Preliminary Report of Archaeological Research Activities
Carried out in the ‘Opunohu Valley, Mo’orea,
Between July 7-August 30, 2001

presented to the
Haut-Commissaire de la République en Polynésie Française

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October 2001
Introduction

This report describes archaeological research activities carried out during a eleven week period in the ‘Opunohu Valley, Mo’orea by Jennifer G. Kahn, Ph.D. candidate in the Department of Anthropology, University of California, Berkeley, under the direction of Prof. Patrick Kirch, Professor of Anthropology at the University of California, Berkeley.

Permission required for conducting archaeological excavation in 'Opunohu Valley was obtained from Mme. L. Peltzer, Ministry of Culture, M. Francis Stein, Chef de Service, Service de la Culture et du Patrimoine, the Haut-Commissaire de la République en Polynésie Française, and M. Gre Tahiata, Director of the Agronomie Rurale, who currently directs use of the ‘Opunohu Valley. Jennifer Kahn was awarded a Graduate Student Research Grant by the UC Berkeley Gump Station, which greatly facilitated the field research presented here, as did use of the stations’ laboratory for preliminary field analyses. The UC Berkeley Gump Station also provided lodging for two interns who worked on the project under the supervision of Jennifer Kahn.

Report of the Summer 2001 Research

Research Goals

Nine weeks were devoted to archaeological excavation in the ‘Opunohu valley at site complexes ScMo 120, ScMo 123, and ScMo 171. These archaeological complexes are located to the north of the first large stream in the Tupauruu section of the valley, on a series of adjacent ridges. Kahn had identified these complexes in the 1999 survey as extremely well preserved sites associated with house curbstone outlines, ideal locales for research pertaining to household production and household wealth and status. The summer 2001 excavations were designed to provide critical comparative data from house sites nearby, but within separate site complexes, to the house sites excavated by Kahn in the summer of 2000 (site complex 170/171) (Kahn and Kirch 2000). The excavations were carried out to demonstrate the range of variability between house site types (rectangular versus round-ended) within different geographical contexts in the northern Tupauruu section of ‘Opunohu valley. In addition to the intensive field excavations, two weeks of preliminary lab analysis were completed at the end of the 2001 field season.

The primary goals of 2001 field project were (1) to create accurate maps of each complex, including all surface architecture and excavated areas, (2) to complete large scale horizontal excavations and test pit excavations at a range of domestic sites in the valley to document site function and aspects of variability in household production, architecture, associated features, and material culture within the overall settlement landscape of the valley, and (3) to utilize several innovative sampling techniques in the excavation methodology, such as micromorphology and soil chemical analysis, to aid in the analysis of spatial patterning at the sites. This research will comprise the data used for Kahn’s Ph.D. research, supervised by Dr. Patrick Kirch, University of California, Berkeley.
Summary of the Research Results

(1) Creating an accurate map of the ScMo 120 and ScMo 123 complexes.

Patrick Kirch, assisted by Lisa Holm, mapped the entire ScMo120 and ScMo123 site complexes at a scale of 1:100 using a plane table and telescopic alidade. The maps also include data on the metric grid system used in the field excavations. These maps are presently being re-scaled, overlaid with one another, and entered into a GIS (Geographic Information Systems) database that will aid in the spatial interpretation of the complexes. The first stage of developing the GIS database is electronically digitizing the plane table base maps using AutoCad version 13 for Windows. The maps will be digitized using a Pentium II computer and a Calcomp 9160 digitizer as the input device.

(2) Carrying out large scale horizontal excavations and test pit excavations at a range of domestic sites in the valley to document site function and aspects of variability in household production, architecture, associated features, and material culture.

Here, we present some of the preliminary results of our 2001 field season excavations. Because the detailed analysis of the sediment samples, charcoal samples, stone tools, and basalt flakes have not yet been completed, all of our statements here should be understood as tentative.

The ScMo 120 Cluster: The complex consists of 8 distinct stone structures, including one oval-ended house site associated with a partially paved lower terrace (120A), several faced/and or partially paved terraces terraces (120A LT, 120D, 120J, 120G), a marae (120E), and a raised stone platform or paepae (120O). The complex was chosen for excavation because it had a well-preserved round-ended house in close proximity to a variety of architectural features. It provided an excellent database from which to understand the functional variability of round-ended house site architecture and variation in the use of space across sites of this type. It also provided an excellent comparison with ScMo 170, a round-ended site excavated in the 2000 season that was associated with a much simpler, and likely family level, marae.

