JOURNAL OF WETLAND ARCHAEOLOGY **5**, 2005, 141–154

Cultural Historical Context of Q^{w}u?g^{w}es (Puget Sound, USA): a Preliminary Investigation

Dale Croes, Katherine M. Kelly and Mark Collard

ABSTRACT

Recent research at the Puget Sound site of Q^{w}u?g^{w}es indicates that it contains a Late Period component of stone, bone-antler and shell artifacts, as well as a waterlogged section containing basketry, cordage and wooden artifacts and associated manufacturing debris. In order to place Q^{w}u?g^{w}es into the culture historical context of the Central Northwest Coast, we have applied cladistic tree-building methods to data derived from these artifacts and from artifacts commonly found in the northern part of Puget Sound, the Gulf of Georgia, the Strait of Juan de Fuca, Washington State, and Vancouver Island. The tree derived from the stone, bone-antler and shell data differs from the trees derived from the basketry data. This suggests that there was a difference in the transmission of information regarding the manufacture and use of the two groups of artifacts. Ideas pertaining to the artifacts made of stone, bone-antler and shell seem to have been shared widely, whereas ideas associated with the artifacts made of basketry were not. There are several possible explanations for this difference, but ethnographic evidence suggests that it is probably primarily a result of the basketry artifacts playing a role in ethnic identity signaling in a way that the stone, bone-antler and shell artifacts did not.

Keywords: Q^{w}u?g^{w}es, PUGET SOUND, PACIFIC NORTHWEST, NORTHWEST COAST, BASKETRY ARTIFACTS, STONE, BONE-ANTLER, SHELL ARTIFACTS (SB-AS), PHASES, ETHNICITY, CLADISTICS

Authors' Addresses: **Dale Croes**, Department of Anthropology, South Puget Sound Community College, Olympia, WA, USA *and* Department of Anthropology, Washington State University, Pullman, WA, USA; **Katherine Kelly**, Department of Anthropology, South Puget Sound Community College *and* The Evergreen State College, Olympia, WA. USA; **Mark Collard**, Department of Anthropology and Sociology, University of British Columbia, Vancouver, Canada, *and* AHRB Centre for the Evolutionary Analysis of Cultural Behaviour, University College London, London, UK

Introduction

Over the past six summer seasons a team of college students and tribal members have explored the partially waterlogged site of Qʷu?gʷes or 45TN240 in Washington State, USA. In this paper, we report preliminary analyses in which cladistic tree-building methods from evolutionary biology were applied to artifact data from Qʷu?gʷes and a range of other central Northwest Coast sites with a view to placing Qʷu?gʷes in cultural historical context.

The site

Qʷu?gʷes is located in Mud Bay, at the southern end of Puget Sound, near the city of Olympia, the capital of Washington State, USA. Members of the Squaxin Island Tribe traditionally occupied the ancient site area. The tribe is part of the Southern Lushootseed language group (Suttles and Lane 1990), and are direct descendants of the maritime clans called "The People of the Waters," who lived and prospered along the shores of the southernmost inlets and surrounding watersheds of Puget Sound prior to recent non-Indian colonization of the Pacific Northwest (Figure 1).

In the first six summers of archaeological investigation at the site, the team excavated approximately 17 m3 of material, which represents about 1% of the overall site. The volume of material excavated might seem out of proportion to the numbers of years the site has been open. However, the intent of the dig, which is operated cooperatively by the South Puget Sound Community College and the Squaxin Island Tribe, is not strictly to excavate. Rather, the goal is to teach archaeological techniques to tribal members and college students while leaving as much of the site undisturbed as possible (Foster and Croes, 2004). Despite this conservative cultural resource management practice, the excavation at Qʷu?gʷes has yielded plenty of interesting material to study.

Qʷu?gʷes is relatively young. The non-perishable artifacts of stone, bone-antler, and shell that have been found throughout the site present the characteristics of the Gulf of Georgia/Late Pacific Period Phase, which is considered to have begun around AD 200/500 and to have ended at the time of the Coast's first smallpox epidemic in AD 1775 (Ames and Maschner 1999). A Gulf of Georgia/Late Pacific Period date is further supported by two ~700 year old C14 dates that have been obtained from material found in the waterlogged section of the site, and by the results of a geological survey. The latter suggests that the portion of the site that is currently being excavated was first occupied following an earthquake that took place around AD 1000 (Sherrod 1998). The earthquake appears to have dropped land in Mud Bay by as much as three meters and forced people to move to higher ground to the current site location. The geological survey also indicates that a second earthquake struck Qʷu?gʷes about AD 1700 (Sherrod, 1998; Erickson, 2001). Thus, the available evidence suggests that the excavated part of Qʷu?gʷes was first occupied around 1,000 years ago and that occupation continued at the site until at least the second half of the eighteenth century.

Qʷu?gʷes has been divided into three areas based on presumed ancient use. The Wet Site/Shell Midden makes up the largest excavated portion of the site. It lies along the

