ARCHAEOLOGICAL RESEARCH IN MICRONESIA DURING THE PAST DECADE

Jun Takayama
Tezukayama University
Nara, Japan.

In the early post-war era, systematic archaeological research in Micronesia commenced in the Mariana Islands (Spoehr 1957), Yap (Gifford and Gifford 1959), and the Palaus (Osborne 1966). During the 1970's, further final reports of earlier research were issued by Davidson (1971) for Nukuoro Atoll, Reinman (1977) for Guam, and Osborne (1979) for the Palaus. New investigations have recently been started throughout Micronesia, and according to Cordy (1980:360) over 125 archaeological projects have been undertaken in the Trust Territory of the Pacific Islands since 1977.

In this article I briefly outline the results of Japanese expeditions led by myself and my colleagues during the past ten years, and for convenience I proceed according to the chronological order of our expeditions.

THE MARIANA ISLANDS

Short-term archaeological surveys on Rota Island have been carried out three times since 1970. At the Mochon Site five latte were excavated (Takayama and Egami 1971; Takayama and Intoh 1976), and the results supported Spoehr's claim that Marianas Plain ware was proceeded in time by Marianas Red ware (Spoehr 1957:169). Strictly speaking, however, the well-made Marianas Red ware with glossy, red-slipped surfaces (Spoehr 1957:117-8) has not yet been found on Rota. This may indicate a later date for our Rota sites, and my impression gained from a comparison of the Marianas Red sherds from the Mochon Site, the Laulau Beach Site on Saipan (J.C. Marck and J.R. Moses, pers comms.), and the Ypao Beach Park Site on Guam (A.B. Lizama pers. comm.) is that the most superior Marianas Red was probably manufactured on Saipan. A radiocarbon date of 1527 300 B.C. was obtained by Spoehr for Marianas Red on Saipan (Shutler 1978:223), although Reinman (1977:90) also demonstrates the presence of Marianas Red wares on Guam prior to 1500 B.C. The high quality Marianas Red from the deeper (but not deepest) levels of the Laulau Beach Site on Saipan is associated with two radiocarbon dates of 940 B.C. and 960 B.C. (Micronesian Preservation 1978). Accordingly, the theory of Reinman (1977:58,90), that Guamanian Calcareous Sand Tempered (CST) wares are intermediate in time between Spoehr's Marianas Red and the later Volcanic Sand Tempered (VST) wares seems reasonable at present. As mentioned above, however, our excavations on Rota did not provide data to clarify this point, because no typical Marianas

Red has been found yet, and because the earliest radiocarbon dates are only 510 and 600 B.C. Nevertheless, we regard the inclusion of calcareous sand temper as one of the most distinguishable diagnostic features of our late Marianas Red on Rota.

Regarding the origin of Spoehr's "Lime-Filled, Impressed Trade Ware", the hypothesis of Pellett and Spoehr (1961:323) has been subsequently supported by Spoehr himself through the discovery of the same type of pottery on Sanga Sanga Island in the southern Philippines (Spoehr 1973:274). Lime-filled, decorated pottery has also been reported from other parts of the Philippines (Solheim 1968:60; Fox 1970:85) and Melanesia (Shutler and Shutler 1975:54; Golson 1971:70; Bellwood 1975:13). Moreover, calcareous sand tempers occur in Lapita ware (Dickinson and Shutler 1979:1667). According to Bellwood (1978a:48) some of the basic Lapita motifs are paralleled in eastern Indonesia and the Philippines. In addition, some of the decorative styles on about 100 Lime-Filled, Impressed sherds recently found at the Ypao Beach Site on Guam (A. Lizama, pers. comm.) bear some resemblance to those of Lapita and the Philippine red wares. Therefore, I am inclined to support the views of Golson (1971:70) and Bellwood (1975:13) who suggest a tie between Lapita and Marianas Red, but convincing evidence in support has not yet been obtained. Petrographic analysis of our Lime-Filled, Impressed pottery from Rota indicates that it was locally made (Dickinson 1977a).

Besides Marianas Red and Lime-Filled, Impressed wares, special attention must also be paid to the black, glossy superior pottery excavated at the Laulau Beach Site on Saipan, associated with Marianas Red (J. Marck and J. Moses pers. comm.). Four black-ware sherds were also collected on Tinian (Pellett and Spoehr 1961:323), but none have yet been obtained on Rota.

