

# THE *UNDervalued* BLACK KATY CHITONS (*KATHARINA TUNICATA*) AS A SHELLFISH RESOURCE ON THE NORTHWEST COAST OF NORTH AMERICA

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## ABSTRACT

From the earliest movements of people onto the Northwest Coast of North America, black Katy chitons (*Katharina tunicata*) probably provided an important source of animal protein, as well as vitamin A and calcium. Archaeological studies often under-recognize their sometimes substantial contributions to the shellfish diet. A review of the ethnographic literature suggests their importance on the central and north coast; findings include a wide variety of recipes as a special meal, naming of high rank nobility “chiton,” and the very creation of women and all humans in some oral histories. This Native importance may reflect the deep-rooted transformation of this basic resource that helped support the First Peoples. Archaeologist may need to expand their bi-valve studies to better include the contribution of this eight valve/plate mollusk.

## Introduction

During the summer of 2013, I was part of a team of archaeologists exploring the wet site potential of the Labouchere Bay area, Prince of Wales Island, Southeast Alaska (Fig. 1). The research was led by Dr. E. James Dixon and graduate student Mark Williams of the University of New Mexico, and logistically supported by Pacific Northwest Archaeological Services and wet site specialists from Japan. One of our goals was to excavate waterlogged ancient clam beds, with the hopes of examining the extent of reliance on maritime resources of Alaska’s early period peoples, who were potentially associated with the nearby and well-known On-Your-Knees Cave (PET 408; Fig. 1).

One site area in particular exhibited fauna in non-wet shell midden deposits on a raised terrace, approximately 10 m above mean tide today, with a calibrated age (IntCal13) from a depth of 150 cmbd of 6,642–6,496 cal yr B.P. A noticeably common invertebrate shellfish at this raised midden area was the black Katy chiton (*Katharina tunicata*) (Fig. 2).

Only once previously had I worked on a shell midden with an unusually high concentration of black Katy chiton plates; during my 1968 University of Washington (UW) field school we found similar concentrations at the Watmough Bay/Bight site (45-SJ2-80) Lopez Island, Washington State with <sup>14</sup>C dates from approximately 3,000 B.P. (Daniels 2009:181–182, Taylor 2012:86–87; Fig. 1).

With these site emphases on black Katy chitons, and their common occurrence in many other Northwest Coast sites, this article examines the black Katy chitons and their economic and cultural value along the ancient Northwest Coast of North America and into the ethnographic period.

The often discussed concept of the *kelp highway*, providing a route for first peoples onto the northwest coast of America and eventual occupation of the continent, recognizes marine peoples' use of abundant chitons on the rocky shores of the kelp beds; chitons would be a major source of shellfish nutrients and part of the original maritime diets (Erlandson et al. 2007:167). This incipient importance may still be reflected in Haida origins stories on the North Coast, where chitons are said to have birthed the first human females and males here (see ethnography section, below).