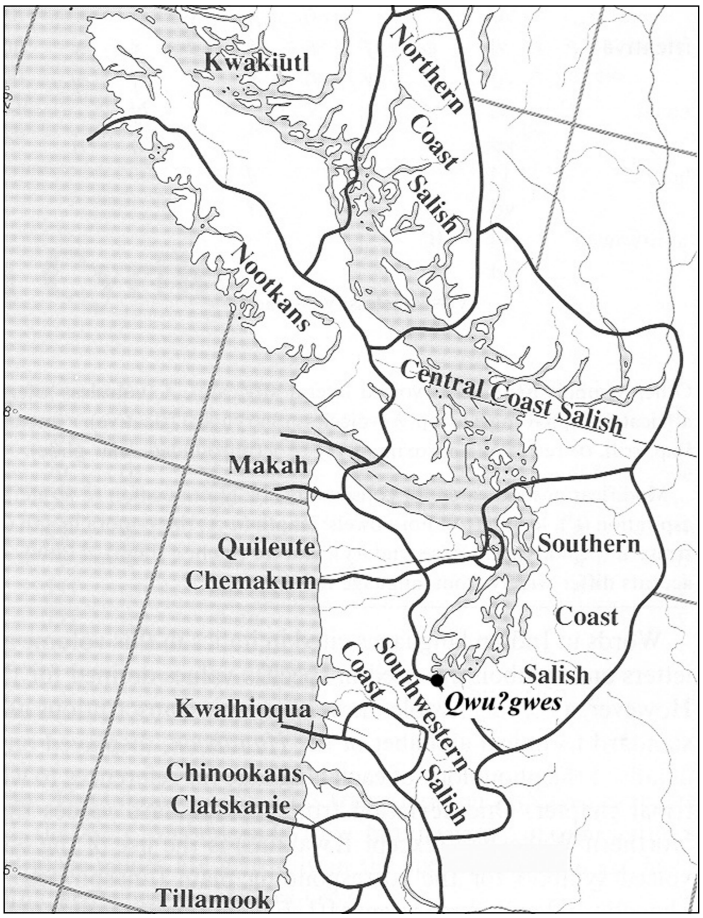

Fig. 1. Central Northwest Coast Culture Area with Q^{w}u?g^{w}es shown in south Puget Sound region (Base map adapted from Suttles, W. (ed.) 1990 Handbook of the North American Indians. Volume 7: The Northwest Coast. *Smithsonian Institution, Washington, DC)*

artificially (and deliberately) constructed levee of shell midden along the beachfront (to protect the food processing area that is discussed below), and is subject to year-round tidal action. The matrix in these units is composed of sands and silts mixed with very densely packed shells. A fresh water aquifer flows through the shell midden at about 50 cm below the surface, creating a wet or waterlogged portion of the site. This section of the site has yielded numerous plant food remains and ample evidence of a flourishing wood and fiber industry. The Living Area lies on a small headland, at the northernmost part of the site. The matrix in these units is predominantly loose, dark soil with charcoal and ash, within a shell midden. The matrix in the living area contains house post molds, family-size hearth areas and house floors. The third area appears to have been used as a

community food processing area based on the presence of stone paved steaming ovens that have been found. This area, though technically a "dry site", is frequently inundated by the tides, especially in the winter.

Region-wide comparison

The purpose of the study described here was to compare the assemblage of artifacts recovered at Q^{w}u?g^{w}es with the assemblages unearthed at better known sites in Puget Sound, the Gulf of Georgia, the Strait of Juan de Fuca, the northwest coast of Washington State, and British Columbia. We were particularly interested in whether or not the distribution of artifacts made of wood and fiber matched the distribution of artifacts made of stone, bone-antler and shell (hereafter abbreviated SB-AS). It is clear from wet site archaeological research and from ethnographic collections that artifacts made of wood and fiber regularly comprised over 90% of the material culture of the populations in the Pacific Northwest prior to contact (Croes 1976, 1989, 1992, 1995). Yet, because wood and fiber artifacts do not usually preserve well, they have not featured prominently in the efforts of archaeologists to shed light on the ancient history of human settlement in the Pacific Northwest. Rather, archaeologists working in the region have relied heavily on the SB-AS artifacts to generate their cultural historical hypotheses (Matson and Coupland 1995). Given this state of affairs, it seemed crucial to compare the distribution of the perishable artifacts with the distribution of the SB-AS artifacts.

We began by compiling a dataset that records the presence/absence of SB-AS artifacts in 48 Pacific Northwest archaeological assemblages. A few of the assemblages are in excess of 4,000 years old, but most of them date within the last 3,000 years. We obtained the majority of the SB-AS data from Matson (1974), Matson and Coupland (1995), Monks (1982) and Morgan (1999). Additional data were added from the Hoko River Wet site (45CA213), the Hoko Rockshelter (45CA21), Ozette Village wet site (45CA24) (Croes 1995) and a number of assemblages located on western Vancouver Island, British Columbia, Canada (McMillan 1999).

Subsequently, we constructed two perishable artifact-related datasets. One records the presence/absence of 93 basketry attributes (modes) recorded at Q^{w}u?g^{w}es and the 10 other Pacific Northwest wet sites, including Axeti (FaSu-1), Biederbost (45SN100), Conway (45SK59b), Fishtown (45SK99), Hoko River Wet/Dry Site (45CA213), Lachane (GbTo-33), Little Qualicum River (DiSc-1), Musqueam NE (DhRt-4), Ozette Wet Site (45CA24), and Water Hazard (DgRs-30). The other records the presence/absence of 96 basketry types at the same 11 sites. The majority of the basketry data were taken from Croes (1977, 1995).

In line with recent work by Collard and Shennan (2000), O'Brien et al. (2001, 2002), Tehrani and Collard (2002), Jordan and Shennan (2003), and O'Brien and Lyman (2003), we used cladistics to investigate the relationships among the assemblages. First outlined in the 1950s (Hennig 1950), cladistics is currently the dominant method of phylogenetic reconstruction used in biology (Wiley et al. 1991; Quicke 1993; Smith 1994; Kitching et al. 1998; Schuh 2000). Based on a null model in which new taxa arise from the bifurcation of existing ones, cladistics defines phylogenetic relationship in terms of relative recency

of common ancestry. A pair of taxa are deemed to be more closely related to one another than either is to a third taxon if they share a common ancestor that is not also shared by the third taxon. Exclusive common ancestry is indicated by evolutionarily novel or derived character states. Two taxa are inferred to share a common ancestor to the exclusion of a third taxon if they exhibit derived character states that are not also exhibited by the third taxon. We conducted our cladistic analyses with the aid of the computer program PAUP* 4.0 (Swofford 1998).