Site 120A is a fare pote'e (round ended-house) with substantial architecture. It is found on an elevated terrace faced with 2 courses of basalt cobbles, where the lower course is comprised of well-chosen, large rectangular boulders. The terrace adjacent to and down slope to the house terrace is well paved with large flat basalt cobbles in a rectangular area along the southern portion. The fare-pote'e curbstone outline is found c. 1.20 m towards the interior of the 120A terrace. The fare pote'e is of medium size, extending 10.0m long by 5.0m wide. The western and southern portions of the curbstone alignment are disturbed, as is a portion of the northern alignment. The disturbance appears to have been caused by tree roots rather than re-use of the site.

The site was cleared and a 1.0m x 1.0m meter grid was laid out along the whole of the house terrace. Most of the fare pote'e interior was excavated (excluding small areas disturbed by a large purau tree in the northern house interior) in a large-scale horizontal excavation block. Smaller excavation blocks and isolated test pits were placed on the
terrace outside of the house interior to investigate activities carried on outside the fare pote’e interior. The northern portion of the terrace exterior to the house was sampled by excavating 1.0m x .50m units in alternating units, in an effort to systematically sample the site. Overall, 54.5 m² were excavated, 41.5 m² within the house interior and 13 m² along the exterior portion of the house terrace (see Figure 1).

![Figure 1: The 120A fare pote’e after the field excavations.](image)

The cultural deposit from the interior of the fare pote’e was very clean and lacked concentrated amounts of charcoal. Interior sub-surface features included postholes and an in-situ fire feature located along the southern border of the house. The latter appeared to represent a single use hearth, possibly for providing warmth or light within the house interior. Several polished adze flakes were recovered in the excavations, as well as an adze cutting edge fragment and an adze butt fragment. Two large subsurface boulders were encountered in the interior house excavations (Figure 2). These were surrounded by concentrations of adze flakes and simple basalt, found along the surface of the house floor. These flat topped boulders and their associated lithic scatters represent activity areas, where individuals sat and used adzes and/or reworked adze tools. However, overall, few unpolished basalt flakes resulting from on-site adze manufacture were recovered in the ScMo120 excavations. This data, as well as the recovery of a whetstone and an adze fragment that appears to have been re-used as a polishing stone, tentatively suggest that this fare pote’e was a locale for sculpting wood.

Units excavated exterior to the house on the elevated platform provided important information regarding construction sequences. Cultural deposits just exterior to the house
Figure 2: Western curbstone alignment of the 120A fare pote’e, after the excavations. The two large boulders in the house interior (found along the right bottom corner of the photo) were surrounded by lithic debris and were the loci for adze use and adze maintenance activities. Located in the background are the 120A paved area just adjacent to the house and the 120A LT terrace.

had a noticeably higher concentration of charcoal than the house interior, suggesting either sweeping of the house interior to maintain cleanliness or a decision to locate fire features in the exterior area of the house. However, no formal fire features such as earth ovens or fire pits with stone borders were encountered in the exterior house excavations. Test units just to the west of the house exterior included remains of activities not encountered in the interior excavations, such as storage pits and a series of postholes, suggesting that other structures may have been erected on the terrace external to the fare pote’e.

Site 120A LT is a large faced terrace located down slope of ScMo 120A, on the western side of the pavement located along the western border of the house platform. The terrace is 13.5m long and 8.0m wide and is faced with four to six courses of stacked basalt boulders and cobbles, approximately 1.0m in height. The southern edge of the terrace just adjacent to the front facing is paved for approximately 1.5m. Other areas on the terrace have small paved portions, and all of the paved areas are faced by alignments of basalt stones that resemble house curbstones.

Overall, 11m² were excavated within the interior terrace area. The cultural deposits resembled those from the areas excavated at ScMo 120A. They were clean and lacked any concentrations of charcoal. Several adze flakes were recovered, as well as a basalt
The majority of the flakes were found in areas just adjacent to the front paving along the western edge of the terrace, suggesting this was an activity area for wood sculpting and/or adze maintenance activities.

The northern portion of the terrace exterior to the house was sampled by excavating 1.0m x 0.50m units in alternating units, in an effort to systematically sample the site. A series of pit and posthole features were located here, but no in-situ fire features were recovered. The 120A LT terrace appears to have had a similar function to that of the 120A fare pote'e, possibly a locale for wood sculpting and/or an area where adze maintenance activities were carried out. The spatial arrangement of the features suggests that a series of short-term structures may have been erected on the terrace over time. Furthermore, the lack of well-defined fire features indicates that this terrace, as well as the 120 fare pote'e, had a specialized function. The type and distribution of sub-surface features do not indicate that the full range of domestic cooking activities were carried out at either ScMo 120A or ScMo 120A LT.

