

THE PROGRESS AND PROCESS OF THEORY-BUILDING:  
THE NORTHEAST AND NORTHWEST COASTS

Ronald J. Nash

This paper is a review of the progress and process of model-building as it applies to populations on the Northeast Coast (Maine and Atlantic Canada) and the Northwest Coast (mainly Washington and British Columbia). On both coasts, we are dealing with non-agricultural populations of hunters-gatherers-fishers and one reason for doing a review is to measure the progress being made in developing middle-range and general theory for such maritime cultures. During the 1970s, there was considerable interest in constructing models of the subsistence-settlement systems among hunters-gatherers and these models tended to be predictive with respect to adaptive responses. Bettinger (1980) has reviewed the recent trends in modeling hunter-gatherer cultures, but the review is not concerned with maritime hunters-gatherers. The review offered here covers not only present, but past efforts in model-building and thus affords a historical perspective on the process of paradigmatic change. In addition, such a review serves to focus attention on and delineate issues and problems common to archaeologists working on both the Northeast and Northwest coasts. Finally, in an attempt to avoid simply talking about theory, a dialectical model is advanced to describe some structural and evolutionary developments in these coastal cultures.

In keeping with these objectives, the models are reviewed in terms of: 1) paradigmatic affiliation; 2) applicability to coastal cultures; and 3) degree of generality. The paradigm concept has

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Ronald J. Nash, Department of Sociology and Anthropology, St. Francis Xavier University, Antigonish, Nova Scotia, B2G 1C0.

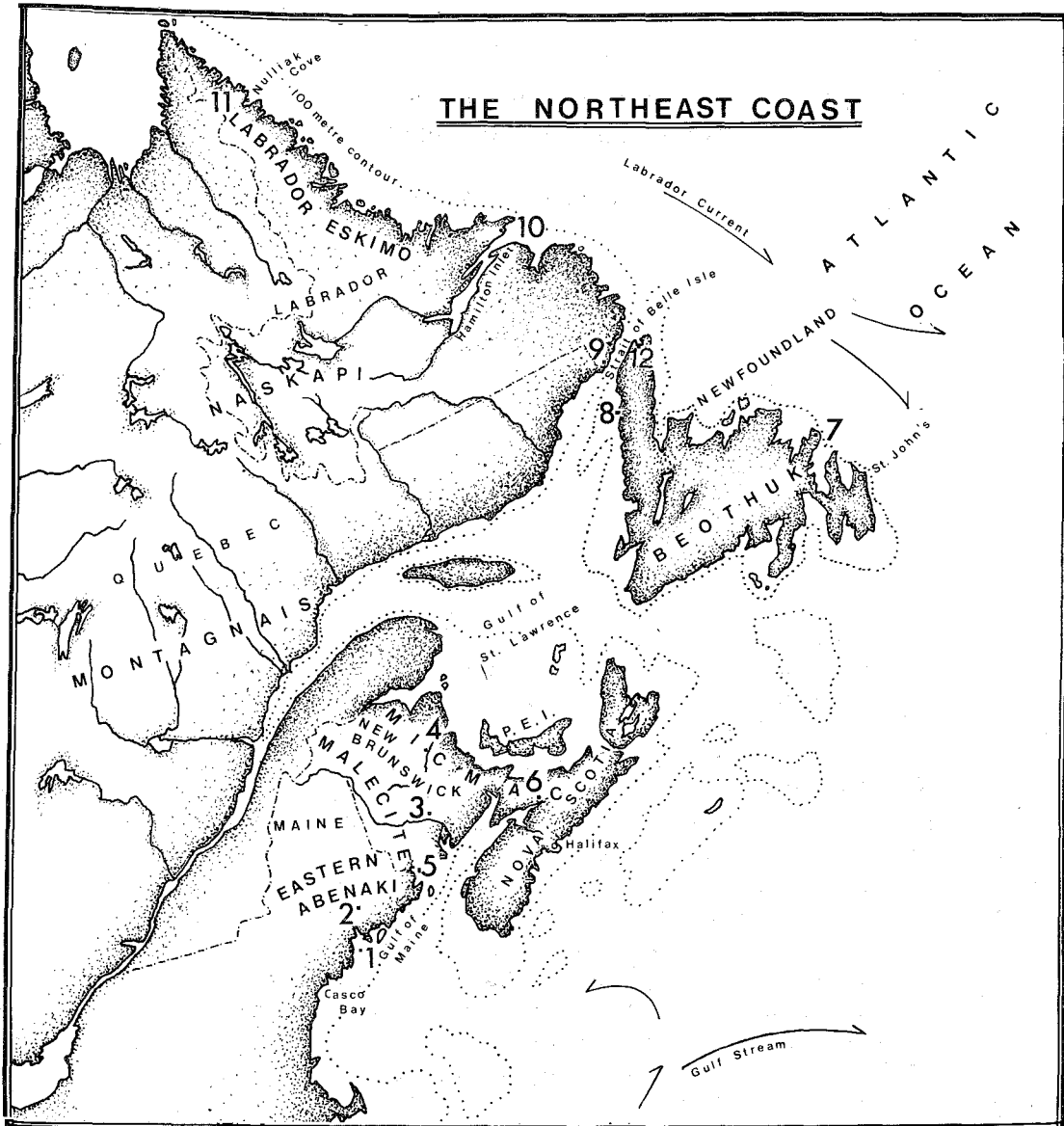
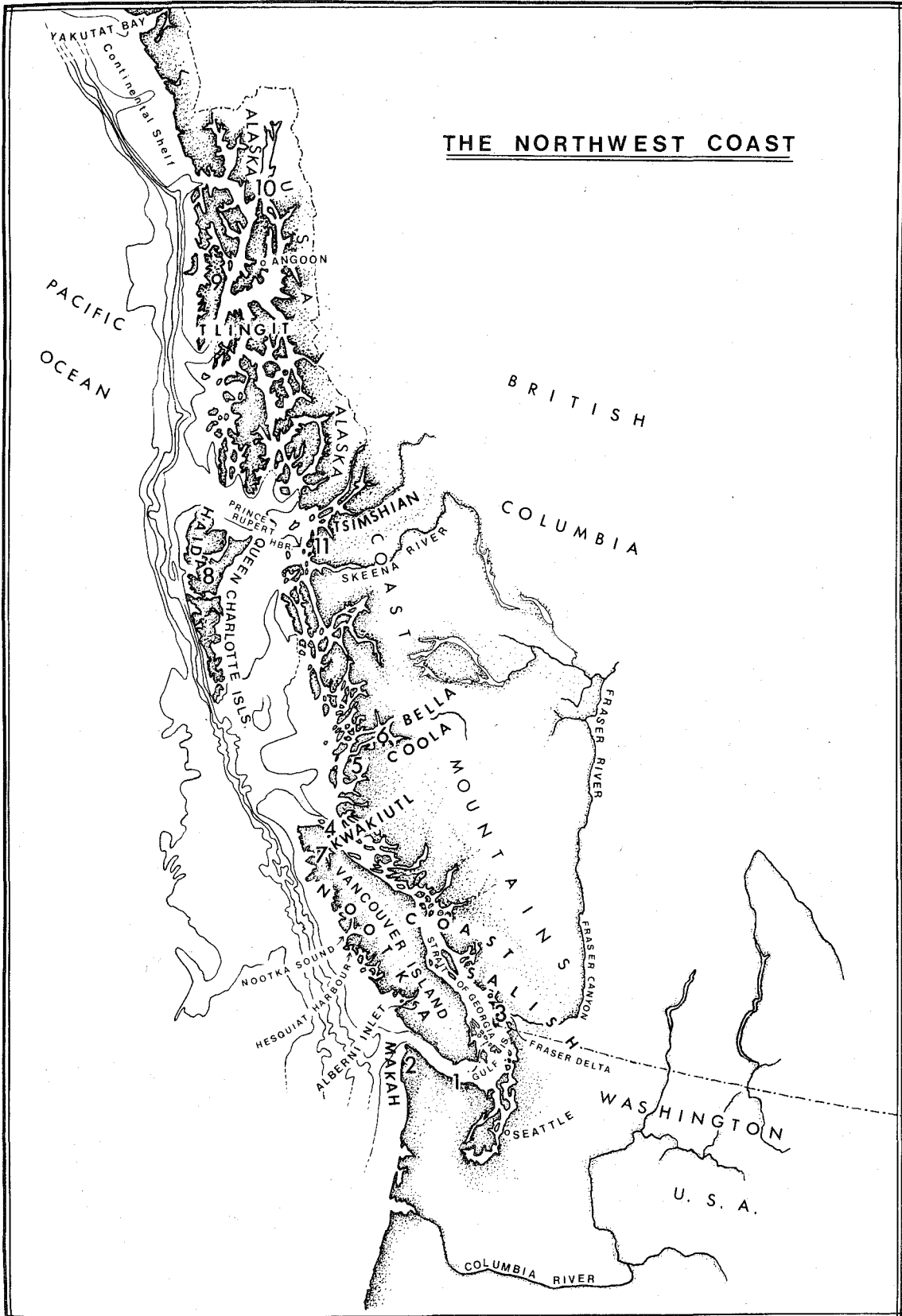


