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Kosrae Pottery, Clay, and Early Settlement

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Abstract—Recent investigations have disclosed the presence of deeply buried and submerged prehistoric pottery deposits on Kosrae. Radiocarbon determinations with age ranges between 108 B.C. and A.D. 244 indicate that this pottery occupation, known only from a restricted area on Lelu Island, is the locus of the earliest known settlement on Kosrae. Early prehistoric settlement on Kosrae is reviewed, and comparisons with pottery assemblages from Truk and Pohnpei are briefly noted. The highly limited spatial and temporal distribution of Kosraean pottery is tentatively suggested to be the result of the lack of suitable clay resources for pottery manufacture. Geological and geomorphological conditions governing the formation of clay deposits are discussed.

A model focusing on the adaptive role of ethnicity and cultural diacritics is advanced to account for the emergence of the highly distinctive Early Lapita pottery, its later simplification, and finally the cessation of Late Lapita and other pottery manufacture on many isolated Pacific islands. The high islands of eastern Micronesia, including Kosrae, fall within expectations generated by the model.

Kosrae Pottery

One persistent question in the study of pottery distributions in Micronesia—and particularly in eastern Micronesia—has been the reason for the absence of pottery in Kosrae, a high volcanic island. Given its presence on the other Micronesian high islands, many investigators had the expectation that it would eventually be found on Kosrae. Bath (1986: 48), for example, stated, "To date, no prehistoric pottery has been recovered on Kosrae. It seems likely that it will someday be found, as all the other Micronesian high islands made pottery during pre-contact times." Ayres (1983: 140) also noted, "It is now clear that prehistoric pottery manufacture was widespread throughout the Micronesian high islands (probably including Kosrae also, although no pottery has been found there yet)."

With completion in March 1989 of a field project to mitigate adverse impacts for construction of wastewater systems in Lelu, Tafunsak, and Utwa Municipalities, we can now lay to rest the problematical absence of pottery on Kosrae. Excavations by the author with Marilyn Swift disclosed deeply submerged cultural deposits containing prehistoric pottery. It was found in coralline sediments beneath Katem compound of Lelu Island (Figs. 1, 2).

Virtually all of the pottery sherds ranged between 190 to 230 cm below datum (datum was 7 cm above ground surface; the water level fluctuated with the tide between approximately 33 to 76 cm below datum). A 5 sq. meter excavation unit was dug, producing 217 sherds and 65 small sherd fragments (Fig. 3). Except for 3 sherds found in a buried swamp deposit in the nearby Finpea compound, no other excavation unit in the Inol 1 and Finlas

