

G. MOLLE and **A. HERMANN** with the collaboration of **M. EDDOWES**





This document is the final report of the archaeological field season conducted by the CIRAP team on Teti'aroa atoll, Society Islands, French Polynesia in April 2015.

All photos and maps are the authors' except when indicated otherwise.

Contact:

Dr. Guillaume Molle

School of Archaeology and Anthropology, College of Arts and Social Sciences, AD Hope Bldg, #14 Australian National University Canberra, ACT 2601, Australia

Email: Guillaume.Molle@anu.edu.au



Motu Reiono seen from Tahuna rahi

TABLE OF CONTENTS

1.	Previous Research and Context of the Project	7
	Overview of anthropological research on Teti'aroa	7
	Context of the current research program	7
	Methodology and proceedings	8
2.	Description of archaeological structures on Teti'aroa	11
	Motu Reiono	13
	Motu Tahuna iti and Tahuna rahi	39
	Motu Rimatu'u	41
	Motu Onetahi	51
	Motu Honuea	69
	Motu Ti'araunu	71
	Motu Tauvini and Ahuroa	77
	<i>Motu</i> Hiraanae	79
	Motu Horoatera	83
	Motu Aie	107
3.	General synthesis on the 2015 field season	109
4.	Geochemical analyses of basaltic artifacts	117
5.	Scientific Perspectives	123
Ackn	Acknowledgements	
List of references		127
Appendices		129

1. Previous Research and Context of the Project

Overview of archaeological research on Teti'aroa

In the 1930s, Kenneth P. Emory, a pioneering Polynesian archaeologist from the Bishop Museum of Hawaii, was one of the first to mention ancient remains on Teti'aroa. Though Emory never visited the island, he provided a list of land toponyms and names related to fishponds, and one *marae ari'i* in his monograph on stone remains of the Society Islands (Emory, 1933: 121). Later, Pierre Vérin led the first archaeological survey on the atoll uncovering a number of *marae* and terraces as well as an archery platform, an uncommon elite presence marker (Vérin, 1962). However, his descriptions were really succinct. Vérin was accompanied by Raoul Tessier who also left some notes about the traditions and history (Tessier, 1962).

In 1972 and 1973, at the initiative of Marlon Brando, new owner of the island, two field seasons were conducted by Yosihiko Sinoto and Patrick McCoy from the Bishop Museum, with the help of Tahitian and Hawaiian students. They completed surface archaeological surveys of Onetahi and Rimatu'u *motu*, and excavated at several sites. Their results were briefly presented in a field report (Sinoto & McCoy, 1974) although most of the material seems to remain unpublished.

More recently, other archaeological work commissioned by the Teti'aroa Society took place during the construction project of the Brando Hotel. A group of three structures was studied, relocated and restored in order to avoid its destruction by the extension of the airstrip (Hardy, 2008). The discovery of other remains, including a *marae* and a domestic site on *motu* Onetahi as well as another *marae* with a burial on *motu* Horoatera, led two archaeologists from the CIRAP to conduct new work on the atoll (Molle, 2011; Hermann, 2013a). These operations were possible thanks to the will of TS to preserve the cultural heritage of the atoll.

Context of the current research program

Building upon this favorable context of collaboration and with the support of the Tetiaroa Society, the CIRAP (*International Center for Archaeological Research in Polynesia*) proposed to continue these efforts through a three-phase archaeological project aiming to investigate the place of the atoll in the ancient history of the Polynesian Islands.

Through the combination of archaeological surveys, excavations, and laboratory analyses, we intend to reconstruct the history and evolution of the Polynesian communities that settled on Teti'aroa from initial colonization until the 19th century. Eventually, the project also intends to help the Tetiaroa Society to manage the rich cultural heritage of the atoll and transmit it to the guests, schools etc.

The schedule was initially defined as follows:

Phase I: survey and completion of the preliminary inventories, construction of a GIS database of all archaeological remains, recording of the structures

Phase II: detailed mapping and excavations of selected domestic and ceremonial sites

Phase III: excavations on selected sites, palynological coring transects

The current document summarizes the work undertaken during the phase I of our program which took place in March 2015. It presents the methodology of fieldwork, the current state of the archaeological inventory, and initial analyses of settlement patterns and ceremonial architecture.

The project was funded thanks to a grant in the amount of US\$9,340.00 by the Seeley Family Foundation. The project has been reviewed by the Tetiaroa Society Scientific Advisory Board and approved by the Tetiaroa Society Executive Board. Our work has been authorized by the Ministry of Culture of French Polynesia (decree n°2717 of March 18th, 2015).

The CIRAP research team spends a total of 19 days on the atoll (March 9-27). It was composed of Dr. Guillaume Molle (ANU-CIRAP), Dr. Aymeric Hermann (UPF-CIRAP) and Moanatea Claret (Master Student at the University of French Polynesia). Mark Eddowes, archaeologist of the Tetiaroa Society, joined us for a couple of days. On the field, we received the help of Clément Ameil (TS) and Luciano Kokokilagi (Ranger from the Frangipanier Cie).

