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Sailing through history: conserving and researching a rare Tahitian canoe sail

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Summary The British Museum has a unique canoe sail in its collection, which is likely to be the only Tahitian canoe sail (*'ie*) to have survived from the early era of sailing canoes. This sail is just over 9.5 metres long by 1.5 metres wide, curving at the top and bottom, and is characteristic of the Society Islands. It dates from either the eighteenth or early nineteenth century. It is constructed from finely plaited mats of cut pandanus leaf, with fibre loop fasteners secured along its edges, and has remains of the ropes that ran up each side of the sail and were used to tie it to a mast. Canoes and sails of this type were observed and documented by early European voyagers. Islanders and Europeans were fascinated with each other's maritime technology and collected techniques and examples from each other. Several canoes and sails from the central Pacific were brought back to Britain and France in the eighteenth century and one of the richest collections of Polynesian maritime technology is held at the British Museum.

In 2007 and 2008, the Museum's Tahitian sail was assessed, conserved and documented in exceptional detail. Conservation included the removal of soiling, crease reduction and the introduction of two types of support: lengths of toned mulberry paper were woven to support smaller, weak areas and holes, while strips of Tyvek® were used to maintain plait alignment over large areas of loss, particularly during rolling and unrolling.

The collaboration between curators and conservators at the British Museum and a Tahitian curator was an important part of the conservation project and resulted in the creation of a large amount of information about this sail that now serves as a resource for a variety of interest groups, many from the Pacific, who are now able to access the sail without compromising its long-term preservation.

INTRODUCTION

The canoe sail from Tahiti in the collections at the British Museum (Oc1999,Q.139: Figure 1) appears to be the only such sail to have survived from Tahiti's sailing canoe era. Tahitians stopped making sailing canoes in the 1840s, when the French colonial government instituted a ban on inter-island travel. The sail probably reached the Museum in the late eighteenth or early nineteenth century. It had been in storage in the Museum's reserve collection until its significance was recognized and a programme was initiated that led to its assessment, conservation and documentation in 2007–2008. Prior to conservation, the size and fragile condition of the sail had rendered it impossible to unfold safely, which significantly limited examination and analysis. After conservation, the sail remains inherently very fragile, but can now be made available for occasional study.

During this project, British Museum curators and conservators were fortunate to work with one of the authors (TH), who is a specialist in the history and technology of Polynesian canoes from the Musée de Tahiti. Together with the conservation and resulting close technical study, the collaboration greatly enhanced the understanding of this particular sail.

News of the conservation and examination project spread rapidly, and scholars, journalists and Polynesians working on reconstructing voyaging canoes have been able to benefit from this unique opportunity to view a complete Polynesian sail constructed with traditional materials and techniques, where previously they relied largely on guesswork.

DESCRIPTION OF THE SAIL

The sail is tall and narrow, measuring 9.68 m high by 1.53 m wide, and curves inwards at the top and bottom ends. Its form matches the illustrations made by the artists on Cook's

FIGURE 1. Tahitian sail Oc1999,Q.139 (during treatment)

and Bligh's early voyages to Tahiti, in particular those by the artists S. Parkinson, W. Hodges and J. Webber on the three Cook voyages and by Lieutenant George Tobin on Bligh's *Providence* in 1792, Figures 2–4. The sail's dimensions, with a width to height ratio of one to six, accord with the observations of these visitors.

The sail is constructed from three large mats, as well as smaller pieces of various shapes and sizes, each made from plaited *Pandanus tectorius* leaf (the Tahitian term for which is *fara*).[1] These have been stitched together with running stitches approximately 3–4 cm long in a two Z-plied cord made from the internal bark of *Hibiscus tiliaceus* (Tahitian term *purau*). The outer edges of the mats have been folded over and stitched into a sleeve that runs along the entire perimeter of the sail. This sleeve encases a thick (approximately 3 cm diameter) three Z-plied rope made from *purau* fibre, Figure 5. The rope, strengthening the sail at the edges, extends outwards at the top and bottom ends, while a separate section of rope extends from the mast edge of the sail roughly two-thirds of the way up the sail, Figure 6. These three thick *purau* ropes are a remarkable feature of this sail. The two lower lengths most likely served to fasten the sail to the mast, but the topmost length was probably used to fix a long rope of black feathers.