The cladogram yielded by the analysis of the SB-AS dataset is shown in Figure 2. It groups the 48 sites into three main clusters. These broadly correspond to cultural phases that many researchers recognize in the Pacific Northwest archaeological record – the Locarno Beach, Marpole and Gulf of Georgia/Late Pacific phases. The cluster at the top

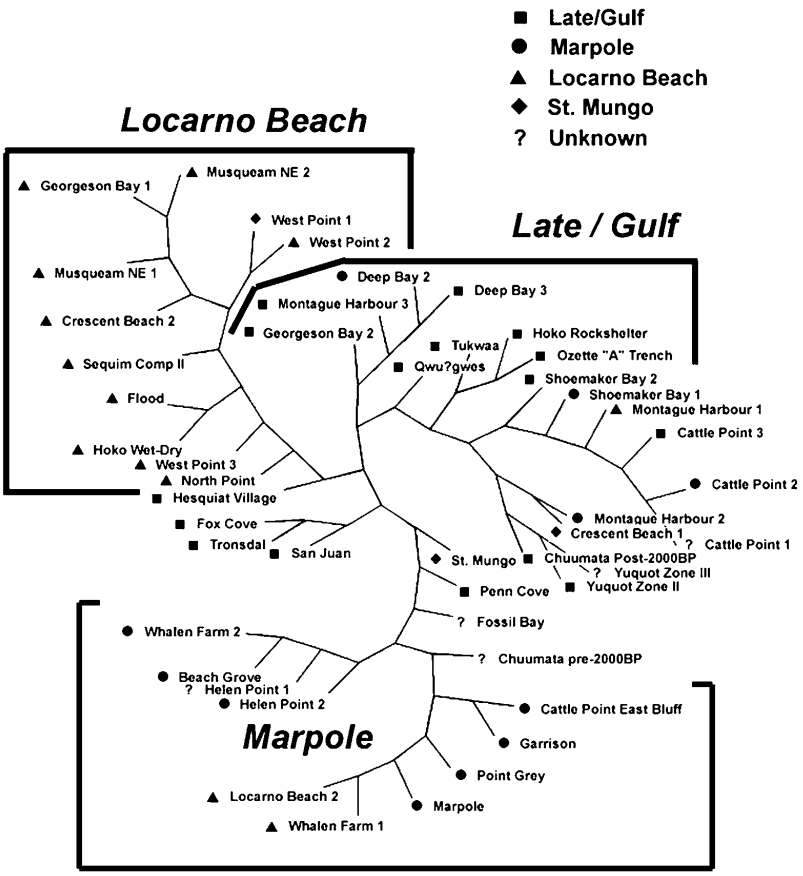

Fig. 2. Unrooted cladogram derived from Northwest Coast stone, bone-antler and shell (SB-AS) artifact categories. Though not perfect, the sites are generally arranged by phases typically defined by SB-AS artifact types on the Northwest Coast.

left of the diagram comprises 77 percent of the 13 assemblages in the dataset that have been assigned to the Locarno Beach Phase (Flood, Crescent Beach 2, Georgeson Bay 1, Hoko Wet-Dry, Musquem NE 1, Musquem NE 2, North Point, Sequim Comp II, West Point 2, West Point 3). Of the other two assemblages that are grouped in the top-left cluster, one has been assigned to the St. Mungo Phase (West Point 1), and one to the Gulf of Georgia/Late Pacific Phase (Hesquiat Village). The cluster at the bottom of the diagram consists of 70% of the 10 assemblages in the dataset that have been assigned to the Marpole Phase. These include Beach Grove, Cattle Point East Bluff, Garrison, Marpole, Point Grey, and Whalen Farm 2. Of the other assemblages that are grouped into the bottom-most cluster, two have been assigned to the Locarno Beach Phase (Locarno Beach 2, Whalen Farm 1), one has been assigned to the St. Mungo Phase, one has been assigned to the Gulf of Georgia/Late Pacific Phase, and three have yet to be assigned to any phase (Chuumata pre-2000 BP, Fossil Bay, Helen Point 1). The cluster on the right hand side of the diagram contains 60 percent of the 15 assemblages in the dataset that have been assigned to the Gulf of Georgia/Late Pacific Phase (Cattle Point 3, Chuumata Post-2000 BP, Deep Bay 3, Georgeson Bay 2, Hoko Rockshelter, Montague Harbour 3, Ozette "A" Trench, Shoemaker Bay 2, Tukwaa, Yuquot Zone II). Of the other assemblages that are grouped in right-most cluster, one has been assigned to the Locarno Beach Phase (Montague Harbour 1), one has been assigned to the St. Mungo Phase (Crescent Beach 1), four have been assigned to the Marpole Phase (Deep Bay 2, Cattle Point 2, Montague Harbour 2, Shoemaker Bay 1), and two have yet to be assigned to a phase (Cattle Point 1, Yuquot Zone III). In addition to the foregoing large clusters, the diagram also contains a small cluster that comprises three assemblages that have been assigned to the Gulf of Georgia/Late Pacific Phase: Fox Cove, San Juan, and Tronsdal. Q^{w}u?g^{w}es is positioned in the cluster that is dominated by Gulf of Georgia/Late Pacific Phase assemblages.

