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HMS *PANDORA* PROJECT — A REPORT ON STAGE 1: FIVE SEASONS OF EXCAVATION

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In 1790 the *Pandora*, a 24 gun frigate sailed from England to Tahiti in pursuit of the *Bounty* and its mutineers. After capturing some mutineers, the *Pandora* was wrecked in 1791 on its return voyage attempting to navigate the Great Barrier Reef, east of Cape York Peninsula, Australia. The survivors sailed in an open boat from the Barrier Reef to Java and eventually returned to England, where the mutineers were brought to trial. The discovery of the *Pandora* shipwreck in November 1977 and its subsequent archaeological investigation by the Queensland Museum constituted an opportunity to expand on the *Bounty* saga and reconstruct its material setting.

Between 1983 and 1995 the Queensland Museum conducted exploratory excavations and survey over five field seasons, as a precursor to more intensive study. Excavation concentrated on the bow and stern sections where there was well preserved material evidence in the crews living spaces and personal storage areas. □ *Maritime archaeology, shipwreck, HMS Pandora, Great Barrier Reef, Royal Navy, HMS Bounty.*

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HISTORICAL BACKGROUND

HMS *Pandora* was a naval frigate dispatched by the British Admiralty on a punitive voyage to the South Pacific. Its mission was to find and recapture HMS *Bounty* and bring to justice 25 men who, in April 1789, had mutinied while they were on the final stage of a voyage to transplant breadfruit from Tahiti to plantations in the British West Indies. The leader of the mutiny was Fletcher Christian, the *Bounty's* acting lieutenant who felt slighted by his commander, Captain William Bligh, and, in an outburst of rage and frustration, incited several members of his watch to take the ship and cast adrift 19 of their shipmates, including Bligh. Following an unsuccessful attempt to establish a settlement on Tubuai, one of the Austral Islands, the *Bounty's* mutinous crew fell out among each other four months later. Sixteen mutineers elected to return to Tahiti in September 1789, after which Fletcher Christian sailed off with the *Bounty* to an unknown destination with eight others and their Polynesian entourage. In the meantime Bligh managed to return to England, where he reported the mutiny and the loss of his ship to the Lords of the Admiralty.

HMS *Pandora* sailed from Portsmouth in early November 1790 and arrived in Tahiti on 23 March 1791 after nearly five months at sea on the route around Cape Horn (Fig. 1). During her six week

stay in Tahiti, fourteen of the *Bounty's* crew were taken prisoner and locked up in a makeshift wooden cell on the *Pandora's* quarterdeck, which the prisoners referred to as 'Pandora's Box'.

The *Pandora* left Tahiti on 8 May 1791 and, until mid-August 1791, cruised the South Pacific in search of the *Bounty* and the remainder of her mutinous crew. The search was unsuccessful because Fletcher Christian and his followers had found a final refuge on uncharted Pitcairn Island, where they had burned and scuttled the *Bounty* in January 1790.

On 29 August 1791 the homeward bound *Pandora* was wrecked on the Great Barrier Reef while exploring an opening in the reef. Four of the prisoners and 31 of *Pandora's* crew died when their ship sank after striking a submerged reef. Having spent two nights on a small sandcay (Escape Cay) in the vicinity of the wreck, the survivors — 89 crew and 10 prisoners — set out for the Dutch East Indies in the ship's boats. After an arduous 16-day, 2750km, open boat voyage they arrived in Timor. They subsequently made their way to Batavia (Jakarta). From there they were able to arrange for a passage home via the Cape of Good Hope. At Cape Town the 10 surviving prisoners were transferred to a British warship and transported to England to stand trial. Three of the mutineers were hanged and the *Pandora's* officers faced courts martial. No

