boys lived there awhile and then decided to move downriver. They broke up the house and went downriver where they built a new house. This one was not of jade.

(Hall 1939:247-248)
An Inupiat man named Kahkik related

another version of this story to J.L. Giddings in his book, "Kobuk River People:"

A poor boy is living near Jade Mountain with a lot of other people. During dinner time the poor boy is visiting the rich family who also has a son. While the poor boy is there the rich boy throws a handful of akootuk [Eskimo ice cream] in the poor boy's face. He leaves crying and goes to Oksik Mountain and sees a house on the mountain with its light on. He goes to the house and meets an old woman and her son. The poor boy tells them of his troubles. The old woman tells the two boys to go back to the rich man's house. She gives them her jaw bones which allows them to travel by air. The two boys go to the rich man's house and join them while they are dancing. The boy from the mountain starts to dance and as he tries to dance he ends up leaning sideways. This causes the rich man's house to lean sideways. So they make big slabs of jade for that boy. Those two boys say they want jade to make a house with. And that umelik [rich man] says, "but my house has got to be in the same place again before I will let you have jade." And the umelik gives the boys lots of jade. And they make the house right side up

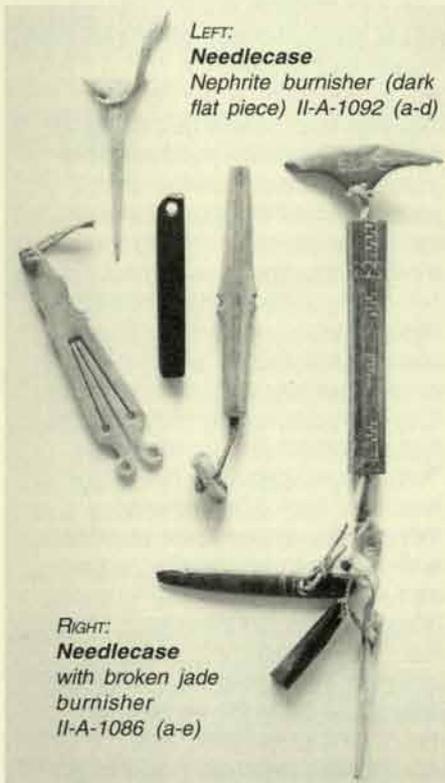
again before they go. The two boys never have a hard time they just go by air. When they get back home, they just go to sleep. They never try to watch the jade they



TOP TO BOTTOM: **Nephrite Chisel** with antler handle II-A-849

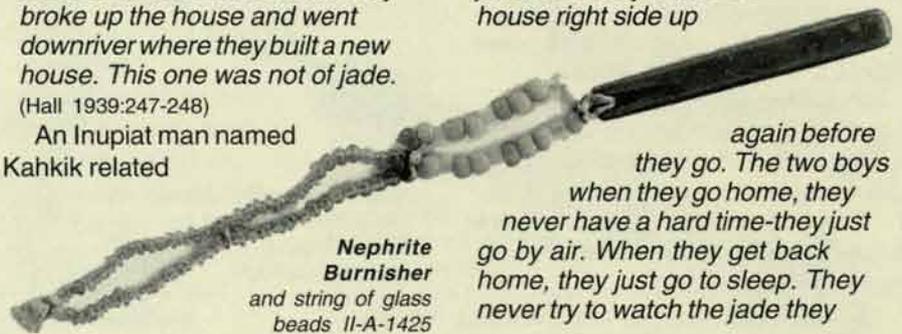
Drill, Jade point with wooden handle II-A-22

Skin Scraper Jade blade II-A-542



LEFT: **Needlecase** Nephrite burnisher (dark flat piece) II-A-1092 (a-d)

RIGHT: **Needlecase** with broken jade burnisher II-A-1086 (a-e)



Nephrite Burnisher and string of glass beads II-A-1425

bring home. And after they sleep, they wake up and look. And they look around-they are awake now-and they are in a big house, all jade. You can see through the house like a window. They look around. Everything is in this cabin-something to eat-something to wear. Those boys are umeliks now. That old lady has been working that jade and making a house while the two boys are sleeping. And that boy that got akootuk on his face, right now he has a big house, all jade. And after a while they are living there, and those other people are getting kind of hungry over there at Jade Mountain. They have no grub at that village. They have a hard time. And that little boy-that boy hit by akootuk-never gives anything, because he has been hit with akootuk.