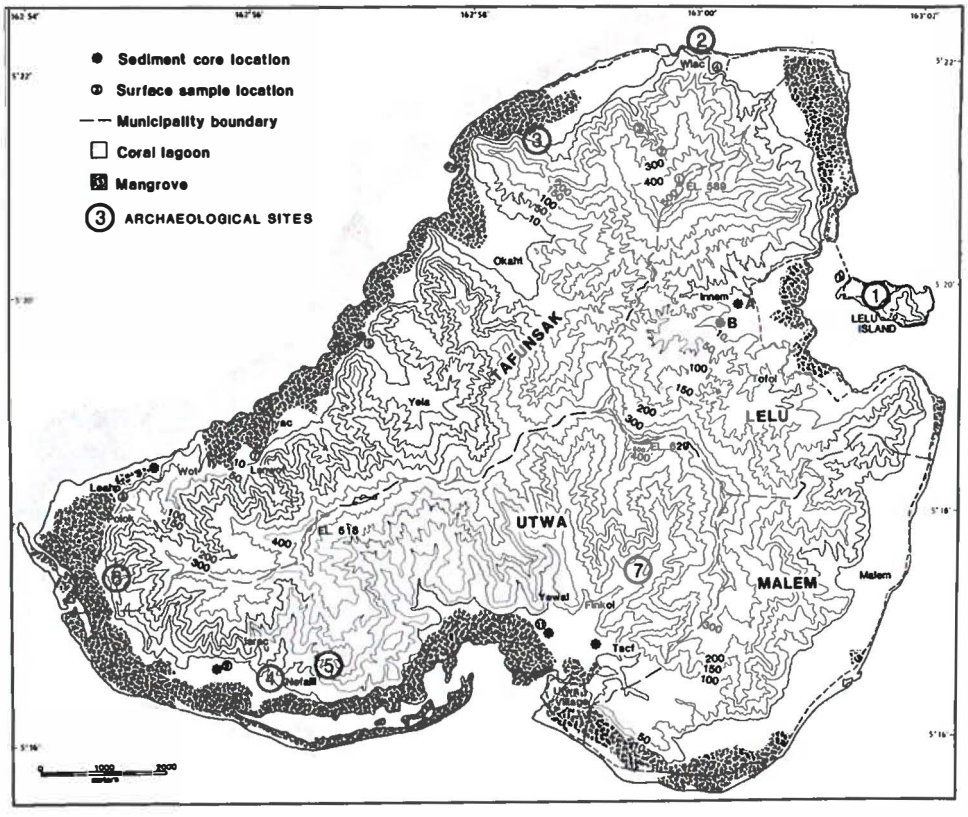

Figure 1. Map of Kosrae showing archaeological sites and coring locations (after Ward 1988). The archaeological site key is as follows: 1 = Lelu Ruins, 2 = Wiac (D15-1), 3 = Tepat (D12-3), 4 = Nefalil (C8-1), 5 = Nefalil (C8-51), 6 = Likihnluhlwem (D17-1), and 7 = Finkol (C2-29).

compounds disclosed evidence for either pottery or an early "pre-islet construction" occupation.

At this time 4 radiocarbon dates—all of charcoal from samples of substantial size—have been processed. Three very tightly clustered samples from the upper, middle, and lower pottery deposits are virtually indistinguishable in age, indicating that pottery was produced for a relatively brief period sometime between 108 B.C. and A.D. 244. (All date ranges were corrected for isotopic fractionation and calibrated using Stuiver & Reimer's [1986] computer program with 95 percent confidence interval based on the 10 year radiocarbon calibration data set.) The fourth date, from immediately above the pottery deposit, indicates that pottery manufacture had definitely ceased by A.D. 427–613. However, the clustering of dates in the pottery deposits suggests that the manufacture of pottery most likely terminated several centuries earlier.

Calcareous sand temper was observed in approximately one-third of the sherds, the remaining two-thirds having either no temper or natural rock (non-coralline) inclusions that may have served as temper.

Stylistically, the sherds are quite distinct from those reported from Pohnpei, the closest high island to Kosrae (Athens 1980, 1984, and this volume). The slightly angled vessel side walls on two sherds are perhaps most similar to some of the sherds recorded from Truk (Shutler *et al.* 1984), though the extremely limited sample of Kosrae sherds makes any inference about possible relationships or affinities with other islands difficult and, at best, speculative. There is no indication that the pottery was imported. However, it appears to fall within the general stylistic range of Late Lapita Plainware, as do the Truk and Pohnpei pottery (see Athens, this volume).

Lelu is the site of the impressive megalithic stone ruins of a former chiefdom center (Sarfert 1919, Cordy 1982a, 1982b, 1985). The stone structures at Lelu were constructed late in prehistory—at least by A.D. 1400 (Cordy 1985) but perhaps after A.D. 1550–1600 (Graves 1986)—upon an extensive area of prehistoric landfill on the reef flat next to a small offshore volcanic island (Figs 1, 2). Lelu, presently the main settlement on Kosrae, was the residence of the paramount and high chiefs at the time of western contact in the 1820's (Ritter & Ritter 1982). The pottery was found well below the fill used in islet construction at Lelu. In this and other respects, Lelu appears to share many characteristics with the Nan Madol site on Pohnpei (see Athens 1984 and this volume).

A detailed report on the stratigraphy and dating of the pottery deposits as well as a complete description of the pottery will be presented in another article. Here I would like