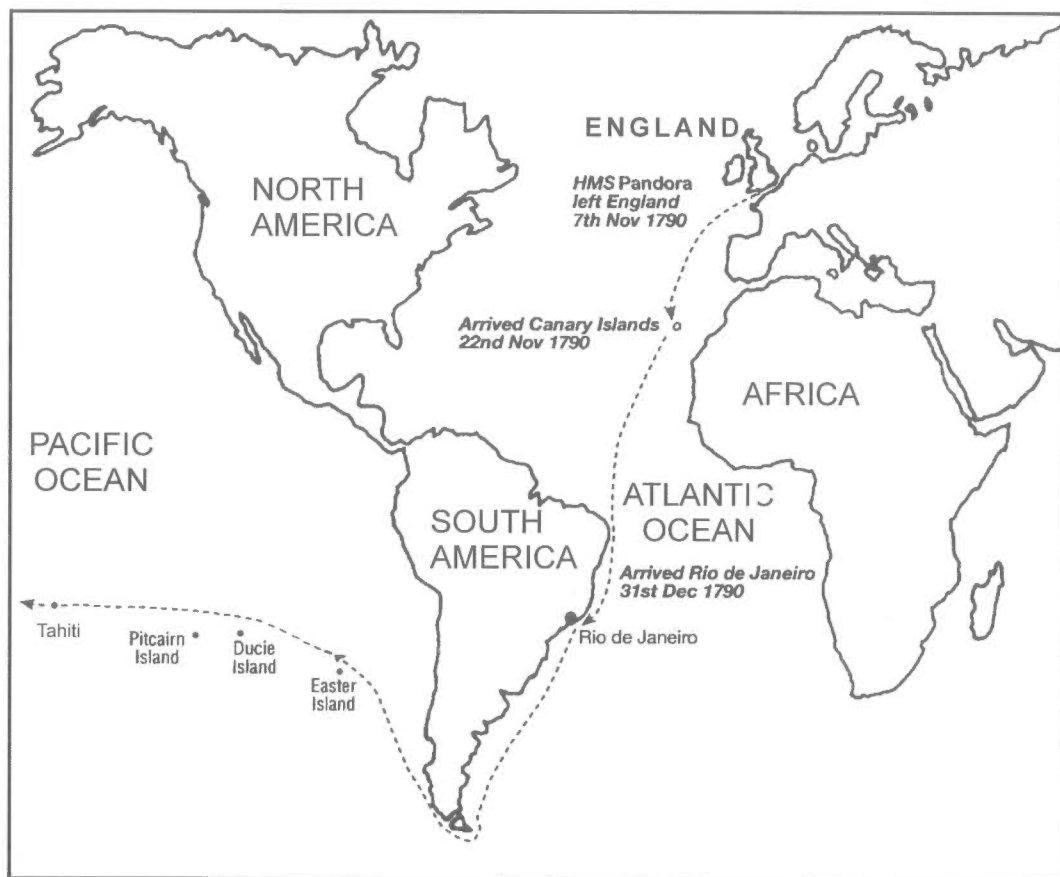


FIG. 1. *Pandora*'s route from England to Tahiti.

efforts were made to salvage the *Pandora*. The wreck remained undisturbed until its rediscovery by scuba divers and documentary film makers Steve Domm, John Heyer and Ben Cropp, with the assistance of the Royal Australian Air Force in November 1977.

Following an archaeological survey commissioned by the Commonwealth Department of Home Affairs & Environment and carried out by the Western Australian Maritime Museum's archaeologist Graeme Henderson in April 1979, the wreck was positively identified as the *Pandora* and declared a protected site under section 7 of the *Historic Shipwrecks Act, 1976* (Henderson, 1979).

Since 1982, management of the wreck has been the responsibility of the Queensland Museum. Nine archaeological excavations have been carried out by the Queensland Museum to date,

with additional financial assistance from the Pandora Foundation, the Commonwealth Government's Historic Shipwrecks Program and the Queensland Museum's Board of Trustees. These excavations have established that an extremely coherent and well-preserved collection of artefacts and a substantial portion of the wrecked hull are buried in the seabed (Henderson, 1986; Gesner, 1988; 1993).

