Archaeobotany of the Central Aleutian Islands

Research Grant Proposal

Holly Thorssin
Undergraduate, Anthropology, UAA
December 6th, 2011
Faculty Advisor: Diane Hanson

Abstract and Goals:

Few resources document Aleut or *Unangan* plant use before Russian contact, emphasizing the need for multiple lines of evidence to understand Aleut subsistence. What we can gather from written histories, plants contributed to *Unangan* subsistence providing variety to the diet, nutrients, favorite foods at winter festivals, medicine, and significance in cleansing, hunting, and menstruation rituals. Archaeological evidence supplements ethnohistorical sources and provides the potential to develop new data about *Unangan* subsistence and storage strategies. In 2011, University of Alaska Anchorage archaeologists conducted the only excavation to date of an upland house in the Aleutian Islands, partly with the intention of recovering plant remains. The goal of this project is to analyze plant remains collected in sediment samples from the house floor to determine the season of year the house was occupied, the plants used, and the processing activities that took place in the house. These data will ultimately be compared to samples from a coastal site to determine if activities from the upland site are different. The objectives of the proposed project are to become trained to identify micro and macrobotanical remains from an archaeological context, and to analyze plant remains recovered in floor samples and a storage feature from the upland site on Adak Island. Training in methods of macro and micro plant particle identification would also be applicable to other Alaskan research. In a place where coastal settlement and resources have defined research until recently, materials from the first inland and upland excavation may provide an opportunity to redefine our understanding of *Unangan* settlement and subsistence on the landscape.

Naoko Endo is an archaeobotanist working at the Department of Archaeology at Simon Fraser University in Burnaby, British Columbia, Canada. She has agreed to train me in the identification of micro and macrobotanical remains over three days in February 2012 in the archaeological laboratories there. This training will include the extraction, recognition and identification of starches, phytoliths, and pollens from an archaeological context. When I return to Anchorage I will apply those techniques to the plant remains I have recovered from sediment samples from ADK-237, an upland site on Adak Island. The analysis may extend through the summer of 2012. I will present preliminary results in the April 2012 Undergraduate Research and Discovery Symposium and a report to the office of Undergraduate Research by May 30, 2012. Later, I will present a report to the U.S. Fish and Wildlife Service, a paper at the 2013 meeting of the Alaska Anthropological Association, and I will write a publishable paper of the results.

Introduction:

Aleutian Island history, as documented since 1741 by Russian fur traders, explorers, missionaries, and fox trappers, reflects the prevailing economic, spiritual, and gender biases of the era. The primary aim of the Russian fur hunters was economically valuable sea mammal pelts while the edible, medicinal, and ritual use of plants and women's occupations were of minor interest. Early historic accounts predictably reflect this emphasis. Ethnohistories often date to the early 18th century after which over 80% of the indigenous people had died, resulting in the loss of traditional ecological knowledge about plants that had been passed down verbally through generations (Lantis 1970). The priest and missionary Father Ivan Veniaminov lived in Unalaska from 1824 to 1834, and his are some of the earliest, detailed, and reliable reports we have about

the *Unangan* way of life. He wrote, "Despite all my effort (sic) to learn their former customs, I could not fully attain this because of their excessive shyness and reluctance to relate what now seems to them either ridiculous or improper" (1984:188). In sum, accurate sources of written records that pertain in even small part to *Unangan* use of plants before contact are often rare or focused on the sea mammal hunting industry and values shaped by the Russian Orthodox Church. These same accounts influence archaeological interpretations to this day.

From later ethnohistoric documentation too, we gather that women and children harvested leaves, stems, and roots that provided staples of *Unangan* food, medicine, basketry and mat-making materials, fuel, dyes, and even fishing gear (Bank 1953, Collins et al. 1945, Coxe 1966, Liapunova 1996, Milan 1974, Turner 2008, Veniaminov 1984). Langsdorff, observed in 1805, "...many sorts of roots, are collected, when they are ripe, by the women and children, and laid up for winter stores" (in Hrdlicka 1945:93). Plant gathering in the spring and fall seasons would have required a comprehensive understanding of plant biology, habitat, seasonal availability, proper processing techniques, and applications to food, medicine, raw materials, and even ritual.