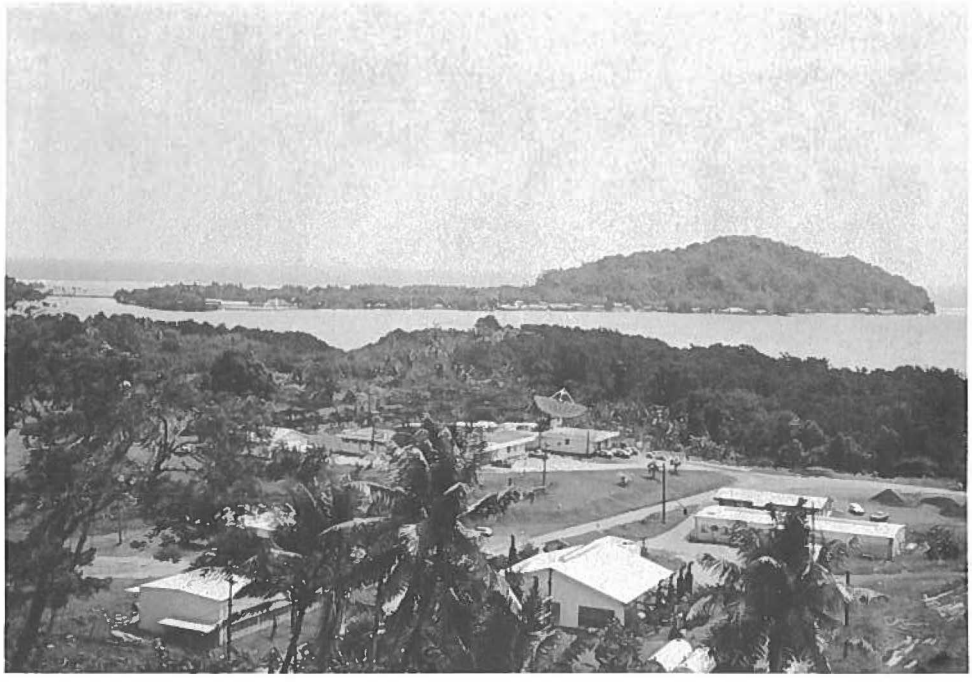

Figure 2. View of Lelu Island to northeast from Kosrae mainland. Artificial islet construction of the Lelu Ruins comprises the entire area to the left of the volcanic hill.

Figure 3. Excavation of submerged pottery deposits below islet fill in Katem compound of Lelu Island. Nena Lonno is excavating while Kerick Benjamin is waiting to haul up buckets of sediment for water-screening.

to discuss several intriguing aspects related to the use and manufacture of pottery on Kosrae.

Evidence for Initial Settlement on Kosrae

One of these intriguing aspects concerns the large amount of recent archaeological fieldwork on Kosrae—probably more man-hours per sq. kilometer of habitable area than any other Micronesian high island—and the lack of any evidence for pottery until now despite a specific interest in finding it (see field reports by Athens *et al.* 1983, Bath 1986, Bath *et al.* unpub., Cordy unpub. 1982a, 1982b, 1985; Cordy *et al.* 1981, 1985; Ueki 1983). Indeed, it appeared that pottery would never be found (see Cordy *et al.* 1985: 26–27). Why was pottery apparently absent on Kosrae? Was it simply a matter of previous investigators not digging deep enough or in the right places, or were there other factors making its scarcity more real than apparent? As will be detailed below, the latter is tentatively suggested as being a realistic possibility. First, however, it is necessary to discuss the evidence for early settlement on Kosrae.

Until now, the earliest radiocarbon date derived from an archaeological context is from the Wiac (also spelled Wiya) site (D15-1) on the north coast of Kosrae (see map, Fig. 1, for site locations mentioned in the text; a description of the Wiac investigations is provided by Cordy unpub.). Four shell samples were processed for radiocarbon dates from this sand beach midden site: three are tightly clustered with means between A.D. 1402 and 1448, and one dated to A.D. 95 ± 70 (Cordy 1982a: 131–132). The latter date, however, being temporally so far removed from the other dates, is open to question. Also, the extensive disturbance of the site by modern inhabitants of the area raises the question of whether the sample was in proper archaeological context or if the shell might have been naturally deposited long before the site was occupied in the 1400s (Cordy unpub.).

Another early date, also reported from the north coast, comes from the D12-3 site in Tepat (Cordy 1981: 106–131). A charcoal date of A.D. 690 ± 110 was obtained from a cooking area associated with several structures (Cordy *et al.* 1985: 264).

Six radiocarbon dates with ages either approximating or prior to A.D. 1000 were recovered from five sites along the south coast of Kosrae. They were all derived from charcoal. The dates are as follows (corrected according to Klein *et al.* 1982 with 95% confidence interval for age ranges): A.D. 890–1185 (C8-1, Feature E in Nefalil), A.D. 600–870 (C8-1, Feature R in Nefalil), A.D. 645–915 (C8-5 in Nefalil), A.D. 65–580 (C8-51 in Nefalil) (Cordy *et al.* 1985: 224–225, 230–231), A.D. 435–630 (D17-1, Likihnluhlwem site), and A.D. 640–1050 (C2-29 in Finkol; Cordy *et al.* 1985: 264).