Along the edges of the sail, numerous small loop fasteners are tied at regular intervals, except for a length between the end of the spar (which ran in parallel with the mast) and the top of the mast, where there are no fasteners. These loops were made either from *purau* or from coconut palm (*Cocos nucifera*) fibres, the Tahitian term for which is *nape*. Tied to several of these loops fasteners are remains of two-ply *purau* fibre cord lengths, which would have helped fix the sail to the mast and the spar. The sail would probably have been rigged on one side to a straight mast reaching slightly over halfway up its height and on the other to a J-shaped spar extending along its entire length, Figure 6. Extra stitching

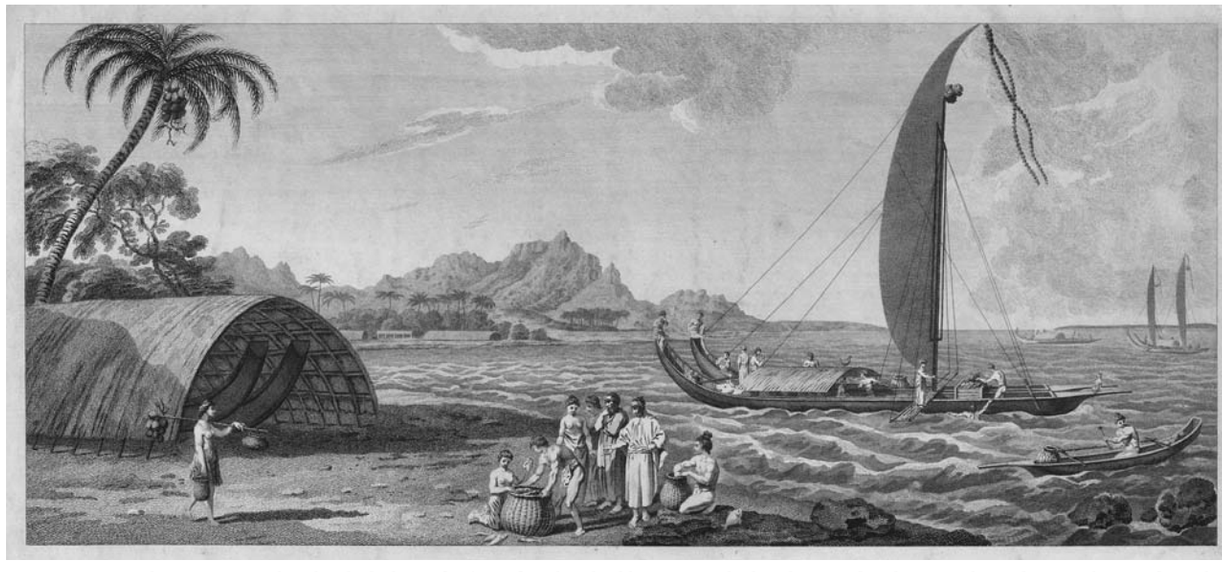

FIGURE 2. E. Rooker, *A view in the island of Ulietea [Raʻiatea] with a double canoe and a boathouse*, after drawings by Sydney Parkinson [12; Plate 3 (vol. II)]. Image: National Library of Australia, Canberra, nla.pic-an.9184895

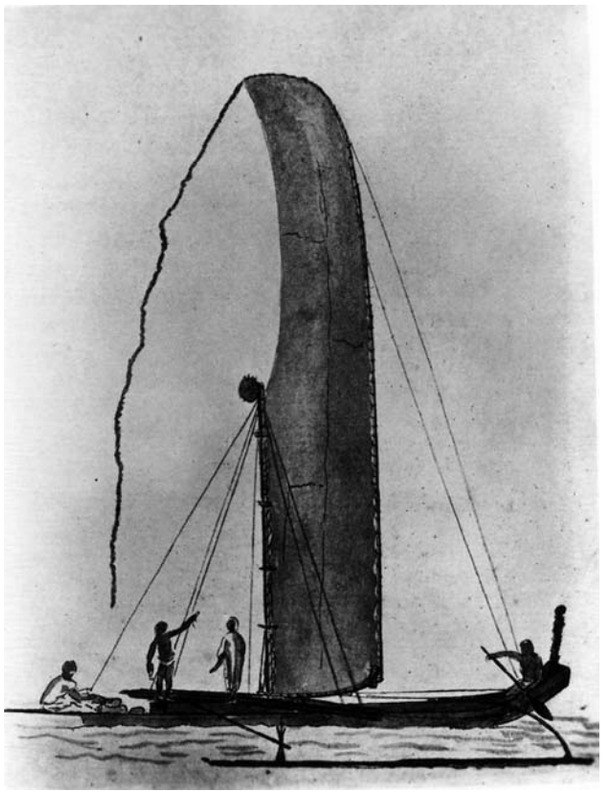

FIGURE 3. George Tobin *[va'a motu]*, pen and wash drawing, Tahiti, 1792. Location of original not identified. Reproduced from Lee, I., *Captain Bligh's second voyage to the South Sea*, Longmans Green and Co., London (1920). Image: National Library of Australia, Canberra

FIGURE 4. Sydney Parkinson, *Canoe of Ulietea [Ra'iatea]*, August 1769; note that the people are not drawn to scale. From 'A collection of drawings made in countries visited by Captain Cook in his first voyage 1768–1771', British Library, Ms Add 23921 f. 20. Image: National Library of Australia, Canberra

with a cord made from *nape*, in this case a three-strand flat plait, has been added along the edge without loop fasteners to strengthen this section, which would not have been reinforced by wood when the sail was rigged.