The cladograms yielded by the basketry datasets are shown in Figures 3 and 4. Although there is insufficient overlap between the SB-AS and basketry assemblages to be certain, the cladograms derived from the basketry data do not seem to group the assemblages in the same way as the cladogram yielded by the SB-AS data. Whereas the SB-AS cladogram grouped the assemblages by phase, the basketry cladograms appear to cluster them by likely linguistic affiliation. In both basketry cladograms, there are two main clusters. One of these comprises Q^{w}u?g^{w}es, Conway, Fishtown, Biederbost, Water Hazard, and Musqueam NE. Conway and Fishtown are two late period (within the last 1,000 years) wet sites that lie on the Skagit River Delta, about 150 miles north of Q^{w}u?g^{w}es (locations in map Figure 5). Like Q^{w}u?g^{w}es, they are located in the traditional Lushootseed language area. The assemblages from Biederbost and Water Hazard are approximately 2,000 years old, while the assemblage from Musqueam NE is about 3,000 years old. These three sites also lie in the historically-documented range of the Coast Salish speaking peoples of the Northwest Coast (Jorgenson 1969).

The other cluster that appears in the basketry cladograms consists of Hoko, Ozette, Lachane, Axeti, and Little Qualicum. The geographically close but temporally separated West Coast sites of Hoko and Ozette lie in the southern Wakashan Nuu-chah-nulth speaking region, and this fork (A) is hypothetically argued to reflect 3000 years of continuity (Croes 1977, 1989, 1992, 1995, 1997, 2001, 2003). In contrast their SB-AS artifacts affiliate with the Locarno Beach (Hoko) and Gulf of Georgia (Ozette 'A' Trench) /Late Period

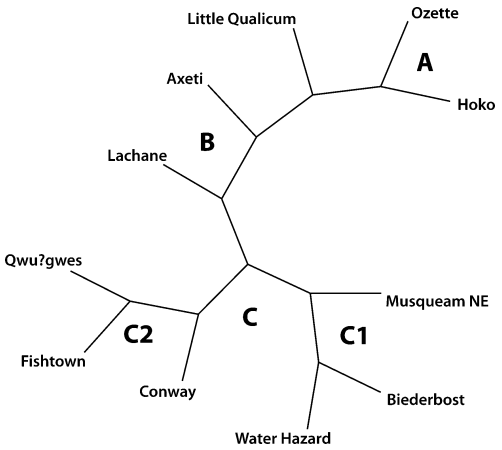

Fig. 3. Unrooted cladogram derived from Northwest Coast wet site basketry attributes (modes)

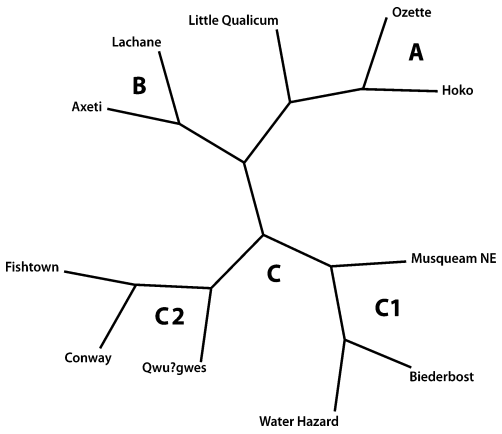

Fig. 4. Unrooted cladogram derived from Northwest Coast wet site basketry types

phases (Figure 2, Croes 1995). Note that the Hoko River and Musqueam NE wet sites are contemporary (approximately 3,000 years old), and both are assigned to the Locarno Beach Phase on the basis of their SB-AS artifacts. However, they are positioned as polar opposites on the basketry cladograms. Thus, they seem to have quite different basketry styles. It seems likely that the linkage of northerly sites (B), West Coast sites (A), and the Little Qualicum River wet site reflects the latter's late period transitory status between the historic Wakashan Kwakwaka'wakw and Salishan areas (Barnett 1955:26; Bernick 1983:154–155, Boas 1888:201, 1890:840). In fact this influence can also be argued for the Axeti wet site as a Salishan Nuxalk/Bella Coola territory surrounded and influenced by Wakashan Kwakwaka'wakws. As has been suggested elsewhere (Croes 1989, 2001), the Lachane wet site is distinctly Tsimshian in ancient basketry style, and its linkage (B) with Axeti may simply reflect a northerly emphasis on cedar bark basketry. Overall, this second cluster is not as easily deciphered, though it does have some interesting geographical patterns, and no doubt would, and will, become more interesting as additional wet site data become available from different west coast and northern locations and time periods.

Discussion and Conclusions

The results of the cladistic analyses we have carried out are interesting for several reasons. First, the finding that Biederbost, Conway, Fishtown, Q^{w}u?g^{w}es, Musqueam NE, and Water Hazard form a cluster to the exclusion of the other wet sites in the analyses of the basketry data implies an impressive time depth for continuity of style in some Northwest Coast basketry artifacts. As mentioned above, Q^{w}u?g^{w}es appears to have been occupied until the second half of the eighteenth century, while Musqueam NE is

dated to around 3,000 BP. Thus, it is possible that the basketry data analyses reveal a 3,000 year long tradition of basketry manufacture (Figure 6).

Further support for the notion that basketry styles may have long continuity in the Pacific Northwest coast comes from wet sites on the northern part of the coast. For example, at least 5–6,000 years of Tlingit-Haida basketry style continuity is reflected at the Silver Hole Site, Prince of Wales Island (49CCRG433; Croes 2001; location shown on