Only the date range of A.D. 65–580 from site C8-51 might possibly warrant some concern as to its validity because of the small sample size and wide dispersion of the charcoal flecks (Cordy *et al.* 1985: 178–182). The sample (Beta 12329) had a weight of 5.5 grams when submitted for processing. After cleaning and pre-treatment, the charcoal weight was reduced to 0.5 grams of carbon. It was given an extended counting time to reduce the standard deviation and insure greater accuracy of the resulting radiocarbon value. Also, the cultural association of the early Likihnluhlwem date (cited above) is not without some problems; probably it should be regarded as more provocative than proven until more is known about the association.

The results of the early Likihnluhlwem dating analysis referred to here were not presented in the Likihnluhlwem excavation report due to processing of the sample after the report had been completed. The radiocarbon analysis for the A.D. 435–630 Likihnluhlwem date (Beta 7433) was performed on a bulk soil sample of a buried "A" horizon soil in which a cobble paving had been identified nearly 1.5 meters below the surface. Though a second radiocarbon sample from this same paving, performed on charcoal, dated into the modern period, such a modern date is not consistent with another stratigraphically superior mid-level charcoal date of A.D. 1025–1325 associated with an upper cobble paving feature. Thus, the bulk soil date appears to be valid considering its stratigraphic placement. Furthermore, the amount of alluvial overburden also suggests some antiquity for the lower pavement feature (Bath *et al.* unpub. and personal communication 1987).

One final date that may be mentioned is that of A.D. 970 ± 180, which was obtained by Cordy (1985: 261) from archaeological deposits from the Lelu site. The indicated age is well before the onset of megalithic construction, suggesting that there was an earlier occupation on presumably man-made islets at the site.

Another type of evidence bearing on the early settlement of Kosrae concerns the continuous swamp and marsh sedimentary sequences studied by Ward (1988), a palynologist working with archaeologists on the road corridor project in 1982 and 1988 (see Athens *et al.* 1983). At the mouth of the four major river valleys of Kosrae, Ward (1988 and recent fieldwork) recovered sediments with basal dates (calibrated according to Klein *et al.* [1982]; date ranges are 95% confidence intervals) of 5730-6295 B.P. (Innem), 4135-4805 B.P. (Yewal), 3110–4095 B.P. (Yela), and 3630-4130 B.P. (Okat; additional cores and dates are also reported by Ward [1988]; coring locations except Okat are given in Fig. 1). These dates may be reasonably regarded as well prior to human settlement on Kosrae.

Of particular interest for the present discussion is Ward's finding of erratic fluctuations in the quantity of total organic carbon in the sediments beginning around 2300 B.P. (corrected range of 15-770 B.C.). Ward (1988) attributes this to anthropogenic disturbance of the vegetation as would occur with gardening activities on the coastal plains and slopes. Although it is possible that climatic shifts might account for this evidence (e.g., the onset of periodic El Niño Southern Oscillation [ENSO] climatic cycles), if Ward is correct in his inference of anthropogenic disturbance, his finding suggests 1) a time for initial human occupation on the main island of Kosrae not based on the vagaries of early archaeological site preservation and visibility, and 2) that the age range of 15-770 B.C. renders any expectation for the presence of Early Lapita settlers highly improbable.

To summarize the dating of early settlement on Kosrae, investigations conducted prior to our discovery of the Lelu pottery had documented the occupation of archaeological sites beginning at least by A.D. 600 to 800 and possibly earlier. The more recent work on Lelu now conclusively demonstrates settlement on Kosrae by about A.D. 1. The number of early dated sites is quite small, suggesting a very small population prior to about A.D. 1000.

In contrast to the information provided by archaeological sites, the swamp and marsh coring studies of Ward suggest a somewhat earlier time frame for the initial settlement of Kosrae. A date of 500 B.C. may be regarded as reasonable based on his findings, though there is the possibility that the carbon particle fluctuations do not indicate human settlement.