(Giddings 1961:109-110)

The author stated that Kahkik related to him that some pieces of jade have been found on top of Oksik Mountain. Kahkik believed they may have been part of the old woman's house.

CONCLUSION

The collections of the Alaska State Museum and Sheldon Jackson Museum hold a diverse sampling of Alaska Native tools and weapons. The Museums' jade collection attests to

JADE IN THE MUSEUMS' COLLECTIONS

In the collections of the Alaska State Museum and Sheldon Jackson Museum are a variety of jade implements. The following is a list of jade tools and weapons that can be found in these two museums.

ALASKA STATE MUSEUM

Tlingit Artifacts

Adze Blades – 5

Inupiat/Yup'ik Artifacts

Adze Blades – 38

Adzes, Complete – 30

Arrowhead – 1

Bodkins – 2

Burnishers – 6

Chisel Bits – 7

Chisels, Complete – 4

Drill Bits – 5

Drills, Complete – 4

Fishing Lure – 1

Hammers – 2

Harpoon Heads – 3

Knife Blades – 2

Knives, Complete – 5

Lancet – 1

Mitliks – 3

Skin Scraper Blades – 3

Skin Scraper, Complete – 1

Ulu Blades – 4

Ulus, Complete – 7

Whetstones – 8

SHELDON JACKSON MUSEUM

Tlingit Artifacts

Adze Blade – 1

Adze, Complete – 1

Inupiat/Yup'ik Artifacts

Adze Blades – 25

Adzes, Complete – 10

Drill, Complete – 1

Hammers – 2

Harpoon Head – 1

Knife Blades – 2

Knife, Complete – 1

Skin Scraper – 1

Ulu Blade – 1

Ulu, Complete – 1

Whetstone – 1

of, and uses of jade are well documented.

However, the exact trade routes and sources of jade used by Alaska Natives, as outlined in this paper, remain as the probable but not definitive answers. Future research in these areas may someday reveal the complete picture.

NOTES

1. Gems are minerals that have ornamental value and according to the jewelry trade, objects associated with the jewelry industry which possess beauty, symmetry, durability, rarity and value necessary for qualification as a gem.

2. An inorganic gem material used traditionally by Alaska Natives was jasper, a type of chalcedony. Jasper was most often used for projectile points and was worked using the pressure flaking technique. Pressure flaking is accomplished by applying pressure to the edge of a stone with a flaking tool to break off small pieces of material. This technique allowed the toolmaker to have complete control over the

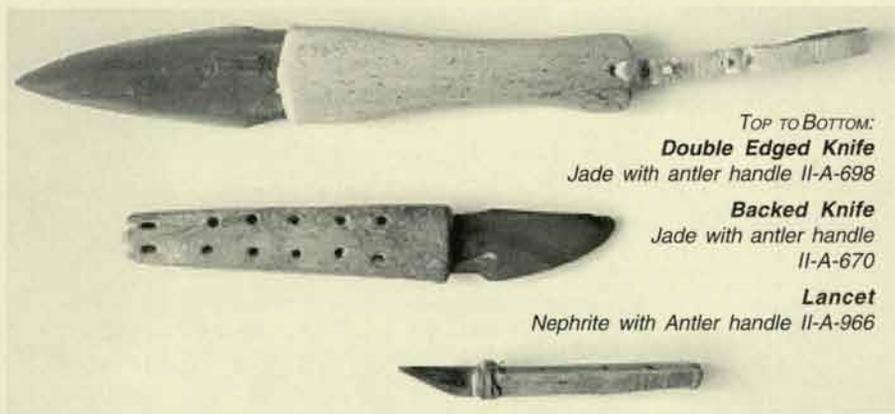
amount of material removed. Jasper was used extensively in other parts of North America for tools and weapons, but was not a major type of mineral used in Alaska. Most tools and weapons in Alaska were made from shale, slate, obsidian, bone, ivory, wood, basalt, chert, sandstone and jade. Another inorganic gem material used traditionally by Alaska Natives was obsidian or natural glass. Obsidian was used for projectile points and as superior cutting tools. While obsidian is fairly tough and of average hardness it is not suitable for use as a durable tool. Approximately 1,500 years preceding contact with European explorers, chipped stone (jasper and obsidian) use among Alaska Natives began to decline and ground stone (sandstone and jade) use increased.

