Traces et fonction : les gestes retrouvés
Colloque international de Liège
Éditions ERAUL, vol. 50, 1993

Materials worked by hunter and gatherer groups of northern North America : implications for use-wear analysis

*Linda R. OWEN**

Résumé

Les comptes rendus ethnographiques sur les Inuit, Aleuts et Indiens du nord de l'Amérique du Nord montrent que ces peuples exploitaient un spectre beaucoup plus vaste de matières organiques que ne le représentent la plupart des programmes expérimentaux d'usure à « fort grossissement ». Les matières qui se dégradent rapidement et sont donc rarement conservées en contexte archéologique sont souvent négligées ou complètement oubliées. De même, les éventuels usages non alimentaires des substances animales et végétales couramment étudiées sont fréquemment ignorés.

Abstract

Ethnographic reports on the Inuit, Aleuts and Indians of northern North America show that they used a much larger spectrum of organic materials in the production of goods than is represented in most « high-power » use-wear experimental programs. Materials that decay rapidly and are thus seldom preserved in archeological contexts are often neglected or overlooked entirely. Possible non-food uses of commonly studied animal and plant substances are also frequently ignored.

Introduction

During the last two decades, there has been an ever increasing amount of research into microscopic use-wear traces on stone tools. The earliest work, which concentrated on the traces left by working different materials with flint in a variety of actions (Semenov, 1964 ; Tringham *et al.*, 1974 ; Keeley, 1980), has been followed by studies of raw materials other than flint, specific tool types and tasks.

The methods employed in functional analyses range from low magnification studies of edge damage through high magnification analyses of use-wear polishes to SEM studies of tool surfaces. The majority of use-wear analysts today work with incident light and stereomicroscopes at

magnifications up to 550x, inferring use by the comparison of the texture, intensity and distribution of polishes, as well as striations, edge damage, edge morphology and tool morphology of prehistoric tools with those of experimental ones.

Since the interpretation of microwear traces is based on comparisons with the traces on experimental tools, a comprehensive program of experiments is of the utmost importance for functional studies. Despite the number of use-wear studies that have been carried out on archeological assemblages, many analysts still limit their research to working common materials such as bone, antler, meat, hide, wood and grasses with simple motions or in a limited number of tasks. A number of materials known to have been used prehistorically or documented in ethnographic reports have been neglected or ignored completely in many studies.

Knowledge about worked materials and tool use can be obtained from studies of recent tool use, practical experience, ethnographic sources and archeological finds. The extent of this knowledge and the experiments based upon it influence all use-wear interpretations and are a major restricting factor in functional reconstructions of archeological artefacts. Correct determination of a tool's use depends upon the analyst's awareness that such a task may have been carried out and familiarity with the traces it could leave. It is thus of essential importance that a broad research framework exist.

Ethnographic data

Ethnographic studies of recent hunters and gatherers give insights into the possible spectrum of materials worked prehistorically, the ways in which they could be worked and the products which could be produced from them. A survey was thus undertaken of ethnographic reports on the use of different organic materials by hunter and gatherer groups of northern North America, including the Inuit (Eskimos), the Aleuts and the Indians of the Subarctic, Woodlands and Northwest Coast. A summary of the ethnographic data is presented here, along with a discussion of prehistoric finds and « high power » use-wear experimentation. The survey covers organic materials used in the production of goods, with little attention paid to food collecting and processing. Emphasis was placed on lesser-known animal and plant materials which have been neglected in use-wear studies and on new ways of using more commonly studied substances.

It should be noted that ethnographic accounts are often quite frustrating when one is searching for technological data. Precise information about the type of materials used, the manner in which they were worked and tool production is only rarely available. This is especially true of women's tasks and possessions in northern North America, where most of the reports were written by men and concentrate on male activities. Descriptions may also be ambiguous, *e. g.* the use of the term horn to refer to both horn and antler, or whalebone for baleen and the bones of whales. Ethnographic specimens purchased from native peoples may also be misleading as they were sometimes made specifically for the collectors and may differ in material, quality or workmanship from comparable private possessions. Due to the limited number of accounts, it is at times difficult to determine to what extent specific native crafts were influenced by contact situations. In so far as possible, an attempt was made to only discuss non-ambiguous, authentic, pre-contact objects.