Figure 1. The Northeast Coast. Archaeological Sites and Localities: 1, Turner Farm Site, Maine. 2, Hirundo Site, Maine. 3, Cow Point, New Brunswick. 4, Augustine and Oxbow Sites, New Brunswick. 5, Teacher's Cove Site, New Brunswick. 6, Debert Site, Nova Scotia. 7, Cape Freels Site, Newfoundland. 8, Port au Choix Site, Newfoundland. 9, L'Anse-Amour Site, Labrador. 10, Rattler's Bight Site, Labrador. 11, Saglek Bay Locality, Labrador. 12, L'Anse aux Meadows Site, Newfoundland.

Figure 2. The Northwest Coast. Archaeological Sites and Localities: 1, Manis Site, Washington. 2, Ozette Site, Washington. 3, Glenrose Cannery Site, British Columbia. 4, Bear Cove Site, British Columbia. 5, Namu Site, British Columbia. 6, Axeti Site, British Columbia. 7, Quatsino Site, British Columbia. 8, Lawn Point Site, British Columbia. 9, Hidden Falls Site, Alaska. 10, Groundhog Bay Site, Alaska. 11, Boardwalk Site, British Columbia.



been critically evaluated (e.g. Meltzer 1979), but it is convenient as a classificatory device for the purposes here and is used in its narrow definition following Kuhn (1970:175) as "the concrete puzzle solutions which when employed as models or examples, can replace explicit rules as a basis for the solution of the remaining puzzles of normal science." The paradigmatic distinctions used in this paper are methodological rather than metaphysical (*as per* Meltzer) and the particular paradigms discussed below are among those identified by Clarke (1972:7) and Knudsen (1978:342). Many models crosscut paradigms, but tend to be weighted within only one. The dimension of applicability to coastal cultures addresses the problem of whether coastal cultures are simply a subset of hunter-gatherer cultures, or so distinct as to warrant a separate line of model development up to the level of middle-range theory. Turner states the issue as follows: "However, until it is demonstrated that maritime biomes possess a class of unique traits (attributes) or that maritime hunter-gatherers operate within a unique class of norms, a theory of adaptation cannot be devised solely for maritime biomes" (1980:743). Finally, the degree of generality refers to low, middle-range and general theory. Goodyear *et al.* (1978:161) have recently defined middle-range theory as "... those constructs with assumptions and propositions whose implications can be examined *empirically*, but which are sufficiently *general* to be incorporated into ever broader generalization."

#### THE CULTURAL-HISTORICAL PARADIGM

The traditional goal of archaeology has been writing culture history. This exercise involves excavations at stratified sites and the qualitative use of stylistic modes to construct a classification of normatively defined cultures in space and time. Migrations and diffusion were the usual agents of culture change. It is important to note that studies of historical processes and a search for laws have long been of interest to historians, but in practice, the emphasis has been on the chronology and description of particular, non-recurrent situations. These concerns were paramount until 1948, when the publication of W.W. Taylor's "A Study of Archaeology" laid the basis for subsequent widespread acceptance of cultural reconstruction as an additional goal of archaeology. It has been observed that many aspects of Taylor's "conjunctive approach" were being quietly carried out well before 1948 and in this respect, the work by Smith and Wintemberg (1929) on the shellheaps of Nova Scotia is precocious in its reconstruction of the lifeways of the late prehistoric Micmac. An interest in cultural reconstruction continues today, particularly in the ecological paradigm but cultural-historical work, although not complete in every sense, is

currently more of a spin-off product from investigations centered in other paradigms. This situation is a consequence of the conclusion reached by some archaeologists in the 1960s that cultural-historical studies had reached a point of diminishing returns, that they were an endless jigsaw puzzle which generated no theory. The result of this malaise was the well-documented paradigmatic shift towards a multivariate, systemic view of Culture and a new goal -- the study of culture process (Binford 1968a).

#### Models of Northwest Coast Prehistory

Although subject to frequent revision, there are presently a number of regional sequences covering the prehistory for the Late Period (the last 5000 years) of the south, central and north portions of the Northwest Coast (e.g. Carlson 1970a). On the South Coast, the exemplary work in Kuhn's sense was done by Borden for the Fraser Canyon (1968) and the Fraser Delta (e.g. Borden 1970) regions. In his earlier speculations (e.g. 1954a), Borden relied upon external influences, diffusion and migration, as the agents of change. Present models have most or all of the major linguistic groups on the North and Central Coasts in place during the last 4000-5000 years. The debate as to continuity in the Late Period centers on the origin of the Marpole Culture on the South Coast. One interpretation stresses continuity and *in situ* evolution from the Locarno Beach culture (Mitchell 1971) and perhaps St. Mungo, through Marpole to the historic Coast Salish people; while the discontinuity model (Borden 1970, Burley 1979b) postulates a break in the prehistory owing to the movement of Marpole peoples from the middle Fraser River locality to the coast about 400 B.C. The seesaw battle of discontinuity vs. continuity may be resolved in the process of conducting work in other paradigms, such as the ecological paradigm where the "discontinuity" might be understood as more of an adaptive change (c.f. Thompson 1978a).