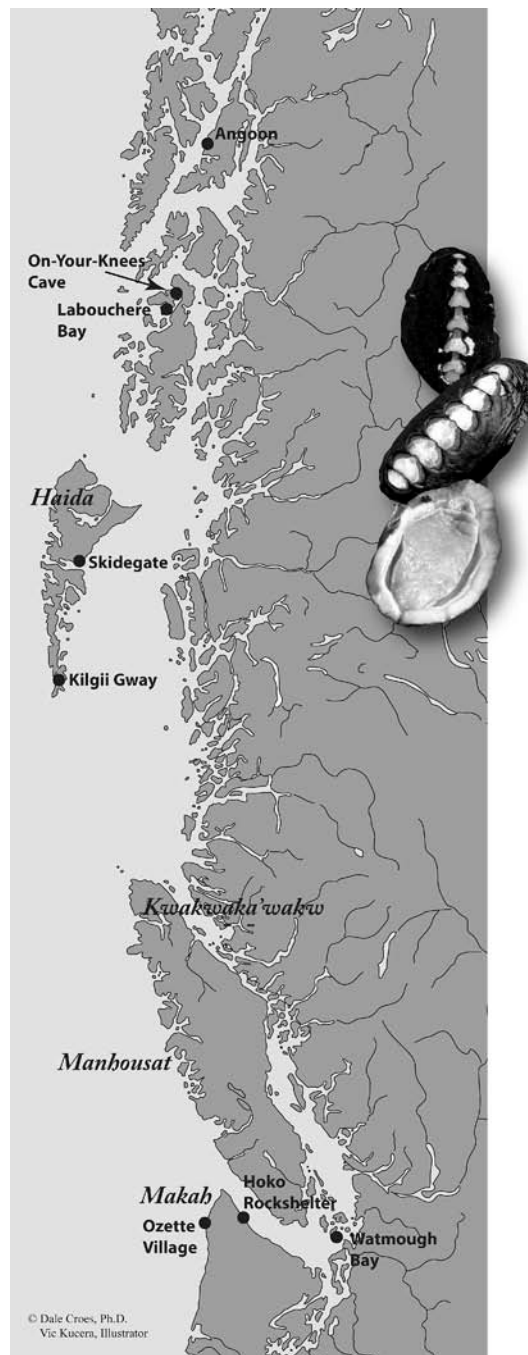


Fig. 1. Location of archaeological and ethnographic areas discussed in study (map courtesy of Vic Kucera).

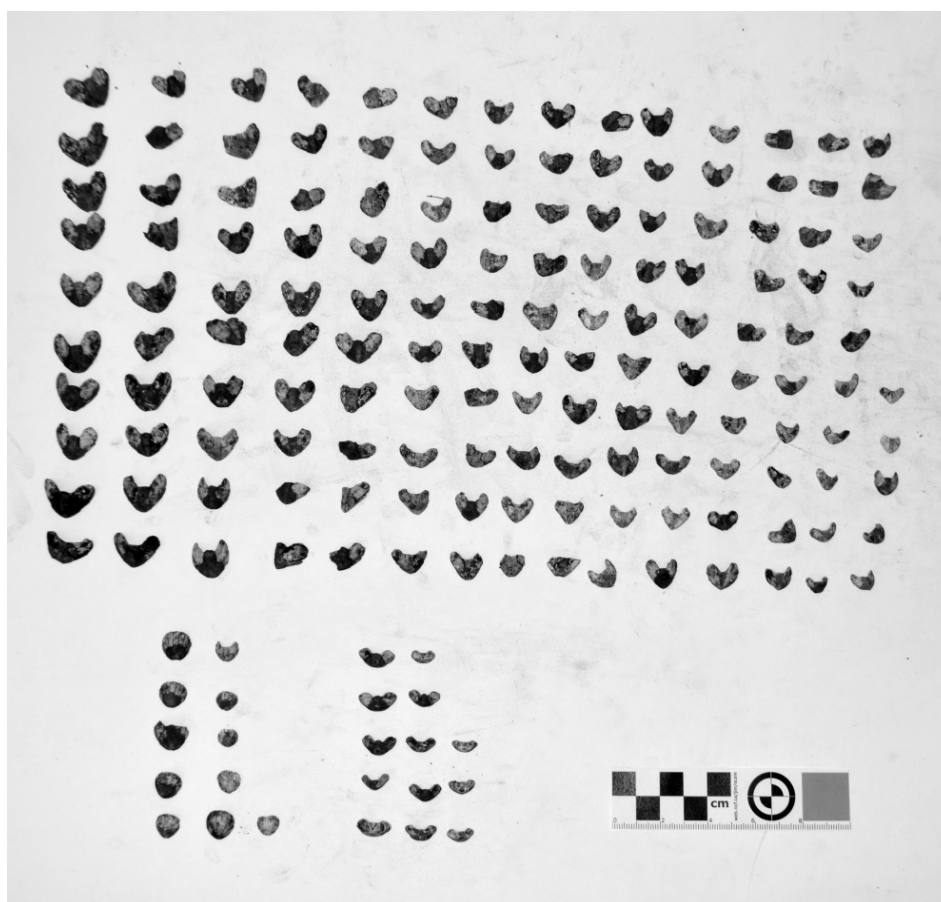


Fig. 2. Photograph showing black Katy chiton (*Katharina tunicata*) plates from Test Unit D, Elderberry midden site, Labouchere Bay, Prince of Wales Island, Alaska. Lower left of photograph shows mostly front anterior “nose” plates (see Fig. 4; photograph by Mark Williams, 2013).

