

Constructing the Pacific Hut

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Frontispiece to 2nd ed. of *Essay on Architecture*, Marc-Antoine Laugier, 1755.

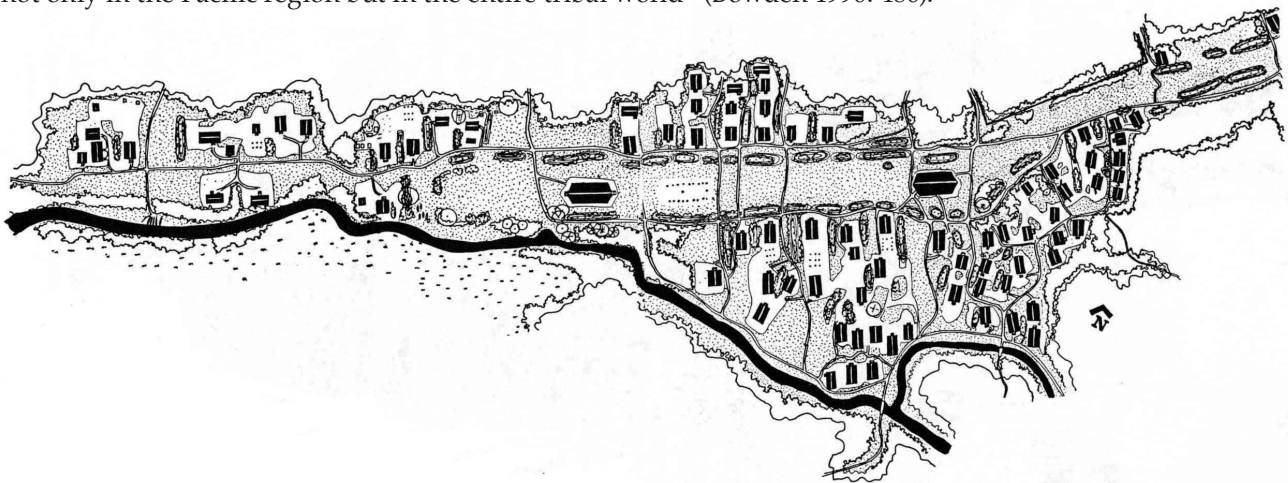
Building a primitive hut is not quite as simple as Laugier's well-known illustration would have us believe. The arrangement requires four judiciously placed, identical, trees to provide its support and, more importantly, its lateral stability. This is as far-fetched a fantasy as any utopian sky-hook, but we are diverted from appreciating this by the figures in the foreground pointing to the hut as the origin of architecture that is activated by this symposium. The wider question relating to the issue of origin is, what kind of knowledge systems are brought to bear on it? Traditionally, such questions are framed by considerations of environmental determinism, cultural signification and history.

Tectonic issues are often neglected, but the instability of architectural origins becomes immediately apparent to anyone trying to build even the most primitive of huts. Somehow the supporting posts have to be stabilised, which is often achieved by burying them in the ground. However the vertical cantilever of the posts is usually not enough to resist the outward thrust of the rafters. The Pacific solution to the spreading posts is to support the ridge beam itself on posts, thereby eliminating the lateral load. The ridge beam is the ubiquitous sign of the Pacific hut. This paper will consider some examples of the ridge beam and its supports (or lack of) on the houses of just two Pacific Island nations – Samoa and Papua New Guinea.

Rykwert discusses the situation at Ise temple (“perhaps the best known of Japanese religious buildings”) towards the end of *On Adam's House in Paradise*: “the oddest feature is that the roof is not supported on the walls ... [instead] ... the ridge beam is independently carried by two large columns which go directly into the ground” (Rykwert 1981: 178). He also points out that the post that is housed on the unused site at Ise is “shin-no-mi-hashira (literally ‘the august column of the heart’)” (Rykwert 1981: 177). This ridge-beam support is given all sorts of significances in the Pacific. In Polynesia the post is often identified with the authority of the chief, also as a mast, making the ridge the keel of the upturned boat. In the Māori meeting house the main supporting post is the pou tokomanawa – the heart of the anthropomorphic house.

Wallace and Irwin say the prehistoric Māori house “could be seen as being built from the top down” (Wallace and Irwin 1999: 80). They suggest that the technology of house construction derives from canoe-building traditions (Wallace and Irwin 1999: 84). Māori sometimes used old canoes as a ridge (Neich 2001). Consequently, houses in Oceania tend to be tied down rather than built up as with the compressive earth-based technologies of walls and arches. In the Pacific, when the rafters cross at the ridge, there is generally an upper ridge as a constructional device to secure the top ends. The upper ridge is sometimes tensioned down on to the ridge beam itself, which pre-stresses the rafters, increasing their spanning capacity and reinforcing the upside-down-boat cross-section.