The pandanus leaf has been split longitudinally in strips and plaited together in a plain bias pattern, now rather distorted. The upper surface of the leaf is characterized by a smooth glossy cuticle while the lower surface is ribbed and matt. The strips have been plaited predominantly, but not exclusively, with the same leaf surface facing to one

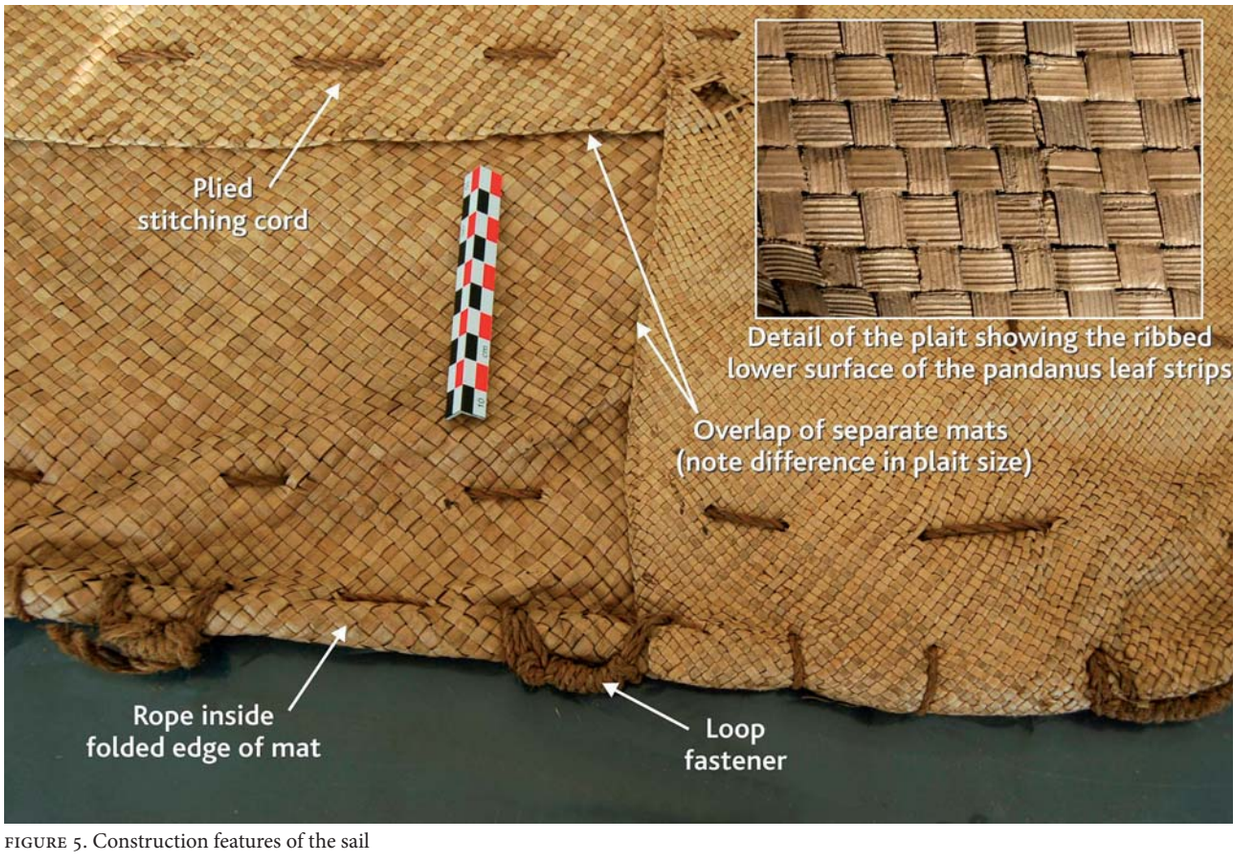

FIGURE 5. Construction features of the sail

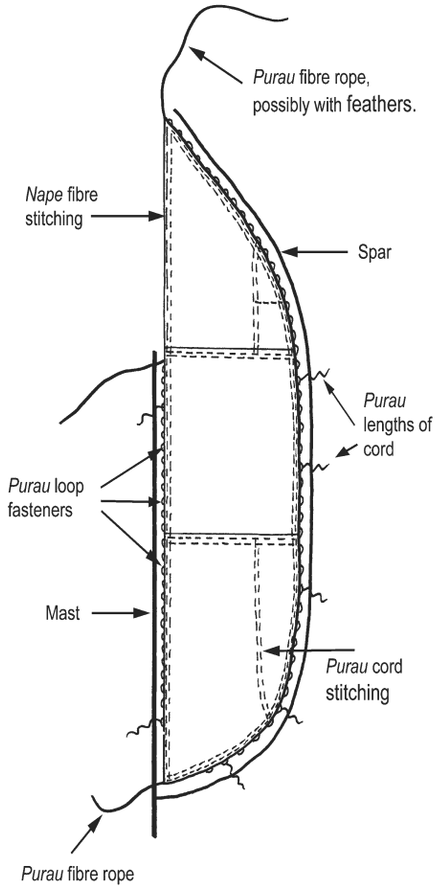

FIGURE 6. Diagram of posited sail rigging (not to scale)

side of the sail, Figure 5. It is possible to speculate an intentional purpose behind this – perhaps to keep an even and flat tension on the sail, or for decorative effect. The width of the cut strips varies from mat to mat and is in the range 3–5 mm. This difference produces mats that vary in delicacy and fineness, suggesting they may have been plaited by more than one hand.

CONSERVING THE SAIL

Condition

The Tahitian sail arrived in the organic artefact conservation studios folded into a 'bundle'. The scale of the undertaking involved in conserving such a large and fragile object cannot be understated, and detailed scheduling of resources and forward planning, including staffing, materials and studio space was essential. For example, it required ten tables, which almost entirely filled the studio, to accommodate the sail's full length, so that manoeuvring procedures such as turning that are usually straightforward required careful step-by-step planning.

Considerable sections of the sail remained in remarkably good condition with the pandanus leaf clean, intact and retaining a degree of suppleness and flexibility. However, there were also large areas of damage where the leaf was extremely brittle and had broken, resulting in either the loss of one element of the plait structure or both. The folding of the sail in storage had significantly deformed it, and there were strongly set folds at intervals across its width that prevented it from opening flat, Figure 7. Large splits had formed along these fold lines, and there were many areas of loss: at least 33 areas had holes spanning 10 cm or more. Not all areas of loss corresponded with folds or were in areas where the surrounding pandanus was particularly brittle, and may have occurred during use of the sail. Once one element in the plait structure had broken this clearly had a significant impact on the structural stability of the surrounding area, since the plait elements could then easily move out of position and leave the broken ends vulnerable to further damage. Many fragments, both plaited sections and individual leaf strips, were found detached and wrapped up with the sail bundle, Figure 8.