### Black Katy Chiton (*Katharina tunicata*) Characterization

This chiton species grows to about three inches (7–8 cm), having six winged insertion plates and a nose anterior and posterior plate along its back (Figs. 2 and 4). They inhabit the mid-intertidal rocky beaches in exposed wave-swept shorelines (Figs. 3 and 4). Black Katy chitons do well in this mid-intertidal zone in steep rocky shores, high energy surf, and large tidal ranges. Today the site area of Labouchere Bay is a low-energy mud-flats tidal beach—perhaps 6,550 years ago a higher sea level would expose vertical bedrock here and provide a high-energy surf habitat for chitons. This chiton, unlike some other species, is not extremely sensitive to light and can be found in the open, often in kelp bed areas, feeding on algae. It has a short life span of about three years, and is an edible size by two years old—so there would be a quick recovery of harvested areas with new generations replacing previous ones.

Live meat weight, after removing plates, was calculated to average 52.4 g in research at the Ozette site (45-CA-24) in Washington State (Wessen 1983:122). A single chiton would provide an estimated 42 kcal (Drury 1985:93). In *Nutrients in Native Foods of Southeast Alaska* Helen M. Drury described the particular value of black Katy chitons as:

. . . a good source of vitamin A [approx. 248 RE per chiton]. 100 g [2 chitons] contained nearly 1/4th of the RDA for both riboflavin and niacin and more than 1/8th of the RDA of calcium. This nutritious member of the mollusk family, popularly called gumboots, is very well liked by SE Alaska Natives. Chitons can be gathered from the rocks of the rugged coastline during low tides. (Drury 1985:96–97)



Fig. 3. Chitons in mid-tidal area habitat grazing for algae (top photographs); Chitons from Hoko River mouth area, top and bottom views (bottom photographs).



Fig. 4. Plates with anterior plate to left, six insertion plates, and posterior plate to right—MNI is determined by counting anterior and posterior plates and the larger number represents MNI.

## Northwest Coast Archaeological Significance of Black Katy Chiton

Exploring overviews of sites in the central and northern Northwest Coast showed that black Katy chitons were a significant shellfish in outer coast archaeological sites near rocky high-energy exposed beaches. In the central Northwest Coast overall fauna from 19 sites were examined in the Salish Sea and the outer coast of Washington as a general synthesis of regional data (Butler and Campbell 2004). Two outer coast sites demonstrated a significant emphasis on black Katy chitons, ranking second at both sites in terms of shellfish meat-weight contribution: the Ozette Village wet site (45-CA-24) and the Hoko Rockshelter (45-CA-21) (Miller 1983; Wessen 1983; Croes 2005; Fig. 1).

At Ozette, Gary Wessen estimated the relative contribution of major shellfish species to live meat weight total, with corrected data, showing all chitons providing 26%, the highest percentage, and California mussels (*Mytilus californianus*) second, providing 24%, with an estimated meat weight contribution of all species of 4,057,889.2 g; over a million grams each of chitons and mussels (Wessen 1983:61–64). Since California mussels can be collected easily in large patches and chitons must be pried off one by one, these results are particularly noteworthy in terms of their dietary intake at this outer-coast site.

Horizontal samples were systematically taken from across the surface of the Hoko Rockshelter, by David Miller, which he used to estimate the raw shelled meat weight (RSMW) contribution of the different shellfish species. California mussels provided by far the most contribution of meat weight at 70%, however black Katy chitons ranked second with 6.2%, followed by butter clams (*Saxidomus giganteus*: 4.3%), crab (3.0%) and then littleneck clams (*Protothaca staminea*: 2.8%) (Miller 1983:98–104; Croes 2005).

Both Ozette and Hoko Rockshelter are outer coast sites that were occupied contemporaneously (Fig. 1). The high rank order abundance of black Katy chitons to dietary intake has not been given appropriate attention, with more focus on use of bivalve mussels and clams.