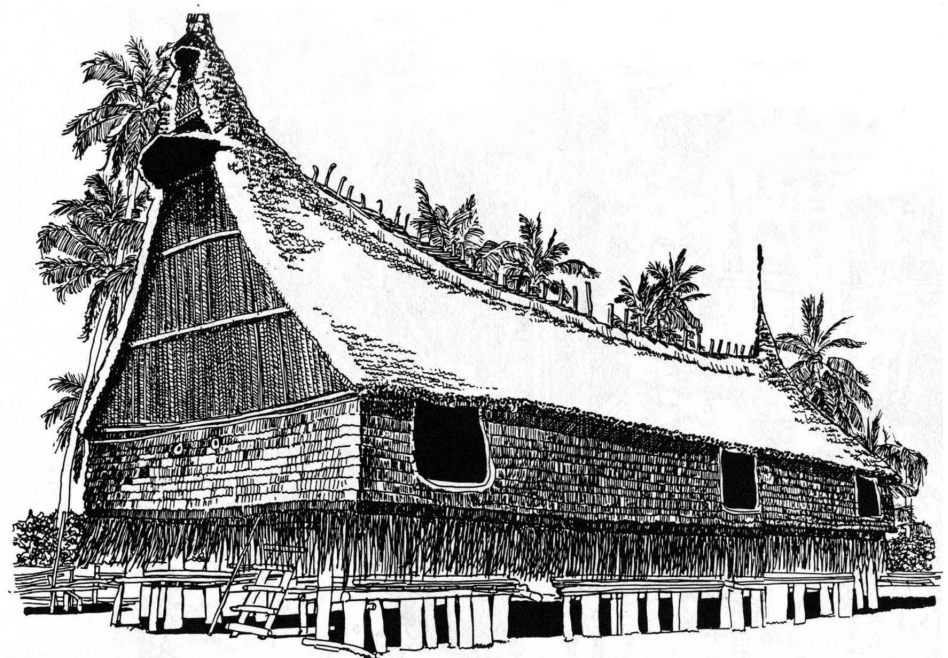
The middle section of the Sepik river system in Papua New Guinea is separated by mountains from the northern coast, to which the river drains. Several groups live in the Sepik but there are differences in the architecture between those who live on the river (the Iatmul) and the people who occupy the mountains (referred to generally as the Maprik area). There have been forays into the region for over a century by well-known commentators such as Gregory Bateson and Margaret Mead, and the Sepik area has been described as "excessive" in its cultural elaboration and aesthetic production. In the early 1980s an anthropological conference on the Sepik was held, followed by the publication of *Sepik Heritage: Tradition and Change in Papua New Guinea*. In this there is frequent reference to the houses, particularly the ceremonial or 'spirit' houses (*haus tambaran*) which, as Ross Bowden says, "... constitute some of the most impressive forms of vernacular architecture not only in the Pacific region but in the entire tribal world" (Bowden 1990: 480).



Site plan of Palimbei, 1978.
Drawing: Wallace M. Ruff

Opinion on whether the ceremonial houses are elaborations of the domestic houses seems divided among the anthropologists. Certainly the ceremonial houses are much bigger than the domestic houses. The *haus tambaran* and the dwellings are differentiated within the settlement patterns. "The important differences, socially and structurally, between the men and women who compose clan settlements can be correlated symbolically with the physical layout of villages." (Bowden 1990: 481) Men constitute the residential cores of a group whereas women occupy the periphery (Bowden 1990: 482). On the banks of the Sepik river, the Iatmul people site their *haus tambaran* parallel to the river, sitting centrally in its open space dancing ground while the domestic houses are at right angles to the river. Both buildings are elevated on piles because of regular floods.

The characteristic saddle-shaped roof of the *haus tambaran* is made by propping the upper ridge at each end of the building. The prop is known as the *meri* post, which has at its lower end a carved figure of a woman. (*Meri* is the word for woman in *tok pisin* – the lingua franca). The access ladder to the upper level goes up between the legs of the carved *meri*. The *meri* in turn sits on a horizontal beam supported on the cantilevered ends of the wall plates, which are themselves cantilevered beyond the supporting posts. These supporting posts are usually richly carved and are often constructed (as are the canoes) from trees salvaged from the river. At their bases the ridge posts have the orator's stool, a significant location in the house where the men spend their days (and nights) in important discussions.