The sail was heavily soiled on both sides with fine, black, sooty particulate matter, typical of urban pollution. The level of soiling could be correlated to the way in which the sail had been folded in storage, with the heaviest layer on the outermost surfaces. The level of soiling also related to the condition of the pandanus leaf; in the heavily blackened areas the plant fibres were rigid and brittle, while the less soiled areas remained surprisingly pliable.

Treatment

The primary aim of the treatment was to enhance the preservation of the sail in long-term storage. However, in light of the interest that the conservation of the sail began to engender, particularly in communities physically distant from the UK,[2] there was a desire to enable the greatest possible access to the information contained in the sail without compromising its preservation.

Much soiling was removed using low-powered vacuum suction and vulcanized latex rubber sponges. After both sides of the sail had been cleaned in this way, the sail was humidified using contact humidification; dampened cotton cloth was used to introduce moisture vapour through a Gore-Tex® membrane (a polytetrafluoroethene and polyester laminate). Temporarily increasing the moisture content of the plant fibre made it more flexible, facilitating the reshaping of folds and distortions. Heavy blankets were used to hold the realigned and flattened sail in place as the relative humidity returned to ambient conditions.

Two approaches to the physical stabilization of the sail were taken. The first aimed to hold together and secure within the plait structure any broken leaf strips, thus preventing their loss. The second aimed to provide structural integrity to the sail on a larger scale, helping to

FIGURE 7. The top end of the sail before conservation, showing the extensive creasing across the width of the sail

FIGURE 8. Sections of brittle and split pandanus leaf

address the dimensional instability and stresses caused by the larger areas of complete loss.