Artifacts associated with Marianas Red consist of stone and shell adzes, stone, coral, and shell ornaments, and shell one-piece fishhooks (Spoehr 1957:174; Pellett and Spoehr 1961:323-5, Takayama and Egami 1971:29; Takayama and Intoh 1976:34). The discoveries of a dog bone and of sherds with impressions of rice husks from cultural deposits of (or immediately before) the Latte Phase on Rota are of great importance, but it is still uncertain whether dogs and rice date back to the Marianas Red Phase.

During the Latte Phase more definite cultural influences from the Philippines to the Marianas can be observed in material culture, especially in rim forms and decorative styles of pottery, tanged adzes of stone (Thompson 1932: Fig.16b; Beyer 1948: Fig.12), and a carnelian bead to be mentioned below. Interestingly enough, so far no beaked adzes of stone or shell have been found in the Marianas or the Philippines, although this type of adze is widespread throughout the rest of Micronesia, Indonesia and parts of Melanesia.

At the end of 1972 four of my students went to Pagan Island in the northern Marianas for archaeological work. Test excavation of the Regusa latte structure indicated that Marianas Red is non-existent there, and that the earliest pottery is attributable to Marianas Plainware, dating to A.D. 1325 90, 1495 115, and 1665 95 (Egami and Saito 1973:213-4). It is possible that the settlement of Pagan Island occurred in late prehistoric times from the southern Marianas, and I am inclined to infer that the reason for this later settlement on Pagan may largely be due to a fear of volcanic activity.

A highlight of the Pagan excavation was the discovery of a carnelian bead of Indian origin, like those found in the Philippines (Egami and Saito 1973:213). In addition, the discovery of a bone of domestic fowl (Phasionidae Family) on Pagan coincides with the ethnohistoric accounts (Thompson 1945:30), and suggests the presence of domesticated fowls before European contact.

Apart from the investigations mentioned above, there is also the invaluable archaeological work by Thompson (1977) on two Pre-Latte phase middens on Saipan's leeward coast.

THE TRUK ISLANDS

Thompson (1932:42, 54, 57) stated that some artifacts found in the Marianas, such as coral pounders, Tridacna shell adzes of her Type 3, and Conus shell rings were imported from the Carolines. Accordingly, I have long had a strong interest in the prehistoric culture of Truk, which was archaeologically almost unknown prior to 1970, except for Smith's description (1958:68), and Gosda's unseen report quoted in Woodworth's bibliography (1980:109). I have now been to Tol Island in the Truk Lagoon four times since 1972, and after the report of our first preliminary survey was published I discovered that reconnaissance work had already been undertaken on Tol in 1970 by Clune (1974:205-6;n.d.).

Our 1972 and 1973 survey on Tol was concentrated on clearing and measuring the large fortified site of Fauba, together with test excavations (Takayama and Seki 1973). In 1975 the Chukienu shell midden was excavated (Takayama and Intoh 1978), and in 1979 a brief site survey and test excavations on a very small scale were conducted near the Fauba Site and in the adjacent village of Faub. All of these sites on Tol are characterized by an absence of prehistoric pottery and the presence of European bottle glass.

The first discovery of prehistoric pottery in Truk was made in 1976 in the beach below high tide on Fefan Island, as a result of dredging operations (Takayama 1976; Force 1977; Borthwick

and Takayama 1977:271; Takayama and Shutler 1978:1-9). In 1977 test excavations were carried out on the site (Shutler, Sinoto and Takayama 1977), which has been dated to about 2000 B.P. As in Tonga, Samoa and Marquesas, the art of pottery making disappeared in Truk some time after this.

As in other islands of Oceania, Trukese material culture has undergone changes throughout the past 2000 years. The coral food pounders exhibit remarkable typological changes (Takayama and Intoh 1978:63), and the establishment of a clear-cut chronological sequence for these is useful for cross-dating within Truk, and even between Truk and other islands. For instance, the bell-shaped coral pounders collected by Thompson in the Marianas can be attributed to ethnographic times, and her bottle-shaped specimens (Thompson 1932: Fig.19c,d) belong to the late prehistoric period in Truk. There is no doubt that the Trukese bell-shaped pounders, which are similar to those of Eastern Polynesia, developed from the previous bottle-shaped form within Truk during the past few centuries. The bottle-shaped pounders, or intermediate forms between these and the earlier pestle-like pounders, have also been found on Ponape and Kosrae in late prehistoric cultural contexts.