On the Central Coast, archaeological work at Namu during the late 1960s and early 1970s involved historical and ecological research goals (Hester and Nelson 1978:6). These investigations produced a key sequence of historical periods spanning 9000 years, and an inductively derived model of accretion and synthesis to explain the cultural development. The predicative capacity of the model is in question however, since it is unclear why the many traits with origins outside the Northwest Coast should have been accepted and synthesized as they were.

The project of largest scale on the North Coast is the North Coast Prehistory Project initiated by George MacDonald in 1966 "...

in the belief that there must be sites with sufficient time depth to detail the development of the elaborate and highly integrated cultural pattern known historically" (MacDonald and Inglis 1981:37). Ecological studies were soon added to these historical and ethnographic goals. The historical data spanning 5000 years are interpreted in terms of a three-period model of cultural continuity. The archaeological sequence "... is seen as a series of developing technological traditions which have an accumulative effect through time. New elements are appended to a basic pattern, but do not significantly alter it" (MacDonald and Inglis 1981:42). Like the accretion and synthesis model inspired by the Namu excavations, this model is inductively derived and a continuity model, but is smaller in scope (regional vs. areal) and lacks the emphasis which Hester and Nelson place on diffusion. Diffusion in Prince Rupert Harbour is modeled by means of the area co-tradition concept (MacDonald 1969:244).

The Early Period, prior to 3000 B.C., has been the subject of recent studies (*Canadian Journal of Archaeology*, Vol. 3, 1979), but there are still only a few pertinent sites. The three most explicit models are those proposed by Fladmark, Carlson and Borden and which address somewhat different historical problems. Fladmark (1979) tackles the large problem of the entry of people to North America during the late Wisconsin glacial period and puts forward a coastal migration model with maritime adapted populations moving south via a chain of sea-level refugia. Deductive testing of the model will be difficult because much of the archaeological evidence has been submerged by rising post-glacial sea-levels. It is a promising model nonetheless, and notable in its direct applicability to maritime prehistory. Carlson's model (1979a:224) has a much wider field, covering both the coast and the interior, and is a descriptive model of the cultural interaction and the basal traditions during the Early Period. It is a continuity model, but Hester (1979:231) has questioned the extension of these traditions through to the historic linguistic groups. Charles Borden's concerns are with the historical origins of the Northwest Coast Culture Pattern and in his later formulations (1975, 1979) he presents an economic merging model whereby the economic foundations for this pattern arose as a historical merger between two contrasting subsistence strategies (and technologies) having origins on different parts of the coast. Without denying the real differences in the early postglacial economics and technologies on the North and South Coasts, it is not certain that all of the early North Coast sites reflect the same kind of adaptation, and as Catherine Carlson notes (1979:192), technology and subsistence patterns need not coincide at least on the Central Coast.

## Models of Northeast Coast Prehistory

There has been less archaeology done on the Northeast Coast and the culture history is correspondingly more piecemeal, especially in the Maritimes. There remains considerable potential for basic cultural-historical work, not only as an end in itself, but as a prerequisite for some aspects of model-building in the evolutionary paradigm. More remarkable limitations on the data arise from continuing coastal submergence in the Maine-Maritimes region which has left most of the former coastal Paleo-Indian and Archaic occupations now under water and on the continental shelf (Simonsen 1979). Models of the early prehistory will thus be deductive and difficult to test. Computer simulation models seem most suitable or models extrapolated from the rising coast of Labrador. Summaries of the culture history of the Northeast can be found in the Handbook (Trigger 1978b), and Snow (1980) has synthesized the prehistory of New England. More general discussions include monographs by Sanger (1979g) for the Maine-Maritimes region and Tuck (1976a) for Labrador/Newfoundland.

There are two principal and related historical problems facing archaeologists working on the Northeast Coast, particularly in the Maine-Maritimes region. The first of these is the paucity of sites in the 10,000-5000 B.P. time range and the second is the issue of cultural continuity. Both Sanger (1979g:23-24) and Snow (1980:168) have evaluated the models presently competing to explain the scarcity of Early and Middle Archaic sites in Maine (a situation also covering the Maritimes). Of the four hypotheses considered, Sanger argues that his River Gradient Hypothesis offers the best fit while conceding that all four hypotheses may be valid to some degree. Snow (1980:158) is of the opinion that mathematical catastrophe models might explain the apparent depopulation in Early Archaic times.

The second issue is a continuity vs. replacement debate analogous to that existing in the culture history of southern British Columbia. In the Northeastern case, disagreement centers on several time intervals: 1) the late Paleo-Indian -- Early Archaic (ca. 7500 B.C.); 2) the Middle/Late Archaic (ca. 3500 B.C.); and 3) the Late/Terminal Archaic (ca. 1500 B.C.) and is focussed on the Maine-Maritimes regions. The continuity model has been presented by Tuck (1975, a,b,c) and postulates *in situ* cultural development from Paleo-Indian to historic times. The model derives from geochronological, subsistence and typological data in southern Labrador, but depends elsewhere upon accepting the notion of a Maritime Archaic Tradition. The model stresses the maritime nature of even Paleo-Indian adaptations. The model may not cover the

origins of the Maritime's peoples (Tuck 1978:34) or the Naskapi.

Cultural discontinuity or population replacement models have been advocated by Sanger (1975, 1979g) in an effort to explain certain episodes of accelerated culture change south of the Gulf of St. Lawrence. Such models are said to be less parsimonious, but better able to accommodate environmental change. With regard to the few Early and Middle Archaic components in Maine, Sanger argues that there is no case for continuity with Paleo-Indian cultures. Similarly, the Late Archaic cultures with their elaborate mortuary cults are not considered expressions of the Maritime Archaic Tradition but rather as related to the Vergennes phase of the Laurentian Tradition which has spread into Maine by 5000 B.P. (Sanger 1973:128-130; 1979g:42, 71). The decline of these Late Archaic cultures is attributed by Sanger (1975) and Dincauze (1975) to a population replacement in concert with significant changes in the ecology, the new arrivals being identified as the Susquehanna Tradition. Cook (1976) argues that there was no such migration.

Before leaving the continuity issue, it should be noted that on the Labrador-Newfoundland coasts (but not further south), there have been several population replacements involving the appearance of Independence I, Dorset, and Thule Eskimo populations. The reality of such discontinuities is accepted owing to the absence of classification difficulties in dealing with these Eskimo cultures, and models are concerned with the nature of the contact between Indian and Eskimo groups (Tuck 1976a; Fitzhugh 1972).

These culture changes of northern origin did not directly impact south of the Gulf of St. Lawrence. On the other hand, several of the major trait complexes in Maine and the Maritimes -- agriculture (which reached the Abenaki of southern Maine), shellfish collecting and ceramics are considered to have southern origins (Snow 1978), but there are few diffusion models to deal with these important changes.