Methodology and proceedings

As previously mentioned, the main objective of the phase I was to complete the archaeological inventory of Teti'aroa by conducting extensive surveys over the different *motu* in order to record each structure in details and build an archaeological map of the atoll. As Onetahi has been well documented since Sinoto's initial survey, we chose to focus our attention on the other *motu*.

Our survey builds first on existing and published data gathered by previous archaeologists who worked on the island. In 2014-2015, Mark Eddowes, archaeologist and consultant for Tetiaroa Society, spent much time relocating the sites previously described or mentioned by Vérin and Sinoto, especially on Onetahi, Rimatu'u and Reiono, and he recorded them with GPS. In addition, Eddowes came to discover new structures that he reported to us. Thanks to the GPS coordinates, we were able to visit these sites quickly and map them in details by saving a consequent amount of time. However, we also conducted additional surveys to inventory as many archaeological remains as possible. Considering that most of the structures are part of habitation clusters, we carefully surveyed the vicinity of these known sites by radiating around them. In the areas so far undocumented, we chose to survey from the lagoon shore

towards the ocean side, by following 60 meters wide strips to ensure the best coverage.

Aside Reiono that still shows remnants of primary forest quite easy to walk through, all the islets present a dense, thick vegetation mainly composed of *Pandanus tectorius*, *Pisonia grandis* and *Hibiscus tiliaceus* that impacts the quality of our survey in two ways: first, it is hard to penetrate in the center of the *motu* and maintain regular strips for surveying and second, the thick cover of leaves on the ground probably hides many archaeological remains from our view. If we were able to locate easily the largest elevated structures like the *marae*, we must admit that the natural environment of the atoll makes impossible to attain a fully comprehensive inventory and it is likely that we missed a few small structures (alignments of low coral blocks for instance) of which kind seems to be discovered only by luck. It does not change drastically our preliminary analysis of the settlement patterns as these are mainly based on typical *marae* structures and other visible habitation sites.

Due to various inventory systems used by Vérin and Sinoto (sites numbers were also recently synthesized by Eddowes), it was sometimes difficult to conflate all the records together. In consequence, we decided to start over a new inventory. Once located, each structure has been attributed an inventory number according to the system of the Service de la Culture et du Patrimoine (Conte, 1991). Identification includes three letters for the name of the *motu* (for example: REI- for Reiono), followed by the number of the structure. The table presented in Appendix 1 includes connection with previous inventories so the reader can easily access the references. Our new inventory concerns all the surface structures as well as the location of sites where surface remains were discovered and likely indicate a former settlement site. We chose not to include the archaeological deposits mentioned in literature as most of them have been recently disturbed and do not seem to be directly associated with structures on surface.

Clearing the sites was usually necessary in order to reveal the spatial organization of the features but we only removed vegetation debris on surface to reduce the impact on the vegetation (no trees were cut, such decisions will be taken only in relation to future site management). Archaeological remains were then photographed, mapped and described (fig.1).

Because of time limitations, and as we wanted to be as efficient as possible, we dedicated a large part of our time to surveying on Reiono, the only *motu* that had not been visited by Eddowes, and on Horoatera where remains are quite numerous and of large dimensions, thus requiring more time to map. We visited briefly the small *motu* of Hiraanae, Aie, Honuea and Tahuna rahi. Rimatu'u was already well documented and we only took GPS points on the known sites. On Ti'araunu, we mapped a few structures located by Eddowes, including the archery platform but due to our limited time, we were not able to conduct extensive survey on this large *motu* which is the only one to remain partially documented.

Fig.1: Mapping and description of archaeological structures



The archaeological database currently contains recordings for 90 structures in total. Figure 2 shows the number of structures recorded on each *motu*.

2. DESCRIPTION OF ARCHAEOLOGICAL STRUCTURES

Honuca: 3

Horoatera: 21

Honuca: 3

Aic: 0

Tahuna iti: 0

Reiono: 22

Reiono: 22

Fig.2: Number of archaeological sites recorded on Teti'aroa motu (image Google Earth ©)

MOTU REIONO

Reiono is the southernmost *motu* of Teti'aroa and the only one that still shows remnants of primary forest. It was quickly surveyed by Vérin who recorded only a large *marae* and several taro pits located in the south (1962: 111). Sinoto reported 14 sites including four *marae*, some habitation structures, coral alignments as well as a midden deposit (Sinoto & McCoy, 1974: 28sq.). As Eddowes never had the chance to conduct an extensive survey on Reiono, we chose to start our field season there, which allowed us to locate previously mentioned sites and discover new ones hidden in the vegetation. In total, 22 structures are recorded on this *motu* (fig.3).