Ceremonial house called *Paiyembit*, 1978.
Drawing: Wallace M. Ruff

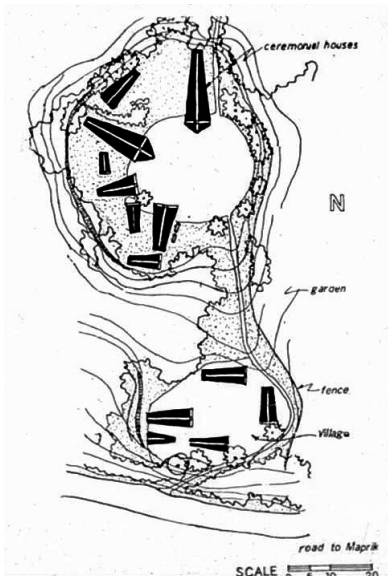
The upper level is used for storage, and for secret initiation ceremonies where the presence of the *tambaran* is announced by flutes and bullroarers. The secret is, of course, that it is the men who play these instruments. The floor (as again is characteristic with Oceanic houses) is a quite separate structure – supported on its own system of posts and beams, and again using cantilevers to increase the load-bearing capacity of horizontal members. The outer skin of the house is hung off the roof structure.

By contrast the *haus tambaran* in the Maprik area has no floor, and the settlement pattern consists of hamlets sited on mountain ridges and organised around living courtyards. The houses here appear quite different to the Iatmul, their richly painted bark facades towering above the courtyards. Forge (1971) and Tuzin (1980) have each described the construction of these houses for the two main groups in the area (Arapesh and Abelam respectively) in some detail.

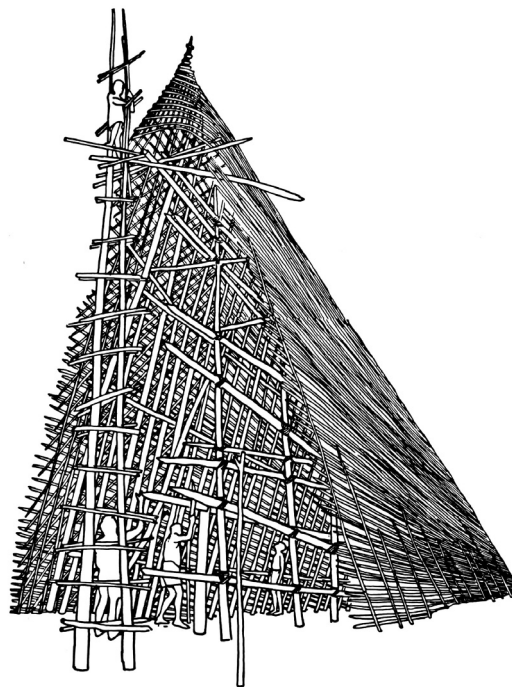
First the heavy wall plates that slope to the rear both in plan and section are erected on their supporting posts buried some three metres into the ground, using bamboo poles to excavate the holes. The ridge is similarly massive and raised (usually at dawn) on temporary supports – a major ritual and structural undertaking (said to be carried out by the *tambaran*). Once the roof framework of slender bamboo has been installed it acts as a diaphragm, and the ridge pole supports are removed, “... with the terrific weight of the ridgepole being borne entirely by the rafters the latter bow very slightly. The house takes on a slightly ‘hunched’ appearance.” (Tuzin 1980: 151-152)

The question is of course why the Maprik ridgepole needs to be so massive when in fact it is the building which supports the ridge pole rather than vice versa. This support can be compared to the competitive display of yams, each in their own netting hammock, the growing of which is a principle activity of the men and where size is the issue. Both ridge-pole and yam are of course phallic and there is apparent sexual imagery in the elaborate hooded treatment of the end of the ridge pole which is similar in both Iatmul and Maprik houses. It is also said, however, that the people themselves deny this association (Forge 1974: 306).

This might be a reason why some anthropologists have gone to considerable lengths to argue that the Maprik houses in the mountains are the same as the Iatmul houses down on the river. “Although Abelam and Iatmul ceremonial houses do not look alike, they are homologous at a more abstract level; that is



Site plan of Mambauro village (nd).
Drawing: Wallace M. Ruff



Maprik ceremonial house under construction. Drawing: Wallace M. Ruff from a 1950s photo by Anthony Forge

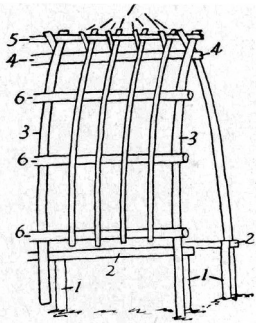
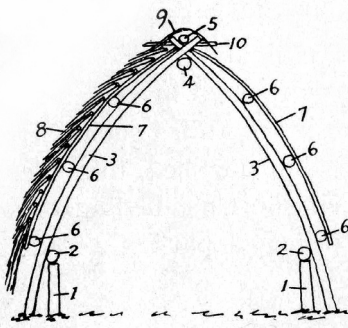
their symbolic functions and ritual forms are virtually identical.” (Forge 1990: 166) The two locations are less than 50 kilometres apart, and the two people are part of the same language family, in a country that has over 700 separate languages. However we are being asked to accept that a house on the ground with a triangular plan, no walls and a sloping ridge pole is the same as a saddle-roofed, rectangular house on stilts.

