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POLITICAL EVOLUTION IN MICRONESIA1



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Anthropology has a longstanding interest in the evolution of social and political systems. Although human cultures are diverse due to their specific histories and environmental settings, comparative research has established the existence of predominant general evolutionary trends. Among these are: increasing scale of the maximally organized political unit; increasing structural and functional differentiation of organized groups, involving specialization and hierarchical decision-making; and increasing social and economic stratification. These macro-trends may be summarized by stating that the complexity of societies has increased during long time spans.

In the cultures of the Pacific basin, Sahlins (1958) was one of the first to realize that the scattered islands of Polynesia offer advantages for investigating the evolution of societal complexity, particularly of stratification. Polynesians, he noted, are phylogenetically closely related: all Polynesian peoples shared the same biological, linguistic, and cultural ancestry. Their common ancestry allowed him to study the diversity of Polynesian social stratification as a process of "adaptive variation" (Sahlins 1958:ix) that followed the colonization of scattered archipelagos with diverse environments. The degree of stratification in precontact times, he concluded, varied directly with island productivity.

Sahlins's study suffered from the problems inherent in his functionalist approach, and he was unable to measure productivity--his main ecological determinant-satisfactorily. But the advantages of comparative studies of phylogenetically related peoples such as Polynesians are now well known. Polynesians shared a common ancestor (at around 3000 B.P., most specialists now believe) and remained largely uninfluenced by other peoples until the time of Western contact. This common cultural ancestry and relative isolation offers a large benefit to evolutionary researchers: we may assume that any differences between these cultures probably arose within Polynesia itself. This makes possible a controlled study of "specific evolution," or of "adaptive radiation" (Kirch and Green 1987). In anthropology, this method was systematized by Eggan (1954) and has come to be known as controlled comparison. One chooses a region where cultures are believed to be descended from the same ancestor and tries to determine the factors that led to the subsequent evolution of differences between these cultures.

Controlled comparison is most useful for sorting out the factors responsible for the evolution of cultural differences. Knowing (or assuming with good evidence) that the cultures under study were once the same culture allows us to more rigorously analyze the factors that made them diverge from one another. Researchers can analyze the factors influencing the evolution of differences relatively free from concerns that such

differences were caused by the multiple origins and distinct histories of the cultures studied. Conversely, features that are shared within the area are already known to be homologous (similar because of their shared ancestry) rather than analogous (independently evolved) (Kirch and Green 1987). Knowing that similar features are homologous increases our confidence that differences arose as a consequence of environmental conditions or of internal sociocultural dynamics, rather than as a consequence of external contacts or fortuitous events. These and other benefits of this method has led to its application to Polynesia (Kirch 1984), Mesoamerica (Flannery and Marcus 1983), and Athapaskan cultures (Aberle 1974; Perry 1983).

Compared to Polynesian, Mesoamerican, and Athapaskan peoples, the islands of Micronesia in the western Pacific are less familiar to anthropologists and the public. Yet linguistic, cultural, and limited archaeological evidence suggest that some of these islands offer the same research advantages as those of Polynesia: historical relatedness and relative isolation. These island cultures, here called Nuclear Micronesia, include all of Kiribati (formerly the Gilberts), the Marshalls, and the islands of the Carolines excluding Yap and Palau (see Figure 1). The archipelagos of Palau, Yap, and the Marianas (including Guam) are part of the Micronesian geographic area. However, the origins of their people lie elsewhere, as do those of the Polynesian outliers of Nukuoro and Kapingamarangi.

Because my research uses the method of controlled comparison, this paper considers only Nuclear Micronesian peoples, who on present evidence appear to share common ancestry. I try to account for some of the diversity within this region by identifying those features of different island environments that affected the level of sociopolitical complexity that had evolved at the time of first contact.

Complexity may be defined in many ways (Carneiro 1970b has the most detailed exposition), depending upon one's interests and the region under study. In this essay, I use five elements to define social and political complexity in the Nuclear Micronesian islands. Specifically, the greater the social and economic inequality, the more elaborate the title hierarchies, the larger the size of the maximally organized political unit (the polity), the wider the sphere of chiefly authority, and the greater the number of administrative levels, the more complex I consider that culture to be.