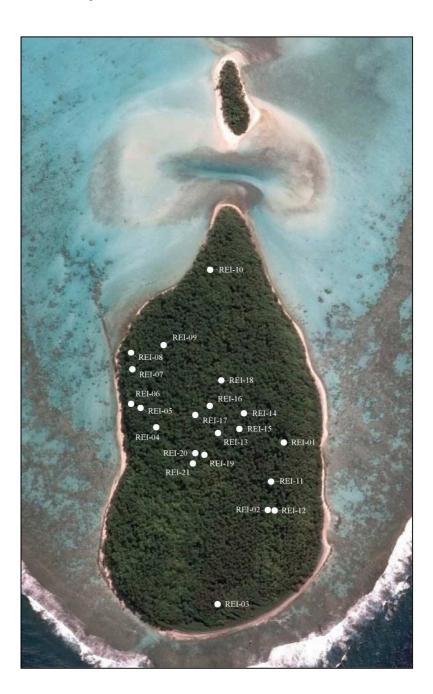


Fig.3: Location of archaeological sites on Reiono (image Google Earth ©)

This large structure is Sinoto's site 6-12 that was described as follows: 'provisionally considered to be a marae. It consists of an irregular, quadrangular, double-walled enclosure, 24.6 by 13.6 meters in maximum dimensions. Along the E wall are two large, dressed-coral slabs resembling uprights. Contiguous to the shortest wall, on the W, is a partial enclosure which may be a shrine. The long walls of major feature are perpendicular to the E shoreline of the motu' (Sinoto & McCoy, 1974: 27). At this location, we observed a group of structures that can be identified as Sinoto's site, although our description differs from his. We identified four features within a space of at least 30 x 12 m (fig.4). The preservation is not good as the vegetation greatly disturbed the remains.

Feature A is a double wall spanning on an N-S axis, of which a few sections are still visible, showing coral slabs set on edge. It is 10,5 m long and about 50 cm wide. In the south part, it likely joins feature B, another double wall extending on an E-W axis. In the current state of preservation, this wall measures 15,2 m long and its width varies between 50 and 80 cm. One section shows a filling of 'iri'iri coral gravel. There is no doubt that these two features initially formed two sides (west and south) of an irregular enclosure. However, the eastern and northern sections, if they ever existed, are no longer visible.

Few meters east of the enclosure, we observe two features, parallel to each other but running on a different axis than feature B which leads us to consider them as forming an independent structure. Both are double walls of which only small sections remain. Feature C is 5 m long, while feature D is 12 m long. Their width is about 50 cm.

Despite our effort, we were unable to locate the upright slabs nor the shrine mentioned by Sinoto. Regarding the poor preservation of the site, it is likely that parts of it have been impacted by growing vegetation. As such, it is delicate to assess any function to this group of structure. There is no evidence that any of the features has ever served as an *ahu*. Moreover, their various orientations do not support the hypothesis of a classic *marae*.

Structure REI-02

This large *marae*, the largest structure of Reiono, was described by Vérin (1962: 111-114) who also provided a rough map of the site, and by Sinoto (1974: 21-24). Despite the dense vegetation covering the northern part of the court, we clearly identified the site especially through the well-built *ahu* located south. Regarding the size and the complexity of the site, we decided to carefully clean the area in order to map it and describe each features in details (fig.5).

The court of the *marae*, of trapezoidal shape, is 36 m long. We measured a width of 13 m in the rear of the court (NW) and 16 m near the *ahu* (SE). The double-walled enclosure is not well preserved and only a few sections are still in place. The width of these walls varies around 50 cm.