We have no space here to go into the tortuous arguments proposing this, except to say this ridge beam is argued to be one of the important similarities. What is certainly different is that in one case the ridge post is a significant location, and in the other there is no ridge post, leaving an empty interior. The gable-end treatments are also different, with magnificent painted bark facades in the Maprik area, and mask screens hanging off the saddle roof for the Iatmul. The origin for both is claimed to be a house on the plains between mountain and river, a story which again is too lengthy to go into. What is certain is that there have been complex migrations of people and architectural ideas, as well as means of construction, associated with this version of the Pacific hut.

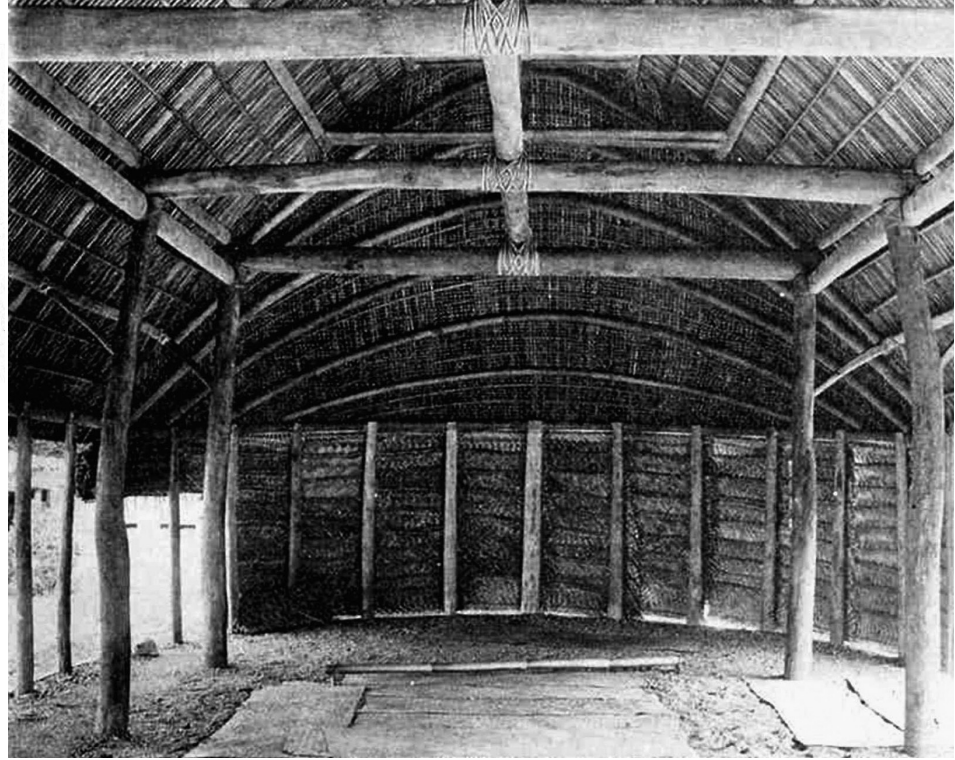
We now shift across the Pacific to Samoa (where, incidentally, Margaret Mead began her career) to build a discussion about the *fale Samoa* in these terms. This discussion proceeds on the basis of the scholarly work of others but also from experience in the construction of a *fale Samoa*. As in the physical building this discussion will be structured by key tectonic elements and operations: the ridge pole, the ridge support and the closure of the gable end.

Evidence shows pre-historic housing in Samoa to have been variable, both across sites and within topographical regions. Stone pavements, perimeter kerbing and the geometries of postholes constitute the evidence of buildings, sufficient to demonstrate that houses consistently differed both in size and tectonic strategy (McKinlay 1974: 28). We also find that this variability of house form extended into the nineteenth and twentieth centuries.

In his 1930 book *Samoa Material Culture*, Te Rangi Hiroa (a.k.a. Peter Buck) lists and describes the full range of buildings he encountered: the canoe shed (*afolau*), the cook house (*fale umu*), the dwelling house (*fale o’o*) and the two types of guest house (*fale afolau* and *fale tele*). Underlying this *fale* taxonomy is a tectonic distinction by which these buildings are understood. The *afolau* is constructed without any vertical ridgebeam supports. Median posts would preclude the housing of



a) Cross-section and side view of canoe shed at Tufutafoe showing *fa'asoata* construction, from Buck, 1930: 12.
 b) Interior view of *fale afolau* showing *utupoto* construction (Handy, 1924: 10)