With the exception of the Marianas, stone adzes were rarely used in Micronesia, and this is also true of Truk. As far as late prehistoric material culture is concerned, it may be safe to say that there were no major differences between the coral islands and the high volcanic islands of Truk (Takayama and Intoh 1980:48). In this connection I have an interest in Knudson's interpretations of the coral island subsistence patterns of Truk (Knudson 1970:66). The former practice of sea-burial by Trukese commoners is analogous to that of the coral islands.

As regards the origin of the Fefan pottery, I derive it from the Marianas Red pottery tradition, based on the numerous white temper inclusions (Takayama 1976; Borthwick and Takayama 1977:271; Takayama and Shutler 1978:8). Shutler (1977:92-3) is of the same opinion (for different reasons), and he also notes a similarity to Marianas Plain. Based mainly on Dickinson's petrographical examinations (1977:104-9), Shutler concludes that the Fefan pottery of 2000 B.P. was locally made inTruk, and that no Lapita pottery has been identified in Micronesia to date (Shutler 1977:93).

The latter throws some doubt on the accepted view, principally drawn from linguistics, that the colonizers of eastern Micronesia were bearers of the Lapita culture (Shutler and Marck 1975:101; Bellwood 1978b:295; 1980:184). However, even if the Fefan pottery cannot be derived from Lapita ware, we cannot totally rule out a settlement of eastern Micronesia (including Truk) by people moving up from eastern Melanesia and/or Western Polynesia,

considering parallels in physical types, cultures, and languages between all these areas. Although numerous potsherds have been recently collected at Nan Madol on Ponape, I am still interested in the observations by Ayres and Haun (1978:10-11) of parallels between the aceramic cultures of the Eastern Carolines and the Southeast Solomons.

Finally, archaeological work has revealed the presence of dog in Truk during the past 2000 years (Sinoto 1977:60; Takayama and Intoh 1978:62) and the appearance of cat and fowl around European contact (Takayama and Seki 1973:57).

THE PALAU ISLANDS

In 1954, an intensive survey throughout the Palaus was undertaken by Osborne (1966), and this was later followed by test excavations at several sites in 1968 and 1969 (Osborne 1979). Two seasons were then spent by ourselves in the Palaus in 1977 (Takayama and Takasugi 1978; Takayama 1979a:78-80; 1979b:81-103; Hayakawa 1979b:73-8) and 1978 (Takayama, Intoh and Takasugi 1980). In addition, archaeological reconnaissance surveys of the proposed Babeldaub-Koror airport site, and of the proposed airport site on Pelelie Island, were done by Kirch (1978a). More recently, systematic work has been undertaken under the direction of G.J. Gumerman of Southern Illinois University (Gumerman, Snyder and Masse 1980).

Osborne obtained seven C14 dates on charcoal, six of which are accepted as valid by him. Of these, the earliest date of 1120 B.C. from Aulong Island is associated with a well-developed ceramic complex including some fine sand tempered pottery (Osborne 1979:237, 264). The terrace-building period is determined by charcoal dates to cover some 1200 years or more, beginning about A.D. 90 400. Although no dates were obtained for the large megalithic site of Bairulchau, Osborne supposes that it was built between A.D. 800 and 1000 (Osborne 1979:265).

Eighteen radiocarbon dates were obtained from our excavations on Kayangel Atoll, Pelelie Island, Aluptaciel Island, and Koror Island. If we exclude the inverted date of 290 90 B.C. from a recent layer on Aluptaciel, the earliest date (A.D. 40 70) comes from the lowest pottery-bearing layer on Ngajangel Islet in Kayangel Atoll. Settlement on Aluptaciel began by at least the eighth century A.D., and the shell midden on Pelelie is attributable to a similar age. A single radiocarbon date of A.D. 1755 70 was associated with the stone structure of Ngelemilei on Koror. This is an acceptable date to me. My impression gained during the survey is that the carved stone monoliths and other

stone structures (pavements, platforms and roads) may belong to late prehistoric times, probably dating back to five or six hundred years ago at the most.