#### Problems and Anomalies

Cultural-historical studies are alive and well, but in spite of much progress, there remain problems in classification which delay resolution of continuity questions for example. In the Northeast, descriptive units tend to be traditions using both technological and/or adaptive criteria, but there are persistent difficulties in sorting out the overlapping definitions of the Archaic traditions. Further progress may depend on continued assessment of existing maritime units (such as the Maritime Archaic) as well as the use of



cross-cultural units such as adaptive type (Fitzhugh 1975b) and defined so as to deal with historical problems in coastal area. Archaeologists on the Northwest Coast are encountering difficulty with the phase concept (Abbott 1972), but one path through such difficulties lies in the use of the techniques of numerical taxonomy (Matson 1974). It may be, however, that the continuity problems constitute persistent anomalies in Kuhn's sense and that their solution will come about in the course of work within other paradigms. As suggested above, discontinuities might represent adaptive changes explicable with ecological models, or the discontinuities might represent episodes of evolutionary change explicable with punctuated-equilibria models. Ecological, evolutionary or demographic models might also eventually explain the apparent lack of sites dating prior to 5000 years ago. The persistence of such problems may help to explain why cultural-historical work has been superseded on these coasts as elsewhere, by work centered in other paradigms, but a more fundamental factor has probably been the continued absence of generalizations about coastal prehistory.

#### THE ETHNOGRAPHIC PARADIGM

Research conducted in this venerable paradigm typically involves drawing analogies between ethnographic and archaeological cultures, occasionally in the context of ethno-archaeology, with the aim of producing fuller cultural reconstructions. Recent work has also employed ethnographic data in a search for general adaptive principles by means of which hunters-gatherers cope with environmental uncertainty. Emphasis has been on distilling out "pure" economic systems or supplementing archaeological models and it is significant that perhaps because of the materialist bias, archaeologists have made little use of ethnography to determine the influence of goals, satisfaction levels, value systems and preferences.

Ethnographic models are effective for local and regional cultural reconstructions, but they may often be describing only refugee populations (Whitlam 1980a:13) and in any case, their predictive capacity drops off as the model is extended back beyond the protohistoric period. Moreover, as Bettinger points out (1980:205), while it is possible to make some descriptive statements about hunters-gatherers, it is difficult to make inductive or deductive generalizations owing to the particularistic nature of ethnographic studies.

The ethnographic paradigm has been and continues to be of

greater importance in Northwest Coast archaeology owing to: 1) the fact that sustained European contact was some two centuries later than on the Northeast Coast; and 2) the relative complexity of the historic cultures on the Northwest Coast produced a natural interest in their origin and development. While there is no doubt that depopulation and acculturation radically transformed traditional cultures on the west coast (Burley 1979a), there was nothing equivalent to the genocide of the Beothuks, nor did the western fur trade lead to a total collapse of the subsistence-settlement system. This was not the case in the east where some historic subsistence-settlement systems may well be a mirror image of the late prehistoric systems (Sanger 1979g:12) and only such band-level peoples as the Naskapi retain any potential for ethnographic work (e.g. Fitzhugh 1972:180).

Thus, the availability of ethnographic data on the Northwest Coast could be coupled with historic research on the time depth of the ethnographic pattern. The ethnohistorical work of de Laguna *et al.* (1964) represents the tightest integration of these two paradigms, but ethnographic work has been linked to most historical work, either at the problem formulation stage (MacDonald and Inglis 1981) or in syntheses involving cultural reconstructions (Mitchell 1971). Ethnographic research has also been effectively linked with ecological research, although usually in an adjunct role, and it has been especially important in the Hesquiat Project (Haggarty and Boehm n.d.) and the Ozette Archaeological Project.

On the east coast, ethnography has offered limited analogies (MacDonald 1968:129, Tuck 1976b) or, as in Hoffman's work (1955), ethnographic records were used to develop a comprehensive model of precontact Micmac society. Continuing archaeological research has questioned the accuracy of this latter model (Nash 1980b) and by implication, the utility of ethnographic-based research.

Archaeologists on the east coast have never operated within an ethnographic paradigm, but have used ethnographic data in a selective manner for cultural reconstructions. We are unlikely to formulate accurate models of societies on the east coast during the 16th century by relying on historical records. Baseline reconstructions will likely emerge as a result of work in other paradigms. This seems also to be the case on the Northwest Coast where continuing archaeological work together with re-evaluation of the classic ethnographic pattern is leading to a revised conception of late prehistoric society (Burley 1979a). Accurate reconstructions are obviously necessary for any discussion as to the comparative complexities of these cultures at the time of contact. The Micmac and their neighbors to the south were ranked societies

like those of the west coast, but at least some of the ethnic groups on the West Coast may have been chiefdoms (Service 1978:221-240; Price 1979:187) and therefore socially and politically more complex. Miller and Mitchell (this volume) assess this issue for the Micmac and Coast Tsimshian respectively. *If* there is a significant difference in cultural complexity, we are faced with the problem of explaining why this should have occurred, especially since these cultures are situated on oceans of approximately equal biological productivity (Gross 1977:335). The ethnographic paradigm appears increasingly unsuitable for reconstructing proto-historic cultural systems, dealing with questions of comparative cultural complexity or generating any theory and will probably shift from its position as a minor paradigm on the west coast to a cluster of models having very restricted application.

#### RECONSTRUCTING SOCIO-POLITICAL ORGANIZATION

One of the objectives of the "new" archaeology was the reconstruction of prehistoric socio-political organization, not by means of ethnographic analogies, but by recognizing the variability in the archaeological record and translating this variability into models of social behavior and social organization. The exemplary studies were done in the Southwest (Longacre 1968, Hill 1968) and while such efforts have had mixed success (Dumond 1977), identifying social units, residence patterns and community relations remains an area of contemporary research (Redman *et al.* 1978).

There has been relatively little such research on the Northeast and Northwest Coasts. Architectural studies and house floor analyses at Ozette (Mauger and Daugherty 1980) will provide unusually accurate descriptions of Makah community organization and will permit evaluation of ethnographic models which will have some validity in this late context. In most other cases, such as shell middens, it has been difficult to isolate discrete occupations and interest on the West Coast has centered on the identification of social ranking and stratification. Donald and Mitchell (1975) have discussed the relationship of ranking and salmon resources, and Ames (1981, this volume) has provided models for the evolution of ranked societies. Ranking appears 2500-3000 years ago on the Northwest Coasts (Ames 1981:797), while on the Northeast Coast, there are at least status differences between men and women by the Late Archaic Period (Tuck 1976b:89).