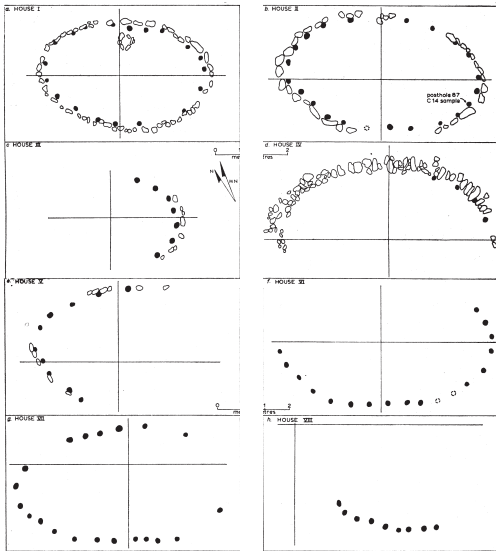
b)

outrigger and double hull canoes. Instead the ridgebeam is supported on curving rafters. This form of construction is termed *fa'asoata* and constructs a clear uninterrupted interior space (Buck 1930: 20).

Other *fale* have alternative tectonics, one of which also constructs an empty centre. Employing a strategy called *utupoto*, the *fale umu* and the *fale afolau* both achieve ridge-beam support, not with curved rafters, but with a system of additional internal perimeter posts, cross beams and king posts. Buck described the *fale o'o* (the ordinary dwelling house) as being built entirely with this *utupoto* method. He also made the inference that, perhaps because of the uniform constructional strategy of the *fale o'o*, that it evolved into the *fale afolau* (the long guest house) leaving the *fale tele* (round guest house) with its central post as a more recent development (Buck 1930: 20).

In 1974, archaeologist Jack McKinlay compared findings from an early post-contact excavation at Saso'a with a pre-contact site at Fologa-a-lalo. Neither site revealed posthole configurations that indicated *utupoto* construction. The houses either presented median central posts, as in the *fale tele*, or were without any evidence of post support for the ridge beam. While the houses that lacked evidence of vertical ridge support were the smaller houses of those excavated at Fologa, the implication was that their construction was of the *fa'asoata* system. Another significant finding at these Upolu sites was that the older houses at Fologa tended to be oval, if not elliptical in form, while the more recent and often larger houses at Saso'a were of a more circular plan (McKinlay 1974: 20).

There are two important implications of this research for this paper. The first is that *fa'asoata* construction was used for some dwelling houses in the eighteenth century, and that there was no evidence of the use of *utupoto* construction at this time (McKinlay 1974: 28). Archaeology of *fale* shows both variety and continuity: variety, in the sense of tectonics and in geometry, but what we also find, in all forms of plan, from the array of post holes excavated, was the continuous and persistent presence of the round end of the *fale*, the *tala*. The *tala* is the part of the *fale* that from the western viewpoint becomes the signifier of the building. As the *tala* rounds off the open gable structure so it constructs the *fale* as an enclosed centralised form. In keeping with the formal significance of this transformation, the relationship of the *tala* to the central gable section (*itu*) deserves more scrutiny.



c)



d)

The *afolau* or canoe shed was the first building discussed by Buck in his bulletin *Samoan Material Culture* and was his exemplar of the *fa'asoata* construction strategy. Buck measured and drew one of the last two surviving *afolau*. The critical characteristic of the *afolau* is that it shares the sectional profile of the centre of the *fale* but lacks the closure of the *tala* at the gable ends.

When the Tongan long house arrived in Samoa in the 1830s as part of Christianity's dispersal across the Pacific, the linkage between buildings, canoes and voyages was re-made (Barnes & Green 2008: 7).

Buck was to confirm this relationship etymologically:

The word *afolau* (canoe shed) is widespread in Polynesia. In Tahiti, *farau* is a shed for a canoe and in the Tuamotus *horau* is a shed. In Hawaii *halau* is a long house with the end in front used mostly for canoes. In Māori, *wharau* has come to mean a particular kind of long house, but also means a rough shed which included that built over a canoe. In the Moriori dialect of the Chatham island *wharau* is a ship. (Buck 1930: 2)

Afolau is also used as descriptor of sea voyage (Barnes & Green 2008: 7). This Tongan building, the long house, became known in Samoa as *fale afolau*, calling up both the name and the clear centre of the canoe shed and perhaps the voyage that brought it.