Animals

Animals were a very important source of raw materials for the hunter and gatherer groups of northern North America. In addition to food, they provided a number of utilized substances, such as skin, fur, inner organs, sinew, bone, antler, ivory, teeth, horn, hooves, feathers, quills, beaks, claws and baleen.

Skin, Fur, Inner Organs, Sinew

Throughout northern North America, many different types of animal skins, treated in various ways, were used for the production of clothes, shelters, bedding, containers and thongs. There has been considerable microwear experimentation with skins, including different tanning processes, most of it limited to the skins of large mammals (Owen *et al.*, 1984 ; Juel Jensen, 1988a). Although

caribou and deer skins were the most commonly used by northern peoples, the skins of fish and birds also played a considerable role. According to Hatt (1969 : 7), « if one were to mention the sorts of skin used in arctic clothing in a sequence based on their importance and the geographic distribution of their use, then reindeer skin ought to be mentioned first, followed by bird skins and fishskins, and only then sealskins... Dog skins are fifth in importance, followed by a great number of other fur-bearing animals, the majority of which have only been of secondary importance to arctic clothing, though in another way, through the fur trade, they have come to play an important economic role ».

According to Hatt (1969 : 9), the use of fish skin by northern peoples « is apparently much greater than it appears from the museum collections. The little decorated fishskin clothing has only barely attracted the attention of collectors ». Clothing of fish skins was especially important for peoples who lived from river fishing. The western Inuit and Indians of Alaska used them to make waterproof capes and parkas (see for example Nelson, 1983, plate XIX), as well as moccasins, leggings, mittens and women's aprons. Throughout the Arctic (Damas, 1984) and Subarctic (Helm, 1981), they were made into waterproof bags and containers, mostly for liquids such as blood and oil. The skins of salmon, burbot and sturgeon were utilized most frequently. Drucker (1955 : 61) also reports that the Indians of the Northwest Coast used sharkskin to finely sand wooden articles.

The Inuit frequently used bird skins for clothing, especially undergarmets, but also for warm winter parkas, pants and hats (Hatt, 1969 ; Damas, 1984). They also made containers, sleeping mats and blankets from them. The skins of seawater birds, such as eider duck, puffins, cormorant and murre, were preferred for the production of clothes. Nelson (1983 : 150) illustrates a lancepoint wrapper from Cape Darby made of swan's neck skin with the feathers still on it. The lanceheads were wrapped so that a layer of skin lay between each of them. Bird skins were apparently of less importance for the northern Indians, although there are reports that the western Déné wore clothes of bird skin in earlier times (Hatt, 1969 : 10).

The use of bird skins in the Arctic is not a recent development as shown by finds of well preserved pieces of seal and bird skin – some with fine sewing – in the permafrost at the ca. 4 000 year old Sarqaq site of Qeqertaussuk in Greenland (Gronnow and Meldgaard, 1988 : 437).

The coastal Inuit and Aleuts made waterproof clothing of intestines for protection against rain and against seawater during boating (Hatt, 1969 : 52-55). Neckhigh suits of sea-mammal intestine were also worn by the Bering Strait Eskimo while setting salmon traps in deep water (Ray, 1984 : 289). Normally seal, walrus or sea lion gut were used although Hatt (1969 : 11) also mentions whale intestines, mucous membranes, liver membranes and tongue skin. Pieces of these were soaked, scraped, inflated and dried in the sun, which gave them an opaque quality (Hughes, 1984 : 266). Boot legs, men's pants and sometimes heavy parkas were also made from the pharynx and oesophagus of seals and sea lions (Hatt, 1969 : 11).

In addition, the internal organs (bladders, stomachs and intestines) of larger animals were used for bags, containers (especially for liquids), floats and drums. The sinew of large animals was made into sewing thread and bow strings. Sinew thread is not only durable and strong, but also swells when it becomes moist, which helps keep seams waterproof (Hatt, 1969 : 21). When sinew was not available, the Inuit of Quebec substituted dried sea gull oesophagus or guillemot (*Uria lomvia*) wing tendons (D'Anglure, 1984 : 481).

Although there has been extensive use-wear experimentation with hides, it has been directed towards mammal skins. The use of fish skins, bird skins and inner organs for clothes and containers has been neglected. The working of fish, for example, has centered on butchering (Gijn, 1986).

