ARCHAEOLOGY OF ATAFU, TOKELAU: SOME INITIAL RESULTS FROM 2008

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ABSTRACT

Surface survey, shovel testing, and stratigraphic excavations were done on Atafu Atoll in Tokelau during August 2008. Initial results suggest that Fale Islet has the most potential for further archaeological research. Dense cultural deposits on this islet are >1 m (39 in.) deep. Cultural material recovered includes food bone, fire-affected volcanic rock, tool-grade basalt flakes and tool fragments, Tridacna shell adzes, and pearl-shell fishhook fragments. Dog bone occurs from the earliest deposits through to the late prehistoric, while pig bone is found only in historic contexts. Fish bone is common throughout, and, with the exception of Tridacna, there are few edible mollusk remains. Initial EDXRF (Energy Dispersive X-Ray Fluorescence) analyses have found the basalt to be consistent with documented sources on Tutuila, Samoa. Basal radiocarbon dates from two excavation units are 660-540 cal. BP and 500-310 cal. BP (at 2σ).

TOKELAU AND PREVIOUS ARCHAEOLOGY

Tokelau is a group of three atolls, Fakaofo, Nukunonu, and Atafu, located ~500-600 km (311-373 mi.) north of Samoa in the equatorial Pacific. Global climate change and rising sea level will have a disproportionate effect on these atolls because of their tiny landmass (~10 km² [3.9 mi.²]), most of which is < 2 m (6.6 ft.) above sea level. The current human population is ~1,400 persons, and this is probably near the prehistoric maximum (Huntsman & Hooper 1996). Like other atolls, Tokelau has a severely limited resource base — a situation that necessitated the development of strong cultural mechanisms for resource management and resiliency. The sole prior archaeological project in Tokelau aimed to establish the presence of archaeological deposits on each atoll, obtain initial estimates of their age, and a general idea of their contents (Best 1988:104).

Best excavated at the modern village location on each atoll. He found deposits at each containing: well-preserved faunal material (McAlister 2002); bone, shell and stone tools; in situ features; and exogenous material such as ceramics and basalt. Best’s (1988) radiocarbon dates on the lowest cultural strata are in the ~1,100-600 cal. BP range (as re-calibrated by Addison & Kalolo 2009), a critical time for understanding the settlement of East Polynesia and the Polynesian outliers as well as understanding the interaction network that distributed Samoan basalt over a large portion of the Southwest Pacific (Addison, in prep.).

Although long seen as marginal to the main processes in Polynesia, the northern atoll arc (Tuvalu, Tokelau, Phoenix Islands, Line Islands, and Northern Cook Islands) may have played a critical role in post-Lapita Polynesian dispersals and subsequent interactions (Addison 2007). Typical early East Polynesian artefacts are found in the Line, Phoenix, and Northern Cook Islands (Anderson, et al. 2002; Anderson, et al. 2000; Bellwood 1978; Chikamori, et al. 991; Pearthree & Di Piazza 2003), while West Polynesian basalt tools are found in Tokelau, the Phoenix, and Northern Cook Islands (Best, et al.- 1992; Di Piazza & Pearthree 2001).
Prevailing easterly winds do not favor a direct route from West Polynesia to the nearest East Polynesian high islands (the Southern Cook Islands). Computer modeling of voyaging routes has indicated this as a formidable barrier to the settlement of East Polynesia (Di Piazza, et al. 2007; Irwin 1992). However, analysis of daily wind patterns (as opposed to averaged wind-rose data) indicates that short jumps between Samoa and various atolls in the northern atoll arc in a “stepping-stone” pattern provide a reliable and relatively easy route into high-island East Polynesia (Addison, in prep.). A route through the northern atoll arc also provides a downwind safety net, a factor that has been put forth as an important aspect of Polynesian voyaging strategies (Irwin 1992). If such a strategy was used, Tokelau would have been a nexus because of its geographic position.

The Tokelau Department of Education, the American Samoa Community College and international collaborators have launched a multi-disciplinary program of research that will include all atolls in Tokelau (see description at www.tokelauscience.com). Below we report initial result of a preliminary exploration of Atafu Atoll’s archaeology conducted in August, 2008.

**SURFACE SURVEY**

Surface survey by line-abreast transects found no traditional surface features or artefacts outside Fale Islet, the location of the atoll’s only village (Figure 1). Five shovel tests on three islets at the east side of the atoll found no cultural deposits. Screening of the shovel tests found only a few small fish bones at one location. Together, these results suggest two possibilities: 1) that permanent habitation on Atafu has always been on Fale Islet; or 2) that the other islets are so affected by storms that archaeological remains there have been severely impacted. The exception to this pattern is the *Cyrtosperma chamissonis* cultivation pits on islets at the southeast corner of the atoll, which remain in cultivation.