Polynesian architecture has been repeatedly linked to both the canoe and the sea. Albert Refiti has concluded, "The ocean is the single most powerful architectural device in the evolution of Polynesian architecture and culture" (Refiti 2002: 209). On this basis we may explain the presence of the *fale* as a building type in both Tonga and Samoa.¹ But while a history of voyaging between archipelagos can explain similarities, questions about origins remain. What can be said, from the archaeological evidence in Samoa, and from drawings and descriptions from Cook's experiences in Tonga, is that both island groups used a building type that featured both a clear centre and rounded ends in the late 1700s (Beaglehole 1967: 935).²

When Louis Auguste de Sainson visited Tonga in 1833 with Durmont d'Urville, he made a number of architectural drawings. Prominent in one image are two

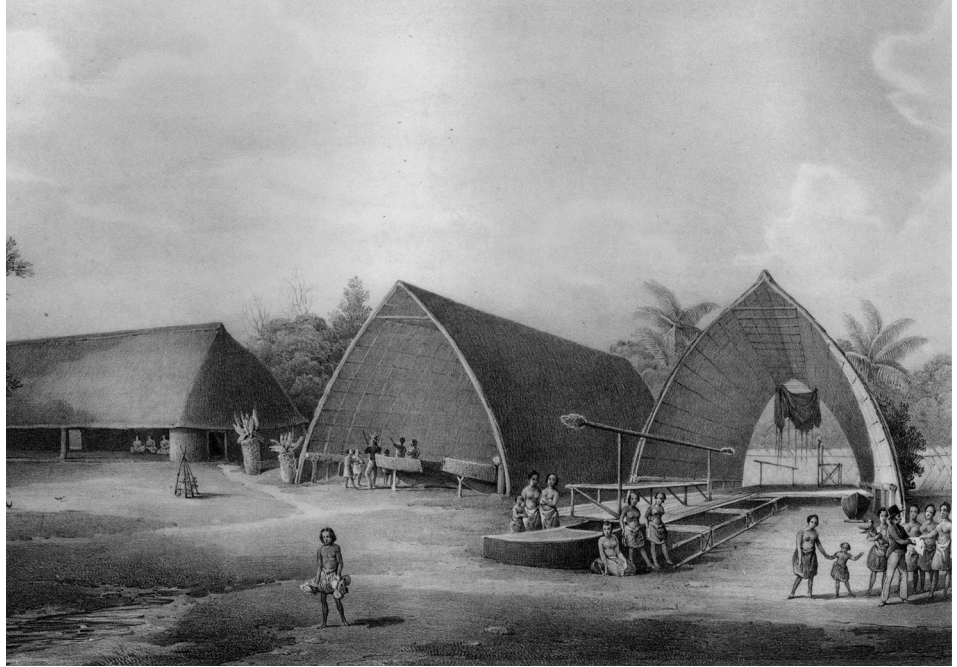
c) Plans of elliptical houses lacking central or utupotu posts at *Folosa-a-lalo* (Kisao Ishisuki, 1974: 43)

d) The *itu* is the sectional shape of the inverted canoe and is built first. Photo: Treadwell 2003

1. Neich, R. (2006). Pacific Voyaging after the Exploration Period. In K.R. Howe (Ed.) *Vaka Moana Voyages of the Ancestors: The Discovery and Settlement of the Pacific*. Auckland: David Bateman. 290. Neich wrote of Tonga's historic maritime "empire", "... whatever it has been called, this relationship is very important as the only prehistoric Polynesian large scale network of political and social relationships reaching beyond separate archipelagos for which some degree of documentation is available. For archaeologists trying to explain the presence of artefacts of exotic materials such as the widespread distribution of Samoan adzes in prehistoric central Oceania, the Tonga maritime empire has been seen as a possible explanation."

2. J.C. Beaglehole (Ed.) *The Journal of Captain Cook on his voyages of Discovery, vol 3 The voyage of the Resolution and Discovery pt 2* (Cambridge 1967), p. 935. "The divisions of the middling one [house] is about thirty feet long, twenty broad and twelve high. It is properly speaking a sort of roof shade, rounded at the ends, reaching two feet and a half (or at the most three) of the ground all round ..."

Two canoe sheds and a long house in Tonga 1833. From: Durmont d'Urville, JSC, 1833 *voyage de la Corvette Astrolabe* Pt II Pl 81, ATL Wellington NZ Neg 54013 ½



large, open-gabled canoe sheds and, in the background, the Tongan long house, the *fale hau*. From this image it becomes clear that both buildings feature the same long gable section and open interior space. The distinguishing feature between them is the round-ended *tala* on the *fale*. The inference might be drawn that the *afolau* and *fale* share ancestry, but visual similarity alone is superficial. This question might be further traced through tectonics and representation.

In his introduction to Samoan buildings, Buck wrote, “In describing the various types of Samoan houses, it is better to follow their natural evolution and work upward from the simplest form to the highly organised guest houses” (Buck 1930: 10). Buck was also trained as a medical doctor, a discipline structured by Darwinian thought, in which species evolved through favourable mutation and natural selection, from simple to complex structures.

In this context, the *fale umu*, the simplest of houses, contained, for Buck, the pre-conditions for development into the larger complex houses. Of its *tala* and the single curved purlin (*fau*) he wrote:

The single *fau* is in one piece, but in order to take the curve the pole is thinned by splitting of a section on either side, such a purlin is termed a *fau sasae*. The *fau sasae* is important in that it forms the precursor of the very elaborate curved purlins used in the guest house. (Buck 1930: 15)

Acting as it does to stabilise the rafters as they fall in an array from the ridge end, the *fau sausae* becomes for Buck the ‘origin’ of the curved *tala*.