Breaks in the leaf strips, small holes, and the edges of any large areas of loss where projecting fragments of pandanus leaf were moving or breaking off, were all strengthened by introducing support elements into the plait in these areas, Figure 9. Strips of a similar width to the original leaf strips were cut from colour-matched 11 g.m^{-2} *tengujo* mulberry paper. Liquitex® acrylic paints diluted in water were used to tone the paper and gave a subtle sheen that matched the slightly glossy leaf. The toned *tengujo* papers were laminated with 10% Lascaux 498 HV adhesive (a thermoplastic

FIGURE 9. Using a 'needle' cut from heavyweight Melinex®, a mulberry paper support strip is woven across a weak area. To the left of the damaged area, already incorporated repair strips are visible

FIGURE 10. After securing the edges with toned paper strips, lengths of cut Tyvek® maintain the plait alignment across the large area of loss

acrylic polymer dispersion based on methyl methacrylate and butylacrylate). By laminating together two sheets of paper it was possible to recreate the subtle colour variations on either side of the original leaf strips.

Using 'needles' cut from heavyweight polyester film (Melinex®) and tweezers to draw them through, the paper support strips were woven into the structure on top of the original pandanus strips, bridging across breaks and looping

round to anchor broken leaf ends. The paper supports were secured at points to the pandanus leaf below with a dot of arrowroot starch paste adhesive, applied with a small brush.

The use of long-fibred mulberry papers in the repair of basketry is well documented, and is used regularly at the British Museum [1, 2]. It was found to be a very compatible material with the pandanus: it gave sufficient strength, was fine enough to insert within the plait, blended well visually, and was flexible enough to conform to the leaf and preserve the natural movement between individual elements within the weave structure.

The larger areas of loss had a significant impact on the overall stability of the sail, making the surrounding areas vulnerable to further damage, particularly when it was being handled or rolled, when they tended to project out of alignment. As the sail was to be rolled for storage and it was expected that it would be unrolled occasionally for study, this posed a problem.

To hold the broken edges in register and maintain the overall plait alignment of the sail, 'bridging' elements were added. Cut strips of Tyvek® (a non-woven high density polyethylene) were stretched across the area of loss at spaced intervals and secured either side by weaving alongside the pandanus leaf for short sections, Figure 10. Tyvek was chosen in place of the mulberry paper for its additional strength; a narrow strip can successfully bridge two areas across a large space without tearing. The supports were left uncoloured, and were secured by weaving the ends back on themselves, rather than by adhesion [3].[3] There was no intention to infill the missing areas, only to stabilize the sail structure and protect vulnerable surrounding areas. These supports have worked well to maintain plait alignment during rolling and unrolling. Inserting the supports at spaced intervals was inevitably faster than the more closely spaced coloured paper supports, and the white colour of the Tyvek gives a visual indication of the inherently fragile nature of the sail during examination. As no adhesive was used, the Tyvek strips can easily be removed should the sail ever go on display, and further cosmetic infilling could be carried out if this was ever deemed to be appropriate.

The pandanus leaf remains extremely brittle and the sail is, therefore, very prone to continual fresh, small-scale breaks occurring, particularly during handling. This makes it unlikely that the sail itself can be regularly or repeatedly rolled and unrolled in its entirety without causing damage.

Prior to long-term storage, the sail was rolled around a padded, acid-free card roller and extra padding was introduced to accommodate the undulations and unevenly distributed raised areas of sail.

Information resource

During the conservation process conservators had the first opportunity to examine the sail closely. Various forms of detailed documentation were undertaken, including the production of descriptions, diagrams, detailed measurements and extensive photographs, all of which have been made available through the *Collection Database* on the British Museum website.[4]

The various documents will enable all interested parties to have access to the information, including academic researchers, those involved in Polynesian canoe reconstructions, museum curators and conservators. The rich visual information ensures that access is available to those who may not read English as their primary language. It is of particular value, as the sheer size and fragility of the sail precludes its display in the near future, although occasional study is possible, if cumbersome.

POLYNESIAN CANOES AND SAILS

The design and construction of canoe sails have shared many points of similarity across Polynesia, a cultural–geographic region covering the eastern and central Pacific, from Hawaii in the north to Rapanui (Easter Island) in the east and across to New Zealand in the south. A number of attempts have been made to reconstruct ancient Polynesian canoes relying on information drawn from contemporary traditional building knowledge, historical accounts and drawings. However, very little is known about ancient fibre sails because they disappeared very soon after the first contacts with Europeans. The analysis of the few surviving sails that were collected at the time, when the canoes were still in use, is therefore crucial to understand how they were made and their role in sail canoe navigation.