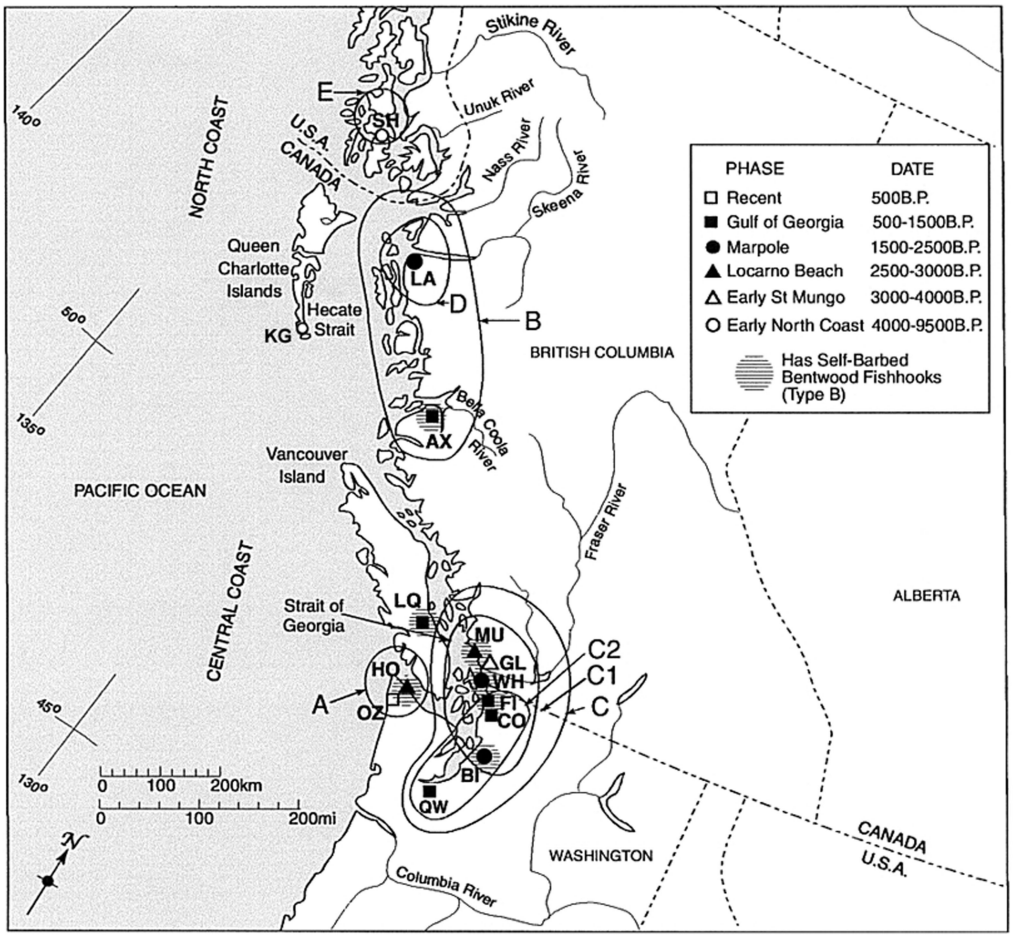

Fig. 5. Northwest Coast sites that have yielded basketry artifacts. Site abbreviations: SH: Silver Hole, KG: Kilgii Gwaay, LA: Lachane, AX: Axeti, LQ: Little Qualicum River, MU: Musqueam NE, GL: Glenrose, WH: Water Hazard, FI: Fishtown, CO: Conway, BI: Biederbost, Qw: Q^{w}u?g^{w}es, HO: Hoko River, OZ: Ozette (map adapted from original by Susan Matson). Circled regions represent areas of stylistic continuity suggested by cladistic analysis outlined in this paper (Figures 3 and 4) and by past analyses of the basketry by Croes (1977, 1989, 1992, 1995, 1997, 2001, 2003)

map, Figure 5), and at the Lanaak Site, Baranof Island (49XPA78; Bernick 1999). We may also see this pattern as more basketry is found at the 9,450 BP wet site of Kilgii Gwaay on the south end of the Queen Charlotte Islands (1325T; Mackie, et. al. 2003; location shown on map, Figure 5). Also the Lachane Site reflects a strong Tsimshian basketry style continuity distinct from the Haida-Tlingit styles mentioned above for 2,000 years (Croes 1989, 2001). Therefore, we propose that the origins of ancient ancestral Tlingit, Haida, Tsimshian, Wakashan, Chimakuan, Salish, etc., lie well beyond 3,000 BP on the Northwest Coast, and, specifically for the Central Northwest Coast area, well beyond the Locarno Beach Phase (Figure 6).

Second, the clustering of SA-BS assemblages by phase suggests that artifacts that were used for subsistence (harpoon points, knives, fish hooks, for example) and manufacturing (adze bits, antler and bone wedges, bone awls, stone hand mauls, for example) were used over the broad region and change in style at about the same time-period (cf. Croes and Hackenberger 1988). This in turn suggests that the groups living on the Coast exchanged information pertaining to the production and utilization of such artifacts with few if any restrictions. In contrast, the clustering of basketry assemblages in accordance with likely linguistic affiliation suggests that the groups on the Coast did