The principal issue confronting comparative archaeologists is the possibility that the Late Archaic cultures of the Northeast Coast are more complex than their counterparts (St. Mungo, Mayne and

Locarno Beach phases) on the Northwest Coast. This is the reverse situation to that discussed for the time of European contact. There are adaptive and technological parallels with the west coast cultures (Fitzhugh 1975b), but the east coast cultures may be socially and ideologically more complex. The Late Archaic is regarded as a Period of cultural florescence with its widespread exchange systems and energy-expensive mortuary cult. Snow (1980:211) suggests that in New England, the bands may have been larger and more sedentary than previously. Tuck (1976b:84) has offered a reconstruction of the social organization and other aspects of culture among the Maritime Archaic peoples at Port au Choix. If we grant considerable isomorphism between social and ideological complexity, then the elaborate and widespread Maritime Archaic burial cult probably indicates more than simply status differences between men and women. A ranked society is implied and at a comparatively early date. It should also be noted that the burial mounds of Labrador are the world's earliest (McGhee 1976).

At present, there is little progress in developing models of prehistoric social organization, on the coasts or elsewhere. The paradigm itself is promising, but it lacks middle range theory and operational models which tell us what social correlates can be expected given certain kinds of variation in the material culture. This is the domain of behavioral archaeology (Schiffer 1976) and it will be difficult to specify community organization, ranking or degree of cultural complexity until the paradigm is developed beyond an embryonic stage. When this has been accomplished, we can attempt to define the relationships between social organization and coastal environments. In the meantime, I offer the proposition that on average, maritime hunters-gatherers have a more complex social, political and ideological structure than neighboring interior hunters-gatherers.

#### THE ECOLOGICAL PARADIGM

Ecologically structured research is concerned with the ways in which cultures are adapted to their natural environments with the result that the archaeological work is focussed on faunal and floral remains more so than artifacts. Ecological studies tend to be synchronic and oriented towards reconstructing subsistence systems and the paleoenvironments in which they functioned. Such reconstructions of the resource base, procurement strategies, schedules etc. require consideration of settlement systems -- an area of research sometimes identified within a "geographical" paradigm (Clarke 1972:7) and characterized by locational models borrowed from geography and geomorphology. Because these studies

are so frequently linked as subsistence-settlement models and causal priority given to subsistence pursuits (e.g. Jochim 1976:13), subsistence-settlement models will be reviewed under the ecological umbrella.

The ecological paradigm is commensurate with several other paradigms and disciplines. As noted above, there is a logical link to settlement studies and geography; connections with culture history and ethnography were discussed earlier and the concept of adaptation forms a bridge to the evolutionary paradigm. Population ecology is shared with the demographic paradigm and ecology underlies the conservationist ethic of cultural resource management studies.

The ecological paradigm is the dominant paradigm in contemporary American archaeology, a situation which resulted from the mushrooming ecology movement which began in the 1960s and the recognition among archaeologists that within the incomplete nature of the archaeological record, floral and faunal remains and site locations were hard data readily convertible to ecological models. Such epistemology underlies the statement by Hester with regard to west coast shell middens that "... the primary data preserved in the midden is ecological in nature and therefore techniques of collection and analysis of these data should be stressed" (1978:6). Some of the inherent limitations of the ecological paradigm have been pointed out (Vayda and Rapport 1968, Trigger 1978a and Nash 1980), but its use is pervasive.

Faunal and floral analysis are standard parts of the research design whenever excavations are contemplated either at a single site (e.g. Matson *et al.* 1976, Bourque 1975) or in the course of regional projects (Bonnichsen and Sanger 1977; MacDonald and Inglis 1981). The ecological information is commonly directed towards constructing subsistence-settlement models for a region (e.g. Fitzhugh 1972, Thompson 1978a) or a more precariously, for a time period (Snow 1980) or a tradition (Tuck 1975a). General cultural-ecological descriptions often employ the focal-diffuse distinctions for subsistence patterns (Cleland 1976) and the classification by Beardsley *et al.* (1956) to describe mobility. At present, such models are in the initial stage of development and most explicit for Hamilton Inlet, Labrador (Fitzhugh 1972), Hesquiatic Harbour on the Central part of the North west Coast (Haggarty and Boehm n.d.) and the southern Gulf of Georgia (Thompson 1978a). Such work needs to continue, but given the tremendous cost, considerable thought needs to be given as to where the point of diminishing returns lies with respect to building theory.

Modeling subsistence-settlement systems seems only routinely troublesome until the resource list comes to shellfish, for what explanations of the sacred cow complex are to anthropology, the exploitation of shellfish is to coastal archaeology. The shellfish issue exposes the deep divisions between the Cultural (ideational, emic, mentalistic) Paradigm and the Ecological Paradigm and to some extent, the effects of the separation between archaeology and cultural anthropology. The humble horseshoe clam has become one focus of an entertaining struggle between cultural materialism represented by Marvin Harris and the Cultural (structuralist) perspective argued by Claude Levi-Strauss (see Harris 1979:202), while archaeologists continue to battle from their trenches.

On the Northwest Coast, Borden would seem to argue from a Cultural perspective in claiming that many early populations ignored or neglected inter-tidal food resources such as clams and mussels (1975:113). The ecological position is represented by Fladmark (1975) who argues that intensive shellfish collecting is the logical outgrowth of the decreased mobility which accompanied stabilization of the eco-system. In the Northeast, Nash (1980b:21-22) has argued that the distribution of shellheaps in eastern Nova Scotia cannot be modeled satisfactorily solely within the ecological paradigm, and Snow (1972) has emphasized the technological variable in shellfish collecting and the desirability of avoiding deterministic ecology (1980:179). Braun (1974), Brennan (1976) and others have argued for interpretations in Ecological rather than Cultural terms.

As Bettinger notes (1980:211), hunters-gatherers are usually selective whether under conditions of scarcity or plenty. *Culturally*-ordered selectivity of resource use is an issue that requires increased recognition and investigation. Shellfish exploitation may be the proximate issue, but the larger issues are of people-nature relationships and human rationality. The only recent model to include Cultural goals within subsistence strategies is Jochim's (1976) model of hunters-gatherers which focuses on the need for choices and decisions in resource use scheduling. His two major subsistence goals (secure income and population aggregation) are not exceptional, but he includes four secondary desires or preferences which are much more independent in expression. Jochim's model may constitute middle-range theory; certainly it is comprehensive, but it has yet to be tested on coastal cultures. Nonetheless, such decision models, which derive from the economics and management fields, offer a welcome bridge between the Cultural and Ecological Paradigms.

Progress in developing theory is most evident in the ecological paradigm and there are at present, three related models which

provide some propositions about maritime hunters-gatherers. These models are: 1) a Systemic Integration model (Fladmark 1975); 2) a definitional model (Yesner 1980); and 3) an optimum diet model (Perlman 1980). Sanger (1979e) is also developing an adaptation model for the Gulf of Maine. The middle-range generality of these three models and the incipient nature of such theory suggests they warrant some examination.

Fladmark's Systemic Integration model was developed to explain the accelerated culture change and intensification that began about 3000 B.C. on the Northwest Coast. It is more parsimonious than the other models in that the key variable is coastal stabilization, for until stabilization occurs, biotic populations such as anadromous fish cannot reach climax productivity, nor can the higher consumer societies which depend on the fish. The model has stimulated considerable thought and debate (e.g. Sanger 1979f:851; Borden 1975:113) and in this volume, Fladmark extends its application to include the Northeast Coast. Sea-level change and fish populations are also central to Sanger's (1979g:30) River Gradient Model for the Gulf of Maine.