In Puget Sound, recent excavations of two 1 x 1m excavation units (EXUs) at the Watmough Bay/Bight site (45-SJ-280; Fig. 1) supported my 1968 non-quantitative observations of high black Katy chiton use at this inside coast site; this species ranked second in percent MNI of shellfish abundance in both units: EXU 1: 50% common littleneck clam (*Protothaca staminea*), 16% black Katy chiton; EXU 2: 30% common littleneck clam, 27% black Katy chiton (Daniels 2009:180–182).

On the north coast, the region of Labouchere Bay sites, Madonna Moss provided a synthesis comparing eight sites near Angoon, Alaska (Fig. 1). Six of these sites had butter clams ranked first, indicating an emphasis on gravelly to mud-flat beaches. Black Katy chitons, from rocky exposed shores, ranked second in two sites, third in two other sites, and fourth in another two sites. Therefore, in six of the sites, black Katy chitons ranked second to fourth amongst ten species of shellfish (Moss 1993:636–638).

The oldest known wet site, the 10,700 years B.P. Kilgii Gwaay, Haida Gwaii, with excellent preservation of wood/fiber as well as vertebrate/invertebrate fauna, exhibited a strong dominance of California mussel in column samples (84% of shellfish weight); black Katy chiton plates occur in most of the samples, though less than 1% (Fedje et al. 2005:196; Rebecca Wigen, personal communications 2014; Fig. 1).

Therefore, where archaeological data were detailed enough to summarize in the central and northern Northwest Coast, black Katy chitons ranked high in a number of sites with access to high energy rocky exposed beaches. Their importance showed they have tended to be under-observed

in shellfish studies, where the bivalve species of clams and mussels have been given more attention. Chitons indeed need to be recognized as an important shellfish food resource in ancient Northwest Coast diets, especially since they must be collected one-by-one, versus being pried off in aggregated patches.

### Northwest Coast Ethnographic Importance of Black Katy Chiton

In both the central and northern Northwest Coast, black Katy chitons were gathered in areas of rocky exposed beaches and often noted as a desired food. Collecting was mostly in spring when they were said to be the most tender, though winter use offset having mostly dried foods, since chitons needed to be eaten fresh; no record was ever found of drying them for storage (for similar emphasis and use by Chugach Alutiiq, Kenai Peninsula, Alaska, see Salomon, Tanape, Huntington 2007). David Glen Miller (1983), in his Hoko Rockshelter intertidal resources analysis, pointed out that:

All groups of the central Northwest Coast valued black chiton, many of them considering it a great delicacy. Nootkan groups regarded them to be best in spring when the sea begins to warm up. It was believed that by July their flesh was tougher....

...Collection of the black chiton usually involved the use of a stick or knife which was used to pry the chiton from the rocks. The Kwakiutl used flat pointed hemlock branches for procuring the chitons and baskets for transporting them to a place where they were prepared for eating....

There is an incredible variety of ways in which the black chiton can be prepared for consumption. Upon occasion they even were eaten raw by certain Nootkan groups (Manhousat, Makah). Also, the Kwakiutl had preliminary preparation methods which were used at times before cooking. The method involved soaking the chitons in a dish of fresh water for four days, after which they were cleaned and soaked for another day (1983:47–48). The common ways to cook chitons include various means of boiling or steaming in pits and then cleaning out the plates and internal organs, and often the black skin, before eating (Boas 1921:481–484; Ellis and Swan 1981:38). Also roasting next to the fire, placing them on hot coals for a few minutes or in cracks in the firewood to cook in own juices—tongs were used for placement and removal (Ellis and Swan 1981:37; Miller 1983:49; Fig. 1).

Eating chitons raw may involve cutting off the foot and chewing it like gum. Also raw whole chitons were pounded with rocks or sticks until softened and then the plates and inside organs removed before eating. Eating raw chitons was said to have medicinal value as a relaxant, though too many can lead to becoming too relaxed and/or dizziness and one would have to lay down for awhile. Makah Elders interviewed by the author referred to this effect of eating raw chiton feet as “having good dreams.” The Manhousat also had a women’s feast/gathering in the spring season where soaked-pounded chitons were eaten raw while enjoying each other’s company and gossip. Men would often come sit outside the circle of women, where they could be passed soaked-pounded raw chitons to eat (Ellis and Swan 1981:36).