Fig.4: Map of site REI-01

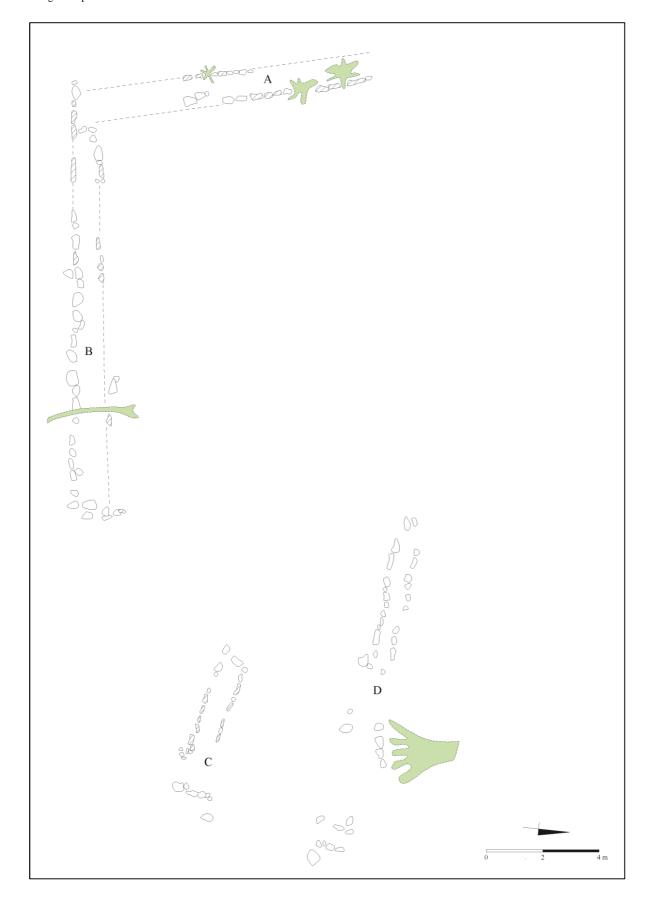
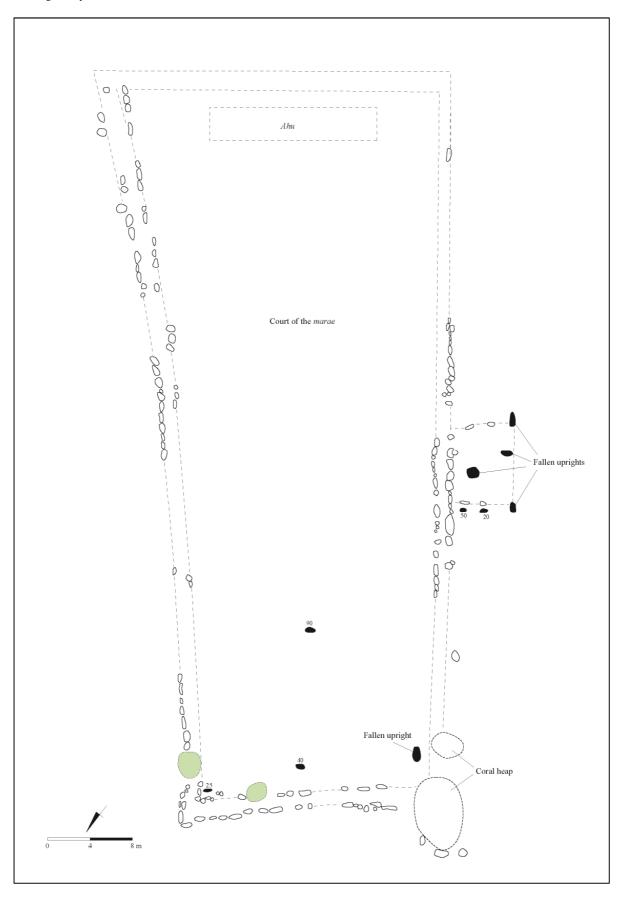


Fig.5: Map of site REI-02



They are made of coral blocks, some of them set on edge, reaching 10-20 cm above the ground. Most of the filling of coral gravel has now disappeared. Vérin noted some paved areas in the middle of the court but none is visible today.

In the northern part of the court, along the rear wall, we found three coral slabs serving as uprights. The first in the N angle only shows the base (25 cm high), the second in the middle is 40 cm high but must have broken, and the last one in the NW angle, about 70 cm high, has fallen. Another upright (88 x 48 x 14 cm) is visible in the middle of the court where it stands alone (fig.6). Just behind, we found a fragment of a basalt prism. Regarding its size and its location of this slab, it is likely that it served as the main backrest of the *marae*.



Fig.6: Upright slab in the center of the court

Along the western wall of the court is a small outer enclosure already described by both Vérin and Sinoto. It measures 3 x 3,7 m. It is now very disturbed and obscured by coral rubble but it seems that the outer limits consist in simple alignments of small coral slabs on edge while the eastern wall (which is included in the *marae* court wall) is made up of unusually large coral slabs. We identified four fallen uprights (including two in the angles and one in the middle) and the bases of two other aligned slabs outside the northern section. This feature could be interpreted as a small annex shrine. Similar examples of such adjacent enclosures were found on other Teti'aroa *marae*.

Sinoto (1974: 23) also mentioned the existence of two adjoining alignments inside the court, in the NW corner. It is now impossible to confirm this information as the whole area is covered with coral rubble.

In comparison with the court walls, the *ahu* appears to be better preserved. Careful cleaning and surface examination revealed the complexity of its structure and the existence of different elements (fig.7). We agree with Sinoto's opinion of an *ahu* detached from the back wall. The latter is almost entirely obscured by coral rubble, likely originated from the filling, but we can still observe in the eastern part an alignment of coral slabs on edge that formed the inner facing. Based on the best preserved section, we assume that the back wall was at least 90 cm wide which makes it more massive than the court walls. The SW angle shows evidence of the attention paid to its construction with large size blocks projecting up to 45 cm above the ground.

The detached *ahu* consists in a main central platform positioned 80 cm in front of the back wall. It is 7,9 m long and 1,75 cm wide (fig.8). The front and eastern side walls are well preserved, showing that the platform was delineated by alignments of coral slabs (50-80 cm long) set on edge. Their height varies between 20 and 30 cm above the court ground. It was filled with 'iri'iri gravel. A horizontal slab in the western part could be the only remain of a top pavement but the evidence is fragile. Three upright slabs are standing immediately in front of the ahu following a common "trilogy" pattern with one located in the middle of the platform (only the base is visible, 30 cm high), and two in the east (75 cm high) and west (60 cm high) ends (fig.9). Just behind the central one, integrated to the back wall of the ahu, is another upright 69 cm high. It is not surprising as we often find a double series of upright stones (front and back) on Tahitian ahu. We may assume that two other uprights were originally set up in the back corners as well. We actually note another upright just behind the central front one that is clearly not in its initial position. It is possible that it came from the back line and has been moved there after the abandonment of the site. A shell is placed in the filling of the ahu, behind the facing.