Polynesians from the Society Islands (Tahiti and surrounding islands) referred to the sails of their canoes with the term '*ie*. This term can also be found in Tuamotu, while on Mangareva *kie*, a variant of '*ie*, is used. Nearly everywhere else (notably Hawaii, New Zealand, Samoa, Wallis and Rarotonga) the terms *rä* or *lä* are in use [4]. Polynesian sails were finely woven out of pandanus fibre, work that was carried out exclusively by women, while the ropes and lines used in conjunction with them were made by men. Similarly, all seafaring carpentry work was carried out exclusively by men and under the supervision of a master called *Tahua tarai va'a* [5].

In the Society Islands, the sail on every canoe was based on a single model and it is even likely that they were also of similar size. This type of sail, referred to as the 'simple triangular sail', was quite widespread throughout eastern Polynesia (the area including Hawaii and the Society and Marquesas Islands) and was also found in New Zealand.

Society Island canoes were tacking canoes, with the sail fixed in position and the prow of the canoe always facing forward. In other parts of Oceania, double-ended canoes, referred to as shunting canoes, could sail in both directions: there was a step at each end and the apex of the sail was

moved from one end of the canoe to the other with the helmsman positioning himself at the opposite end [6].

Tacking canoes were fast vessels: one man would pilot the canoe with a steering paddle made of dense wood and with a very wide blade, while one or two other men were needed to maintain the balance of the canoe by moving along the flat beam or cross-beam that was lashed across the mid-point of the canoe and that extended out over the water on both sides [7]. The Tahitian type of sail was distinctive in that it was high, very narrow and the upper section reached a considerable height beyond the mast-head, curving in towards the mast axis when the canoe was moving; for further information on the canoes and sails of Polynesia, and specifically the Society Islands, see [8–11].

Outrigger canoes with a single sail were called *va'a motu*. They were used for deep-sea fishing and shorter journeys. The only other canoes that were fitted with sails were the large double-hulled canoes. They had two sails and were of two different types: the *tipaerua* (a big *va'a* with a double hull) and the *pahi*. The *tipaerua* had hulls (like those of the single-sailed *va'a motu*) that were carved out of tree trunks, attached end to end and built up with strakes (boards), while the *pahi* was a complex structure of boards pierced and 'sewn' together. The cross-section through the hull of the *tipaerua* was U-shaped, but the *pahi* had a sharp keel. The prow of the *tipaerua* comprised a projecting horizontal platform and its stern was wide and raised, while for the *pahi* both the prow and the stern were raised and tapered. Both types of canoes could reach lengths between 16 and 24 m and one or two shelters were sometimes built on the deck connecting the hulls. These canoes usually had two sails set out as in a ketch, i.e. with a larger sail on a mast in the front third of the canoe and a smaller sail in the aft third. Both sails were always placed on the connecting deck halfway between the two hulls, and a ladder was attached to the mast to help reach the sail and sail sheet (the rope that the helmsman held to make slight adjustments to the angle of the sail, keeping it close to the wind).

Around 1789–1791, James Morrison described a typical Tahitian sail as being equal in length to a canoe (i.e. about 10 m), and with a width varying between 1.5 and 2.2 m [7; p. 168]. A long rope was attached to the top of the sail and decorated with black feathers, presumably to indicate wind direction, while a cone-shaped basket of unknown function was placed at the top of the mast. Captain James Cook noted a few years previously that a canoe about 10 m long had a mast of around 8 m and a sail a third longer than the mast [12; p. 223 (vol. 2)]. The sail sheet was attached at the point where the horizontal bamboo boom at the foot of the sail met the vertical boom-sprit and was held by the helmsman; on larger canoes, several men handled the sail sheet. The disadvantage of this type of sail was that it could not be reduced when the winds became strong [7; p. 168], but the Polynesians invented a means to reduce the overall surface of the sail by detaching and rolling up the lower section of the sail. When the canoe capsized, a rope was tied to the end of the boom and one of the crew climbed onto the beam to make it sink while pulling on the rope until the sail lifted out of the water, which, with the help of wind, righted the canoe.

The sails of the Society Islands have been referred to erroneously as 'crab claw sails' because drawings showed a wide curvature towards the top of the mast [6; p. 36]. The examination of the British Museum sail has confirmed – by the location of the fibre loop fasteners along its edge – that this curvature was not intrinsic in the form of the sail, but was the shape given to the sail by the wind. This effect was heightened by the way in which the end of the spar bent back towards the mast, pulled by a rope [7; p. 203]. It is highly likely that this was also the case for Tongan and especially Hawaiian sails, which have also inaccurately been represented as crab claw sails; the model Tahitian and Hawaiian canoes made by Admiral Pâris from 1871 are testimony to this mistake. There are indeed many Polynesian crab claw sails, but they are on amphidrome canoes used by Polynesian populations living within Melanesian areas (the Motu living on the islands along the south eastern coast of New Guinea and the Taumako in the Santa Cruz Archipelago, east of the Solomon Islands).