Site 120D is a large terrace adjacent to and east of ScMo 120A. The terrace is faced with three courses of stacked basalt cobbles and runs 19.5m long by 8.0m wide. An upraised paepae (ScMo 120O) is located along the northern extent of this terrace, as is a fallen upright stone. Time constraints precluded opening up a large horizontal excavation at ScMo 120D, however, 4m² were excavated to recover charcoal samples for chronometric dating and to retrieve information concerning site function. Again, the cultural deposit was relatively clean but had a greater amount of charcoal and fire cracked rock than the cultural deposit associated with the terraces excavated down slope. No subsurface features were found and few basalt flakes were recovered. In contrast to the terraces located down slope, Site 120D lacked adze flakes or adze fragments, indicating that this terrace had a different function than that of ScMo 120A or 120A LT. It appears to have been an open but maintained space, associated with activities that left charcoal traces but were not associated with domestic cooking activities. Further archival research will be carried out to provide a more detailed functional interpretation of this portion of the site in the next few months. However, it is possible that this terrace functioned as an open ritual area in front of the ScMo 120 marae, given the excavation results, as well as the sites’ spatial context, i.e. adjacent to and just below the ScMo 120E marae.

Site 120E is a marae, running 14.0m long by 13.0m wide. This marae is comprised of two adjacent enclosures and has several interesting and complex surface architectural features. The southern enclosure has well-constructed walls, made up of 3-4 courses of stacked boulders .70m high and 1.0m wide. There are several fallen uprights along the southern wall. A line of three uprights is located along the eastern portion of this southern enclosure, as well as a backrest stone and a pit with a stone lined border. The northern enclosure has a series of fallen uprights along its eastern interior area, and a pit with a stone lined border and a linear alignment in the western interior area.
Time constraints limited detailed excavation of the 120E marae. Two m² units were excavated in the southern marae enclosure in an attempt to retrieve charcoal samples suitable for chronometric dating. Isolated charcoal chunks were recovered in the deposits, at the interface of the cultural deposit with the underlying construction fill deposit. The cultural deposit was very clean and contained only a few flakes and a few fire-cracked rocks. No sub-surface features were located in these limited test excavations. Further excavations will be needed to provide a detailed picture of the activities carried out at this site.

The ScMo 123 Cluster: This site is found to the northeast of ScMo 120, on the adjacent ridge top. The complex consists of five distinct stone structures, including a rectangular house site (123A) with an adjacent paved area to the west, two large upslope marae (123B and 123C,) and a large terrace separating the house site from the two upslope marae (see Figure 3). The complex was chosen for excavation because it had a well-preserved rectangular house in close proximity to a large-scale marae cluster. Given the often-accepted notion that fare haupape served as commoner sleeping houses, which has been recently challenged (Orliac 2000; Oakes 1994), this site was chosen for excavation because its variable context suggested that the fare haupape may have had a specialized purpose, rather than functioning as a locale for everyday domestic or residential activities. Thus, the site provided an excellent starting point from which to understand the functional variability of rectangular houses and variation in the use of space across sites of this type. It also provided an excellent comparison with ScMo 171B and 171C, rectangular houses excavated in the 2000 season that appeared to be used as sleeping houses, with exterior areas devoted to a range of domestic activities, including cooking and food preparation.

Site 123A is a rectangular house delineated by unworked basalt curbstones. The house is of moderate size, with interior dimensions of 4.5m length by 3.0m width. This fare haupape is situated on a substantial upraised terrace. The front facing of this terrace is well constructed from 3-4 courses of stacked basalt cobbles and boulders, with an overall height of .80cm. The terrace measures 8.5m long by 8.0m wide and the area between the terrace facing and the fare haupape is well paved for an extent of 5.0m. A possible ramp feature is located along the northern extent of the terrace.

The full extent of the site 123A fare haupape interior was excavated, excluding the southern portion of the site that was disturbed by a large mape tree. A large portion of the exterior house terrace between 123A and the 123B marae was excavated as a series of 1.0m x .50m units in an attempt to locate sub-surface features. Overall, 47.5 m² were opened at ScMo 123A, 13.5m² within the fare haupape and 34m² on exterior portions of the house terrace (see Figures 4 and 5).