ISLANDS AND HISTORIES

Geologically, the islands under consideration may be divided into two forms: high (volcanic) islands with a basalt base, and low islands with a limestone base. Only three complexes of islands within Nuclear Micronesia are high: Kosrae, Pohnpei, and Chuuk (formerly known as Kusaie, Ponape, and Truk, respectively). All other Carolinian islands, all the Marshalls, and all of Kiribati are low islands. The contrast between the two island types is marked. Pohnpei, Kosrae, and the various high islands in the Chuuk lagoon are large islands by Micronesian standards (about 130, 42, and 34 square miles, respectively), are well-watered, are mountainous, and are relatively diverse and rich, with several vertical ecological zones suitable for different

Figure 1: Micronesia



agricultural uses. Most low islands are atolls, consisting of several islets around the periphery of a lagoon and reef. They have relatively little land: Carolinian low islands average about .8, Marshallese about 2.4, and Gilbertese about 8.4 square miles of land. Low islands typically have large lagoons relative to their land area, however. Lagoon size averages are 77 square miles for the Carolines, 161 for the Marshalls, and 71 for the Gilberts. (Means of land and lagoon areas were calculated from data in United States Commercial Company 1965.) Therefore, on low islands, crop diversity is usually lower and people tend to be more dependent on fish.

Archaeological work beginning in the late 1970s indicates that these islands were initially settled in the first millennium B.C. The origins of the Nuclear Micronesian peoples are not entirely agreed upon at present. Blust (1984) suggests that the languages are most closely related to those of the southeastern Solomon Islands, while Marck (1975) argues for a homeland in northern Vanuatu. There does seem to be wide agreement that the immediate Nuclear Micronesian homeland was in the Solomon-Vanuatu area, rather than in southeast Asia or Polynesia.

The island or archipelago of initial settlement likewise is presently uncertain. Pottery has been excavated from the earliest levels of sites on Pohnpei, Kosrae, and Chuuk (Athens 1990; Ayres 1990; King and Parker 1984). Its presence suggests that one of these high islands was the first to be colonized, for the skills of pottery-making should have atrophied on low islands where clay deposits are lacking. However, Kiribati and the Marshallese low islands also are candidates for initial settlement, based on the diversity of the eastern island languages and some archaeological evidence (Streck 1990).

Linguistic comparisons suggest that the Nuclear Micronesian languages developed from a common tongue (Bender 1971; Bender and Wang 1985). Gilbertese, Marshallese, Kosraen, and Pohnpeic (the latter including some outlying atolls), are clearly separate languages, although some dialect variation exists within these archipelagos. Chuuk and the islands to the west form a dialect chain (Jackson 1983), presumably reflecting the fact that the central and western Carolines were the last to be settled.

This brief survey of what is presently known about the language relationships and prehistory of the islanders suggests that the Nuclear Micronesian cultures do in fact share common ancestry, and that the diversity of their economies and polities arose largely within Micronesia itself. The methodology of controlled comparison should then shed light on the reasons for the divergence of the cultures after the islands were colonized.

POLITICAL SYSTEMS

All Nuclear Micronesian political systems fall into the type generally called chiefdoms. All recognized distinctions of rank based largely on genealogical seniority in a system of ranked matriclans segmented into lineages or other subunits. (Only Kiribati peoples diverged from the matrilineal emphasis by tracing relations ambilineally.) Everywhere, chiefs had some authority over decision making about public labor and resources and control over some kinds of conduct. Chiefly clans

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generally received some kind of first fruits or other payment, most commonly in return for grants of land made generations ago to more recent immigrants. Some degree of social and political differentiation is thus universal in the islands. Some linguists believe that hereditary chieftainship predated the settlement of Nuclear Micronesia, originating when speakers of the Oceanic branch of the Austronesian language family first settled the remote Pacific in the second millennium B.C. (Pawley 1982; Lichtenberk 1986; Pawley and Green 1984; Bellwood 1989).

Those unfamiliar with the region are often surprised to learn of the high levels of complexity found aboriginally on some of the islands, most notably Pohnpei and Kosrae. Social ranking, based on matriclan affiliation, was so highly developed on these two islands that most scholars have spoken of noble and commoner "classes," despite the small aboriginal populations. Chiefs received enormous periodic feasts and other symbolic tribute as well as a high degree of honor and respect from their subjects. Nominally, at least, they had domain over the resources of the islands and broad authority over the lives and labor of commoners. On both Pohnpei and Kosrae, paramount chiefs appointed able and loyal members of noble clans to high titles, each with a ranked position. The social and political differentiation on both islands carried with them marked differences in material wealth and access to valued foods and other goods.