Alaska Eskimos used jade as an ornamental and cultural accoutrement, most often in the form of the labret (lip plug) worn by men and to a lesser extent by some women. Ornamental uses of jade are not an integral part of this discussion.

3. Jadeite is a different mineral, having its own chemical composition and mineral structure. Nephrite jade is a form of actinolite (a silicate of magnesium and calcium with iron

the fact that jade was an important part of a man's and woman's toolkit. Jade's mineral characteristics show that this is due to its resistance to breakage, its durability as a tool or weapon, ability to hold a keen edge or point, and its burnishing qualities on animal skins. Jade's scarcity in Alaska also made it an object of considerable worth and prestige.

The characteristics of, the working



TOP TO BOTTOM:
Double Edged Knife
Jade with antler handle II-A-698

Backed Knife
Jade with antler handle
II-A-670

Lancet
Nephrite with Antler handle II-A-966

in the ferrous state), but is distinguished from actinolite by its massiveness and compactness. Even though jadeite and nephrite are both completely different materials, they are both known as jade. This is due to their similar appearance and because of historical custom.

4. Specific Gravity is a physical property of minerals and is a key test for determining the composition of a substance. It means the weight of a substance in relation to the weight of the same volume of water. For example, a substance with a specific gravity of 2.5 would be 2.5 times heavier as the same volume of water. Generally, but not always, the higher the specific gravity the more dense the material. Refractive Index, another physical property and key testing method, means the ratio of the velocity of light in air to its velocity as it travels through another substance. Light travels through space at the relatively constant rate of 186,000 miles per second, but when it passes through liquids or solids it is slowed and bent forcing it to change its path. Refractive Index varies with direction in crystals. All substances, except isometric (a crystal form where all angles are equal and symmetrical) materials, have more than one Refractive Index. Double Refraction is a phenomenon where light is split into two beams polarized at right angles to each other. Images seen through a transparent material of this type appear doubled. Nephrite has a specific gravity of between 2.90-3.10 and a refractive index between 1.600-1.615 and 1.626-1.641; nephrite jade is doubly refractive.
5. There are two scales used for comparing the durability of gems and minerals. One, the Mohs scale addresses hardness of a material. Hardness considers an object's resistance to scratching. Diamond is the hardest known material. The other durability scale measures toughness. Toughness considers an object's resistance to breaking. Nephrite jade is the toughest known material and is rated exceptional in this category.
6. Early anthropological studies of Alaska suggested that Alaska Natives received all of their iron through contact with European explorers. This is not entirely accurate. Iron native to the geology of

Alaska is very rare, however, there were other sources as well. Tlingit oral histories speak of daggers that were made of metal that "fell from the sky" (meteoric iron). Another source of iron was from Japan and China. Iron in the form of spikes in driftwood, or from flotsam and jetsam from ships, was swept to Alaska on the Japanese Current. An additional source of iron came from Spanish colonists residing in California and Mexico as early as the 16th century. The northerly trade routes among Native Americans along the North American coast would have led to pieces of iron arriving in Alaska. Alaska Eskimos traded with Siberian Eskimos via the Bering Strait for hundreds of years. There is archaeological evidence that proves there was metal exchange between these groups of people as far back as A.D. 500.