Theodore Bank (1953) estimated that traditional *Unangan* society used fifty different plants for a variety of purposes. Lydia Black (1984) lists fish, sea mammals, and roots as the most important elements of *Unangan* diet and noted that chocolate lily, ground and eaten with sea mammal oil, was a favorite at winter festivities. Also called *sarana*, this plant was gathered extensively in autumn and could be powdered, boiled, roasted, fried, or soaked in seal oil to store for the winter (Collins et al. 1945:69, Coxe 1966, Golodoff 2003, Turner 2008:161). Known as ***makarsha*** by the Russians, the roots of bistort were stored and eaten medicinally by people who had a fever (Bank 1953, Hrdlicka 1945, Garibaldi 1999, Golodoff 2003, Veltre et al. 2006). The yellow summer flowers of the *Narcissus anemone* were also used as fishing lures (Veltre et al. 2006).

Plants like chocolate lily, wild rye, horsetail, and lupine roots also held conceptual power. Woven into *Unangan* oral legend and often associated with women, these plants were endowed with powers to form emergency roads to other islands, allow humans to shape-shift, poison enemies, and open doorways to subterranean worlds. They were also featured in place names like *Sarana Cove* or *Black Lily Bay* (Bergsland and Dirks1990, Veltre et al. 2006). The case of white bog orchid demonstrates again that these plants held great power in *Unangan* perceptions; the roots of this plant, although commonly eaten by the rest of the population, were forbidden from the diet of a growing boy. Non-observance of this prohibition would mean that the boy's uncle would fail at sea during the hunt (Bergsland and Dirks 1990:207). Separation rites of first menstruation were observed with the use of *Angelica lucida* for cleansing, which was also useful for cramps (Golodoff 2003, Veltre et al. 2006). When burned, angelica was believed to ward off seasickness and this plant was also valued by shamans to bring luck (Black 1984). These stories and beliefs that surround plants constitute part of a broad system of traditional ecological knowledge that pertained particularly to the seasonal work and lives of women. Valuable references include contemporary books about *Unangan* and Inupiaq use of plants (Golodoff 2003, Jones 2010) along with the work of ethnographers, anthropologists, and archaeologists (Bank 1950, Laughlin 1980) who observed and studied the *Unangan* people and their ancestors' material record of settlement and burials.

Preservation in the archaeological record favors stone and bone resources and technology and not organic plant remains that decay rapidly. This lack of visible plant remains leads to a tendency to disregard the importance of plant resources. Paleobotanical materials that are "...charred [carbonized], waterlogged, desiccated or mineralized" (Schlumbaum 2008:233, Pennington and Weber 2004) have the best chance of preservation; waterlogged and slightly acidic soils are often anaerobic and thereby encourage a low rate of microorganism activity (Pearsall 2010). Those plants with a tough exocarp or hard outer casing like a seed, and dense structure are most likely to remain in macrobotanical form.

Unlike their macro-counterparts, microbotanical remains such as starches, phytoliths, and pollens are more likely to persist in the record although their presence is not immediately obvious to the field researcher (Hastorf 1999, Lepofsky et al. 2001, Pearsall 2010, Pennington and Weber 2004). Starches have been identified in an archaeological site on the northern Solomon Islands from 28,000 years ago providing proof of their resilience (Loy, et al. 1992). Phytoliths are plant bodies made of silica that is retained from the groundwater in the form of monosilicic acid (Pearsall 2010). These silicified plant tissues are particularly resistant to decomposition from weathering as demonstrated from their identification at the 1.75 million year old Dmanisi Site in Georgia in Eastern Europe (Messager, et al. 2010). In regard to pollens, the high level of precipitation and saturation of the soil in the Aleutian Islands inhibits their breakdown by oxygen. Coupled with average low temperatures, the likelihood of pollen preservation in the Aleutian Island archaeobotanical record is high (Bank1953, Pearsall 2010).