Fig.8: View of the *ahu* from the court, and series of uprights on the left

Fig.7: Detailed map of the ahu of site REI-02

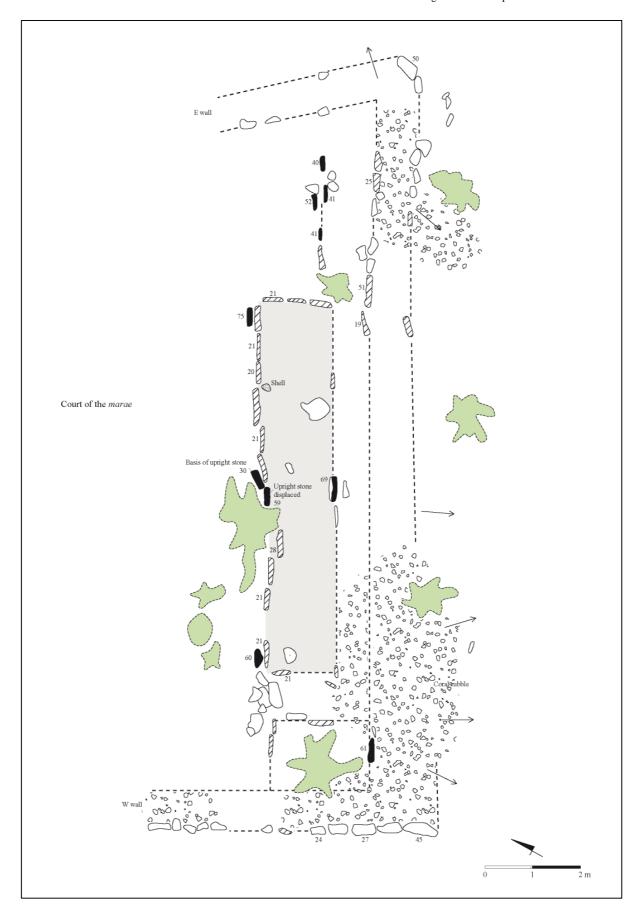


Fig.9: Close view of the NE corner of the *ahu* with the front upright



At the west end of the main *ahu*, and detached from it by a 1 m wide passage, is a rectangular feature that corresponds to either a small enclosure or platform (it is impossible to conclude on one or the other option because of the rubble cover). The facing of this feature is perfectly aligned with the main platform's, although the west and south walls are actually included in the corner walls of the *marae*. In the back, we note an upright slab, 61 cm high, which would define the structure as a possible shrine.

At the east end of the *ahu*, we observe a series of four small upright slabs (fig.10). Three of them (40 cm high) are aligned while the fourth (52 cm) is standing just in front of the middle one. This series is aligned with the back wall of the *ahu*. Although the area is covered with coral rubble, it is likely in our reconstruction view that they formed an independent feature in the SE corner of the court.



Fig.10: Series of small uprights east of the *ahu*, structure REI-02

In the south end of the motu Reiono, on top of a coral bank, we encountered a single coral slab of $60 \times 60 \times 10$ cm, standing perpendicular to the shore. As noted with similar examples elsewhere on the atoll, it might have served as a boundary marker.

Structure REI-04

On the west part of the *motu*, a series of coral slabs set on edge seems to have been part of a structure of which they are the only remains. Two slabs form a perpendicular angle, while a larger one (50 cm high) is placed in continuity (fig.11). It is impossible to assess a function to this poorly preserved structure.

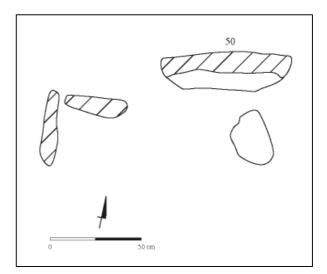


Fig.11: Map of REI-04 remains

Structure REI-05

This structure covers a surface of at least 12,5 by 8,5 m. We observe a rectangular enclosure of which the SW wall is the only preserved section, comprising several slabs set on edge (figs.12-13). It is 3 m wide. Some coral rubble is visible around the coconut tree growing in the middle of this feature although it is not certain that it was originally filled with gravel. At the SW end, a perpendicular double wall runs over 5,5 m, showing a maximum width of 1,7 m. A single slab on edge is visible in the NE part of the site, probably marking the opposite limit of this "court". It is difficult to assess a definitive function to this structure that may correspond to Sinoto's habitation site 6-3 (1974: 24) despite some differences in our description.