Across Polynesia, canoes were treated with care and ceremony. The protection of the gods was called upon periodically to ensure the ongoing good fortune of the canoe and voyages taken within it. Large war canoes were in many ways sacred and embodied the prestige of a community's chief [13]. Captains Wallis and Cook, after observing the central role of canoes in Tahitian society, took canoes hostage when the two groups came into conflict, or broke up war canoes in reprisal, guessing how much impact this would have on the community.

COLLECTING CANOES

From their first encounters in 1767, Europeans and Tahitians were fascinated with each other's ocean-going technologies, and both inspected, asked questions about, and measured the other's vessels [14]. British, French and Spanish voyagers often recorded these assessments in their logs and journals, providing insights into the scale of values within which one maritime culture viewed another. The Europeans were, for the most part, impressed by the canoes they observed in Tahiti and other Polynesian islands. During his first visit to the island, Cook wrote lengthy, detailed descriptions of the construction and uses of canoes. He wrote of the "ingenuity" of the canoe makers and reported enthusiastically on the manoeuvres of a huge fleet of elaborately carved war canoes that he had witnessed, noting that these were manned with "at least fifteen hundred warriors, and four thousand paddlers" [15].

Collecting samples of these technologies was a way for travellers to record evidence of the practices and skills of particular interest to them as mariners and as a means of gauging the maritime expertise of those they met in the Pacific, although objects related to canoes were not given or traded in such great quantities as other products of the Society Islands; it is stone adzes, fish hooks, lengths of barkcloth and other, more readily replaced, objects of everyday life that are the common contents of museum shelves and stores. Voyagers needed to be in a position to offer high value goods, not just the usual trinkets, to trade for vessels that had such a central importance in the life of the islands. As a result, canoes were collected by those with a specialist interest and not just a general desire to bring back potentially lucrative, eye-catching souvenirs.

There appear to be only two mentions in early navigators' logbooks of the acquisition of a Polynesian sail. The first is when Commodore John Byron seized the sailing canoes of the inhabitants of Takaroa in the Tuamotu Islands in 1765 as a reprisal for their aggressive attitude. The sail, which he kept but has never been identified, struck him as "as neat a piece of work" as he had ever seen [12; p. 120 (vol. 1)]. One of the authors (TH) has investigated the possibility that it could be another Polynesian sail at the British Museum (Oc1999,Q.140), but for a variety of reasons this seems unlikely. A chief (*ari'i*) of the Hitia'a district on the eastern side of Tahiti gave a long, woven sail to the second European captain to reach the island (Louis de Bougainville), who arrived on the *Boudeuse* a few months after Samuel Wallis's initial visit in 1767 [16].[5] The sail would presumably have been taken back to Paris, along with Ahutoru, a high-born young man of the Hitia'a district and the first Pacific islander to visit Europe.

The objects collected and their collection history show that canoes were only really of interest to the explorers themselves (rather than other members of their crew) and only the first explorers were able and eager to study them. Indeed, the changes initiated by these contacts radically and irrevocably altered Polynesian traditions and crafts. Captain George Vancouver noted that as early as 1793 Hawaii's great chiefs followed the great chief Kamehameha's example and rigged their canoes with western sails [17]. This was also the case in other parts of Polynesia and particularly on those islands that had a privileged contact with Europeans.

Sails and canoes at the British Museum

There are no extant records of the British Museum sail's arrival or early history at the Museum. Two sails made of "coarse mats" were listed in an 1842 *Synopsis* of the Museum as part of the long-term display in the popular 'South Seas Room' [18]. This room acted primarily as a showcase for material from Cook's voyages. There is insufficient evidence to confirm which sails these were, but the Tahitian sail is likely to have been collected very early; it has a parchment label, commonly used in the eighteenth century, indicating that it is likely to have reached the Museum late that century or in the nineteenth century, in time to be included in the South Seas Room display. The label is not conclusively of the eighteenth century, as the inked text reads 'Tahiti', rather than 'Otaheite'. British writers tended to use 'Tahiti' from the early nineteenth century, once the use of the Tahitian honorific article 'O' was understood and it was more usual for eighteenth-century writers to use 'Otaheite'. However, at least one early commentator, James Morrison, a *Bounty* mutineer who lived on the island from 1788 to 1791, recognized and used 'Taheite' in his account of the island, which he had finished writing by 1792. The use of 'Tahiti' on the label suggests a slightly later collection and labelling date than the Wallis or Cook voyages, but Morrison's example shows that it is possible that it was labelled in the period between the late 1780s and early 1800s, when voyagers, traders and missionaries were spending longer periods on the island and securing a better grasp of the language.