Yesner's model is a more elaborate attempt to define the common features of maritime adapted populations. It is an inductively derived model consisting of statements about resource availability, settlement patterns, technology and demography. As Yesner concedes, (1980:733,745), the subsistence related features are less controversial than the demographic ones. It is a normative descriptive model and suffers from the fact that the relationships among the features are not specified. A next step could involve checking the accuracy of this model on the Northeast and Northwest Coasts. The model will be subject to rapid revision, but will remain of historic interest in initiating attempts to recognize maritime hunters-gatherers as a special class of society requiring special theoretical treatment.

Perlman also considers coastal populations "atypical" with respect to other hunters-gatherers and like Yesner, he characterizes coastal environments as biologically productive -- in contrast to Osborn's (1977) earlier assessment. Perlman's principal model is a least effort -- least risk model, one of a series of optimal foraging models developed in biology. He applies it in an informal, deductive fashion to the archeological record of the United States east coast. One such "expectation" derived from the model concerns the early initial use of sea resources and the necessity of coastal stabilization for intensified use of these resources. This is compatible with Fladmark's model and Yesner's summary of maritime prehistory (1980a:733-734). Other general conclusions concern the

role of shellfish, the probability of storage techniques, the sedentism of coastal cultures (also one of Yesner's ten features) and the probability of non-band organization. The difficulties in this application of the model are that : 1) the "expectations" said to derive from the model appear reasonable, but are not rigorously derived; and 2) while the data do not invalidate these expectations, this is due to minimal or negative evidence in three cases (shellfish, storage, social organization) rather than positive correlations. The complexities of shellfish exploitation and social organization have been discussed earlier.

It is satisfying to see the emergence of some theory in ecological archaeology, but there are some problems besides the limitations inherent in the paradigm. References for critiques of the paradigm have been noted earlier; the comments here are concerned with the application of ecological models in a coastal context and the direction and destiny of continued ecological reconstructions.

Ecologically-minded archaeologists have often drawn their models from general biology and applied them directly to archaeological contexts. There are problems with this procedure. First, there is little consideration given to the commensurability problem. Vayda and Rapport (1968) noted the general lack of correspondence with general plant and animal ecology that occurs when cultures rather than human populations become the units of adaptive study. If human populations are used, can Culture be factored out? It would seem preferable for archaeologists to develop their own theory of cultural ecology as Steward (1955) originally proposed. Concepts rather than whole models can be borrowed from biology and, in the case of coastal archaeologists, from marine biology and oceanography.

A second point on borrowed models is that there seems to be insufficient borrowing from oceanography. Oceanographic data has been most prominent in debates over transoceanic contacts. The problems are historical, centering on whether similarities in traits found on opposite sides of the ocean are the result of independent invention or diffusion. The mechanics of contact have hinged upon the circulation patterns of the ocean's currents. One such well-argued debate concerns the possibility of early culture contact between Japan and Ecuador via a North Pacific route (Meggers and Evans 1966, McEwan and Dickson 1978). Oceanographic data have also been of concern in modeling the migrations and initial settlement of the islands in Micronesia and Polynesia.

Productivity estimates for marine ecosystems (e.g. Yesner



1980a), tidal action -- resources studies (Ham 1976:74) and study of circulation patterns (Mitchell 1971) are important to archaeologists, but we can probably also modify hydraulic simulation models of the type used by oceanographers in order to understand the effects of physical processes -- shoreline changes, the mixing of estuarine waters, the effects of tides and tidal currents -- on the lives of coast dwellers. Estuaries, which Robert Ingle called "the crossroads of evolution" (1954:65) could become foci for interdisciplinary work on sea/land transitions, rather than studied simply as microenvironments with a higher concentration of food resources and sites.

A cautionary note seems in order with regard to ecological studies. A principal pitfall for culture historians has been the temptation to be content with "mopping-up" operations involving the filling in of gaps in history's endless jigsaw puzzle. A similar dead-end is possible for ecological investigations which are, like ethnography and the modeling of social organization, largely directed towards synchronic cultural reconstructions. In ecological archaeology, the pitfall lies in producing reconstruction after reconstruction, each one ever more detailed as analysis progresses from macro to micro to a grain of sand in concert with a swollen army of interdisciplinary specialists. In some cases, the structure collapses under its own weight after the principal investigator dies or becomes bored, leaving only a residue of preliminary reports. Finally, it should be recognized that the current emphasis on ecological studies has diverted attention from evolutionary and processual studies which are of greater scientific significance.

#### THE DEMOGRAPHIC PARADIGM

In his recent review, Hassan terms demographic archaeology "... an analytical and interpretive approach within archaeology" (1978:49). It can also be identified as a paradigm concerned with size, density, growth and other population parameters in archaeological contexts. It is closely linked with ecology (population ecology) and geography through settlement patterns studies and when population pressure creates change, there are evolutionary implications. In recent years there has been a proliferation of demographic models of culture change, although such models are curiously under-represented in the archaeology of the Northeast and Northwest Coasts.

Demographic data has traditionally been used as an adjunct to cultural-historical work or cultural reconstructions. Early investigations sometimes used skeletal data to bolster arguments

about migrations and origins (e.g. Hill-Tout 1930), but more often, osteological information from burials and cemeteries has been analyzed to provide information on physical characteristics, age and sex profiles, mortality, paleopathology and population distances as well as for knowledge concerning mortuary customs and social organization (e.g. Anderson 1976, Cybulski 1978).

There have been relatively few estimates of population size or density for individual sites, regions or areas. California archaeologists have long used quantitative studies of shell middens to make population estimates (Cook 1946), but this remains to be done on the Northwest and Northeast Coasts. Where estimates have been made, they are likely to be based on ethnography and are conservative given the depopulation which followed European contact. As things stand, we cannot for example, rule out the presence of Micmac "towns" during the Woodland Period in the Maritimes. On a regional scale, Miller (1976, 1980a) has used ethnohistorical records and depopulation ratios to arrive at an estimate of 26,000 Micmacs at the time of contact -- a figure far higher than traditional estimates and a figure which has dramatically different implications as to cultural complexity. Present estimates for the various groups on the British Columbia Coast (Duff 1964) extend back only to 1835. These numbers are probably also conservative and need to be extrapolated back towards the mid 1700s. Relatively high population densities is one of the features which Yesner (1980a) identifies as characteristic of coastal populations -- a generally acceptable proposition.

Beyond the difficulties in obtaining reliable estimates of population size and density, there is the topic of population growth which is presently the centre of a debate as to its operation with respect to cultural change. The issue is whether population growth is inherent and thus an independent variable (e.g. Cohen 1975) useful for explaining adaptive change, or whether population growth is a dependent variable as seems to be the case in Yesner's model (1980a) and Perlman's model (1980). The issue is an important one, although Bettinger (1980:228) suggests that no *a priori* assumption need be made and that the position taken depends on the nature of the problem.