Contrary to our expectations, no calcareous sand tempered pottery has been recovered in the Palaus so far. According to our radiocarbon dates the Palauans have developed their own characteristic types of pottery during the past 2000 years, although Osborne's dates indicate an age-range of 3000 years for pottery. As already noted by Osborne, a lack of clear-cut change in Palauan ceramic attributes through this great time span makes it very difficult to establish a pottery sequence.

The absence so far in the Palaus of the calcareous sand tempered pottery, which is part of the Marianas Red pottery tradition, is a puzzle. All I can say at present is that if the calcareous sand tempered pottery really does exist in the Palaus, it may be buried below the high-tide level, near the present beach, as in the case of Fefan. Otherwise, Osborne's earliest pottery, with its fine sand temper, may be a variant derived from the calcareous sand tempered Marianas Red ware tradition, although this possibility seems weak.

The linguistic suggestions of ties between Palauan and Indonesian languages (Matthews 1949-1950:436; Bender 1971:431) are supported by the recovery of shell beaked adzes in Palau, which can be derived from the stone pick adzes of Indonesia (e.g., Duff 1970:15; Heekeren 1972:170). However, other artifacts recently found in southwestern Sulawesi (Mulvaney and Soejono 1970:26-33; 1972:163-77; Glover 1976:113-54), and in Minahasa and the Talaud Islands (Bellwood 1978c:240-88), do not seem to me to resemble anything known so far from the Palaus.

As far as the Palaus, Yap, and the Marianas are concerned, Solheim's hypothesis that the first probable movement of the 'Nusantao' people into Micronesia brought a shell tool tradition without pottery (Solheim 1976:135) cannot be supported at present. Finally, Osborne's excavations yielded bones of jungle fowls (Osborne 1979:347), but pig teeth were only collected from surface contexts (Osborne 1966:465).

THE YAP ISLANDS

Since the Giffords' pioneering work of 1956 on Yap (Gifford and Gifford 1959), further archaeological projects have taken place only very recently; for instance by Hayakawa (1979a:67-71) in 1977, by Kirch (1978b) in 1978, and by ourselves in 1980.

As part of our Ngulu Atoll archaeological survey project, the Giffords' Pemrang site in southern Yap Island was selected for test excavation because of the existence of a sawei relationship between Ngulu and the Guror village of Yap, in which the Pemrang site is situated. At Pemrang, eight 2-meter-square test pits were dug near the Giffords' original trench. Although detailed analyses of the finds are not yet finished, it seems safe to state that there are at least three chronologically distinct types of pottery. The earliest is characterised by white temper inclusions, including small shells, and the following type is sharply distinguished by a lack of the white inclusions; some sherds in this second group have mineral tempers. The latest pottery is the laminated ware first reported by the Giffords. At present I am inclined to think that our early pottery is related to the Marianas Red pottery tradition, although both the rim forms and the absence of red-slip in Yap suggest differences. The dates obtained from our excavation at Pemrang (see Appendix) range from only 360 80 B.C. to A.D. 220 75, much later than the earliest dates for Marianas Red in Marianas, so earlier pottery may still be awaiting discovery in Yap. The unlaminated ware described by the Giffords, and identified by Spoehr with his Marianas Plain, possibly corresponds with our middle pottery phase.

THE ATOLLS OF THE WESTERN CAROLINES

In 1975-76 archaeological test excavations were carried out by Fujimura and Alkire (1979) on the atolls of Faraulep, Woleai, and Lamotrek in the outer islands of Yap. Of these, Lamotrek yielded pottery. Interestingly enough, petrographic study indicates that some sherds are of Palauan origin, and the remainder are derived from Yap. Considering the existence of the sawei exchange system the recovery of Yapese pottery is as expected, but the discovery of Palauan pottery is a surprise. This could either have arrived via Yap, or Lamotrek voyagers could have travelled direct to the Palaus to obtain it.

On the basis of eight radiocarbon dates Lamotrek was probably initially settled some time between A.D. 1000 and 1100, although it may have been settled 500 to 700 years earlier according to a date derived from a Tridacna shell adze (see below). Bones and/or teeth of dog, chicken, and pig were also found in the Lamotrek excavation.

An archaeological survey of Ulithi Atoll was performed during 1978 and 1979 by Craib (1980). Ulithi is the largest atoll in the Carolines, and it occupied the highest position in the sawei system. Ceramic sherds belonging to the laminated ware of Yap are common, as are Cassis scrapers (identified as "Conus" adzes by Craib). Two radiocarbon dates of A.D. 260 and 490 were obtained

from a site on Mogmog Islet, but they are not accepted by Craib owing to inconsistency with the Giffords' chronology for laminated ware in Yap.