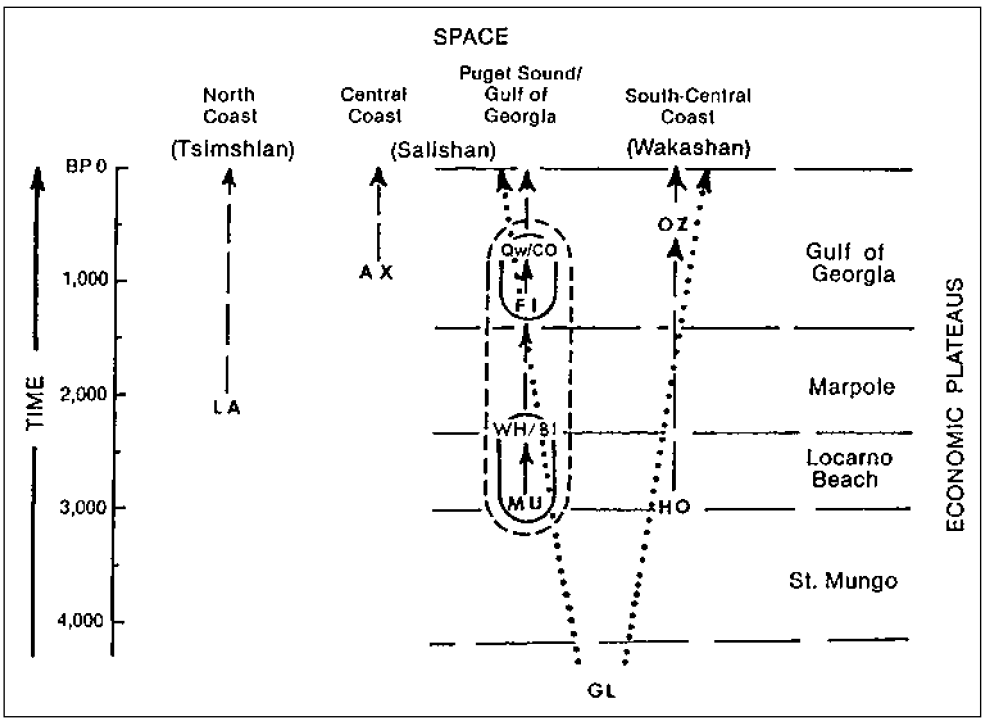

Fig. 6. Hypothetical stylistic/ethnic continuity patterns based on basketry artifact analyses that crosscut phase designations based on stone bone-antler and shell (SB-AS) artifacts. For site abbreviations see Figure 5

not share information pertaining to the manufacture of their basketry on a regular basis, perhaps because basketry styles were important in relation to ethnic identity.

The proposed difference in the evolution of economically-important and ethnically-significant artifacts is supported by the distribution of ancient wooden fishhooks from Northwest Coast wet sites. If the hypothesis involving rapid economic artifact diffusion is correct, then the wooden fishhooks, with over 1,300 so far recovered from Northwest Coast wet sites, and clearly a subsistence related artifact, should be broadly distributed over regions separated by ancient basketry styles. This is the case. Self-barbed bentwood fishhooks (Type B, most associated with cod fisheries) were found for 3,000 years throughout central and northern Northwest Coast regions (see above map, Figure 5, for Type B fishhook distribution), and, in fact, were the main cod fishhooks into the contact period in the North Coast (but discontinued in the Central Coast about 1,000 years ago) (Croes 1997, 2001, 2003).

It is also interesting to note in connection with the putative difference in the evolution of economically-important and ethnically-significant artifacts that there is some evidence that guarding of basketry traditions occurs among contemporary First Nations weavers in the Pacific Northwest. When DC was analyzing the ancient Makah basketry from the Ozette Village wet site in the early 1970s, he was invited by the Tribe to learn Makah basketry by master weavers Isabelle Ides and Lena McGee Claplanhoo at the Neah Bay School. The Tribal council (correctly) believed that DC could not fully understand Ozette basketry without learning Makah techniques (Croes 1999). So for four months he spent two hours a morning at the Makah K-12 school classes (elementary and high school classes) learning to weave. The main restriction placed on him by the Tribe was that he could not teach Makah basketry to others. DC got to know his teachers very well, and he learned that Isabelle and Lena's mother was from a Coast Salish community and married into the Allabush Makah family. Though from a different weaving tradition, Mrs. Allabush was required to learn her new Makah family's basketry from her husband's mother, and teach her children (including Isabelle and Lena) the same (Croes 2004:72–74). Many years after his training DC sponsored Isabelle and her granddaughter to teach a basketry workshop at a college in Seattle. A van of Coast Salish elders came to attend. They specifically asked to learn the Makah form of weaves and designs. However, Isabelle and her granddaughter would not teach them their specific techniques. They only allowed the visiting elders to learn their basic techniques. So, it appears that among the Makah at least basketry traditions are closely guarded. At the moment, we do not know whether other First Nations groups on the Coast protect their basketry techniques as carefully as the Makah, but obviously long-term guarding of basketry traditions represents one plausible reason why our basketry datasets yielded clusters that correspond to the likely linguistic affiliations of the populations that produced them.

Lastly, it is worth noting that the results of our analyses contribute to an on-going debate regarding the processes involved in macro-scale cultural evolution. To date, the debate in question has concentrated on two competing hypotheses, which have been termed the phylogenesis hypothesis and the ethnogenesis hypothesis (Tehrani and Collard 2002). According to the phylogenesis hypothesis, the similarities and differences among cultures

are primarily the result of cultural assemblages dividing as the communities that produce them repeatedly grow and split. The strong version of the hypothesis suggests that "Transmission Isolating Mechanisms" or "TRIMS" impede the transmission of cultural elements among contemporaneous communities (Durham 1992). TRIMS are akin to the barriers to hybridisation that separate species, and include language differences, ethnocentricism, and intercommunity violence (Durham 1992). The phylogenesis hypothesis predicts that the similarities and differences among cultures can be represented by a cladogram, and that there will be a strong association between cultural variation and linguistic, morphological and genetic patterns. In contrast, supporters of the ethnogenesis hypothesis (e.g. Terrell 1987, 1988, 2001; Moore 1994a, 1994b, 2001; Dewar 1995; Terrell et al. 1997, 2001) believe that it is unrealistic "to think that history is patterned like the nodes and branches of a comparative, phylogenetic, or cladistic tree" (Terrell et al. 1997:184). Instead, they argue that the biological, linguistic and cultural evolution of our species is best characterized by "a constant flow of people, and hence their genes, language, and culture, across the fuzzy boundaries of tribes and nations" (Moore 2001:51). That is, according to the ethnogenesis hypothesis, the patterns of similarity and difference among cultural assemblages are chiefly a consequence of individuals copying each other's practices, exchanging ideas and objects, and marrying one another. The ethnogenesis hypothesis predicts that the similarities and differences among cultures can best be represented by a network, and that there will be a close relationship between cultural patterns and the frequency and intensity of contact among populations.