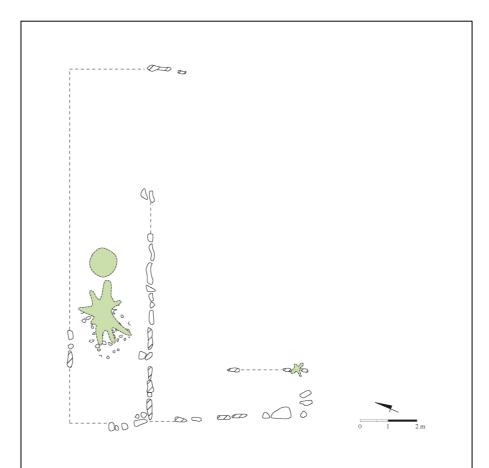
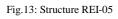


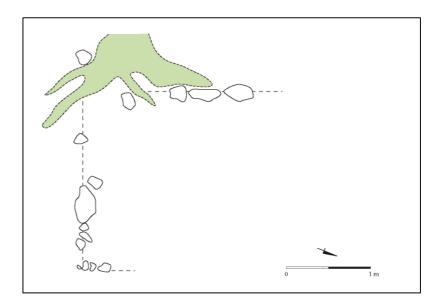
Fig.12: Map of structure REI-05





Approximately 5 m NW from REI-05, we discovered two perpendicular alignments of coral blocks, respectively 2,2 and 2,1 m long, forming the corner of an enclosure of which function remains uncertain (fig.14).

Fig.14: Map of REI-06 remains



Structure REI-07

This structure (fig.15) is without any doubt the habitation site 6-4 described by Sinoto (1974: 24). It consists in a double-walled enclosure (A) and two circular features (B-C). Only south and east walls of the enclosure still remain although their preservation is quite poor. The south section is 8,5 m long and 1,3 m wide and includes some slabs set on edge. The east section is 12,2 m long and 80 cm wide. The '*iri*'iri filling is still visible in some parts. Sinoto mentioned a paved area in the SW corner but we did not find such trace.

Feature B is located immediately back of the south wall, while feature C is 4 m further south. Both are positioned on an axis perpendicular to the wall of the enclosure. They consist in a circle of rough coral blocks with an inside diameter of about 90 cm (fig.16). We carefully cleaned these features but found no evidence for their function, although we are certain these were not ovens nor hearths.

Fig.15: Map of structure REI-07



Fig.16: View of the stone circle (feature B), REI-07



Fig.17: Map of structure REI-08

North of REI-07, we encounter another poorly preserved alignment including two slabs set on edge (fig.17). Presence of other blocks lets us suppose that the structure was a simple enclosure at least 8 m long and 5,6 m wide. It must correspond to one of Sinoto's habitation sites although it is impossible to find a clear connection with his descriptions.



This is a maite (taro pit) area covered by dense vegetation.

Structure REI-10

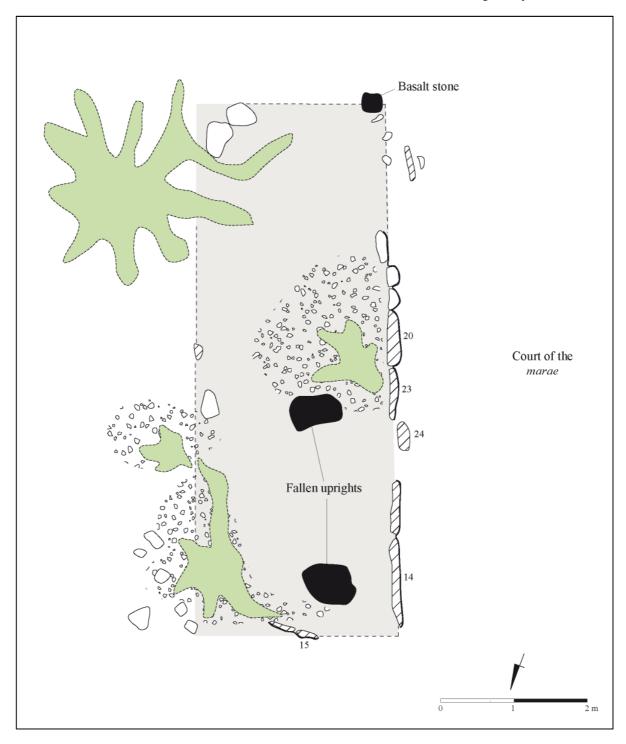
This small *ahu* has been previously described by Sinoto as the *marae* site 6-6 (1974: 25). It is located 30 m from the shoreline. The court was likely opened as no remain of wall has been found but we suppose that it was located west of the *ahu*.

The *ahu*, poorly preserved, is oriented on a SE/NW axis, and built parallel to the shore (fig.18). It measures 7,5 m long and 2,8 m wide. The west facing wall is made of long (up to 100 cm) coral slabs set on edge, reaching 25 cm high. The rear wall is completely disturbed by the roots of many trees and most of the slabs and blocks have been displaced. In the south corner of the *ahu*, is a basalt block of 20 x 20 x 10 cm, which seemed to have broken following a heat episode (fig.19). It clearly lies in the corner of the *ahu* and as such, might be interpreted as a potential foundation stone for the *marae*. We sampled it to run geochemical analyses and determine its provenance. In the middle and the northern part of the platform, two uprights of 70 cm in height have fallen and now lie flat. They likely form a "trilogy" of slabs initially standing in the middle of the *ahu*.