Ngulu is an atoll situated about 135 km southwest of Yap, and about 300 km northeast of Ngajangel Islet in Kayangel Atoll of the Palaus. The modern inhabitants of this tiny islet are Yapese in their customs and language. Based on mythology and the accounts of early missionaries and visiting voyagers, Lessa (1975:76) argues that it was actually uninhabited in 1525, and possibly settled only in recent years.

Our test excavations on this islet were done in the summer of 1980, and at two sites we encountered 2-3m deep pottery-bearing cultural deposits. The upper layers yielded Yapese laminated ware yet, interestingly, below this occurred some Palauan pottery and clay disks. And from the lowest layers the hoped-for white tempered sherds appeared. Radiocarbon dates, ranging from A.D. 260 to A.D. 330 (see Appendix) were obtained from a little above the lowest pottery-bearing stratum, and these suggest that the appearance of pottery on Ngulu dates back to around or just before the time of Christ. As such, it appears a reasonable assumption that these dates also apply to the initial settlement of Lamotrek and Mogmog.

Regarding the origin of the early calcareous tempered sherds from Ngulu I must withhold conclusions until the results of Dickinson's petrographic analyses are obtained, although the possibility of a Yapese derivation is strong (see page , and following article by W.R. Dickinson). Meanwhile, as noted by Intoh (1981), the Palauan pottery and clay disks from Ngulu appear to have been taken there by Palauans themselves, rather than via other routes as supposed by Fujimura and Alkire. It may be necessary to consider the possibility of an ethnohistorically-unknown occupation by Palauans of the outer coral islands of Yap. The discovery of Yapese laminated sherds from the upper layers on Ngulu seems to relate to the oral tradition collected by Lessa (1961:45-7), yet at present it is unclear whether this means a replacement of the earliest inhabitants of Ngulu by newcomers from Yap in the recent past. This is a problem which may be solved archaeologically in the future.

THE ATOLLS OF THE EASTERN CAROLINES

In the summer of 1979 a very brief reconnaissance survey was done in the Lower Mortlock Islands in the Eastern Carolines (Takayama and Intoh 1980). Some test pits were dug on the islets of Moch and Satawan in Satawan Atoll, which is geographically the nearest neighbour to Nukuoro (177 km). These excavations produced

radiocarbon dates of A.D. 965 and A.D. 1050, and yielded a small quantity of shell artifacts, all suggesting that these coral islands were colonised by people from Truk around or before the 10th century A.D. However, surface finds of Cassis scrapers and pots strongly indicate ties with the outer coral islands of Yap, so archaeological surveys in these, especially the Hall Islands, Namonuito Islands, and Western Islands, will be necessary in the future.

On the other hand, the artifacts found in the Lower Mortlocks suggest only limited prehistoric contacts between these atolls and Nukuoro, although Terebra shell adzes with concave bevels found in the Lower Mortlocks are very similar to some Terebra adzes from Nukuoro (Davidson 1971:53). This type of adze is also reported from the atolls of Ulithi (Craib 1980:179) and Ngulu (Eilers 1936:237), but it does not occur in our Terebra shell assemblages from Tol, Yap and the Palaus. However, it has been reported also from Vanuatu (Shutler and Shutler 1965:Pl.6b; Garanger 1972: Fig.40, 7-8, passim).

In 1979 and 1980, an archaeological survey in Kapingamarangi Atoll was undertaken by Leach and Ward (1980). According to their preliminary report, cultural materials were found in very natural-looking beach sediments to as deep as 4.5 metres, yet artefacts from the excavations were rare, but include Tridacna shell adzes and arm bands, and a few shell and bone fish-hooks. A wealth of economic debris was also recovered, particularly fishbone, and also bones of pig, rat, and birds (Leach and Ward 1980:50, 63). Bones of pig and dog were also found in the excavations on Nukuoro (Davidson 1971:89-20).