The results of our analyses are significant in the context of the phylogenesis versus ethnogenesis debate because they suggest that different domains of culture can evolve in different ways. The clustering of assemblages by phase we observed in our analyses of the SB-AS artifacts is in keeping with the ethnogenesis hypothesis since it implies the more or less unfettered sharing of ideas and/or the trading of subsistence/manufacturing related SB-AS (and wooden fishhook) artifacts among populations. In contrast, the clustering of assemblages by likely linguistic affiliation that we observed in our analyses of the complex basketry attributes and types is compatible with the phylogenesis hypothesis since it implies that there was relatively little movement of ideas relating to basketry manufacture and/or widespread trade of basketry items among groups on the Coast over several thousand years. Thus, our analyses suggest that both phylogenesis and ethnogenesis were involved in the evolution of the cultures of the Northwest Coast. The obvious corollary of this is that it may be inappropriate to conceptualize cultural evolution in terms of a single dominant process as generally has been the case to date.

References

Ames, K. M. and Maschner, H. D. G. 1999 *Peoples of the Northwest Coast: Their Archaeology and Prehistory*. London: Thames & Hudson.

Barnett, H. G. 1955 *The Coast Salish of British Columbia*. Eugene: University of Oregon Press.

Bernick, K. 1983 A site catchment analysis of the Little Qualicum River site, DiSc 1: A wet site on the east coast of Vancouver Island, B.C. *National Museum of Man Mercury Series* 118.

Bernick, K. 1999 Lanaak (49XPA78), a wet site on Baranof Island, Southeastern Alaska. Report of June 1999 archaeological investigations, State of Alaska Field Archaeology Permit 99–10. Anchorage: Alaska Office of History and Archaeology, Division of Parks and Outdoor Recreation.

Boas, F. 1888 Myths and legends of the Catloltq of Vancouver Island. *American Antiquarian and Oriental Journal* 10 (4):201–211, 366–373.

Boas, F. 1890 First general report on the Indians of British Columbia. *Report of the 59th meeting of the British Association for the Advancement of Science*, 801–855. Newcastle-upon-Tyne, September 1889.

Collard, M. and S. J. Shennan 2000 Ethnogenesis versus phylogenesis in prehistoric culture change: a case-study using European Neolithic pottery and biological phylogenetic techniques. In C. Renfrew and K. Boyle (eds) *Archaeogenetics: DNA and the Population Prehistory of Europe*, 89–97. Cambridge: McDonald Institute for Archaeological Research.

Croes, D. (ed.) 1976 *The Excavation of Water-Saturated Archaeological Sites (Wet Sites) on the Northwest Coast of North America*. Mercury Series 50, Archaeological Survey of Canada, National Museum of Man, Ottawa.

Croes, D. 1977 *Basketry from the Ozette Village archaeological site: a technological, functional and comparative study*. Ph.D. dissertation, Washington State University. University Microfilms 77–25, 762, Ann Arbor MI.

Croes, D. 1989 Prehistoric Ethnicity on the Northwest Coast of North America, An Evaluation of Style in Basketry and Lithics. In R. Whallon (ed.) *Research in Anthropological Archaeology*, 101–130. New York, Academic Press.

Croes, D. 1992 An Evolving Revolution in Wet Site Research on the Northwest Coast of North America. In B. Coles (ed.) *The Wetland Revolution in Prehistory*, 9–11. Wetland Archaeology Research Project (WARP) Occasional Paper 6. Exeter, England.

Croes, D. 1995 *The Hoko River Archaeological Complex: The Wet/Dry Site (45CA213), 3,000–1,700 B.P.* Washington State University Press. Pullman, Washington.

Croes, D. 1997 The north-central cultural dichotomy on the Northwest Coast of North America: its evolution as suggested by wet-site basketry and wooden fish-hooks. *Antiquity* 71:594–615.

Croes, D. 1999 The Hoko River Wet Site, A Joint Tribe/University Research Project. In B. Coles, J. Coles and M. Schou Jørgensen (eds) *The Wetland Revolution in Prehistory*, 59–66. WARP Occasional Paper 12. Exeter, WARP.

Croes, D. 2001 North coast prehistory – reflections from Northwest Coast wet site research. In J. S. Cybulski (ed.) *Perspectives on Northern Northwest Coast Prehistory*, Canadian Museum of Civilization, Hull, Quebec. Mercury Series Paper 160, 145–171.

Croes, D. 2003 Northwest Coast wet-site artifacts: a key to understanding resource procurement, storage, management, and exchange. In R. G. Matson, G. Coupland and Q. Mackie (eds) *Emerging from the Mist: Studies in Northwest Coast Culture History*, 51–75. UBC Press, Vancouver, BC.

Croes, D. and S. Hackenburger 1988 Hoko River Archaeological Complex: Modeling Prehistoric Northwest Coast Economic Evolution. In *Research in Economic Anthropology*, Supplement 3, 19–85. JAI Press, Inc, USA.

Dewar, R. E. 1995 Of nets and trees: untangling the reticulate and dendritic in Madagascar's prehistory. *World Archaeology* 26:301–18.

Durham, W. H. 1992 Applications of evolutionary culture theory. *Annual Review of Anthropology* 21:331–55.

Erickson, J. L. 2001 Setting and Geomorphology of Q^{w}u?g^{w}es Site and Surrounding Environment, Paper Presented in symposium: Q^{w}u?g^{w}es: An Example of Sharing the Research: Squaxin lsland Tribe and South Puget Sound Community College, at the 55th Annual Northwest Anthropological Conference, Boise, Idaho.

Foster, R. and D. Croes 2002 Tribal-Archaeological Cooperative Agreement: A Holistic Cultural Resource Management Approach. *Journal of Wetland Archaeology* 2, 25–38.

Foster, R. and Croes, D. 2004 Joint tribal / college wet site investigations: a critical need for Native American expertise. *Journal of Wetland Archaeology* 4, 125–137.