Pottery: Temporal and Spatial Distribution

The occurrence of pottery on Kosrae is interesting for a number of reasons. The most obvious is that it can help to establish possible origins and cultural affinities of the initial settlers through a comparison of stylistic attributes. Because of the small sample of sherds, however, it is not possible to pursue this question in detail. As previously mentioned, the Kosrae pottery is readily distinquishable from the Pohnpei pottery (see Athens, this volume) but does share an important attribute—that of angled side walls or bases—with the Truk pottery. Interestingly, both the Pohnpei and Truk ceramics have initial dates of about A.D. 1 (Athens, this volume; Shutler *et al.* 1984: 57–59), which is virtually the same as the Kosrae pottery.

Another interesting aspect of the Kosrae pottery, one that will be pursued in some detail here, concerns what appears to be its highly limited temporal and spatial occurrence on Kosrae.

Spatially, the pottery occupation is very restricted in area on Lelu Island. Recent excavations suggest that it is confined primarily to Katem compound or perhaps extends only slightly beyond the Katem boundaries. Katem has an area of roughly 0.35 hectares.

Because no pottery has been found on the main island of Kosrae despite extensive investigations, it is possible that the early pottery occupation was limited to Lelu. However, our recent investigations demonstrate that any coastal occupations of similar age may be submerged. Furthermore, the extensive swamp coring work of Ward (1988 and recent fieldwork) shows that most of the swamps surrounding Kosrae are of relatively recent age, having been formed after about A.D. 500 (though, as previously noted, swamps at the mouth of the four major river valleys on Kosrae formed well prior to human settlement, between approximately 3,000 and 6,000 B.P. [Ward 1988 and recent fieldwork]). Thus, if the earliest pottery-bearing sites were located along the shoreline, if any in fact existed on the Kosrae mainland, they would be submerged in coralline and sand reef deposits and buried under several meters of swamp deposits. The problem of documenting such an early occupation is clearly formidable. The lack of early pottery-bearing sites on the Kosrae mainland, therefore, may simply be due to to insufficient search effort and looking in the wrong places. However, it is also possible that such sites never existed. It may be that Lelu was the area of initial settlement on Kosrae, and that because of the extremely brief span of pottery use by the initial settlers, pottery never reached the mainland. There are reasons to consider this a realistic possibility.

As already indicated, the pottery deposit on Lelu yielded 3 dates of essentially the same age for 3 different levels within the deposit. A sample from a non-pottery–bearing deposit stratigraphically just above the pottery yielded a date some 400 to 500 years later. This information suggests that the period of pottery use was confined to a very short time period; apparently ceramics ceased to be used well before the A.D. 427–613 date of the non-pottery deposit. If the Lelu pottery deposit is representative of pottery use on Kosrae, and there is no reason to suspect that it is not, then it may be that pottery use was so brief that it ceased before settlement spread to the Kosrae mainland.

This supposition poses the intriguing question of why pottery use was so restricted spatially and temporally on Kosrae. In comparison, use of pottery on Pohnpei endured for approximately 1100 years (Athens, this volume), and on Truk it lasted at least 700 years

and possibly longer (Shutler *et al.* 1984). It will be suggested here that the presumed short-lived pottery phenomenon on Kosrae may have to do more with geology than anything else. The reasons for this very tentative supposition will now be explored.

Pottery and Geology: The Case of Kosrae

In a recent paper providing much insight into the nature of pottery distributions in the Pacific, Claridge (1984) discusses the geological requirements for suitable pottery clay resources in the islands. He argues that the presence and longevity of pottery use on many Pacific islands is governed by the quality of clay and temper sands that are available for vessel manufacture.

Andesitic rock, which has a high silica content, is found on many islands of Fiji and Melanesia. It weathers to produce good quality clays and temper. However, to the east of Fiji the high volcanic islands are formed of oceanic basalt, which has a low silica content. As a result, such volcanic islands do not lend themselves to the formation of good clays for pottery manufacture. In addition, atolls and raised coral reefs in the Pacific are devoid of siliceous rocks for the formation of clays, and high quality volcanic tempering sand is also absent on these islands.

Claridge's (1984) discussion indicates that island geology and weathering are critical to the formation of suitable clay deposits for pottery manufacture. The age of a volcanic island also may be a significant factor in the formation of suitable clays. However, as Claridge (1984) notes, rocks weather quite rapidly in tropical environments where climatic conditions are warm and moist. According to Claridge (1984: 39), ". . . all of the pottery in the south Pacific area is made from raw materials formed by subaerial weathering processes."