Pohnpei's approximately 20,000 people were divided into five independent chiefdoms or polities. Each had two lines of twelve high titles--each ranked relative to the others--held by members of the two clans considered noble in that polity. Each chiefdom had its own paramount chief, who held the title of highest traditional rank in one of the lines of titles. Each of the five chiefdoms were subdivided into between fifteen and 40 named sections. The paramount chief allocated control over sections to other title-holders in both lines, who were regularly feasted by the commoners who lived in the sections' farmsteads. Commoners at the local level competed through feasting and service for another, lower-ranked series of titles conferred by the chief assigned control of their section (Petersen 1982; Reisenberg 1968).

The approximately 6,000 people of Kosrae, in contrast, were politically unified into a single chiefdom by the time of contact. The Kosraen nobility, along with their retainers, lived on the tiny island of Leluh in a bay off the east coast of the main island. Their commoner subjects lived in small settlements scattered on the mainland, where they worked land for their own subsistence and for tribute rendered to the chief assigned control of their district. Nobles competed to be granted one of about eighteen titles by the paramount. Such a grant brought control over the labor and lives of commoners who lived in the sections administered by the title-holder. Certain foods and drinks were reserved for the nobility alone, suggesting the presence of sumptuary laws (Peoples 1985, 1990).

However brief and simplified, the preceding description conveys a sense of the complexity of the political systems that evolved on these two islands. In the above and other ways, Pohnpei and Kosrae are comparable to the better known Polynesian chiefdoms of Hawaii and Tahiti in their complexity, although the Micronesian islands are much smaller in both land area and population.

In contrast, social, political, and economic differentiation was much less developed on the islands of the central and western Carolines. (Cordy 1986 has the briefest summary of the variations.) Here too there were distinctions in the rankings of clans and their segments, with chieftainships hereditary within only one or a few clans. But chiefly authority was more sharply confined to public activity spheres such as the building and maintenance of voyaging canoes and canoe houses, the organization of communal fishing expeditions, the construction of public fish weirs and seines, and the sanctioning of serious misconduct that threatened the whole community. Material prestations to chiefs mainly took the form of contributions of the first breadfruit harvested and a portion of turtles and fish caught. Most of these and other offerings were widely redistributed. Chiefs in the central and western Carolines were honored and obeyed, but lived little better than others and worked alongside those of lower rank. They seemed to articulate the will of the people rather than to impose their will upon them, and to organize activities for the public welfare (synthesized from Alkire 1989 [Lamotrek]; Burrows and Spiro 1970 [Ifaluk]; Goodenough 1966 [Truk]); Lessa 1950, 1966 [Ulithi]; Marshall 1972 [Namoluk]); Tolerton and Rauch n.d. [Lukunor]).

In sum, although all Nuclear Micronesians recognized hereditary rank distinctions, there were notable differences in the degree to which these distinctions were elaborated on different archipelagos. Speaking very generally, the powers and privileges of high-ranking people were greatest in the eastern islands (with exceptions to be noted in the next section) and least in the central and western Carolines. Given that the ancestral culture likely recognized status differences, what explains the degree to which these differences were elaborated into complex sociopolitical systems on various islands?

PRODUCTIVITY AND COMPLEXITY

One possible explanation for the different levels of complexity reached is that less productive island environments were less able to materially support the development of sociopolitical hierarchies than more productive environments. This was one hypothesis offered by Sahlins (1958) in his early and influential comparative study of Polynesian stratification. He argued that islanders whose environments were able to supply regular surpluses for chiefly redistribution developed higher levels of stratification. He held that commoners would have to be able to produce a surplus before a nonproductive chiefly class could be supported, while one important function of the chiefs was to manage the redistribution of the surplus.

In such arguments, the concept of productivity is most often used in its nontechnical sense to refer to the ease with which a human population is able to satisfy its material wants and needs from an environment over the long term. So conceived, productivity might be equated to suitability for human habitation, environmental quality, or even potential for human use. In an island ecological setting, productivity could be measured by physical factors such as island size and elevation, lagoon size, average rainfall, drought frequency, and typhoon incidence (Alkire 1978:15-18; Knudson 1970). These would affect the human population by influencing adaptational features

such as crop type and diversity, mean yields and their fluctuations, caloric and protein intakes, labor hours needed to support an average adult, and birth and death rates.