There is however no inevitability that such a sequence took place. In order for this thinking to be convincing, it becomes necessary to believe only in a one-directional functional model of development. It is, of course, equally possible for a feature to be retrospectively applied to a building because of any number of cultural or functional priorities, and the split *fau saesae* could be an approximation to the *fau*. Functional determinism as an explanation for the round end of the *fale* is also unsustainable in the face of a huge diversity of gable-end strategies elsewhere in the Pacific and even in Samoa. Further scrutiny of the *tala* of the larger *fale* seems to suggest that there are other than the traditional structural priorities of continuity and stability.

Buck’s drawings of the junction between the *tala* and the *itu* show that the junction is achieved by connecting the thinnest of the thatching astles to the much reduced rafter element. The large curved purlins (*fau*) transmit no direct load

through major structural members of the *itu*. It is as though the two sections of the building were simply stitched together. This junction is also a delineation between builders, a signature of identification and limitation. Buck comments on this 'dotted line': "The weakness of Samoan houses is the joint of the rounded ends to the end rafters of the middle section. There is danger that the wind will lift the thatch directly and take the roof with it." (Buck 1930: 82)

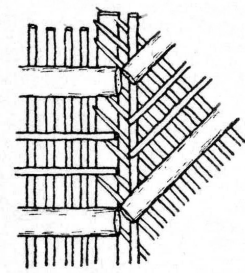
It is possible, however, that the *fale* still has some commitment to mobility. German anthropologist Augustin Kramer wrote of the *tala*, "Next to this centre part on each side is the round part of the *tala* which however is attached so loosely that it can be removed at any time which is very important in transporting such houses." (Kramer 1994-5: 270) There is an accompanying image of Samoans carrying a *tala* past Kramer's front gate. Because, elsewhere in the Pacific and even in Samoa, gable ends are routinely closed off using straight members in various configurations, and because of the detachability of the *tala* from the *itu*, an inference might be drawn that other systems of knowledge are implicated, both in the potential mobility of the *tala* and its constructional relationship to the gable end.

Edward Smith Handy observed the construction of a *fale afolau* in Samoa some six years before Buck. He described a small timber element fitted to complete the ridge beam at the apex of the *itu* gable and its junction with the top of the *tala*. "*Moamoa*", he wrote, "were carved in symbolic representation of the moon and the stars." (Handy 1924: 8)

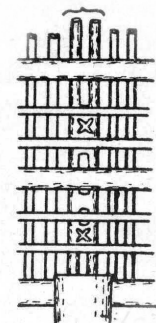
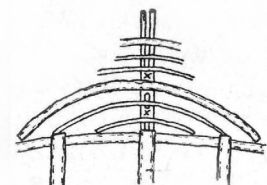
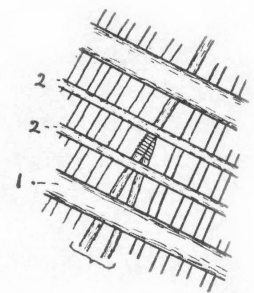
Stars make another appearance in the *tala*. In a description of builders' guild marks, Buck pointed to an inscription of stars on a narrow timber batten standing vertically at the mid-point of the *fau lalo* (lowest and horizontal element of the *tala*) and behind the ascending arcs of the *fau*. Although Buck dismisses the significance of this as being of modern origin, it is curious that star symbols, in this context, combine to construct an arc from the midpoint of the *fau lalo*, to its zenith at the peak of the gable and the *moamoa*. Latent within the structure, but perhaps more compelling, are the arcs of the rising purlins of the *tala*, each lifting in succession from the 'horizon' of the *fau lalo*, like stars rising in sequence before the progress of the canoe and the rotation of the earth.

In this sense the *tala* is the mobile element that reinvests the voyage and its progress by stellar navigation. It also may be read as an activated cosmological model, an association between roof and sky readily made elsewhere in the Pacific (Budgett 2007: 39; Maude 1980: 5).

While the sectional shape of the *itu* recalls the hull of the canoe, the entwinement between architecture and canoe proliferates elsewhere. In Kramer's translation of the constructional sequence of the large catamaran we learn that before the carpenter issues instructions to begin building the canoe, he instructs the builders to build the house that the canoe will be built in. After the keel blocks are placed in the completed *afolau*, the keel is laid underneath and in line with the ridge pole, Kramer records, "then the builders take a round pole and stand it upright against the ridge beam of the house at the same time placing the other end on the keel" (Kramer 1994-5: 291). The ridge pole of the house stabilises the keel of the boat as the planking is scribed to fit. Momentarily architecture and boat become one again.