Additional evidence for subsistence plant use is found in the vegetation that grows today on Aleutian Island village sites. Plants such as rye grass, cow parsnip, chocolate lily, angelica, yarrow, and lupine often predominate. Additional archaeological evidence of subsistence practices in relation to plants may be found in sub-floor storage features that likely held raw or processed plants and fish and sea mammal meat (Corbett, et al. 2001, Hoffman 1997, 1999, Jochelson 1925, Knecht and Davis 2008, Maschner 1999). One such storage feature was found during the 2011 excavations. Storage pits were located both outside and inside the semi-subterranean, sod-covered *barabaras* in which the *Unangan* people resided. Jochelson's (1925:35) excavations from 1909-1910 uncovered, "... half-decayed roots of *Polygonum viviparum* [bistort] and *Fritillaria kamtschatica* [chocolate lily]" from a 30 cm round and 90 cm deep storage feature that was covered with flat rocks. The location and contents of these storage features may indicate something about the economic use of surplus, the type of surplus, the storage of raw materials like grasses for the floor and for basketry, season of site occupation, and even details about the organization of the household economy.

Project Design:

This grant will allow me to undertake three days of training at Simon Frasier University in laboratory methods of chemical extraction, analysis, and identification of microbotanical remains from an archaeological context. The identification of starches, phytoliths, and pollens focuses on the characteristic morphological features.

During the summer of 2011, I participated in an upland house excavation with Dr. Diane Hanson on the west side of Adak Island. A one liter soil sample was collected from each 20-centimeter

section in the northwest of every 2X2-meter excavation quadrant. It was measured, and recorded by quadrant and depth below the surface, then removed at the end of the excavation.These samples come from within the house, the surrounding midden, and from an outside storage feature. A section from a control pit excavated off-site was also sampled, providing a total of ten areas sampled in continuous stratigraphic layers. From these liter samples, sixteen ounces were passed through a flotation machine (Flote-Tech, Dausman Technical Services) in the laboratory during the Fall 2011 semester. The flotation machine pushes air through a water bath tofacilitate the retrieval of light and heavy botanical remains that are then air dried and analyzed for morphological attributes. As soil samples of a constant size are slowly added, the heavier material (fraction) sinks to the mesh at the bottom while the lighter fraction of botanical materials floats to the top and out a spillway from the side of the reservoir into a fine mesh cloth, or series of screens (Pennington and Weber 2004). Light botanical materials would have otherwise passed through the 6.4mm (¼-inch) screen typically used in the field to sift dirt during the excavation. These flotation samples have been set aside for future identification. The other half, a 454-gm (16 ounce) portion, awaits micro analysis for starches, phytoliths, and pollens.

Anticipated Results:

According to relatively rare ethnohistoric records about *Unangan* plant use and storage before contact, we know that botanical resources played a significant role in nutritional, medicinal, and ritual adaptations. I expect tofind micro or macrobotanical remains in samples from the inland house floor and outside storage feature at ADK-237. Plant remains that are known to have been harvested in quantities include chocolate lily, white orchid, angelica, cow parsnip, sea lovage, rye grass, kelp, lupine, and sorrels, to name a few (Bank 1953, Collins et al. 1945, Coxe 1966, Golodoff 2003, Hrdlicka 1945, Liapunova 1996, Turner 2008, Veniaminov 1984). Each of these plants is harvested for edible and medicinal purposes at a specific time of the year and a preponderance of any one type of starch, phytolith, or pollen remains may provide details about subsistence, medicinal, or ritual activities that were taking place in this inland settlement. The analysis of pollen granules from the house floor may provide further evidence for season of occupation.

Potential problems include the possibility that plant remains like starches, phytoliths, and pollen did not survive in the soil. There is an additional possibility that comparative reference collections here in Alaska may not include plants that were relevant to *Unangan* subsistence, and this would inhibit their positive identification.

This will be the first inland analysis of microbotanical remains in the Aleutian Islands, and the first of its kind for the Central Aleutian Islands. Identification of plant remains in an inland and upland ecosystem will allow us to determine the types of human activities associated with particular plant resources, in particular settlement patterns, at particular times of the year. For example, did inland sites function as central locations for the seasonal harvest of terrestrial resources like plants? Pollen and certain types of plants that are harvested only at particular times of the year (roots in the fall, shoots in the spring) may provide valuable evidence about season of occupation and the functional importance of inland sites. Were these plants processed and stored for long-term consumption, as suggested in ethnohistories, and if so where? Data from storage features, as was found during the 2011 excavation on Adak, and hearth areas are particularly

relevant to this question. Another question is whether the eruption of volcanoes had an effect on the flora as it is represented directly above tephra layers in the archaeological record. The answers to these questions, through micro and macrobotanical analysis, will allow us to understand *Unangan* subsistence patterns in a wider context, beyond the traditional coastal focus. I intend to pursue future systemic comparison of archaeobotanical remains (macro and microscopic) between inland and coastal areas in the Aleutian Islands through graduate research at the University of Alaska Anchorage. My goal will be to interpret *Unangan* plant use, in both inland and coastal contexts, and in light of ethnohistorical and archaeobotanical evidence. I am interested in seeking a more holistic view of *Unangan* subsistence patterns to include the work of female harvesters beyond the coastal parameters of most research.