In Micronesia, some comparative research has supported a generalized correlation between productivity (necessarily rather crudely measured) and stratification (Knudson 1970; Mason 1968). Perhaps the best documented such relationship is between rainfall averages and stratification in the eastern low islands of the Marshalls and Kiribati. In the Marshalls, a north to south gradient of increasing rainfall exists. Two northern Marshallese atolls, for instance, receive a mean of about 50 inches (Bikini) and 58 inches (Enewetak) in comparison to the more southerly atolls of Kwajelein (102 inches) and Majuro (104 inches) (Karolle 1988). Although frequent inter-island travel meant that all Marshallese were similar in language and culture at contact, stratification levels are generally thought also to have been significantly greater in the southern than in the northern Marshalls (contrast the northern atolls of Bikini [Mason 1954; Kiste 1974] and Enewetak [Tobin 1967] with the more southerly Majuro [Spoehr 1949] and Arno [Rynkiewich 1972]). A similar correlation holds for the islands of Kiribati, which likewise shared a common language and culture. Precipitation is much less in the southern islands of Beru (41 inches) and Tarawa (71 inches) than in Butaritari-Makin (113 inches) in the north. Again, stratification is generally thought to be greater in the higher rainfall islands of the north (Lambert 1966, 1978; Knudson 1970). Since other physical determinants of island productivity are not systematically related to latitude in these regions, it appears that productivity was positively related to sociopolitical complexity, for these archipelagos at least.

However, there was no simple one-to-one relationship between levels of sociopolitical complexity and environmental productivity within Nuclear Micronesia. The big differences in environmental quality were not determined by rainfall gradients such as the two just discussed, but by island type. It is fairly clear that in most respects the high islands of Pohnpei, Kosrae, and Chuuk offered higher quality environments for human settlement than low islands. They had more rainfall and better natural water storage in rivers and streams. Agriculture was more productive and crop inventories more diverse. They were less susceptible to serious and life-threatening damage from typhoons and tropical storms. Therefore, if environmental quality is the main ecological influence on the degree of sociopolitical complexity reached by particular islands or island groups, then the largest and most consistent differences in complexity ought to be between low and high islands.

Yet some low island residents of eastern Micronesia evolved levels of complexity comparable to those of Pohnpei and Kosrae. The southern Marshalls were linked into several multi-island polities headed by powerful land-claiming and tribute-taking hereditary chiefs. Commoners worked the land under the supervision of the heads of their matrilineages, and the paramount chief visited the islands of his domain periodically to collect tribute and supervise affairs (Mason 1954; Rynkiewich 1972; Spoehr 1949). Although somewhat different in structure, the low islands of northern Kiribati also developed complex political systems (Lambert 1966, 1978).

Conversely, there is a Nuclear Micronesian high island archipelago that contrasts markedly with Pohnpei and Kosrae in its level of complexity. In Chuuk, where several high islands rise from within a single lagoon, the maximally organized

political unit was small and ranking was far less developed. At the time of contact, the volcanic islands of the lagoon were subdivided into several independent chiefdoms that were tiny in comparison to those of Pohnpei and Kosrae. Generally, the chief was the head of the lineage that initially settled the area or that conquered it from another group. Although a chief was entitled to first fruits and respect, there was no proliferation of titles or ranks, little difference in wealth, and the authority of a chief did not extend beyond the named district (Goodenough 1966; Caughey 1977). Further, there is at present no archaeological evidence that a higher level of complexity ever existed in Chuuk (King and Parker 1984:456).

Thus, levels of complexity and stratification were not related in any simple way to the high/low island distinction. We must look beyond environmental quality or productivity to explain differences in the level of complexity in Nuclear Micronesia.

THEORETICAL ORIENTATION

The orientation I believe to be most satisfactory for explaining these differences is derived from three major sources.

First, I follow Barth (1966)--whose pioneering work on social organization has been curiously neglected lately--in treating social forms as the outcome of processes of choice-making under specific sets of constraints. Barth showed us how varying structures of kinship, inequality, chieftainship, and so forth can be generated by considering conditions that affect strategic choices. From the choices of multiple goal-oriented actors (which may be organized groups acting on their common interests as well as individuals) acting under similar constraints, statistical patterns of behavior are generated. In explaining diversity, we should try to make only minimal assumptions about ideational and evaluational differences between populations. We should look first to external conditions (e.g., environmental, demographic) to account for patterned differences. This approach is especially applicable to historically related cultures such as those of Nuclear Micronesia: diversity can more likely be explained by varying conditions than by spontaneous ideational innovations in cultures with common ancestry.