Horn and Similar Materials

Horn is an outgrowth of the epidermis formed by layers of hard protein (Hodges, 1964 : 153-155). The main component of horn, keratin, has a high sulfur content. Hooves, baleen, feathers, quills, hair, beaks and claws are also made of keratin and it is a major component of the epidermis of the skin. All of these materials decay rapidly and are seldom preserved in archeological contexts.

Horn is widely available. Both sexes of the Bovidae, *e. g.* antilopes, bison, cattle, goats, musk

ox and sheep, have horns. It is a soft, flexible and fibrous material which tends to exfoliate when partially decayed (Hodges, 1964 : 153-155). Horn is relatively easy to work and can be formed when heated. While fresh, horns can be cut off relatively easily. This may have been carried out to gain horn or, for example with musk ox, in the process of skinning (Münzel, 1987 : 85). Slightly decayed horns can simply be twisted off as the connective tissue decays relatively quickly, for example within a few days or weeks in the sun. However, the horn itself also rots somewhat and begins to flake at the base (see Pawlik, this volume).

A review of the ethnographic literature shows that horn was used by North American hunting and gathering groups, although not as extensively as bone, antler or hide. Its natural shape was often utilized for containers, scoops, ladles and spoons. Its flexibility also made it ideal for producing parts of composite bows (Hodges, 1964 : 155).

The Inuit appear to have employed horn more extensively than many other peoples, perhaps because of the scarcity of wood in the Arctic. The Netsilik Inuit (Taylor, 1974), for example, used muskox horn for bow splints, grip sections and staves, ladles, dippers, ice scoops, powder horns, knife handles, blubber pounders, breathing hole searchers, wound pins, side prongs of fish leisters, dog trace swivels and loops for kayak frames. The Indians of North America often made spoons and ladles from horn, as well as combs, pendants, musical instruments, noise makers and rattles.

Due to its poor preservation qualities, horn artefacts are almost unknown from Paleolithic sites. It was, however, undoubtedly used, as is shown by the Venus relief of Laussel, France. The natural shape of horns makes them suitable as containers for either solids or liquids. They can also be worked into a number of other forms.

Hooves are chemically identical to horns and often the two materials cannot be distinguished. The Indians of North America often used hooves or pieces of hoof for their rattles and noise makers (Miles, 1963 : 196, 199). A caribou hoof pendant needle case is known from the Eskimo of the Bering Strait region (Nelson, 1983 : plate XLIV 26), as are a pair of snow goggles made from either hoof or sheep horn (Nelson, 1983 : plate LXIV).

As they decay rapidly, hoof artefacts are unknown from Paleolithic contexts. However, cut marks on the third phalanges of the horses from the Magdalenian site of Pekarna Cave, Czechoslovakia, show that hooves were utilized (Berke, 1989 : 18).

Baleen or whalebone is the elastic material made of keratin which forms the plates or strips in the upper jaw of baleen whales. The plates are used to filter small crustacea, krill, from the water. « They are positioned vertically downwards in the huge arched mouth, and can be almost 5 m in length, although this depends on the position in the mouth ; they are several cm wide. The outer edge is smooth and straight and the inner edge has a hairy fringe to trap the food as the water is expelled (Coffey, 1977 : 16) ». The baleen whales include the blue whale, the right whales, the rorquals, the California grey whale and the humpback whale.

The coastal Inuit used baleen most frequently for lashings and bindings, but there are also examples of bowls, combs, fishing lines, snares, nets, net gauges and shuttles (see *e.g.* Damas, 1984 ; Nelson, 1983). The Inuit of Point Barrow peeled off thin strips of baleen with small ulu-like implements known as whalebone shaves (Murdock, 1892 : 173-4 cited in Mathiassen, 1927, I : 61).

Baleen artefacts have been found preserved in the permafrost of many Arctic sites. Among the oldest findings are tool lashings from the ca. 4 000 year old Sarqaq site of Qeqertaussuk in Greenland (Gronnow, Meldgaard, 1988 : 436). They are very common in the more recent Thule sites. Mathiassen (1927 II : 127) reports that Thule sites in the central Eskimo region of « Naujan, Ponds Inlet and Comer's Midden are extraordinarily rich in objects of baleen, so rich that there has been talk of a baleen culture ». Among the baleen objects he describes are bows, sledge shoes, nets, fish traps, snow beaters, cups and bowls, platform coverings, weapon points, knives, knife handles and lashings for tools, kayaks and sledges.