Budget

February 25-29, 2012

Roundtrip Airfare to Vancouver
This supports the initial objective of being trained in archaeobotanical techniques by Naoko Endo at the Department of Archaeology, Simon Fraser University in Burnaby, British Columbia. I will purchase a Full Flex ticket so I will not have to purchase a second ticket if I need to rebook because of unforeseen schedule changes, or if I need to extend the training time to accomplish the project objectives.
$1324.41

Professional training with archaeobotanist Naoko Endo 10 hours/day @ $20/hr for 3 days:
Naoko Endo is an archaeobotanist with expertise in the techniques I need to learn before I can analyze the material from Adak Island.
$600.00

Total Expenses: **$1924.41**

References:

Bank, Theodore P. II
1950 *The University of Michigan Expedition to the Aleutian Islands, 1948-49*. Botanical Gardens and Museum of Anthropology, University of Michigan, Ann Arbor.

1953 Biological succession in the Aleutians. *Pacific Science* 7:493-502.

Black, Lydia
1984 *Atka, An Ethnohistory of the Western Aleutians*. Brown and Martin Ltd., Kingston, Ontario.

Bergsland, Knut and Moses L. Dirks
1990 *Unangam Ungiikangin Kayux Tunusangin, Unangam Uniikangis Ama Tunuzangis, Aleut Tales and Narratives*. Collected by Waldemar Jochelsan. Fairbanks: Alaska Native Language Center, University of Alaska.

Collins, Henry B. Jr., Austin H. Clark, and Egbert H. Walker
1945 *The Aleutian Islands: Their People and Natural History (With Keys for the Identification of the Birds and Plants)*. Washington, D.C.: Smithsonian Institution.

Coxe, William
1966 *The Russian Discoveries Between Asia and America*. Readex Microprint, United States.

Garibaldi, Ann
1999 *Medicinal Flora of the Alaska Natives*. Alaska Natural Heritage Program, Environment and Natural Resources Institute, Anchorage: University of Alaska.

Golodoff, Suzi
2003 *Wildflowers of Unalaska Island: A Guide to the Flowering Plants of an Aleutian Island*. Fairbanks: University of Alaska Press.

Hastorf, Christine A.
1999 Recent Research in Paleoethnobotany. *Journal of Archaeological Research* 7(1):55-103.

Hoffman, Brian W.
1997 Communal Life: The Organization of Unangan Houses on Unimak Island, AD 1550-1750. *Laboratory for Arctic and North Pacific Archaeology* Report No. 3, Madison: University of Wisconsin.

1999 Agayadan Village: Household Archaeology on Unimak Island, Alaska. *Journal of Field Archaeology* 26(2):147-161.

Hrdlicka, Ales
1945 *The Aleutian and Commander Islands and Their Inhabitants*. Philadelphia: The Wistar Institute of Anatomy and Biology.

Jochelson, Waldemar
1925 *Archaeological Investigations in the Aleutians*. Publication 432. Washington D.C.: Carnegie Institution of Washington,

1968 *History, Ethnology and Anthropology of the Aleut*. Netherlands: Oosterhout N.B.

Jones, Anore
2010 *Plants That We Eat, Nauriat, Niginaqtuat: From the Traditional Wisdom of the Inupiat Elders of Northwest Alaska*. Fairbanks: University of Alaska Press.

Knecht, Richard and Richard Davis
2008 The Amaknak Bridge Site: Cultural Change and the Neoglacial in the Eastern Aleutians. *Arctic Anthropology* 45(1): 61-78.

Lantis, Margaret
1970 The Aleut Social System, 1750to 1850, from Early Historical Sources. In: *Ethnohistory in Southwestern Alaska and the Southern Yukon: Method and Content*, edited by Margaret Lantis. Louisville: University of Kentucky Press.Pp. 139-311.