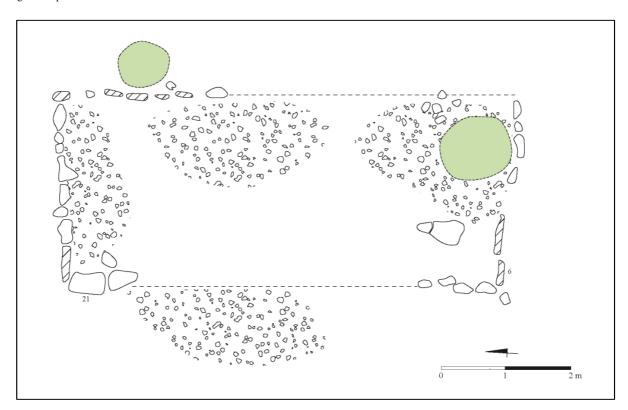
Fig.19: Basalt stone in the south corner of the *ahu*, REI-10

Fig.18: Map of the ahu, REI-10



Located north of REI-02, and hidden by a dense vegetation, we discovered this new structure that consists in a rectangular enclosure measuring 7,25 m long and 3 m wide (fig.20). Walls include some small coral slabs set on edge. Most of the inside is filled with '*iri*'iri which contribute to slightly elevate the structure about 10 cm above the ground. This might have been a habitation site.

Fig.20: Map of structure REI-11



Structure REI-12

This large *marae* is built parallel to and about 20 m east of REI-02 with which it shares some characteristics. It was quickly described by Sinoto as site 6-10 (1974: 26). It is now almost entirely covered with dense purau and pandanus trees. It would have required at least two days to clear the structure in order to map it and describe it in details. Regarding our short timing, we chose not to investigate further this site during the 2015 field season, but instead returning in the future with a larger team. However, we were able to document its general aspect. The double-walled court enclosure measures approximately 28,5 m long. Its width varies from 11,7 m in the south part and 14,5 m in the north part which makes it a trapezoidal shaped court similar to REI-02. The ahu is located at the southern end of the court, in the same axis than the ahu of REI-02. It is difficult to reconstruct the original dimensions and structure of the ahu as the whole area is disturbed by growing trees and covered with rubble. Sinoto indicated that it was separated from the back wall. Our preliminary observations are not conclusive on this matter but we note a double wall made up of large slabs set on edge, 90 cm wide and filled with mediumsized coral blocks. At 4,5 m in front of this wall, in the court, we observe a large slab ($60 \times 13 \times 40 \text{ cm}$) that may have been part of the former *ahu*. Following Sinoto, at least four uprights were still standing on the *ahu* in the same position as those on REI-02 when he visited the site but these are no longer visible. He also mentioned the presence of human bones among the rubble as well as two possible shrines on paved surfaces in the north end. It is impossible to confirm this information without clearing the whole area. However, we discovered the base of a central upright ($36 \times 14 \times 25 \text{ cm}$) which, regarding its location, may have served as the main backrest of the court, as noted for REI-02.

The similar characteristics and relative positions of the two *marae* REI-02 and REI-12 suggest they might have functioned together at some time. Evidently, future investigation on Reiono will focus on this group of structures.

Structure REI-13

We located a 1 m long alignment of slabs on edge associated to a group of coral blocks that may have defined a larger structure. About 5 m north, we also found a basalt pebble (fig.21).

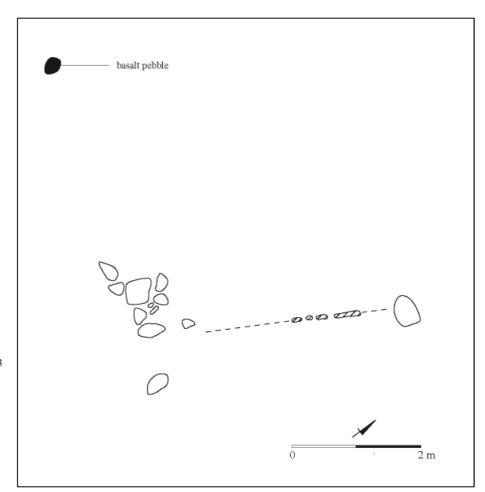


Fig.21: Map of structure REI-13

This is not a structure *per se*, but a group of oven stones, easily identifiable as vacuolar basalt rocks showing traces of heat on their surface.

Structure REI-15

We noted the sparse remains of an alignment but the poor preservation excludes further interpretation of this site.