7. The author did not find evidence that other Alaska Natives (i.e., Athabaskans, Aleuts, etc.) used jade.
8. The Jade Mountains are also known as Jade Mountain, Green Stone Mountain and Ashiganok. The village located close to this jade deposit is named "Shungnak," (same meaning as Ashiganok) the Eskimo name for jade. Among the Salish of British Columbia, the word sokala'ist means "greenstone." Among the Tlingit jade is known as tsu, which means "green."
9. Dr. John Simpson spent two years in Pt. Barrow in 1875 and made a report on his observations to the Royal Geographic Society of London after his return to England.
10. Some definitions of tool types: adzes are woodcutting tools used like a hatchet except that the blade is perpendicular to the haft rather than parallel like a hatchet; mitliks are a type of knife that has a small blade set in the handle towards the tip; ulus are womens' knives shaped like a half-moon with a handle on the flat part of the blade; bumishers are used to add the final edge to a tool or weapon or for smoothing a woman's sewing work; whetstones are used for sharpening blades; and bodkins are used when sewing and function as an awl for punching holes into leather work.

BIBLIOGRAPHY

- Abbott, Helen; Brown, Steve; Price, Lorna and Thurman, Paula (eds.)
1995 *The Spirit Within: Northwest Coast Native Art from the John H. Hauberg Collection*. Seattle, WA: Seattle Art Museum.
- Arem, Joel
1973 *Rocks and Minerals*. New York, NY: Bantam Books.
- Carlson, Roy L.
1994 *Trade and Exchange in Prehistoric British Columbia*. Prehistoric Exchange Systems in North America. New York, NY: Plenum Press.
- Clark, Dr. Donald W.
1998 *Precontact History*. Yukon Territory, Alaska Geographic: Volume 25, Number 2. Anchorage, AK: Alaska Geographic Society.
- Emmons, George T.
1923 *Jade in British Columbia and Alaska, and its use by the Natives*. New York, NY: Museum of the American Indian. Heye Foundation. (pages cited: 16-18; 22-23; 42-43).
1991 *The Tlingit Indians*. (edited with additions by Frederica de Laguna). New York, NY: American Museum of Natural History. (page cited: 171).
- Gemological Institute of America.
1993 *Gem Reference Guide*. Santa Monica, CA.
- Giddings, J.L.
1961 *Kobuk River People*. College, AK: University of Alaska. (pages cited: 109-110).
1964 *The Archeology of Cape Denbigh*. Providence, RI: Brown University Press.
- Liddicoat, Richard T., Jr.
1993 *Handbook of Gem Identification*. Santa Monica, CA.: Gemological Institute of America.
- Hall, Edwin S. Jr.
1939 *The Eskimo Storyteller*. Knoxville, TN: University of Tennessee Press. (page cited: 248).
- Murdoch, John
1892 *Ethnological Results of the Point Barrow Expedition*. Washington, DC: Smithsonian Institution. (pages cited: 60; 167; 233; 240 & 244).
- Nelson, Edward William
1899 *The Eskimo About Bering Strait*. Washington, DC: Smithsonian Institution. (page cited: 91).
- Norman, Howard
1990 *Northern Tales: Traditional Stories of Eskimo and Indian Peoples*. New York, NY: Pantheon Books. (pages cited: 9; 269-270).
- Pough, Frederick H.
1953 *A Field Guide to Rocks and Minerals*. Boston, MA: Houghton-Mifflin Co.
- Stewart, Hilary
1973 *Indian Artifacts of the Northwest Coast*. Seattle, WA: University of Washington Press.
- Swanton, John R.
1909 *Tlingit Myths and Texts*. Bureau of American Ethnology: Bulletin 39. Washington, DC: Smithsonian Institution. (page cited: 5).
- Webster, Robert
1962 *Gems: Their Sources, Description & Identification*. Hamden, CT: Butterworth & Co.
- Withtoft, John and Eyman, Frances
1969 *Metallurgy of the Tlingit, Dene, and Eskimo*. Expedition: Volume 11, Number 3. Philadelphia, PA: University Museum of the University of Pennsylvania.