The cultural deposit from the fare pote'e interior contained moderate amounts of basalt flake debitage, polished adze flakes, and charcoal fragments. Notable artifacts recovered
include an unfinished bifacially worked basalt flake that resembles a coconut grater and two adze butt fragments. Subsurface features were lacking within the house interior. Several of the adze flakes and much of the basalt debitage were recovered from the
western edge of the house, near the paved area, suggesting that this was a locale for stone tool use or reworking. The spatial patterning of the recovered flakes tentatively suggests that this western face of the *fare haupape* was never fully enclosed, but left open to the adjacent paved area to the front of the house.

Figure 5: The 123A fare haupape after the field excavations.

Units excavated exterior to the house on the elevated platform gave important information regarding construction sequences, as the cultural deposit was typically shallower in this area and had less charcoal until the interface with the underlying B fill was reached. In the terraced area to the east of the *fare haupape*, a series of small in-situ burnt sediment lenses and dense charcoal deposits were recovered at the basal surface of the cultural deposit. Sub-surface features in the units excavated exterior to the house included a simple in-situ fire feature, several postholes, and numerous pits of varying forms. The data indicates that there may have been small informal structures present on the 123A terrace adjacent to the *fare haupape*. However, the lack of well-defined earth ovens and the paucity of informal hearths in the areas exterior to the house suggest that this *fare haupape* was not used for everyday domestic activities and may have had a specialized function. Further laboratory analysis and archival research are necessary before a more detailed explanation of site function can be offered.

*Site 123B* is the smaller *marae* found upslope to the 123A *fare haupape*. It is adjacent to a larger *marae* (123C) that was not mapped in detail for the present study. The 123B *marae* runs 15.0m SE by NW and is 8.0m wide. A small attached pavement is located along the southern wall of the *marae*, and 1.5m to the south of this is another faced wall of basalt cobbles. Several fallen upright stones are located in the western area of the *marae* interior and along the northern wall. The *ahu* is situated at the eastern end of the
marae and is faced with large pieces of fan coral. Eleven large fallen uprights are located near the ahu.

The cultural deposit within the marae was very clean, almost devoid of charcoal inclusions. A few basalt flakes were recovered in the excavations and a single polished adze flake. Further excavation will need to be carried out at this marae complex in order to adequately understand its specific function as well as its specific age and construction sequence.

3) To utilize several innovative sampling techniques in the excavation methodology to aid in understanding spatial patterning at domestic sites.

Four innovative sampling techniques were used in the field. First, we collected .5-liter sediment samples from each 1.0m by 1.0m unit. These systematically collected sediment samples will be chemically analyzed to identify in-situ activity areas and site formation processes. It is hoped that this analysis will aid in identification of areas that once held shell or faunal remains that do not preserve in the 'Opunohu soils because of their extreme acidity.

In addition, 3.0-liter sediment samples were taken from each 1.0m by 1.0m unit for wet screening, while approximately 50% of the sediment volume of each feature was wet screened. A few small fragments of shell, coral, and bone (all pieces of the totara fish) were recovered in the field laboratory from the wet screened samples. These wet screened samples will be further sorted at UC Berkeley to recover carbonized wood and plant remains that may be identifiable, as well as microdebitage that will be included in the lithic analysis.

Utilizing a third technique, eleven sediment blocks were cut from cultural deposits located both within the houses’ interior and exterior areas. These will be analyzed using micromorphological analysis, similar to thin-section analysis of geological specimens. The goal is to test the utility of this method for determining the specific functions and contents of spatial areas and features commonly found at domestic contexts throughout Polynesia (after Kahn and Radewagen ms.).

Finally, several local geological samples of fine-grained basalt outcrops and/or waterworn cobble sources were taken at various sites along Mo’orea and along riverbeds in the ‘Opunohu valley. These geological source samples will be analyzed using the WDXRF (wave length-dispersive x-ray fluorescence) technique. In this way, geochemical data of the basalt rock available from local Mo’orean sources can be documented, so that different sources of fine-grained basalt suitable for adze production in the Society Islands can be distinguished from one another. Using this data, we can then characterize the basalt artifacts recovered in the 2001 excavations and source them to their original geological provenance. This data will allow us to understand if the adzes found in the ‘Opunohu valley excavations were produced from local basalt sources or if they derive from off-island sources and hence, were imported into the site through some sort of exchange.
Preliminary Lab Analysis and Additional Ongoing Analysis

Two weeks of the field season were devoted to preliminary lab analysis at the UC Berkeley Gump Research Station. All artifact bags recovered from the 2001 excavations were inventoried and the data was put into an Excel database. A copy of this inventory was presented to M. Stein at the Service de la Culture et du Patrimoine prior to Kahn's departure. In addition, over 200 sediment samples were wet screened to recover micro-artifacts. Floatation samples were processed and the light and heavy fractions kept for later sorting of all charred organic materials.