Feathers were used throughout northern North America as decoration for clothing, bags, etc. The Indians also substituted feather spines for porcupine quills in their quillwork. On the Northwest Coast, robes were even produced from duck or geese down and bark fiber (Drucker, 1955 : plate 16).

They were also used in the production of arrows. The feathers (usually wing and tail feathers of large birds such as eagles or turkeys) were split

down the spines, trimmed and lashed to the shafts. Feathers, such as those of the ptarmigan, are absorbent and were also used by the Eskimo for cleansing purposes and in diapers (Ray, 1984 : 289).

The Indians of North America used porcupine quills for decorating their clothing and other items. Ritzenhaler (1978 : 749) writes of the southwestern Chippewa : « Before European glass beads were introduced, quillwork was the most important decorative applicative. Porcupine quills were dyed, flattened, and sewed in floral designs on buckskin clothing and Mide bags, medicine bags presented to Midewiwin initiates. Floral designs were added to birchbark boxes by inserting the quills into holes punched by awls. Geometric designs were achieved by loom weaving, the panels then attached to clothing, knife sheaths, and Mide bags ».

Bird beaks, animal claws, hair and turtle shells were also employed on occasion. In addition to quillwork and beads, the Indians used twisted strands of moose and deer hair to decorate clothes and other items. Animals claws, bird beaks, *e. g.* from puffins, and even bird feet were used to decorate clothing and necklaces. Puffin beaks were also used as noise makers on rattles (Drucker, 1955 : plate 24). The natural shape of turtle and tortoise shells was utilized for spoons, cups and rattles and the shell worked into combs.

Microwear research with horn and similar materials has been generally neglected, despite the general availability of such products and the number of ways in which they can be used. A few experiments have been carried out with horn (Plisson, 1985 : 28, 59) and feathers (Sussman, 1988 : 108). In conjunction with this ethnographic work, a new series of experiments with horn has been undertaken (Pawlik, this volume).

Bone, Antler, Ivory and Teeth

Bone is composed of hydroxyapatite (bone mineral), collagen and water, whereby the proportion of calcium to phosphorous varies from bone to bone. Antlers are an outgrowth of the bones of the skull on various species of deer which are shed each year. During growth they are covered with skin (velvet). According to Hodges (1964 : 153), « structurally antler is somewhat similar to a long bone. There is an outer cortex of compact, bone-like material, although the inner cavity is not marrow-filled, but instead is a spongy structure rather similar to cancellous bone ». The proportions of cortex and cancellous antler vary considerably between species.

The elongated teeth of elephants, walruses, wild boar, peccaries and narwhals are referred to as tusks. In elephants, these are the upper incisors (Hodges, 1964 : 154). They differ from other teeth in that only the tips of young tusks are covered with enamel. With the exception of a relatively small pulp-cavity at the base, they are composed almost entirely of dentine, referred to as ivory. It is comprised of 50-60 % calcium bound by collagen (Hahn, 1986 : 54).

The term ivory is also used in the broad sense to describe the tusks or upper canines of both sexes of the walrus (*Odobenus rosmarus*). These are also « without enamel, but the dentine is laid down in two distinct layers. The outer dentine is homogeneous, but the inner secondary dentine has a marbled, and at times almost crystalline, appearance and is translucent. Normally the inner dentine was avoided (Hodges,1964 : 154) ». The tusks of adult males can reach lengths of more than 90 cm and weights of 6.35 kg (Coffey, 1977 : 155). Like the walrus, the tusks of wild boars and peccaries are elongated canines. In the narwhal (*Monodon monceros*), one or occasionally both of the two upper teeth grow twistingly forward and may reach a length of 3 m (Coffey, 1977 : 106).

Bone, antler and ivory (walrus tusks, narwhal tusks and some fossil ivory) were of special importance in the Arctic where wood was scarce. They were used, among other things, for the production of weapon points, harpoons, leisters, arrowshaft straighteners, composite bows, wrist guards, fishhooks, net gauges, handles, hafts, foreshafts, polishers, chisels, wedges, picks, scrapers, needles, snow knives and shovels, snow goggles, ice scoops, ice creepers, sled runners, harness toggles, spoons, combs, small boxes and needle cases, figurines, pendants and ornaments (see *e. g.* Damas, 1984).