The implication of Claridge's argument for finding pottery on Kosrae boils down to the following question: does the island have the kind of geology that would make it likely for suitable clay resources to be found there? If not, then it is doubtful that the manufacture of prehistoric pottery would be a viable enterprise.

There are no studies on Kosrae specifically addressing the presence, distribution, and mineralogical composition of clays. A U.S.D.A. Soil Conservation Service report, however, provides some relevant information. This report, which describes soil distributions from an economic perspective (Laird 1983a), is of interest because it fails to indicate the existence of any soil types that are entirely of a clay texture (defined as ". . . soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt" (Laird 1983a: 41). Silty clay loam, extremely stony clay loam, and clay loam are examples of typical soil textures on Kosrae having a clay component, all of which would be unsuitable for pottery manufacture.

During the course of recent archaeological investigations in Malsu (just west of Wiac—see Fig. 1), a 20 to 30 cm thick deposit of clay was found above a buried peat deposit and below 1.40 meters of colluvium. The suitability of this clay for pottery manufacture is uncertain at present, though firing tests and chemical analyses are being pursued. Whatever the outcome, however, the presence of charcoal in the lower peat deposit suggests the presence of man prior to the formation of the clay and therefore that the clay

was formed after pottery manufacture had ceased. Radiocarbon samples have been submitted to date the peat deposit.

Also noteworthy are observations on soils made by the author and colleagues during the course of a number of archaeological investigations throughout Kosrae (Athens *et al.* 1983, Cordy *et al.* 1985). Neither the residual slope soils nor the alluvial and colluvial coastal soils contain clay deposits that appear to be even remotely suitable for vessel manufacture. It is recognized, of course, that clay deposits for pottery can be quite localized as indicated by the apparently isolated clay stratum near Wiac, and that the amount of subsurface sampling conducted by both archaeologists and soil scientists has been relatively small.

Matty (1982) provides additional information relevant to evaluating the possible existence of clay resources on Kosrae. Briefly, he describes Kosrae, along with Pohnpei and Truk, as ". . . eroded basaltic shield volcanoes." The lava, therefore, is not andesitic, being characterized by its degree of "silica under-saturation" (Mattey 1982: 10). Furthermore, as Mattey (1982) notes, the lavas become progressively more alkalic from Truk to Kosrae. The age of Kosrae was determined to be 1-2 million years, while Pohnpei formed 4-8 million years ago, and Truk formed 8-14 million years ago (Keating *et al.* 1984).

As may be seen, the soils and geological information suggest that Kosrae is unlikely to have clays suitable for the manufacture of pottery. Not only is the parent rock low in silica, necessary for the formation of the better pottery clays, but field studies and archaeological investigations suggest that deposits with high clay content (in the textural definition of the U.S.D.A. Soil Conservation Service) are rare and/or may post-date the time period of interest. The geological youthfulness of the island also may be a factor limiting the time available for needed weathering processes to occur for the formation of clays.

In contrast, the age and mineral characteristics of Pohnpei and Truk would be somewhat more suitable for the formation of clays. These islands are considerably older than Kosrae and, as noted by Mattey (1982: 10), ". . . shield building lavas from the older islands tend to be less silica-undersaturated than those from Kusaie [Kosrae]." The higher silica content of the basalts of these islands, while still relatively low, presumably would allow the formation of clays of presumably higher quality for pottery manufacture. Furthermore, soil studies indicate the presence of a few clay deposits on Pohnpei and Yap (Laird 1982; Hunter-Anderson, personal communication), though this does not seem to be the case for Truk (Laird 1983b).

One final point concerning the geology of Kosrae should be mentioned in relation to the paucity of suitable clay resources for pottery manufacture. This concerns island geomorphology and the lack of appropriate locations for the deposition of clay minerals in economically exploitable contexts until quite recently. Here reference is to the need for low energy alluvial environments, particularly swamps and marshes, in which clays can settle out of suspension before they can be carried offshore during ongoing erosional processes. As demonstrated by the coring studies of Ward (1988), the formation of most marshes and swamps on Kosrae occurred relatively recently. Kosrae's very narrow coastal plain is probably also quite recent, the island being almost entirely dominated by rugged mountains. According to Whitesell *et al.* (1986: 1), "Mountainous areas make up about 70 percent of the island, with foot slopes, alluvial fans, and bottom lands comprising

about 15 percent of the total area. Approximately 14 percent of Kosrae Island is vegetated by mangrove swamps, and only 3 percent of the land area is classified as nonforest." Thus, the potential for suitable clay resources on Kosrae, especially during the early period of occupation, appears to be quite limited on geomorphological grounds alone.