Continued laboratory analysis at UC Berkeley will include sorting of the C14 samples to choose the most appropriate samples to be sent out for chronometric dating. Each C14 sample will be analyzed by Ph.D. candidate James Coil who will identify wood charcoal specimens to tree species, in order that appropriate fast growing, short lived trees can be chosen for the radiocarbon dating program. In addition, the wet screened sediment samples will be further sorted so that any micro-artifacts, including micro-debitage, can be included in the lithic assemblage analysis. The reduction stage analysis of all stone tools and debitage has begun and the WDXRF analysis of all geological and archaeological samples will be carried out for the duration of winter 2001 and spring 2002. The soil micromorphology samples will be sent out for impregnation and thin sectioning and will then be analyzed by Kahn in the spring of 2001. Overlaying feature maps onto the GIS database of site maps will be completed in this time as well.

Conclusion

While we cannot provide any definitive conclusions until the results of the radiocarbon dating are received and the lab analyses are completed, the 2001 excavations have yielded a considerable amount of data indicating there was substantial variation among prehistoric fare haupape and fare pote’e house types. This variation can be noted first in the geographical location of the houses, their degree of isolation from other residential sites, as well as their proximity to marae sites. In addition, there is substantial variation in the complexity of the surface architecture associated with the two types of houses, and in the subsurface arrangement of features and artifacts. Our data indicate that there was also substantial difference in the use of space for particular activities within these types of prehistoric house sites.

Further, comparison of the houses excavated in 2000 and 2001 supports that both fare haupape and fare pote’e could have either domestic residential functions or in some cases, specialized functions. Both of the houses excavated in the 2001 season lacked well-defined earth ovens or hearths that could be attributed to cooking activities. This, along with the generally clean nature of the cultural deposits, and the suites of artifacts found, indicates that the ScMo 120 fare pote’e and the ScMo 123A fare haupape had specialized functions. This is in contrast to the fare haupape sites ScMo 171C and 171B, excavated in 2000, that clearly represented sleeping houses with a range of domestic
activities carried out in the areas exterior to the house. Once the detailed analysis of the sediment samples and lithic debitage are completed, we will be able to present a more detailed view of the functional differentiation between *fare haupape* and *fare pote’e* house sites and whether this variation can be attributed in part to social differentiation or specialization in household production.

**Acknowledgements**

We would like to express our deep appreciation to the following individuals who assisted us, or facilitated our research: Mme. Peltzer, Director, Ministry of Culture and Research; M. Francis Stein, Chef de Service, Service de la Culture et du Patrimoine; M. Gre Tahiata, Director, Agronomie Rurale, ‘Opunohu Valley, Mo’orea; Mme. Marimari Kellum, Mo’orea; Dr. Neil Davies, Director, UCB Gump Research Station. We would also like to thank Cannis Aroquean, Taufa Tahiata, Pipo Tahiata, Martha Tahiata, Evari’i Tahiata, and Kaua Alger for their assistance in the field. Mlle. Hinanui Cauchois (Service de la Culture et du Patrimoine) and Mlle. Tamara Maric (Université de Polynésie Française) served as interns on the project and their help in the field was appreciated (see Figure 6). Deia Sutch and Sharon Horsky are gratefully acknowledged for their work as Kahn’s field assistants. We would like to thank Prof. Roger Green for kindly supplying copies of his original field notes that aided in relocating the sites excavated.

*Figure 6: A portion of the 2001 field crew.*
Financial support for this research was provided by grants from the UC Berkeley Gump Research Station (Office of the Vice-Chancellor, University of California, Berkeley), the Lowie Olsen Fund (Department of Anthropology, University of California Berkeley), the Stahl Fund (Archaeological Research Facility, University of California, Berkeley), Prof. Roger Green, and the Class of 1954 Chair endowed fund. Use of the laboratory facilities at the UC Berkeley Gump Research Station facilitated the preliminary field analyses. Jenny Kahn gratefully acknowledges the financial support from the station that enabled her to have two field interns on the project, Hinanui Cauchois and Tamara Maric.

References Cited

Kahn, J.G. and P.V. Kirch  

Oakes, N.R.  
1994 *The Late Prehistoric Maohi Fare Haupape: An Examination of Household Organization in Mo’orea, French Polynesia*. MA thesis, Simon Fraser University.

Orliac, C.  