There have been few attempts to use population growth as an independent variable or any sort agent of change. On the West coast, Ames (1979) has used the concept of optimum population size to help explain some aspects of the enculturation process among groups on the Skeena River. In a later paper (1981), population growth is viewed by Ames as one of the processes (but not a prime mover) responsible for the formation of ranked societies. Snow has

outlined an inductively derived comprehensive growth model for New England prehistory. It is not intended to cover other regions, nor is it specifically a coastal model. Very simply, this model depicts long-term population not as one or several lines on a graph, each line with a gradual slope, but rather as a wavy line reflecting "... episodes of rapid growth and sharp decline" (1980:256). In such a wave model, population growth can be either an independent or dependent variable at different times.

There is little demographic work to review and the most obvious conclusion to be drawn is that there is great potential for the use of demographic models in coastal archaeology. In both academic and cultural resource management studies, it is common practice to employ regional sampling methodologies. Such methodologies are very conducive to producing population data, so that demographic problems can easily be accommodated in many research designs. Determination of growth rates and trajectories is an obvious need, and in particular, it would be interesting to determine whether the presence of the Coast Range compressed living space so as to produce logistic growth curves for populations on the West Coast.

#### THE EVOLUTIONARY PARADIGM

Evolution has recently been defined as systemic organizational change (Gall and Saxe 1977:256) and in a somewhat different vein, as "... a particular framework for explaining change as differential persistence of variability" (Dunnell 1980:38). The evolutionary paradigm shares the idea of adaptation with ecology, but evolutionary studies are diachronic, not synchronic. Dunnell (1980) has reviewed evolutionary studies in archaeology finding them to be largely transformational and progressive in philosophy and yielding merely historical generalizations about the results of change. Stages are a typical classificatory product. This type of cultural evolution (which also typifies schemes in cultural anthropology) lacks any selective mechanism and is unrelated to Darwinian evolution. Although more recent processual archaeology is compatible with scientific evolutionary biology, there have been few evolutionary models of any kind and little advance in developing archaeological evolutionary theory (Meltzer 1979:654, Dunnell 1980:82). This situation holds true on the Northeast and Northwest Coasts as well and is ironic in view of the diachronic strength of archaeology. In the two areas of interest here, a basic question remains to be answered prior to model-building. Has there been any macro-evolutionary change? By this I mean major systemic organizational change (*sensu* Gall and Saxe) or revolutionary changes (Service 1971:13) as distinct from growth, social change or

development which are incremental in nature. The issue is pursued below.

The nineteenth century unilinear model of cultural evolution appears briefly in Hill-Tout's 1895 paper "Later Prehistoric Man in British Columbia" (Maud 1978:37), but I am unaware of other evolutionary advances until the use of developmental stages (e.g. Paleo-Indian, Archaic) became common in Northeastern archaeology (e.g. Willey and Phillips 1958). In the 1970s there were a few excellent contributions concerned with the evolution of coastal societies. Fitzhugh (1972:191-194) advanced five propositions said to characterize coastal cultural dynamics. These propositions, relating culture change to the resource base and to climatic changes, were inductively derived from Labrador data, but can be tested on the Northwest Coast. To some extent this has been considered, for in 1975 Fitzhugh suggested (1975b:374-375) that the intensified maritime adaptations and technological changes that began about 6000 to 5000 years B.P. among circumpolar cultures might be explicable as a response to the ecological changes accompanying the onset of the Atlantic (hypsihermal) climatic episode. Somewhat earlier, Mitchell (1971:71) proposed a similar climatic model for these changes in southern British Columbia. A final evolutionary model, which has the virtue of distinguishing constraints and processes, is Ames' model for the evolution of social ranking on the Northwest Coast. A basic hypothesis is that "... ranking evolved on the coast through the constraining of a resilient system" (1981:798). This model would probably not apply to the east coast societies since one of the constraints, environmental circumscription, was likely to have been operative at a much lower level.

The tortoise-like progress of evolutionary studies seems partially attributable to the issue of commensurability between cultural and biological evolution. Dunnell (1980) has outlined the historical cleavage between these two and the confusion that often exists when biological concepts have been borrowed by archaeologists. Similar problems were noted earlier with respect to ecological models in archaeology. Dunnell stresses the need for a new kind of evolutionary theory, but one similar to that of evolutionary biology. Yoffee (1979) on the other hand, attributes the lack of progress to over-reliance on the mechanisms of biological evolution, which he argues, do not involve the internal sources of change characteristic of culture change. With the exception of the Ames model, the models mentioned above rely upon external (environmental) causes for culture change.

Evolutionary biology is currently in upheaval over the issue of gradual vs. punctuated equilibria and perhaps even the

possibility that acquired characteristics can occasionally be inherited. The first issue has already surfaced in cultural anthropology (Diener 1980), the second waits to be explored by sociobiologists. The punctuated-equilibria model is designed to explain rapid change on the premise that "... gradual environmental changes generally give use to *quantum* adjustments in system behavior when the response under consideration is complex ..." (Diener 1980:425). Such models might assist in explaining such rapid, macro-evolutionary changes as the florescence of the Late Archaic cultures in the east, the widespread, roughly synchronous appearance of shell midden sites on the west coast ca. 5000 B.P. and, on a smaller scale, the appearance of the Marpole Culture.

Evolutionary models, punctuated-equilibria types and others, will undoubtedly be borrowed from biology and applied with mixed success to problems such as those mentioned above. But, since cultural evolution is fundamentally different from biological evolution, it seems apparent that tracking the progress of evolutionary biology is likely to yield only half-truths.

#### THE CULTURAL PARADIGM

Cultural theories and models define socio-cultural phenomena from an emic perspective and ascribe causal priority to the mental conditions and processes operative at the level of superstructure (ideology etc.) and structure (domestic and political economy) rather than the infrastructure (modes of production and reproduction). This is in contrast to the etic perspective and the causal priority attributed to ecological, economic and demographic variables (the infrastructure) under a cultural materialist strategy (Harris 1979).

Cultural theories, often termed mentalistic or idealistic, have a long history in anthropology, beginning with the social philosophers of the 18th century and continuing through 19th century evolutionary anthropology where proximate causation might involve material conditions, but ultimate causation was attributed to the pre-eminence of the mind (see Harris 1968:212). The ideological bias continued even during the eclecticism of the Boasian period of historical particularism and it was basic to most culture and personality studies. British social anthropology gave social structure priority of analysis and despite the general eclecticism prevalent in anthropology today, Cultural theories are favoured within French structuralism and they are critical to dialectical materialism.

Mentalistic theories were never overtly popular in North American archaeology. Cultural-historical studies have been largely atheoretical, although presumably diffusion and perhaps migrations operated within mental rather than material constraints. Schwartz (1978) has proposed that psychic archaeology represents an emergent paradigm, but at the moment, its only coastal application has been in British Columbia and it represents only an emergent curiosity. Harris (1968, 1979) has written extended polemics against ideational anthropology and goes further in arguing that there is an "insuperable difficulty" preventing application of ethnosematic models to archaeology.