Dr. John Sinton, an igneous petrologist in the Dept. of Geology, Univ. of Hawaii, also made a similar observation (personal communication). While noting that the geology of Kosrae would not absolutely preclude the formation of some silica clays from weathering basalts, a fair amount of enrichment of these erosional residues would still be necessary for the formation of exploitable clay deposits. This enrichment, of course, could only be expected under appropriate geomorphological conditions. It appears that for the time period of pottery manufacture, such conditions would be found only at the mouth of the four major rivers in Kosrae. Whether accessible clay deposits dating prior to about A.D. 1 are actually present, however, is not known.

Presumably the geomorphological problem would not have been as severe on Pohnpei or Truk which, because of their age, have eroded more extensively and therefore have better developed alluvial formations dating to earlier time periods.

Pohnpei and Truk: The Cessation of Pottery Use

While Claridge's (1984) model appears to account for the general distribution of pottery use and manufacture in the Pacific islands, it does not adequately explain the cessation of pottery use once established on islands having inferior clay and/or tempering resources. Claridge's (1984: 44) explanation for the termination of pottery use on these islands is that, "Eventually the [pottery] art may have died out because it was considered uneconomic to manufacture articles with considerable effort, many of which were of limited use because of their fragility."

The longevity of pottery use on Pohnpei and many other Pacific islands before its eventual abandonment, however, indicates that another explanation is required. For example, pottery use in Pohnpei lasted for some 1,100 years. If the pottery there had been of such poor quality as to be uneconomic to produce and utilize, why did it take so long for this realization to take hold? Actually, much of the Pohnpei pottery is of excellent quality; many vessels had walls only 2 to 4 mm thick, suggesting that the clays and tempering materials were not limiting factors in the manufacture or use of pottery vessels on that island (see Athens, this volume).

Ethnicity and Pottery

As an alternative explanation, it may be suggested that much of the demise of pottery manufacturing on Pacific islands during prehistoric times—and that of Pohnpei in particular—may be due to changed social circumstances. Specifically, pottery vessels, or at least those with distinctive decorative elements, may have originally served as durable ethnic markers signifying membership in particular social groups. In this sense, the extensive and highly identifiable decoration on Early Lapita vessels (see Green 1979, Spriggs 1984) served what Schortman (1989: 53) refers to as a "cultural diacritic." As Schortman (1989:

53–54, citing Rapoport 1982: 181–183), explains, ". . . [cultural diacritics] serve as cultural orientation devices which make it clear to participants what categories of people are present and, hence, what behaviors to expect." It is important to note that such a perspective does not contradict the postulated cooking function of pottery in its original development and use by Proto-Austronesians (Leach 1982). However, there are two facts that suggest the presence of pottery in the Pacific are related to another function: 1) it was not abandoned immediately after the types of foods utilized changed—primarily with the presumed loss of rice—with radiation of Proto-Austronesians into the Pacific (see Leach 1982), and 2) the pottery incorporated a very elaborate decorative system seemingly unrelated to its utilitarian cooking function.

In a previous paper (Athens unpub.), it was argued that the adaptive significance of ethnicity (as indicated by a "unity of cultural forms") is related to a regionally competitive social environment. In such a situation ethnicity provides the basis for a supra-local type of social organization with minimal or no energetic investment in a hierarchy of administrators and with relatively low levels of energy and information exchange needed to maintain the system. The key element of this model is competition and the necessity of ensuring territorial integrity in the face of implied or actual threats by non-members of the ethnic unit in question. Ethnicity provides a mechanism for effective resistance above and beyond the means of local groups that are members of the same ethnic unit. Thus, any challenge to the exclusionary rights of particular local groups by non-ethnic members may be perceived as a challenge to the exclusionary rights of the entire ethnic unit, which has the effect of bringing on an appropriate response in proportion to the challenge. Temporary alliances may be formulated for such purposes even though hostilities may be prevalent within the ethnic units (see Athens unpub. for a detailed discussion of these points).