**EXCAVATIONS**

Three 1×1 m (3.3×3.3 ft.) test units were excavated on Fale Islet within the current village area (locations on Figure 1). Each test unit was placed at the edge of a septic-tank pit in progress. Each had cultural deposits and the stratigraphy in each was different. The stratigraphy and cultural materials broadly parallel results from Best’s 1986 excavations.

**TEST UNIT 1**

At Test Unit 1 (TU-1) Layers I-VII represent ~150 cm (59 in.) of dense cultural deposits (Figure 2). These rest on what appears to be an unmodified beach deposit. The cultural-deposit sediments are mostly coral gravel with variations between strata in color and particle size. Fish bone, bird bone, rat bone, fire-affected volcanic rocks, and basalt tool fragments or flakes were recovered from Layers I-VII. Pig bone was only recovered from Layer I. Dog bone was recovered from Layers III-VII (supporting Best’s dog chronology for Tokelau). Turtle bone was recovered from Layer VII. There was a notable dearth of edible mollusks.
A single dating sample has been processed from TU-1. WK-24478 is an AMS date on a sole piece of Cocos nucifera endocarp. Calibration with OxCal v3.10 (Bronk Ramsey 2005) using the Northern Hemisphere curve (Reimer, et al. 2004) gives a calendar date of 660-540 cal. BP at 2σ (see Addison & Asaua 2006; Petchey & Addison 2008 on reasons for using the NH curve).

Initial results of land-snail analysis from TU-1 indicate only marine species in the lowest stratum. Anthropophilic snail species (including Polynesian introductions) are present throughout the rest of the column. Probable historic introductions are present in the uppermost stratum.

**Test Unit 2**

TU-2 was placed ~30 m (98 ft.) from the lagoon edge. Below Layers I and II, which are recent paving material, Layer III is ~100 cm (39 in.) of very darkly stained cultural deposit in a coral gravel matrix (Figure 3). Cultural materials recovered from Layer III were similar to those from Layers III-VII in TU-1.

At the bottom of Layer III and placed on a non-cultural beach deposit is what appears to be the edge of a house foundation. This consists of an alignment of upright coral slabs surrounded by coral rubble. A piece of Cocos nucifera endocarp (WK-24479) from just above this pavement was AMS dated. The same calibration protocol as for WK-24478 gives a calendar date of 500-310 cal. BP at 2σ. Although no stratigraphic distinctions were recognized in Layer III, we assume that this deposit slowly accumulated over a period of time — likely from the initial occupation of this location (500-310 cal. BP) until the proto-historic period.
**Test Unit 3**

The main cultural stratum of TU-3 (Layer III, Figure 4) is ~100 cm (39 in.) of light-colored coral gravel containing a much more restricted range of cultural materials. These consist of a few fish bones, minimal amounts of fire-affected volcanic rock, a basalt adze blade fragment, and a *Tridacna* valve adze blade fragment. The lower portion of Layer III is a dense deposit of *Tridacna* sp. valves.

An *in situ* combustion feature is indicated by a lens of monocot charcoal (perhaps *Cocos nucifera* petiole) capped by a light-colored powdery material (probably burnt coral). It is unclear if this feature was used for making coral lime (traditionally mixed with coconut oil for use as canoe caulking), or if the light-colored material is the result of repeated fires with coral gravel in one spot (as is common today for Atafu cooking fires). The relatively restricted range of cultural materials and the two adze blade fragments found in TU-3 could suggest an area used for canoe making, hence favoring the lime-making interpretation of the combustion feature’s function.

![Figure 4. TU-3 profile, hash marks indicate a dense deposit of Tridacna valves; drafting by Tuipuavai Tago.](image)

**Future Work**

The near-ubiquitous presence of exogenous volcanic rock (either tool-grade basalt or cooking stones) in the initial Fale Islet excavations suggests that Atafu had external interaction over the period of human occupation of the atoll. Initial analyses of eight pieces of tool-grade basalt from the three test units have found some to be consistent with documented sources on Tutuila Island in Samoa. Further geochemical analyses are underway at the University of Hawai’i, Hilo. Additional excavation should provide more information on the continuity of Tokelau’s interaction with other islands and on the exact sources of exogenous materials. If East Polynesian lithic material exists in Tokelau, a larger sample size will increase the probability of identifying it, both geochemically and by tool morphology.

The presence of pearl shell artefact fragments — so rare in West Polynesia and yet such an important element in East Polynesian assemblages — also indicates the potential of Tokelau archaeological materials to assess the idea of the northern atoll arc as an important pathway into East Polynesia. More excavation and larger samples are needed.

The initial results from the work in August of 2008 suggest that further archaeological research in Tokelau has potential for addressing local and regional questions. Excavations planned for 2009-2011 should provide a much better understanding of the internal processes on each Tokelau atoll as well as the role the archipelago played in regional prehistory.
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REFERENCES

Addison, D.J. in prep. Daily Wind Patterns and Sailing Routes Between Samoa and East Polynesia: Why the Northern Atoll Arc Was Crucial.