PONAPE ISLAND

In 1977 the first systematic archaeological survey on Ponape was initiated in the old Awak section of Uh district (Ayres and Haun 1978; Ayres, Haun and Severence 1979; Ayres 1979:598-600). A palynological study coordinated with the archaeological survey suggests that slash and burn horticulture could have been present upwards of 2000 years ago (see Ross Cordy's article, page). Ayres also argues that visibility of the earliest Ponapean coastal sites, possibly up to 3000-3500 years old, might have been affected by sea-level changes. If so, we must bear in mind that the absence of early sites on Ponape so far may be due to this phenomenon. Based on a series of radiocarbon dates, Ayres demonstrates that earlier settlement seems to have been concentrated somewhat more inland than that of A.D. 1300. Stone platforms are dated to A.D. 840 and 875, and a tomb complex dates to A.D. 1300. A future comparative study between Ayres' results and the Nan Madol ruins is eagerly awaited.

In addition to the survey on Ponape, Ayres undertook test excavations in a former village area on adjacent Ant Atoll, gaining a date of A.D. 800 from midden deposits one meter deep (Ayres 1979:598).

The recent discovery of prehistoric pottery in the Nan Madol ruins is of great interest (Athens 1980:95-99). From the results of his survey on Tapau Islet, Athens has demonstrated that quantities of pottery were used here during the 12th-15th centuries. Although he notes that the Nan Madol pottery bears no obvious relationship to other Micronesian pottery styles (Athens 1980:98), I am inclined to regard it as a survival of the Marianas Red ware and Fefan traditions, partly on the basis of its crushed shell temper. I suspect that the same type of pottery will be found on Kosrae in the future.

THE MARSHALL ISLANDS

Despite their geographically important locations as stepping-stones between eastern Micronesia, western Polynesia, and eastern Melanesia, the Marshalls are archaeologically the least-known islands of Micronesia. However, in 1977 an archaeological survey in the Marshalls and eastern Carolines was performed by Rosendahl (1977). According to his preliminary report, survey in the Marshalls was carried out on 13 different atolls and islands, and some limited test excavations were done. It is my own view that the shell fishhooks found at Nan Madol and Lele on Kosrae may have been derived from the Marshalls, rather than from Truk to the west.

Apart from Rosendahl's expeditions, surveys and test excavations were undertaken in Majuro by Riley (Cordy 1980:236), but no information is yet available.

DISCUSSION AND CONCLUSIONS

The recent archaeological surveys in Micronesia have revealed various new and frequently unexpected facts, in addition to a disproof of the view of Matsumura (1918:127) that one of the major differences between the western and eastern Carolines lies in the respective presence and absence of pottery.

Firstly, the presence of deep cultural deposits in the atolls mentioned above indicates the potential for atoll archaeology, even within typhoon belts, as advocated by Davidson (1967:363-376) from her Nukuoro survey. Accordingly, this fact completely modifies the former recommendations of the Sub-Committee

on Pacific Archaeology, National Research Council, that archaeological work on atolls would be relatively unrewarding (Spoehr, et al. 1951:595).

Secondly, it is becoming clear that ancient artifacts found in excavations are frequently different in form and material from those recorded in ethnographical accounts, as is also often the case in Melanesia and Polynesia. As such, conclusions about the origins or movements of the ancient Micronesians drawn from ethnographic data alone appear to be dangerous. This possibly applies especially to Kiribati and Tuvalu (the Gilbert and Ellice Islands), which today straddle the cultural and linguistic boundary between Polynesia and Micronesia (Green 1967:218): it cannot be assumed that they have always done so.

Thirdly, setting aside differences in time depth, certain localizations of artifact types have been verified, especially in western Micronesia. For example, crescentic knives of Tridacna shell occur only in the Palaus, whereas Cassis shell scrapers of the type found in Yap, its outer coral islands, and the Lower Mortlocks of Truk State are completely absent there. Interestingly, the distribution of the Cassis scrapers coincides with that for Cassis shell containers, except for Yap where pottery has always been manufactured. Conus shell scrapers are limited to the Palaus and Yap, whereas the cowrie shell scrapers which are known archaeologically in Truk are ethnologically reported from Ponape, Kosrae, and the Marshalls, plus Truk, although their form is somewhat different from that of the prehistoric Trukese ones. Except for a very few finds of Cassis shell scrapers in the northern Marianas, which seem to be of recent introduction, all of the above artifact types are missing from the Marianas. On the other hand, stone adzes, rare in the Carolines, are commonly found there. Although slingstones are archaeologically common in the Marianas and Truk, they are non-existent in the volcanic high islands of Yap and the Palaus. Coral food pounders are generally found in Truk, Ponape, and Kosrae, and their range conforms with that of the cowrie shell scrapers. Exact reasons for these distributional variations are uncertain, but some can be interpreted as due to different cultural origins, or to cultural preferences or environmental restrictions.