The archaeologically recoverable portion of most of human history consist of the environmental modifications which different varieties and expressions of energy quanta have brought into being. Binary oppositions, contrastive features, skewing rules etc. have this in common: they have no measurable energy cost (1968:604).

Most archaeologists accept this position and increasingly pursue explanations within the ecological paradigm and follow cultural materialist theory in attributing causal priority to the infrastructure. Cultural variables, ethnosematic models and in fact much of cultural anthropology are all systematically excluded. Cultural models are models of last resort and regarded as untestable since we do not know how to measure such variables archaeologically (at the present time). Nonetheless, decision models (e.g. Jochim 1976) offer some potential for including Cultural variables. The dialectic model outlined below is also an attempt to develop a comprehensive model which is not wholly etic in definition and causation.

#### A Dialectical Model of Maritime Cultures

In dialectical materialism, the infrastructure also assumes causal priority, but there is a distinct epistemology in that the content of the infrastructure, as well as its mode of development, is dialectical in nature. Dialectics, which originated with Hegel, is an idealistic concept whereby interacting things and ideas are believed to be in a state of tension and opposition and that resolution of contradictions and historical development proceeds through a series of negations -- thesis, antithesis, synthesis. similar ideas are to be found in the Yin Yang school of early Chinese philosophy. The trouble with dialectical epistemology "... is the lack of operational instructions for identifying causally decisive 'negations'" (Harris 1979:145). I suggest, however, that a modified, less dogmatic version of the dialectical materialist model

will prove useful in describing and explaining some structural and evolutionary aspects of coastal cultures.

*Infrastructure.* On the face of it, maritime hunters-gatherers would seem to be qualitatively distinct from interior hunters-gatherers by virtue of being located at the interface of two major biomes, terrestrial and marine. Coastal peoples will exploit the rich and diverse resources of both ecozones to varying degrees with the subsistence pursuits being weighted towards one or other of the pair of ecozones. It seems reasonable, therefore, to say that the economic system is binary in nature. Ethnosemantic information relating to this point is generally unavailable except for the Nootka who "... broadly categorize their world on the West Coast as "kla'a" or "outside" in English, and "hil̄stis" or "inside" (Dewhirst 1977:1). "The 'outside' is the "long" unprotected low-lying outer coastline," while the "... 'inside' is basically the setting of the inlets and river mouths that empty into them" (Dewhirst 1977:1,3). The "inside" is interior related.

*Structure and Superstructure.* Is the binary characterization of maritime infrastructure superfluous to our understanding of them? I think not, if for no other reason than this -- it would follow from the principle of infrastructural determinism (i.e. casual priority) that we might expect a greater dualism to characterize the social and political organization and the ideologies of maritime cultures. At the moment, this must remain a hypothesis, for there has been little investigation along these lines other than Duff's analysis of the symbolic logic underlying prehistoric stone sculpture on the Northwest Coast. This art "... uses inherent structural and conceptual dualisms in the artifacts and images: outside-inside, head-body, front-back, part-whole, and so on" (Duff 1975:14). It seems there are paths into the heads of prehistoric peoples and some potential for Cultural variables. Dialectical societies are likely world-wide, the best known cases being the Gê and Bororo peoples of central Brazil. They state quite explicitly that their societies are imbued with oppositions, because "opposition is immanent in the nature of things" (Maybury-Lewis 1979:13). It remains to be seen whether dialectical societies are more frequent along coastal zones.

*Dialectical Evolution.* Marxist anthropologists are most closely identified with dialectical evolution, but it has also been applied to general human evolution by Belasco who comments on the non-deterministic nature of dialectics and the unevenness of the process which results in an asymmetrical or mosaic pattern (1975:87,91). The model proposed here has a more restricted scope

and carries with it the hypothesis that the evolutionary trajectories of coastal cultures will have a greater than expected tendency to follow a dialectical path. That is, dialectical evolution is associated with the evolution of coastal cultures.

Theoretically, the dialectic will involve a long-run tendency towards shifts in the relative weights of subsistence pursuits -- from maritime emphasis to relative equality to interior emphasis and back again -- an oscillating economic mix. The shifts are likely to be precipitated by infrastructural changes -- in the ecology of one or both biomes for example -- or more remotely, as a consequence of inherent tension or lack of congruence between lifeways on land and sea (the dialectical opposition). Changes in systematic organization and perhaps complexity would accompany such shifts, but it follows that there would be no unilinear trend towards intensification of maritime adaptations. It must be admitted that there is little evidence for such swings in the cultural pendulum, although the Fraser Delta (Borden 1970) and Hamilton Inlet (Fitzhugh 1972) sequences could be re-examined from this perspective. It is also difficult to recognize and evaluate historical links between coastal/inland societies classified into different cultures. Dialectical shifts will result in a synchronic mosaic of subsistence-settlement systems -- a situation which seems to characterize the Woodland cultures of eastern Nova Scotia (Nash 1980b). The unevenness of such evolution would also produce significant differences in complexity among contemporaneous cultures in a single area.

Nonini (1980:433) suggests a revived "dialectics of nature" may be forthcoming. In spite of its traditional metaphysical difficulties, such concepts open new possibilities for articulating material and mental variables and integrating paradigms. Harris (1968:71) disputes any connection between dialectical thinking and historical processes, but we can hardly ignore the emerging (and sometimes binary) models of the brain being developed by neurobiologists.

#### CONCLUSIONS

There are several conclusions to be drawn from this review.

a) While this investigation is not an explicit test of Kuhn's model, it appears that the process of paradigmatic replacement that Kuhn describes is not characteristic of the history of archaeology on the Northeast and Northwest Coasts. New directions in model-building occur not as responses to persistent anomalies or



from the falsefication of existing models (in fact models are rarely tested), but rather, as in the case of ecology, from changes in the infrastructure of the society in which scientists operate.

b) Progress in the construction of theory is thus incremental, although not linear. Archaeology is presently in considerable flux and is a multi-paradigmatic discipline with the greatest progress occurring in the ecological paradigm and the greatest effort being expended in derivative CRM studies. In contrast to the Kuhn model, it appears that paradigms (in a methodological sense) are quite commensurate. Accordingly, greater effort is required towards integrating the paradigms and clarifying the bridges, feedback loops and critical paths among paradigms. Sociologists are also contending with the integration issue (Ritzer 1975).

c) There is some progress, notably in the ecological paradigm, towards generating theory pertinent to maritime hunters-gatherers. Unfortunately, there is a tendency to lean on purely biological models and a temptation to simply produce increasingly fine-grained synchronic reconstructions which are costly, labor-intensive and destined to reach a point of diminishing returns with respect to theory. There remains considerable potential for theoretical progress in the demographic paradigm and particularly in the evolutionary paradigm, which ought to be one of archaeology's strengths.

d) In Northeast and Northwest Coast archaeology, as elsewhere, Cultural variables have been ignored owing to present difficulties in measuring them. But, until ideational models and variables are integrated into archaeological theory and the relations between base and superstructure are made operationally (and archaeologically) explicit, we can place only modest levels of confidence in explanations of cultural variability, or greatly restrict the field in which we offer explanations.