Hennig, W. 1950 *Grundzüge einer Theorie der Phylogenetischen Systematik*. Berlin: Deutscher Zentralverlag.

Jordan, P. and S. J. Shennan 2003 Cultural transmission, language, and basketry traditions amongst the Californian Indians. *Journal of Anthropological Archaeology* 22:42–74.

Jorgenson, J. G. 1969. *Salish Language and Culture*. Bloomington, IN: Indiana University Press.

Kitching, I. J., P. L. Forey, C. J. Humphries and D. M. Williams 1998 *Cladistics: the Theory and Practice of Parsimony Analysis*. Oxford: Oxford University Press.

Mackie, A., D. W. Fedje, Q. Mackie, and M. Florian 2003 Early Holocene wood artifacts from the Kilgii Gwaay site, southern Haida Gwaii. Paper presented at the 10th International Wetland Archaeology Research Project (WARP) Conference, April 1–5, 2003. South Puget Sound Community College, Olympia WA, USA.

Matson, R.G. 1974 Clustering and Scaling of Gulf of Georgia Sites. *Syesis* 7:101–114. Victoria, B.C.

Matson, R.G., and G. Coupland 1995 *The prehistory of the Northwest Coast*. San Diego, CA: Academic Press.

McMillan, A. D. 1999 *Since the time of the transformers, the ancient heritage of the Nuu-chah-nulth, Ditidaht, and Makah*. Pacific Rim archaeology, Vancouver, BC: UBC Press.

McMillan, A. D. and D. E. St. Claire 1982 *Alberni Prehistory: An Archaeological and Ethnographic Investigations on Western Vancouver Island*. Victoria B.C.:Theytus Books.

Monks, Gregory G. 1982 Hierarchal Clustering of the Shoemaker Bay I and II Assemblages. In A. D. McMillan and D. E. St. Claire (eds) *Alberni Prehistory: Archaeological and Ethnographic Investigations on Western Vancouver Island*, 139–149. Theytus Books, Penticton BC.

Moore, J. H. 1994a Putting anthropology back together again: the ethnogenetic critique of cladistic theory. *American Anthropologist* 96:370–96.

Moore, J. H. 1994b Ethnogenetic theory. *National Geographic Research and Exploration* 10:10–23.

Moore, J. H. 2001 Ethnogenetic patterns in native North America. In J. E. Terrell (ed.) *Archaeology, Language and History: Essays on Culture and Ethnicity*, 30–56. Wesport, CT: Bergin and Garvey.

Morgan, V. 1999 The SR-101 Sequim Bypass Archaeological Project: Mid- to Late-Holocene Occupations on the Northern Olympic Peninsula, Clallam County, Washington. *Eastern Washington University Reports in Archaeology and History* 100–108. Archaeological and Historical Services, Cheney. Volume 1, 19.16–19.32.

O'Brien, M. J., J. Darwent and R. L. Lyman 2001 Cladistics is useful for reconstructing archaeological phylogenies: Paleoindian points from the southeastern United States. *Journal of Archaeological Science* 28:1115–1136.

O'Brien, M. J., R. L. Lyman, Y. Saab, E. Saab, J. Darwent. and D. S. Glover 2002 Two issues in archaeological phylogenetics: taxon construction and outgroup selection. *Journal of Theoretical Biology* 215:133–150.

O'Brien, M. J. and Lyman, R. L. 2003 *Cladistics and Archaeology*. Salt Lake City: University of Utah Press.

Quicke, D. J. 1993 *Principles and Techniques of Contemporary Taxonomy*. Glasgow: Blackie.

Schuh, R. T. 2000 *Biological Systematics: Principles and Applications*. Ithaca, NY: Cornell University Press.

Sherrod, B. L. 1998 Late Holocene Environments and Earthquakes in Southern Puget Sound. Unpublished Ph.D. dissertation, University of Washington, Seattle.

Smith, A. B. 1994 *Systematics and the Fossil Record: Documenting Evolutionary Patterns*. Oxford: Blackwell.

Suttles, W. (ed.) 1990 *Handbook of the North American Indians, Volume 7: The Northwest Coast*. Smithsonian Institution, Washington, DC.

Suttles, W. and Lane, B. 1990. Southern Coast Salish. In W. Suttles (ed.) *Handbook of North American Indians, Volume 7: The Northwest Coast*, 485–502. Washington DC: Smithsonian Institution Press.

Swofford, D. L. 1998 *PAUP*: Phylogenetic Analysis Using Parsimony (*and other methods). Version 4.0*. Sunderland, MA. Sinauer Associates.

Tehrani, J. and M. Collard 2002 Investigating cultural evolution through biological phylogenetic analyses of Turkmen textiles. *Journal of Anthropological Archaeology* 21, 443–463.

Terrell, J. E. 1987 Comment on History, Phylogeny, and Evolution in Polynesia by P. V. Kirch and R. C. Green. *Current Anthropology* 28:447–8.

Terrell, J. E. 1988 History as a family tree, history as a tangled bank. *Antiquity* 62:642–57.

Terrell, J. E. 2001 Introduction. In J. E. Terrell (ed.) *Archaeology, Language, and History: Essays on Culture and Ethnicity*, 1–10. Wesport, CT: Bergin and Garvey.

Terrell, J. E., T. L. Hunt & C. Gosden 1997 The dimensions of social life in the Pacific: human diversity and the myth of the primitive isolate. *Current Anthropology* 38:155–95.

Terrell, J. E., K. M. Kelly and P. Rainbird 2001 Foregone conclusions? In search of "Papuans" and "Austronesians". *Current Anthropology* 42:97–124.

Wiley, E. O., D. Siegel-Causey, D. R. Brooks and V. A. Funk 1991 *The Compleat Cladist: a Primer of Phylogenetic Procedures*. Lawrence: University of Kansas Museum of Natural History.