Bone and antler were used less frequently in the Subarctic, Woodlands and Northwest Coast, where wood was more readily available. Since they are sturdier than wood, they were an important raw material for the production of tools and weapons which were subjected to great stress, *e. g.*

spear points. Common products of bone and antler include weapon points, flakers, punches, woodworking chisels and wedges, scrapers, awls, combs, pendants and ornaments. Similar objects of bone, antler and ivory are known from archeological contents (*e. g.* projectile points and figurines from the European Paleolithic).

Throughout the area of study, bone, antler and ivory were used interchangeably for a number of objects, depending on their relative availability. In some instances, their material characteristics made one or the other more suitable for specific objects. For example, the fine structure, strength and homogeneity of the compact sections of ivory combined with its bright color and ability to be shined made it a highly valued material for carving (Hodges, 1964 : 154 ; Hahn, 1986 : 55). In contrast, the size and material characteristics of antler restricted its importance for figurines, but its greater elasticity made it more suitable for other types of tools, *e. g.* spear throwers (Hahn, 1986 : 55).

Teeth, present in most vertebrates, have a core of soft pulp surrounded by a hard layer of calcareous dentine that is coated with cement or enamel at the crown. Throughout the area of study, perforated teeth were used as pendants, ornaments or on rattles. In the Subarctic, beaver incisors were also hafted and used as gouges and chisels for woodworking and bark removal (Helm, 1981 ; Nelson, 1983 : 89-90). Goddard (1978 : 217) also mentions arrowheads of fish and animal teeth.

Teeth withstand decay well and are thus often preserved in archeological contexts. Perforated teeth, some with simple engraved decoration, have been found in numerous Paleolithic sites (Jelinek, 1975 : 419-428). The discovery of a spoon made from a sperm whale tooth at the Sarqaq site of Qeqertaussuk in Greenland (Gronnow and Meldgaard, 1988 : 435) shows that larger teeth were used in other manners. The teeth of the sperm whale can be up to 20 cm long.

Bone and antler have been a major focus of use-wear analysis (see Owen *et al.*, 1984 ; Juel Jensen, 1988a). Although the importance of ivory prehistorically has been recognized, research has been limited by the scarcity of the material. Experiments with ivory have been described briefly by Plisson (1985 : 55) and Symens (1988 : 178) and in detail by Unrath *et al.* (1986 : 126 ff) and Pawlik (1991).

Plants

Plants were valuable for the hunter and gatherer groups of northern North America. They not only provided food, but also a number of other raw materials, such as wood, bark, roots, fibers, seeds.

Trees

Wood was one of the most important materials in the Subarctic, Woodlands and Northwest Coast, where it was readily available. The large assortment of products made from wood on the Northwest Coast includes spears, harpoon foreshafts, bows and arrows, quivers, handles, housing, canoes, paddles, bailers, fishhooks, storage vessels, dishes, cooking utensils, boxes, wedges (hardwood), bark working tools, cradles, pillows, ornaments, armor, combs, rattles, drums and whistles (Drucker, 1955).

Despite the relative scarcity of wood in the Arctic, it was nonetheless a highly valued material. Driftwood, the main source of wood, was quite abundant in many areas, *e. g.* along much of the coast of Alaska and in northern Greenland. In areas where driftwood was scarce, such as Quebec, people were known to travel long distances to obtain wood (D'Anglure,1984 : 480).

Throughout the Arctic, wood was especially important for the production of long implements, *e. g.* weapon shafts and tent poles, and for kayak frames, handles and plates. In the Netsilik area, where driftwood was extremely scarce, « sections of driftwood were pieced together to make spear shafts, kayak frames and tent poles (Balikci, 1984 : 417) ». Where wood was abundant, there was a larger spectrum of goods. According to Lantis (1984b : 215) the Nunivak Eskimo of the Bering Sea used wood « for dishes, trays, cups, buckets, and boxes, the dishes varying in size from the child's personal dish (every person had his own) to very large storage and feast dishes, for dolls, for wooden hats, eyeshades, and snow-goggles, and for elaborate masks. These were added to the usual Eskimo requirement for wood shafts and handles, net floats, boat frames and house frames, and other uses ».