The wreck's historical and archaeological values underpin its international cultural significance. It is a major source of European and Polynesian material culture associated with a British naval vessel engaged on a long voyage to the South Pacific Ocean in the last quarter of the 18th century. The *Pandora*'s last voyage falls within a very important period of European discovery in the Pacific Ocean, also referred to as the Grand Age of European Pacific Exploration (Howse, 1990; Smith, 1992). This period had started

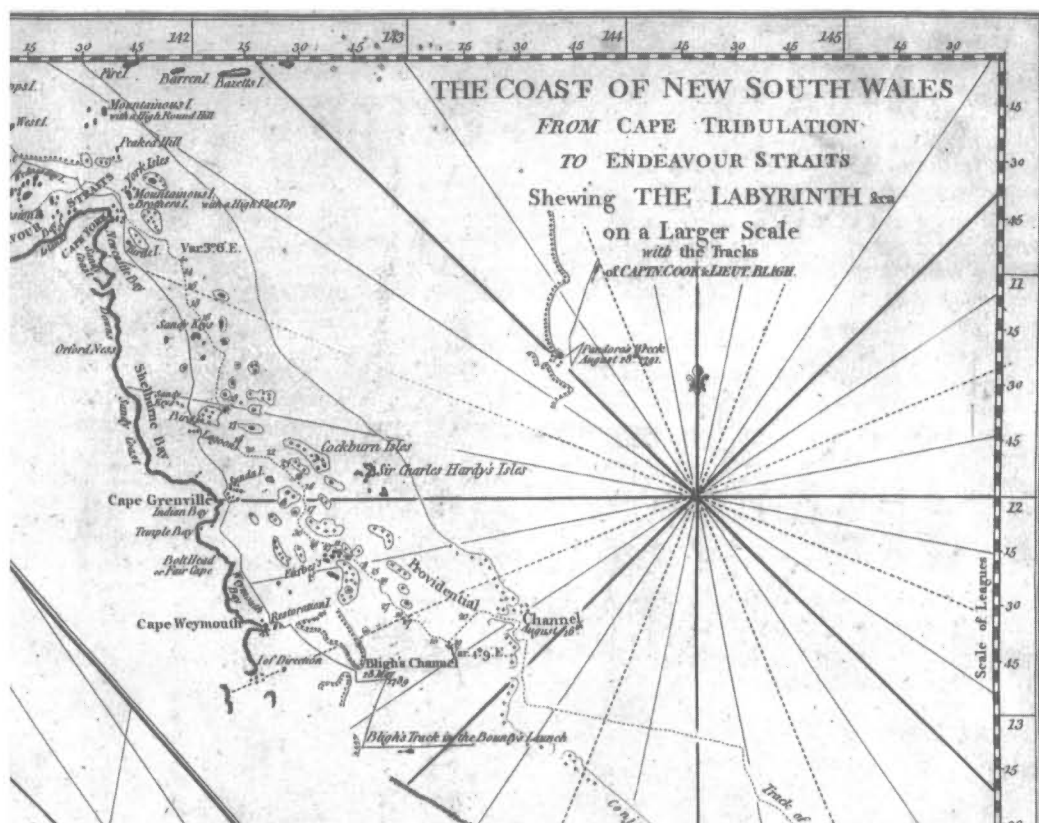


FIG. 2. Portion of late 18th Century chart of Australia's east coast showing the *Pandora*'s track (upper centre) along the Great Barrier Reef between 26th and 28th August 1791, as laid down by Lt Hayward. (State Library NSW #50, Laurie & Whittle)

during the 1760s with Bougainville's voyage, flourished with Cook's three Pacific voyages during the 1770s, and La Perouse's epic voyage in the 1780s, and ended with Matthew Flinders' circumnavigation of Australia in 1802. It was the time when 'enlightened' European philosophers and scientists were rediscovering the world's natural, cultural and social environments, recognising their multifarious forms, and making a concerted effort to systematically classify the diversity they encountered (MacLeod & Rehbock, 1988).

The *Pandora* episode would probably have receded into historical obscurity but for two important facts. The track which the *Pandora* followed while searching for a passage through the Great Barrier Reef and Pandora Entrance to the Torres Strait was copied onto a late 18th century chart of Australia's east coast (Fig. 2). The named features on the nautical charts

became a constant reminder of the fate and location of the *Pandora*.

