

TEMPER SANDS FROM PREHISTORIC SHERDS EXCAVATED AT PEMRANG SITE ON  
YAP AND FROM NEARBY NGULU ATOLL

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Eighteen sherds were sent for examination in thin section by Jun Takayama (see Takayama's preceding article, page ). The materials include eleven sherds from Ngulu atoll (surface sherd, #1; NLTO site, #2; NLTG site, #3-#5; NLTA site, #6-#11), and seven sherds (#12-#18) from the Pemrang site on Yap. Of interest is the fact that sherds from Pemrang may belong to the Marianas Plain ware and/or Red ware tradition(s). Also, selected Ngulu sherds (i.e., #8) closely resemble selected Pemrang sherds (i.e., #13), even though the two locales are about 100 km apart.

Petrographic analysis indicates that none of the sherds examined contain tempers suggestive of derivation from the Marianas. However, some Ngulu sherds with broken sherd tempers are indistinguishable from similar Palau sherds. Other Ngulu sherds almost certainly originated on Yap.

Temper Types

The following nine temper types can be distinguished in the collection:

- A. One sherd (#1, Ngulu) contains a temper sand dominated by grains of foliated, polycrystalline metavolcanic rock characteristic of temper from Yap.
- B. Three sherds (#9, #10, #11, Ngulu) contain similar Yap metavolcanic temper admixed with varied but subordinate proportions of calcareous grains composed of reef detritus.
- C. Two sherds (#14, #16, Pemrang) contain tempers in which calcareous grains are dominant, but are admixed with minor amounts of Yap metavolcanic temper.
- D. Two sherds (#2, #3, Ngulu) contain a temper sand composed mainly of plagioclase and clinopyroxene grains, but with subordinate proportions of the kind of lithic fragments characteristic of the Yap metavolcanic temper.
- E. One sherd (#15, Pemrang) contains dominantly calcareous temper sand with which plagioclase and clinopyroxene grains are mixed.

- F. Three sherds (#4, #7, #8, Ngulu) contain broken sherd temper indistinguishable from temper of similar origin in sherds from Palau.
- G. One sherd (#18, Pemrang) contains broken sherd temper in which metavolcanic lithic fragments indistinguishable from those of Yap metavolcanic temper also occur.
- H. Four sherds (#5 from Ngulu and #12, #13, #17, Pemrang) contain broken sherd temper in which quartzose and cherty grains are abundant.
- I. One sherd (#6 from Ngulu) contains a quartzose temper whose grain types include mainly quartz and polycrystalline quartz-albite lithic fragments with microgranular texture, although albite, epidote, and clinopyroxene grains are also present.

#### Temper Interpretations

Type A from Ngulu was presumably derived from Yap, for no similar temper sands have been observed elsewhere. The occurrence of this Yap metavolcanic temper on Ngulu atoll is thus evidence for transport of ceramic wares or materials from Yap to Ngulu. Type B from Ngulu and Type C from Pemrang together form a gradational spectrum of hybrid tempers formed by coastal or artificial mixing of Yap metavolcanic temper with calcareous reef detritus. Type D from Ngulu and Type E from Pemrang apparently also represent special variants of Yap metavolcanic temper.

Type F from Ngulu may well have been derived from Palau, the only place where broken sherd temper has been observed previously. However, the existence of Type G from Pemrang shows that broken sherd tempers were also used on Yap. Type H tempers are of uncertain derivation whose inferred origin depends upon how Type I is interpreted, for the mineral grains in the broken sherds of Type H are analogous to the species dominant in Type I.

Type I from Ngulu is the same kind of quartzo-feldspathic temper observed previously in subordinate sherds from Yap. Its origin is probably from rare intrusive rock exposed locally on Yap, but much less abundant than the metamorphic rocks that give rise to the characteristic Yap metavolcanic temper. If not derived from Yap, Type I temper may represent importation from the Philippine Islands, for sands of such a composition would not be expected on volcanic islands like Palau or the Marianas.

### Summary

Most of the sherds from the Pemrang site (14, 15, 16, 18) contain temper grain types interpreted as diagnostic of common Yap bedrock sources, and the other Pemrang sherds (12, 13, 17) probably reflect derivation of their temper sands from more local sources on Yap.

Most of the sherds from Ngulu atoll (1, 2, 3, 5?, 9, 10, 11) contain temper sands indicative of derivation from Yap. Three Ngulu sherds (4, 7, 8) containing broken sherd aggregate as temper may have come from Palau, but there is no conclusive evidence to support such an inference. The remaining Ngulu sherd (6) contains a temper known to occur also in sherds from Yap, and probably indigenous to Yap. Conceivably, however, the Yap and Ngulu wares containing this anomalous quartzose temper could have been manufactured in the Philippine Islands to the west. If such an unlikely distant source proves valid, then some of the broken-herd temper with prominent quartzose components (5, 12, 13, 17) may have had similar origins.

The data thus indicate: (1) that all the Pemrang sherds are probably indigenous to Yap, (2) that most or all the Ngulu sherds originated on Yap, (3) that some Ngulu sherds may have come from Palau, and (4) that some Ngulu and Pemrang sherds conceivably may have had a Philippine origin, although such a distant source is unlikely.