In discussing the abundance of chiton in the Hoko Rockshelter site (calculated as second in raw meat weight contribution for shellfish, above), Miller summarized his findings, which contradicted his predictive modeling, with some interesting observations:

....This species is represented in the sampled occupation level more than would be expected based on the model. The black chiton seems to have the greatest variety of ways of being prepared for eating. Each of these ways affects a different and unique taste and/or texture of the food. A great preference for this species may have resulted if individuals preferred a particular type of culinary experience rather than a particular species. This does not seem unlikely if one considers the current use of the potato as a common meal supplement that has a great variety of means of preparation. (Miller 1983:174)

Madonna Moss recently analyzed Franz Boas' detailed description of the central coast Kwakwaka'wakw hunting, fishing and food gathering activities in his *Ethnology of the Kwakiutl* (1921). Boas promoted the research approach of *historical particularism*, as reflected in his recording detail. In his discussion of recipes, he listed 155 dishes, with the most for salmon (n = 33). For shellfish recipes Moss noted:

....7 for chitons, 6 for "sea eggs" (sea urchins), 2 for barnacles, and 1 for winkles (whether these are periwinkles [*Littorina sitkana*] or dogwinkles [*Nucella*] is unclear). Only one recipe involves clams—a soup that calls for a mere four clams mixed with chopped seaweed. The relative lack of attention to shellfish, especially to clams, is striking. Was it that clams were so common that everyone knew how to cook them for immediate consumption or dry them for storage?

....Even though clam-digging and shellfish collecting are portrayed as women's work, men are described as the collectors of large chitons (*Cryptochiton*), for example, '...[w]hen a man wants to eat chitons, he launches his small canoe at low water, and goes to a place where he knows there are many chitons' (Boas 1921:484–485). Boas goes on to describe how a man butchers and cooks chitons. This suggests that chitons were desirable, and required specialized knowledge to find. In another chiton recipe, a woman obtains chitons, and in others the term "gathered" is used, suggesting women (Boas 1921 480–483). In yet another recipe (Boas 1921:483–484), the woman prepares chitons while her husband invites his relatives to join them in eating, indicating that chitons were a special food, worthy of serving to guests. (Moss 2013:12–13)

Boas' recipes included varieties of preparing both large (*Cryptochiton*) and smaller chitons (esp. *Katharina tunicata*) raw, through boiling, and roasting in fire, similar to central coast Nuuchah-nulth accounts above.

On the North Coast, Haida accounts by Solomon Wilson of Skidegate, Haida Gwaii, recorded by David W. Ellis, discussed preparation—including eating raw, roasted in fire, and boiling—and a cooking contest legend involving black Katy chitons:

In the early days these small chitons were often eaten raw as a snack food.... First the chitons were carefully pried from the rocks with a knife or digging stick. If they were damaged or wounded at this time, they would be too tough to eat raw. After

they had been soaked for two or three hours, the foot, called t'aagal, or "tongue," would swell. This caused the chiton to straighten out from its defensive ball shape. The soaking killed it, and also tenderized it. The chiton was then bitten at one end to loosen the meat on each side of the plates or skeleton, called gwu'ngwel. The two sides of tough white meat covered with black skin were then torn from the central plates with the fingers. The tiny red gonads, called ts'iika'l, or "inside," were scooped out and eaten. They were considered a great delicacy. The foot, the sweetest part, was also eaten, as were the two sides of white meat.

...These small chitons were also cooked in an open fire in the early days. They were thrown onto coals and turned continually with a stick. After about one or two minutes, they were taken off and washed. The skin could then be removed with the fingers, and the plates removed from the back with relative ease. Black chitons were especially relished when prepared in this way because "the salt was still in them."