Wooden artefacts are known from many prehistoric Arctic sites. Finds from the Dorset (ca.

2500 BP-1000 BP) include wooden handles for stone tools (*e. g.* blades, burins, adzes and scrapers), shafts, spoons, spatulas, pieces interpreted as kayak parts, drum rims, carvings, figurines and masks (see *e. g.* Maxwell, 1985).

Bark was employed extensively by the Indians of the Subarctic, Woodlands and Northwest Coast. Sheets of bark (*e. g.* from birch, elm, chestnut, basswood, ash, cedar, fir and spruce) were utilized for shelters, roofing, canoes, diverse containers (*e. g.* dishes, cooking vessels, boxes and buckets), infant carriers and temporary raincoats. The inner bark or bast (*e. g.* of basswood, swamp ash) was used to produce cordage, coiled baskets, and was woven to make mats, bags, baskets, nets, tumplines and clothes. Food, medicine, seasoning and hide tanning and coloring agents were obtained from the inner bark or cambium of spruce, pine, birch, poplar and willow (see *e. g.* Eidlitz, 1969).

The importance of bark for the Indians of the Northwest Coast was described by Drucker (1955 : 61-62) : « One could very nearly describe the life of the individual Indian in terms of cedarbark : as an infant, he was swaddled in the bark, shredded and haggled to a cottony consistency ; his pillow and head-presser were pads of the same material ; woven robes and rain capes of shredded bark protected him from rain and cold throughout his life ; checkerwork mats of red cedarbark were his principal household furnishings, serving as tablecloths at mealtimes, as upholstery for seats, and as mattresses for his bed. ...old worn-out mats served to protect his canoe from the checking effects of the sun on bright days. On ceremonial and festive occasions he wore turbans and arm and leg bands twisted and woven of shredded bark. ... And when he died, the chances were that unless he were a chief and entitled to special treatment, his body would be wrapped in a cedarbark mat for burial ».

Since bark decays rapidly, prehistoric finds are rare. Stringwork of lime and willow bast has been recovered from Late Mesolithic and Early Neolithic sites in Denmark (Juel Jensen, 1988b : 248). Pieces of small, cut and rolled birch bark, interpreted as tinder for starting fires, have been found in a number of Dorset and Thule sites on Baffinland (Maxwell, 1973 : 180).

The Indians of northern North America used split tree roots (most commonly spruce and cedar) to sew birchbark containers and canoes, for decoration and to make twined baskets and nets. Prehistorically, split pine roots were used in the Danish Mesolithic and Neolithic to bind twigs for fish traps (Juel Jensen, 1988b : 248).

Extensive experimentation directed toward « high power » use-wear analysis has been carried out with wood (Owen *et al.* 1984 ; Juel Jensen, 1988a : 82). It has included soft and hard woods, in both fresh and seasoned conditions (although not specifically driftwood). With the exception of the de-barking of wood, functional analyses of Paleolithic assemblages have tended to ignore bark and roots despite their numerous possible uses.

Other plants

The Indians of northern North America used a variety of fibrous plants (Helm, 1981 ; Trigger, 1978). For example, cordage was produced from the fibers of nettle, milkweed, wild flax and Indian hemp in the northeast and kelp on the Northwest Coast. Coiled baskets were made from rushes, coarse grass, maize husks, silk grass and wild hemp. Rushes were used to weave baskets, bags and mats for various purposes (*e. g.* flooring, covers for shelters). The fibers of Indian hemp and other plants were also woven into mantles and used to make nets.

Fibrous plants were also an important material for the Eskimos. Lantis (1984b : 215) writes of the Nunivak Eskimo that « the great use of grass, for kayak mats, matting on house benches and walls, coarse mats over drying fish to keep off flies, carrying and storage baskets, trinket baskets, socks and boot insoles, rope, and ceremonial ornamentation, was a characteristic shared with other Yupik, especially those on the Pacific coast, and with Aleuts ». Nelson (1983 : 43, 202-205) also discusses and illustrates Eskimo objects of grass, *e. g.* mats, baskets, bags, socks and boot pads. Grass was commonly used in boots as protection against cold, moisture and pressure (see *e. g.* Hatt, 1969 : 23-24). Remains of shoe grass were even found in an inner sock of skin recovered from the permafrost at the ca. 4 000 year old Sarqaq site of Qeqertaussuk in Greenland (Gronnow and Melgaard, 1988 : 437).