There are three Polynesian sails at the British Museum. The Tahitian sail was kept in storage along with a second sail from elsewhere in Polynesia (Oc1999,Q.140), possibly from the Hawaiian or Marquesas Islands. The latter sail measures 5.1 × 3.6 m and features small geometric designs of dark leaf strips within the pale pandanus weave. This smaller sail is scheduled to be conserved during 2009, and the authors intend to publish any findings from their examination and treatment of this object in due course.

A third sail, from New Zealand (Oc,NZ.147.7), which is trimmed with black feathers, has an elongated, inverted triangular form, 4.4 m long and 1.9 m at its widest end. These three are the only known surviving examples of ancient Polynesian sails and, in addition, the British Museum appears to be the only institution that holds elements from the material culture related to canoes collected at the time they were made and used. British voyagers collected Polynesian material relating to fields other than navigation, and the British Museum holds one of the richest Polynesian collections in the world.

There is a canoe (Oc1771,0531.1), which is nearly intact (the beam is missing and possibly part of the stern) from Nukutavake Island in the Tuamotu Archipelago. This was collected by Captain Samuel Wallis in 1767 and was probably given to the Admiralty of the Royal Navy, which in turn donated it to the British Museum in 1771 [19]. There are also, from Tahiti, examples of the carved posts that decorated the stern and prow of many canoes, showing anthropomorphic ancestor figures (*ti'i*) standing back to back, for example British Museum Oc,Tah.60. A large steering paddle (Oc,Tah.87) and a bailer (Oc,Tah.6) that were almost certainly collected during James Cook's visits are other highlights of the Museum's Polynesian maritime collection. These objects provide fundamental information, and having been collected during the early years of contact with Europeans, they document the changes that occurred as canoe-builders who were used to working

with tools of stone, bone and shell gained access to new tools and materials with which to experiment.

CONCLUSIONS

The ban enforced by the French colonial administration on inter-island travel brought the end of sailing canoes from the 1840s and women stopped weaving sails as small, paddled canoes met the needs for fishing and transport around the coast. Today, Society Islanders sail western-style boats and paddle fibreglass canoes when fishing, travelling around their coastlines, and racing between the islands in annual canoe competitions. In the cultural renaissance under way in the islands, there is a growing interest in rediscovering and reconstructing early voyaging canoe technologies. The sails in the British Museum are precious repositories of cultural knowledge of ongoing relevance in Polynesia today.

While the conservation of this sail aimed primarily to ensure the long-term preservation of this unique object, in-depth technical examination, extensive documentation and interpretation of the sail between British Museum curators and conservators and a Tahitian curator was an important part of the conservation project. This project has allowed a variety of interested parties, including Pacific communities physically distant from the UK (both English and non-English speakers) access to the sail without compromising its long-term preservation.

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MATERIALS AND SUPPLIERS

- Vulcanised latex rubber sponge ('smoke sponge'), Melinex® (125 µm), Tyvek® and Gore-Tex®: Preservation Equipment Ltd., Vinces Road, Diss, Norfolk IP22 4HQ, UK. Sympantex® (also available through Preservation Equipment Ltd.) can be used as a cheaper alternative to Gore-Tex®.
- Tengujo mulberry paper: Shepherds Bookbinders Ltd (formerly Faulkiner Fine Papers), 76 Southampton Row, London, WC1B 4AR, UK.
- Lascaux Acrylic Adhesive 498 HV: AP Fitzpatrick, 142 Cambridge Heath Road, London E1 5QJ, UK.
- Liquitex® acrylic paints: Cornelissen & Sons, 105 Great Russell Street, London, WC1B 3RY, UK.

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NOTES

1. Preliminary identifications of the materials in the sail were made by visual examination by one of the authors (TH). The botanical species present were confirmed as *Pandanus tectorius*, *Hibiscus tiliaceus* and *Cocos nucifera* by Caroline Cartwright.
2. An article entitled 'British Museum "discovers" 2 pre-European Tahitian canoe sails' appeared in the *Tahiti Presse* in 2008. Available at http://outriggersailingcanoes.blogspot.com/2008/03/ancient-sail-found.html (accessed 22 June 2009).
3. A presentation by J. Bracko entitled 'Ten Tips for Tyvek' given at a meeting of the Textile Specialty Group (TSG) of the American Institute for Conservation in Richmond, Virginia in 1990 is cited in reference [3].
4. www.britishmuseum.org/research/search_the_collection_database.aspx (accessed 31 March 2009).
5. The journal of Nicholas Duclos-Guyot (of the *Boudeuse*), held in the Musée National d'Histoire Naturelle, Paris, Ms 2214, Book 1, f. 155, is quoted in [17].