Quick boiling is the only method of cooking black chitons that is still practiced today. The important thing is not to boil them for too long or too short a time, or else they become tough. The fresh, live chitons are first dumped into rapidly boiling water, and are left there for about one minute. They are stirred and pressed with a wooden spoon to loosen their skins. As soon as this occurs the chiton are put into cold water so that they can be handled. The skins are removed, apparently for etiquette reasons alone. At this stage the chitons are curled up into a ball shape. To straighten out the animals and loosen their plates, each end of the chiton is pulled out with the thumbs, while the back is pushed in with the other fingers. A thick white substance often exudes from the chiton when this is done. Many old people eat this secretion and consider it a delicacy. The plates are then individually removed and discarded. After washing, the whole chiton is eaten. (Ellis and Wilson 1981:8-9)

I recently tried the last, quick boiling, method with black Katy chitons collected near Hoko River and soaked in fresh water for four hours. The black skin, plates and internal organs were removed. These were chewy but good, especially with pork and beans (Fig. 5).

The cooking contest mentioned was between the Kitkatla people and Skidegate Inlet people and challenged: "What is the quickest thing you can cook?" The Kitkatla people cooked a fresh deer liver in the fire while the Skidegate people throw black chitons "on the fire, turned it around, and took it out. Before the deer liver was even out of the fire, the Skidegate Inlet people were eating the black chiton" (Ellis and Wilson 1981:9; Fig. 1). Note how liver and chitons are both good sources of vitamin A.

In considering chitons in terms of cultural superstructure and social status on the Northwest Coast, high ranking royal people could and were named after chitons. On the central Northwest Coast Boas discusses a high ranking Kwakwaka'wakw woman "Head-Princess (V 7)" and her ceremonial activities, pointing out:

Now she also changed her name, and she used her winter-dance name which she used among the L!aL!asiqwala. Now she told her winter-dance name to the chiefs. It was Chiton (V 7). She said 'That is my name which I obtained from my father.' (Boas 1921:914)





Fig. 5. Black Katy chitons from Hoko River vicinity prepared for dinner by author with quick boiling method after soaking in fresh water. The eight plates and internal organs removed for a chewy, healthy meal.

On the northern coast, in accounts of the other most eaten chiton, the giant red chitons or gumboots *Cryptochiton stelleri*, Solomon Wilson pointed out that “Chief Skidegate, after whom Skidegate Village is called, received his name from this chiton” (Ellis and Wilson 1981:10; Fig. 1).

In discussing chiton descent from other species, the central coast Nuuchahnulth Manhousat Luke Swan indicated: “To begin with, there is the snail . . . which lives on land. As it grows up, the snail is said to leave its shell or ‘cradle’ behind, and becomes a slug. . . . Then, when the slug ages, it crawls down to the sea shore, and, according to Mr. Swan, ‘gets stuck there, and becomes a haay’ishtuup. The tummy side is the same” (Ellis and Swan 1981:35; Fig. 1). On the North Coast, Haida Solomon Wilson indicated that “the black chiton was said to have descended from a common ground beetle” (Ellis and Wilson 1981:9; Fig. 1). This descent was said to have occurred in a long forgotten part of the Raven legend (Ellis and Wilson 1981:31).

Black Katy Chitons were also discussed in female gender references. On the central coast Luke Swan, Nuuchahnulth Manhousat indicated that “young men were not supposed to eat the mouth region of black chiton, which was apparently taken to be the animal’s vagina. (Although Mr. Swan found this rather hard to believe, as *all* of the black chitons that he had seen were endowed with one of these mouths).” (Ellis and Swan 1981:37; Fig. 1).