In this sense Early Lapita culture, with its unity of cultural forms, may be regarded as an ethnic unit with shared cultural values. Such a view carries with it the implication that Early Lapita culture originated or developed in a regionally competitive environment in the presence of other, non-Lapita groups.

The significance of this argument for the present discussion concerns the kinds of expectations that might be generated regarding dispersal of Early Lapita ethnic groups into geographically isolated Pacific islands. In isolated situations it is quite clear that the *raison d'être* of ethnicity as an organizing principle for local social groups would cease. Without competition, ethnicity and ethnic markers have no meaning. Thus, such cultural diacritics as Early Lapita pottery would cease to have any social function and can be expected to disappear rather rapidly with population dispersal and island colonization.

The fact that a highly simplified type of Lapita pottery, called Late Lapita, continued to be made in many areas after the demise of Early Lapita ware is probably attributable to some degree of functional utility. Caked carbon or soot deposits on the exterior of a significant number of Pohnpeian sherds suggests use of this pottery in food preparation (Athens, this volume). However, pottery eventually ceased to be made on Pohnpei and other islands, presumably because its use for cooking was not essential, and with no social requirements for maintaining ethnic markers, it could be entirely dispensed with. As for Kosrae, with highly limited clay resources of suitable quality and a similar lack of competition during early occupation times, there would be no need to continue to make pottery

at any cost nor to replace it with a substitute cultural diacritic (e.g., decorated gourd containers). It would, therefore, be expected to drop out of the cultural repertory quite quickly.

Concluding Summary

Geological considerations, especially the absence of abundant suitable clays on a geologically young volcanic island, and the lack of appropriate social conditions for ethnic markers on ceramics, are tentatively suggested to be primary factors accounting for the small amount of pottery and the rapid demise of its use on Kosrae. An additional geomorphological constraint may have been the lack of suitable catchments such as marshes and swamps for clay deposition until late in Kosrae's geological history.

Recent radiocarbon dates of pottery-bearing archaeological deposits on Lelu Island indicate that intial settlement of Kosrae may have taken place by approximately A.D. 1. Pottery use was apparently abandoned soon after initial settlement, perhaps less than several hundred years from the time of initial settlement. In any case, it was definitely absent by A.D. 427–613. The density of the plainware sherds found in the submerged coral and sand reef deposits is very low. The occupation represented by the early pottery deposits extends over a small area, perhaps not more than 0.35 hectares. No pottery deposits have been discovered on the main island of Kosrae despite intensive archaeological investigations during the past decade. It is possible, nevertheless, that pottery deposits are submerged and deeply buried along the coastal margins of the main island.

Claridge's argument concerning the reason for the cessation of pottery manufacture on many Pacific islands was rejected. In its place an argument was advanced concerning the adaptive role of ethnicity in the development of highly distinctive pottery such as the Early Lapita wares. Used as a cultural diacritic (Schortman 1989), decorated pottery, in addition to its function as a vessel or container, can serve to mediate relations within and among ethnic groups. However, with dispersal to distant and geographically isolated Pacific islands, the Lapita migrants were far removed from the inter-group competitive milieu in which that culture most likely originated. This made the continued use of pottery as a cultural diacritic meaningless, and its manufacture eventually ceased after a period of simplification.

The highly limited spatial and temporal distribution of pottery on Kosrae should not be considered as evidence that the initial inhabitants had a distinct cultural background from the first migrants to Pohnpei and Truk. Indeed, as suggested by linguistic studies (Alkire 1972; Shutler and Marck 1975; Dyen 1965), the initial settlers of these islands were probably all part of the same Lapita culture ancestral stock, presumably dispersing from several different islands in the Solomons or New Hebrides areas of Melanesia.

It is clear, as Claridge (1984) cogently argued, that clay distribution and quality are of fundamental significance in understanding the distribution of Pacific island pottery. In considering the geological and geomorphological conditions governing clay formation, quality, and deposition on Kosrae, an attempt has been made to account for what is admittedly limited evidence concerning the apparently restricted spatial and temporal distribution of pottery on Kosrae. To what extent these arguments ultimately prove correct for

understanding prehistoric pottery on Kosrae, of course, is unknown. Yet there is very good reason to pursue such studies. With better technical data of the right kind and more intensive searching for early sites in geologically appropriate places, we cannot help but improve our understanding of prehistoric Micronesian cultures.

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