Structure REI-16

This *fare pote'e* (round-ended house) is an interesting new discovery on Reiono as it is traditionally a marker of elite in the settlement patterns. It measures 12,2 m long and 7,3 m wide (fig.22). The border is not entirely preserved due to many coconut trees growing over the site but it includes both coral blocks and slabs set on edge. Inside the structure, we found a fragment of basalt prism and a fishhook fragment (fig.23).

Fig.22: Map of the fare pote'e REI-16

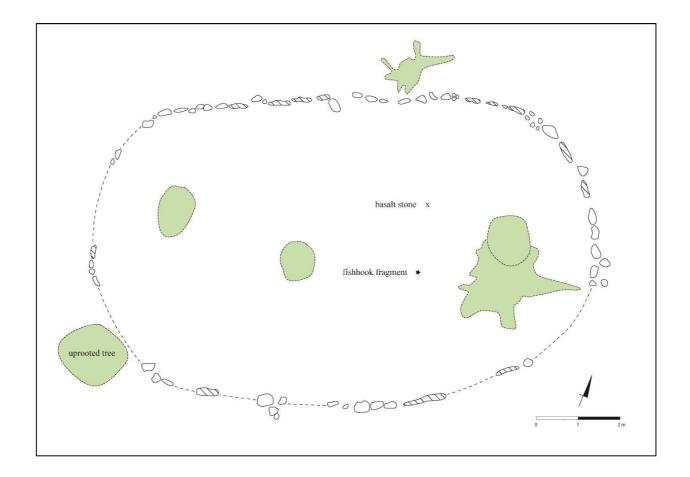
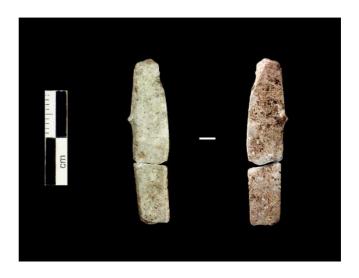


Fig.23: Fishhook fragment found on REI-16



This structure is a large rectangular enclosure defined by simple alignments of coral blocks (fig.24). The north wall is not visible anymore but in the current state of preservation, we estimate the dimensions of the court to 12,5 m in length and 6 m in width. It is partly filled with '*iri*'iri gravel.

Structure REI-18

This poorly preserved structure consists in a 30 cm wide double walled section of slabs on edge running over 1 m. At the south end, a perpendicular slab suggest the corner of an enclosure (fig.25). Some *ma'oa* shells have been found around the remains.

Fig.25: Map of structure REI-18

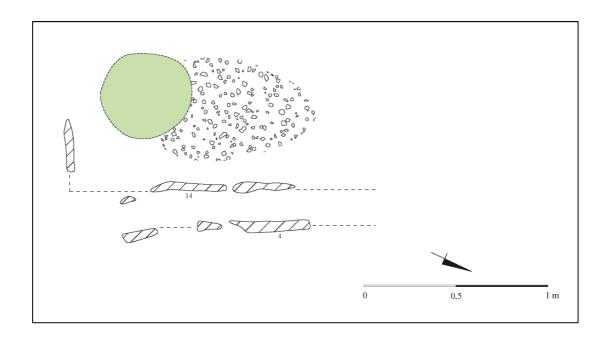
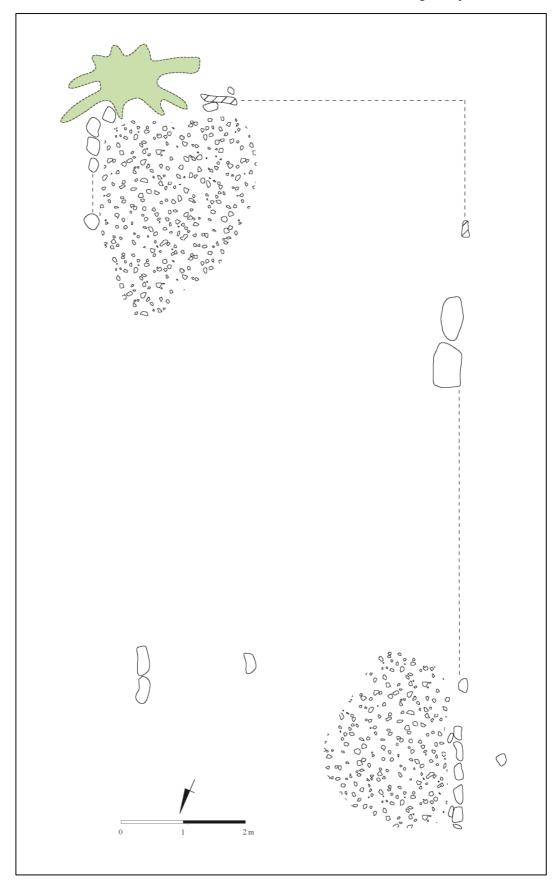


Fig.24: Map of structure REI-17



Located southwest of REI-17, this structure consists in a 6.2×4 m low platform delimited by simple walls made up of medium-sized coral blocks and slabs set on edge (figs.26-27).

Fig.26: Map of structure REI-19