The second set of theoretical ideas deal explicitly with the evolution of chiefdomand state-level political systems. In his seminal article on the origins of states, Carneiro (1970a) presented a model explaining why and how politically complex and socioeconomically stratified systems evolve. As population increases in a large region, communities grow and fission until resource shortages lead to intergroup conflict and warfare, with eventual winners and losers. Under most geographical and ecological conditions, weaker communities avoid further conflict and escape subjugation by emigrating. But if the region is circumscribed by geographical barriers, by the presence of neighboring populations, or by the existence of sharp environmental quality gradients, defeated communities will be unable or unwilling to flee. Militarily weaker groups are subjugated and made to pay taxes and tribute, or to contribute corvee labor, to their conquerors. To administer incorporated populations and resources, conquerors install new administrative levels. Ultimately governmental bureaucracy, classes, regional and occupational specialization, and other features comprising the state evolve.

In Micronesia, no unambiguously state-level polities existed in precontact times, but Carneiro's model of state formation could apply equally well to complex chiefdoms (Carneiro 1981). This model has obvious potential relevance to island settings, where it might be thought that geographic circumscription in the form of ocean barriers would limit the ability of defeated communities groups to flee subjugation. However, as argued below, Micronesian islands differed in the possibilities they offered for outmigration, and this affected the degree of complexity that evolved on particular islands.

The third set of theoretical ideas is derived from Johnson and Earle's (1987) work on cultural evolution, which integrates Carneiro's model of state formation with the concept of intensification popularized by Harris (1977, 1979). I have reformulated and illustrated Johnson and Earle's ideas in the form of a causal diagram (Figure 2). In their model, there is a positive feedback relationship between population increase and intensification of resource use. Intensification involves efforts to produce more food and other products on a given area of land, which in the short term involves greater labor expenditure. Intensification has four major economic consequences, all of which create new problems to which communities respond with new activities. In turn, these activities generate novel co-operative and organizational forms. Such organizations carry with them the potential for certain groups to gain increased control over other groups. Where this potential is realized, socioeconomic stratification and new forms of political complexity evolve.

To these ideas I add a fourth, here stated baldly: complexity is a consequence of the sustained concentration of control over critical resources. By control I mean that a group is considered to have rights over life-sustaining resources (backed up whenever necessary by force) and can dictate the terms under which other groups are allowed to use these resources. Several consequences are likely wherever such control can be achieved and sustained over several generations. Economic and social inequalities increase as those in control are able to use natural and human resources for their own material and social benefits. Polities tend to grow in size, in order to increase the resources available, to reward supporters with spoils, and to defend the polity from attack. The numbers of titles or offices proliferate as ways to reward service and/or fragment opposition. Finally, high-ranking individuals (notably, relatives of the paramount chief or ruler) are given domain over specific local communities to facilitate administration. In a few words, strategies adopted by those who control resources to maintain their access to those resources result in the evolution of complex social and political systems.

These ideas may be brought together. Barth shows how structures arise from choices constrained by external circumstances. Carneiro suggests that long term population growth eventually leads to resource shortages and conflicts. If local ecological and geographical constraints make it more likely that defeated groups choose to accept subjugation rather than flee, chiefdoms and perhaps eventually states will evolve. Johnson and Earle bring intensification into the analysis by showing how it requires novel coping activities and new organizations, which increases the

probability that a few groups will be able to acquire and sustain control over key natural and human resources. I add that strategies for sustaining control leads to increasing inequality, growth in polity size, proliferation of titles or offices, and the addition of administrative levels to manage people and resources.





For my interests, an important question therefore is: what circumstances affected the potential for a few groups to control the key productive and/or culturally desirable resources in the various Nuclear Micronesian island environments? In the following analysis, for reasons of space I shall not further consider the Marshalls and Kiribati, but shall limit the discussion to the islands of the Carolines.

ANALYSIS

There were at least two kinds of influences on the potential for groups to achieve and sustain control over key resources in the Carolines. First was the frequency and severity of natural hazards--most notably, tropical storms, typhoons, and low precipitation--which caused disruptions of the subsistence, settlement, and political systems; where such hazards occurred most often and/or with greatest severity, high levels of complexity were less likely to evolve. Second (following Carneiro) was the opportunities for the losers in political confrontations and military conflicts to escape subordination by going elsewhere; the greater the costs and/or risks of fleeing subjugation by those more powerful, the more likely the losers were to remain and accept a subordinate status, and the greater the complexity that evolved. Islands differed in both these conditions, and these variations affected the kinds of sociopolitical systems that evolved from the ancestral culture. Each of these environmental influences are now discussed.