Fourthly, apart from the portable artifacts, an uneven distribution of domesticated animals (except for fowls) can be observed. However, I take it for granted that present knowledge will be considerably modified by future archaeological work. In short, future archaeological work, not only in Micronesia, but also in the Philippines, Indonesia, Melanesia, and Polynesia, should offer answers for all the problems under consideration.

POSTSCRIPT

After writing this article I received an invaluable report from Dr W.R. Dickinson* on the petrographic study of sherds from the Pemrang site on Yap (7 sherds) and at the two sites on Ngulu Atoll (11 sherds). His results have produced some new and important facts. Of these, most interestingly, one Ngulu sherd found in Layer I contains a temper which suggests a remote possibility that this, together with some other Yapese sherds, could have been manufactured in the Philippines. Ties between Yap and the Philippines are ethnohistorically reported (Lessa 1962:330).

The petrographic report also attests to the presence of possible Palauan pottery on Ngulu Atoll, but denies the presence of pottery derived from the Marianas, despite the fact that ethnohistoric accounts indicate former Carolinian-Marianas voyaging (McCoy 1973:355-65; Lewis 1976:15-28).

* Dr Dickinson's report follows in this bulletin.

APPENDIX: RADIOCARBON DATING

Twenty radiocarbon samples from the sites on Yap Island and Ngulu Atoll were assayed by Japan Radioisotope Association, Tokyo.

Lab No.	Site	Square	Layer	Depth	Material	C-14 dates B.P. on half lifes of: 5730 yrs	5568 yrs
N-4034	YGP*	TP-3	IX	-ca.300cm	Trochus	2310±80 (360±80 B.C.)	2250±75
N-4035	YPG	TP-3	VII	-225cm	Tridacna	1950±75 (0±75 B.C.)	1890±75
N-4036	YPG	TP-0	V	-260cm	Tridacna	2090±60 (140±60 B.C.)	2030±55
N-4037	YPG	TP-6	IV	-210cm	Tridacna	1830±60 (A.D. 120±60)	1770±55
N-4038	YPG	TP-7	III	-168cm	Tridacna	1730±75 (A.D. 220±75)	1680±75
N-4039	NLTA**	TP-2	XI	-179cm	Tridacna	1620±75 (A.D. 330±75)	1580±75
N-4040	NLTA	TP-2	IX	-140cm	Tridacna	1690±75 (A.D. 260±75)	1640±75
N-4041	NLTA	TP-3	VII	-197cm	Tridacna	1690±75 (A.D. 260±75)	1640±75
N-4042	NLTA	TP-4	VI	-155cm	Tridacna	1690±85 (A.D. 260±85)	1640±80
N-4043	NLTG***	TP-1	IV	-ca.67cm	Tridacna	1100±60 (A.D. 850±60)	1070±55
N-4044	NLTG	TP-2	V	-ca.95cm	Tridacna	905±60 (A.D. 1045±60)	880±60
N-4045	YPG	TP-1	I	-45cm	Tridacna	Modern	
N-4046	YPG	TP-1	II	-120cm	Tridacna	1680±85 (A.D. 270±85)	1630±80
N-4047	YPG	TP-1	II	-160cm	Tridacna	1670±60 (A.D. 280±60)	1620±60
N-4048	YPB****	TP-1	IV	-113cm	Spider shell	1460±85 (A.D. 490±85)	1420±80
N-4049	YPG	TP-3	V	-170cm	Tridacna	1790±75 (A.D. 160±75)	1740±75
N-4050	YPG	TP-6	III	-174cm	Tridacna	1830±75 (A.D. 120±75)	1780±75
N-4051	YPG	TP-0	IV	-182cm	Tridacna	1760±60 (A.D. 190±60)	1710±60
N-4052	NLTA	TP-3	VII	-184cm	Tridacna	1760±75 (A.D. 190±75)	1710±75
N-4053	NLTA	TP-4	IV	-66cm	Tridacna	470±80 (A.D. 1480±80)	460±75

* Pemrang site, Yap. ** Tadau site, Ngulu.
*** Tabgap site, Ngulu. **** Boldanig site, Yap.

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