On the north coast, the Haida creation story gave chitons a very important role in the creation of humans—especially the female, as discussed by Madonna Moss:

After the flood, Raven dug a clam from Rose Spit and released the Haida from within the shell (MacDonald 1983:8). These new humans were exclusively men, until Raven attached “sticky chiton” to the genitals of some to transform them into women (MacDonald 1983:8). Hymes (1990:594) has presented a slightly different version of the story obtained from Bill Reid: when Raven finds that the emergent humans are all men, “he induces a sexual experience between these creatures and chitons” and subsequently, the chitons give birth to the first Haida women and men [chitons create humans here!]. Paraphrasing the words of George MacDonald (personal communication 1992), “it doesn’t take a structuralist to see the male

nature of a clam's siphon, and the female nature of chitons." That chitons held special meaning or associations for at least some Northwest Coast women is supported by the Manhousat women's feast of chitons celebrating the low tides of June (Ellis and Swan 1981:83). (Moss 1993:644; Fig. 1)

## Summary and Conclusion

The abundance of black Katy chiton plates in the Labouchere Bay raised terrace shellmidden sites reflected some of the long-term importance for these shellfish as part of ancient Northwest Coast nutrition and subsistence practices. Their central and north coast archaeological resource importance and value as an ethnographic staple has often been overlooked, whereas salmon and bivalve shellfish have been described in the anthropological/archaeological literature in exhaustive detail—Monks (1987) and others have pointed out that Northwest Coast anthropologists suffer from “salmonopea” and I would add possibly “clamopea.” Considering salmonopea one needs to point out that halibut ranked #1 as ancient and ethnographic fisheries among the Makah on the central coast and Haida on the north Coast (Fig. 1). We have shown here that black Katy chiton deserved more attention as a shellfish to resist clamopea—possibly both these “-opea” derived from the Western ranking salmon and clams high in their own culinary diets, certainly above many other fisheries, and mussel, chiton, and univalve shellfisheries?

The fact that (1) both central and north coast royalty derived their inherited names based on chitons; and (2) some Haida stories even show how the creation story involved chitons used to make human females and another where chitons give birth to female and male humans, potentially showed a deep rooted transformation of a basic and ancient subsistence food into the story of how first peoples came to the Northwest Coast of North America.

David Miller had an interesting thought about the wide variety of ways to prepare chitons for consumption when he likened them to potatoes; it was an important part of one's shellfish intake and could be made with several different resulting tastes, including used raw as a medicinal relaxant aid and for community (female) gatherings.

In earlier works at the Hoko River site complex, we have emphasized the importance of shellfish in general to Northwest Coast cultural evolution (Croes and Hackenberger 1988, Croes 1989, 1992). In economic computer simulation modeling of the Hoko River region, and testing with the archaeological data, we were looking for pressure points that might have caused some of the economic shifts in the transition periods between archaeological “phases” of stability. We were surprised to see that one of the pivotal resources that consistently caused cultural pressures through overuse was shellfish, recurrently influencing the human goals for population maintenance (Croes 1992:359).

Other resources could be overused as well, such as deer/elk and round fish/kelp fish, but the salmon and halibut could not be regionally overused. The overuse pressure would require limited population growth, people moving over wider territories, or offsetting the pressures by initiating *storage*, and management practices for fisheries, shellfisheries, and/or deer/elk meats. Resource storage, emphasizing different resources through time, seemed to be the developing practice on the Northwest Coast. We felt these phases (St. Mungo, Locarno Beach, Marpole, and Gulf) were better termed economic stages, and coincided with periods of population expansion. Shellfish was still desired in the computer simulation modeling at a certain level (estimated to be 2 to 14%, and probably more like 2 to 5% of the diet) so needed to be managed to offset overuse (Croes and Hackenberger 1988:68, 70; Croes 1998:12).

Though chitons appear to never be dried or otherwise stored in the ethnographic record, it was still an important staple, and probably the ownership of certain beaches by family (and royalty eventually) was maintained to prevent overuse. Therefore the recruitment of chitons could be watched and harvest managed in these owned, and protected/restricted, areas through time. Since chitons appear to be fast recruiters, becoming edible in their second year, possibly these were collected, as needed; slower recruiters, such as mussels (taking approximately 5–10 years growth to be best harvested) would require stricter management to prevent overharvest (Croes 1992:360).

Hopefully this research has demonstrated the long-term archaeological importance of chitons as a Northwest Coast staple and excellent source for vitamin A and calcium. Ethnographic sources highlighted the infrastructural through super-structural significance of chitons. Too often this invertebrate has been under-recognized in archaeological analyses; clearly it deserves much more attention in future research along the Northwest Coast of North America and throughout the Pacific Basin.

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