Hazards

Periodic, unpredictable, and often severe environmental hazards affected some islands much more often than others. Only one kind of natural hazard can be considered here: typhoons and tropical storms. (As mentioned, chronically low rainfall punctuated by periodic droughts also was a significant hazard in the northern Marshalls and in southern Kiribati, but its effects cannot be analyzed here.) Tropical storms and typhoons occurred throughout the region, but their incidence and severity were unevenly distributed.

The high winds and waves of typhoons and storms destroyed lives, property, and crops of the low islands they struck more or less indiscriminantly. Sometimes, resource destruction and deaths were immediate consequences. But effects were longterm as well as short-term, for saltwater inundation of the interior taro swamp destroyed the crop, which was most commonly the staple food of low islands. Damage to and outright destruction of breadfruit, pandanus, banana, and other important tree crops could likewise be severe. The frequency and intensity of tropical storms increases from east to west in the region, partly because the easterly summer trade winds blow the storms westward. The Carolinian atolls to the west of Chuuk are most affected (Karolle 1988). In fact, several atolls in the western Carolines (including Sorol and Lamaliur) were formerly inhabited, but abandoned due to the effects of typhoons (Alkire 1989:18). Severely destructive typhoons are known from the eastern Carolines in historic times (the population of Mokil atoll was nearly wiped out by a typhoon in the early nineteenth century, for example) but historically they are far less frequent in the east than in the west. Given the elevational differences between low and high islands, it is easy to see that low islands are more in danger from typhoons than are high islands, although the latter would also suffer from food shortages due to crop damage.

Typhoons and tropical storms were thus most frequent and severe in their destruction in the low islands of the central and western Carolines. These periodic

disasters lowered the probability that a single organized group could have maintained long-term control over key resources. The widespread cultural ideology of clan ranking in the central and western Caroline islands is relevant here. Most commonly, clan rank is said to reflect historical priority of settlement: the first clan to settle an island claimed all its resources, and granted later-arriving and in-marrying clans rights over certain lands in return for first fruits or other consideration (Alkire 1974, 1977, 1989). The chief or chiefs were senior-ranking men of the clan or clans that arrived first on a particular island. On Lamotrek, and probably on other islands, there was a generalized correlation between clan rank and clan landholdings (Alkire 1989:30-32). Although many clans are found on several islands scattered over vast stretches of ocean, which particular clan has highest rank varies from island to island. Were it not for the periodic economic and political disruptions caused by typhoons, over time more populous and/or senior clans might have succeeded in achieving greater domination over other groups. But even assuming that, over a long period of time, a single group was able to acquire control over key atoll resources, typhoons would have upset and displaced this control periodically. Survivors often had to resettle on other islands for two or more years until the taro pits were again productive and tree crops recovered or were replanted. Whole populations were sometimes wiped out, and the atoll was recolonized by other neighboring islanders, after which new clans settled and ranking was rearranged. The temporary abandonment of an atoll and subsequent resettlement from neighboring atolls has been documented for tiny Typhoons, therefore, periodically and unpredictably Eauripik (Levin 1976). devastated resources and people, and thereby perturbed relations that might have grown into stronger distinctions between dominant and subordinate groups.

Emigration Possibilities

Small islands separated from one another by dozens or sometimes hundreds of miles of uninhabitable ocean seem to be perfect exemplifications of Carneiro's circumscription model. Despite the obvious geographical constraints inherent in island life, island environments varied in the opportunities and motivations they offered for individuals and groups to emigrate. It is important to note that, for residents of some Micronesian islands, the ocean was more of a highway than a roadblock. Their expert navigators had learned to traverse it (although not without risk) for purposes of trade, refuge, and intermarriage. The people of the central and western Carolines are justifiably famous for their remarkable navigational knowledge and sailing canoe technology (described in Lewis 1972; Gladwin 1970; Thomas 1987). Islands differed in at least two ways (technological and ecological) that affected the decision to leave.