Laughlin, William S.
1980 *Aleuts: Survivors of the Bering Land Bridge*. New York: Holt Rinehart and Winston.

Lepofsky, Dana, Madonna L. Moss, and Natasha Lyons
2001 The Unrealized Potential of Paleoethnobotany in the Archaeology of Northwestern North America: Perspectives from Cape Addington, Alaska. *Arctic Anthropology* 38(1): 48-59.

Liapunova, Roza G. (Marvin W. Falk, Editor)
1996 *Essays on the Ethnography of the Aleuts (at the End of the Eighteenth and the First Half of the Nineteenth Century)*. Translated by Jerry Shelest. Reprinted. Fairbanks: University of Alaska Press.

Loy, Thomas H., Matthew Spriggs, and Stephen Wickler
1992 Direct Evidence for Human Use of Plants 28,000 years Ago: Starch Residues On Stone Artefacts from the Northern Solomon Islands. *Antiquity* 66:898-912.

Maschner, Herbert D.G.
1999 Prologue to the Prehistory of the Lower Alaska Peninsula. *Arctic Anthropology*, 36(1-2): 84-102.

Messager, E., D. Lordkipanidze, C. Delhon, and C.R. Ferring
2010 Palaeoecological Implications of the Lower Pleistocene Phytolith Record from the Dmanisi Site (Georgia). *Palaeogeography, Palaeoclimatology, Palaeoecology* 288(1-4): 1-13.

Milan, Leda Chase
1974 Ethnohistory of Disease and Medical Care among the Aleut. *Anthropological Papers of the University of Alaska* 16(2):15-40.

Minnis, Paul E.
2000 *Ethnobotany: A Reader*. Norman: The University of Oklahoma Press.

Pennington, Heather L., and Steven A. Weber
2004 Paleoethnobotany: Modern Research Connecting Ancient Plants and Ancient Peoples. *Critical Reviews in Plant Sciences* 23(1):13-20.

Pearsall, Deborah
2010 *Paleoethnobotany: A Handbook of Procedures* (2nd ed). Walnut Creek, CA: Left Coast Press.

Schlumbaum, Angela, Marrie Tensen, and Viviane Jaenicke-Despres
2008 Ancient Plant DNA in Archaeobotany. *Vegetation, History and Archaeobotany* 17:233-244.

Turner, Lucien M. (Raymond L. Hudson Editor)
2008 *An Aleutian Ethnography*. Fairbanks: University of Alaska Press.

Veltre, Douglas W., Catherine L. Pendleton, Stephanie A. Schively, Jessica A. Hay, and Natalia Tatarenkova
2006 *Aleut/Unangax Ethnobotany: An Annotated Bibliography*. Conservation of Arctic Flora and Fauna, Flora Technical Report, No. 14, CAFF International Secretariat, Akureyri, Iceland.

Veniaminov, Ivan (Richard A. Pierce, Editor)
1984 *Notes on the Islands of the Unalaska District*. Translated by Lydia T. Black and R.H. Geoghegan. Reprinted. The Limestone Press, Ontario and the University of Alaska Fairbanks.

Wright, Patti
2003 Preservation or destruction of plant remains by carbonization? *Journal of Archaeological Science* 30:577-583.

Project Timeline

February 26- February 28, 2012:
Training by Naoko Endo, an archaeobotanist at Simon Fraser University (Burnaby, British Columbia, Canada), in laboratory methods of micro and macrobotanical analysis.

March-April, 2012:
Apply techniques from laboratory training to the analysis of botanical samples collected during the 2011 field season from inland excavation ADK-237; research will take place in the UAA archaeology lab.

April 15, 2012:
Presentation of preliminary results at the Undergraduate Research and Discovery Symposium

May 15, 2012:
Submit expenditures

May 30, 2012:
Submit final report to the Office of Undergraduate Research

Summer 2012:
Continue analysis of microbotanical remains from ADK-237 at UAA

December 2012:
Submit report of the results of the archaeobotanical analysis to the U.S. Fish and Wildlife Service

March 2013:
Presentation of results in a student paper at the 40th annual Alaskan AnthropologyAssociation Meeting

April 2013:
Preparation of a publishable paper with the results of the archaeobotanical analysis for a professional journal.