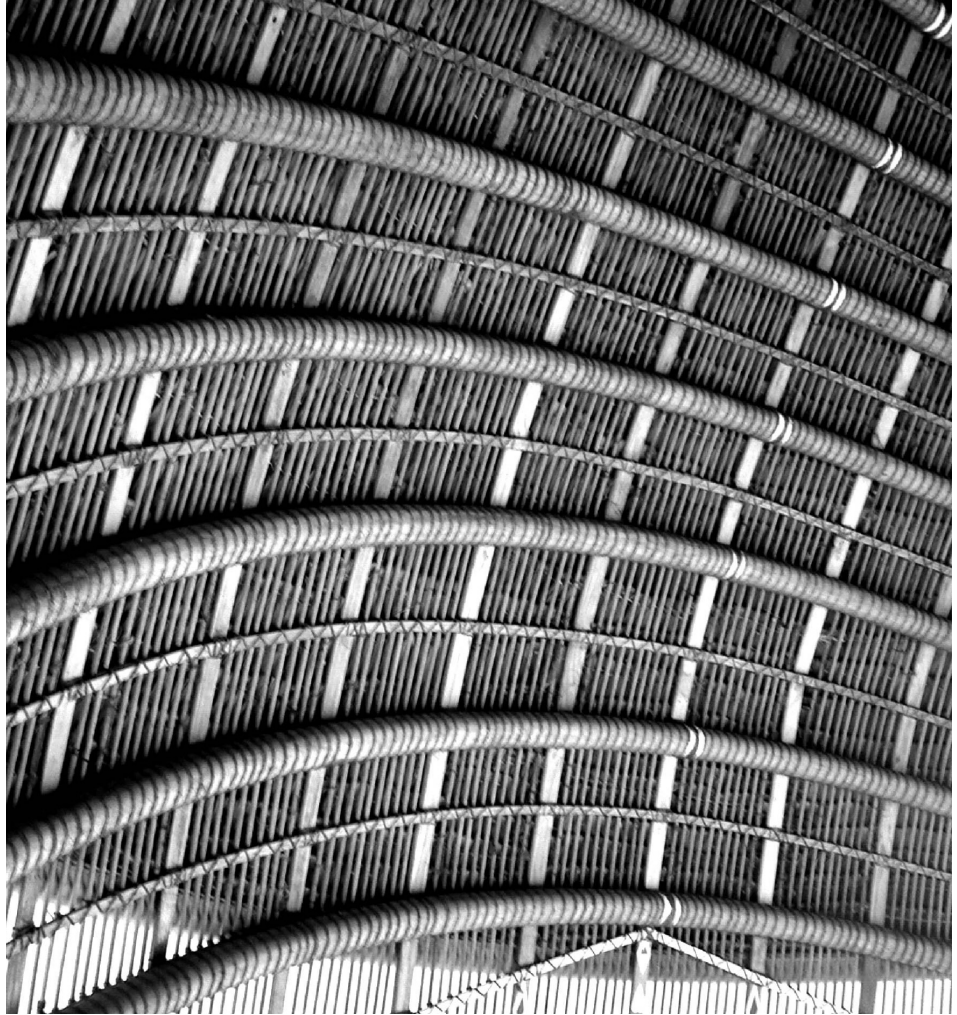


Junction between *itu* and *tala*
(from Buck 1930: 53)



Central split rafter decorated with stars
and fixed to *fau lalo* – in line with ridge
and *moamoa* (from Buck 1930: 87)

Ascending purlins (fau)
Photo: Treadwell 2004



Glossary

<i>afolau</i>	canoe shed
<i>fa'asoata</i>	method of supporting the ridgepole with curved rafters alone, without any intermediate supporting post
<i>fale afolau</i>	the long house – a <i>fale</i> built using <i>utupoto</i> construction
<i>fale o'o</i>	the ordinary dwelling house
<i>fau</i>	curved purlins used to support the thatch rafters in the <i>tala</i>
<i>fau sasae</i>	a <i>fau</i> longitudinally split to enable it to curve around the <i>tala</i>
<i>haus tambaran</i>	ceremonial or spirit house
<i>itu</i>	the middle section of the <i>fale</i> , between the <i>tala</i>
<i>meri</i>	woman in <i>tok pisin</i>
<i>moamoa</i>	a small timber element fitted to complete the ridge beam at the apex of the <i>itu</i> gable and its junction with the top of the <i>tala</i>
<i>pou tokomanawa</i>	central ridge post in a Māori meeting house
<i>tala</i>	the round end sections of the <i>fale</i>
<i>tok pisin</i>	Pidgin, the lingua franca in Papua New Guinea
<i>utupoto</i>	the use of a tie beam to support king posts which support the ridge pole
wharau (Māori)	a particular long house including a shed form built over canoes

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