First, the technology of canoe travel and the knowledge of long-distance navigational techniques were much less highly developed in Kosrae and Pohnpei than in the central and western Carolines. In low island settings, voyages were frequent. For instance, Alkire (1989:129-30) recorded twenty trips from Satawal to neighboring islands and twelve trips from Lamotrek to uninhabited Olimarao in a one year period in 1962-3. Gladwin (1970:39) reported that the fifteen Puluwat voyaging canoes made 73 trips to neighboring islands in a sixteen month period in 1966-7. If anything,

voyages were likely to have been even more frequent in precontact days. Interisland voyages were important for physical survival and material well-being on low islands. This importance is reflected by the high respect given the *palu* (navigator) in the low islands of the Carolines.

There were several reasons why low islanders made frequent long-distance voyages and therefore developed their sailing and navigational skills. (1) As shown above, their low elevation made them much more susceptible to the effects of the strong winds and high waves of storms and typhoons. In the western Carolines, after damaging typhoons many people would abandon their island or be rescued from it by neighboring islands, but would return later when crops had recovered or been replanted. (2) The relatively small land area of low islands increased the importance of marine resources in the diet. Local lands, lagoons and reefs were sometimes too small to support the population, and fish populations were often depleted. To cope with these problems, many low islanders voyaged to uninhabited atolls and reefs to catch sea turtles and fish. For example, Satawal navigators led expeditions to West Fayu and Puluwat canoes voyaged to Pikelot atoll (Gladwin 1970:41-43). Wellestablished trade networks are one of the most notable features of the central and western Carolines. (3) There were cultural rules against marrying within one's own matriclan. Since the population of low islands was so small, people often found their spouses on neighboring islands, strengthening interisland kin ties and increasing rates of voyages.

Their superior canoe technology and navigational knowledge thus made emigration during or after conflicts more feasible on low than on high islands. In addition, the fact that so many clans are represented on multiple islands in the central and western Carolines would have provided emigrants a hospitable destination island, for one of the most important obligations of clanmates is mutual aid. To be sure, trade relations between high and low islands are well-documented, but low islanders by and large were the voyagers. Kosraens, Pohnpeians, and to a lesser extent Chuukese, did not often leave their islands, as Goodenough (1986:555) has recently noted.

There is a second reason why people would be less likely to choose to leave a high island after losing a political confrontation or suffering a military defeat. On high islands, resources were relatively lush, islands were more self-sufficient in material needs and wants, and the subsistence economy was less susceptible to hazards such as typhoons and droughts. Those who lost political or military conflicts would have been more likely to accept subordination, for the decision to leave would have been more costly on high islands. Oversimplifying to make the point, a move from a high to a low island would have entailed a sizeable cost, whereas a move from one low island to a neighboring one would have been far less drastic a change. Higher levels of complexity are therefore expected on high islands, since losing factions would have been more reluctant to abandon a higher quality environment for a lower quality one.

In sum, because ecological conditions on low islands led their cultures to develop superior sailing technology and because it would have been more costly for a losing faction to abandon a relatively lush high island, subjugation and integration of defeated groups is more likely on high islands than on low islands. The main anomaly in this explanation is Chuuk, with its productive high island environment yet

low level of complexity. As argued elsewhere (Peoples 1990), the close proximity of high islands in the Chuuk lagoon helps account for the inability of small-scale political units to conquer and subdue one another over the long term.

WIDER IMPLICATIONS

Controlled comparisons such as the one I have attempted here offer cultural evolutionary researchers a decent chance to integrate the specific (micro-) and general (macro-) approaches to change. Implicit in the above discussion is the assumption that increases in the level of complexity (a macro-change) resulted from processes set into motion by the patterning of strategic choices made by individuals and groups in specific ecological settings (by micro-processes). I argued that ecological conditions specific to certain low islands made the evolution of complexity less probable there because people were less likely to make the choices that culminated in high levels of complexity. There is no environmental determinism in the argument: had the Nuclear Micronesian cultural heritage been different, different political systems would have evolved in the islands. People interact with their environments, and these interactions depend on their cultural heritage as well as on the environment itself.

For this reason, the relationship between micro-processes and the macro-changes that result from them is most easily discerned and analyzed in phylogenetically related cultures, using the method of controlled comparison. Knowing (or, at least, assuming on the basis of good evidence) that many cultures were once one culture, we know that any differences in the level of complexity of these cultures cannot be explained by their multiple origins or disparate histories. We then can set about analyzing the differences in ecological settings that constrain (or, if you like, select for) human actions and thereby help to generate cultural diversity.

NOTES

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