The Aleuts most often used the fiber of dune grass (*Elymus arenarius, subspecies mollis*) for their

baskets, mats, etc. (Lantis, 1984a : 169-170). It was split into fine strands and worked with a two strand twining technique while wet to prevent breaking. Colored designs were made with feathers and other materials.

Other types of plants were used regionally. In the northeast gourds were made into bowls, dishes, ladles and water bottles (Goddard, 1978 : 217). One account also mentions the use of locust thorns as needles (Goddard, 1978 : 227). The Indians also decorated their clothes with plant materials. Throughout the area of study, dried fruits and seeds were made into beads for necklaces and the ornamentation of clothing. Plant dyes were also produced and used to color quills, moose hair, etc.

Remains of objects produced from plants are seldom preserved in archeological contexts. Finds of prehistoric basketry are known from the Great Basin region of North America. According to Adovasia (1986 : 194), « controlled excavations in the abundant dry caves and rockshelters in nearly all sections of this area have yielded basketry collections that span more than 10,000 years of occupation ». Materials varied locally and included tule (*Scirpus* sp.), cattail (*Typha latifola*), sagebrush (*Artemisia tridentata*), true rush (*Juncus* sp.), willow (*Salix* sp.), cane (*Phragmites* sp.), Indian hemp (*Apocynum* sp.), milkweed (*Asclepias speciosa*), cedar (*Juniperus osteosperma*), cliff rose (*Cowania mexicana*), white sage (*Eurotia lanata*) and squaw bush (*Rhus trilobata*) (Adovasia, 1986 : 203).

Although there have been numerous experiments with grasses and reeds (see Owen *et al.*, 1984 ; Juel Jensen, 1988a : 82), analysts working with material from the Upper Paleolithic of Europe have often overlooked the non-food value of plants. In her functional analysis of the lithic artefacts from the French sites of Pincevent and Pont d'Ambon, Moss (1983 : 73) writes : « Plant working experiments were minimal because I felt that even if plants formed a significant part of the final Palaeolithic diet, stone tools would not be used to procure them». The use of plant materials by hunters and gatherers of the Arctic and the age of archeological finds from the Great Basin show that the working of plant materials with lithic tools in the Upper Paleolithic should not be excluded without further investigation.

Conclusions

This survey of ethnographic reports on the Inuit, Aleuts and Indians of northern North America has shown that they used a much larger spectrum of organic materials in the production of goods than is represented in most « high-power » use-wear experimental programs. Materials that decay rapidly and are thus seldom preserved in archeological contexts are often neglected or overlooked entirely. Some of these, such as horn and bark, have numerous possible uses, whereas others, *e. g.* beaks, claws and quills, have more limited applications. Experimentation is also restricted in the ways that materials are worked. Possible non-food uses of commonly studied animal and plant substances, *e. g.* fish and bird skins, inner organs, grasses and seeds, are often ignored. Archeological finds demonstrate that some of these materials were employed in similar ways prehistorically.

Functional studies may also underestimate the possible uses of plant materials in Arctic environments. The Inuit and Aleuts used fibrous plants to make mats, baskets, bags, socks and boot pads. Although scarce, wood was a highly valued material throughout the Arctic. It was of especial importance for the production of long implements, *e. g.* weapon shafts and tent poles, kayak frames, handles, plates and containers.

Since the interpretation of microwear traces on archeological artefacts is based on comparisons with the traces on experimental tools, a comprehensive program of experiments is of the utmost importance for functional studies. Despite the number of use-wear studies that have been carried out on archeological assemblages, research is still limited in many aspects. This study has revealed several materials and tasks previously neglected or overlooked entirely in use-wear analyses. The need for more fundamental research is also shown by finds of undeterminable polishes on archeological artefacts. New experiments increase not only the number of materials and tasks that can be recognized, but also the accuracy with which previously studied materials and tasks can be reconstructed.

* *Institut für Urgeschichte, Universität Tübingen, Schloß, 7400 Tübingen, Germany.*

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