More importantly however, the story of the *Pandora*'s last voyage is one of the three main stories constituting the infamous saga of the mutiny on the *Bounty*, arguably the most dramatised and romanticised seafaring saga from the annals of maritime history — certainly an event which became larger than life from the moment William Bligh returned to England in March 1790 with news of the mutiny. Following his reports about the ordeal which he and his loyal crew had experienced after being cast adrift in the *Bounty*'s launch, Bligh was considered a hero. Feted and acclaimed by society, he was applauded for his fortitude and leadership. Soon afterwards he was given command of another expedition, comprising two vessels, HMS *Providence* and HMS *Assistant*, to complete the breadfruit collecting mission he had originally been

entrusted with when given command of the *Bounty* (Oliver, 1988).

Several years later, however, the accounts of the ten *Bounty* crew brought home as prisoners by the *Pandora*'s Captain Edwards, cast doubts on Bligh's version of events. Bligh's conduct as a naval commander was called into question and his reputation was subsequently tainted by accusations made against him by some mutineers; particularly by Peter Heywood and James Morrison, and by influential members and friends of Fletcher Christian's family. The ensuing controversy fuelled renewed public interest in the *Bounty* saga and resulted in a large collection of narratives, travelogues, letters, pamphlets and articles. Many of these mention the *Pandora*'s role in the Admiralty's attempt to bring to justice the *Bounty*'s mutinous crew. Several are by members of the *Pandora*'s crew who eagerly made available their journals and accounts to satisfy public demand for stories from the South Pacific; in particular about the infamous mutiny.

Indeed, literature on the mutiny has grown to such an extent that a complete catalogue of the *Bounty* saga, including references to the *Pandora*'s voyage, would probably contain more than one thousand entries. The list is still growing as contemporary historians continue to find reasons to analyse and re-interpret the mutiny and its aftermath (Denning, 1992: 397ff).

Thus, the main events of *Pandora*'s last voyage are very well known. The names of the crew as well as the chronology and sequence of events of the voyage can be gathered, not only from such primary sources as the ship's log (Adm. 180, Edwards' papers), but also from the published journals, memoranda, eye witness accounts and letters written by Captain Edward Edwards and Surgeon George Hamilton (Thomson, 1915; Hamilton, 1998), by midshipman David Renouard (Maude, 1964) and by two of the *Bounty* mutineers, Peter Heywood (Marshall, 1825; Tagart, 1832) and James Morrison (Rutter, 1935).

HMS *PANDORA*'S LAST VOYAGE

EN ROUTE (PORTSMOUTH TO TAHITI). Several days after taking up his command of the *Pandora* on 10 August 1790, Captain Edwards was summoned to the Admiralty in London for a briefing on special orders which would take the *Pandora* into the South Pacific on what was to be her last voyage. The orders included instructions:

... to proceed to Otaheite and, not finding the mutineers there, to visit the different groups of the Society and Friendly Islands, and others in the

neighbouring parts of the Pacific and there seize and bring home in confinement all or some of the delinquents ... (Adm/A/2831).

The unusual nature of the voyage required changes to be made to the normal complement of a frigate of the *Pandora*'s class. No marines were to be taken on the voyage, nor were the officers allowed the usual number of 'servants', i.e. apprentices (see Appendix 1). These berths were to be filled by additional seamen. An extra lieutenant was also assigned and the usual number of master's mates and midshipmen was doubled. These changes to the crew were made in anticipation of the need to provide an effective crew to bring the *Bounty* back to England after her capture. The length, duration and the extraordinary nature of the voyage also required more than the usual quantity of stores and supplies to be taken on board. In addition, spares and new fittings for the *Bounty* were required. Surgeon Hamilton's metaphor likening the crew to weevils, who first had to eat a hole in their bread to make a space for themselves, is testimony that the ship was filled to capacity on departure (Thomson, 1915: 92; Hamilton, 1998: 5).

Among the extra officers added to the *Pandora*'s crew was Thomas Hayward, one of the *Bounty*'s midshipmen. As one of the 18 crew who did not go with Fletcher Christian in the *Bounty*, Hayward had accompanied Bligh in the launch and had served as a witness at Bligh's court martial. By assigning Hayward to the *Pandora* as the third lieutenant, the Admiralty was acting with some forethought as they felt his participation would assist in the recognition of the mutineers.

After leaving Portsmouth on 7 November 1790, the *Pandora*'s first port of call was Tenerife in the Canary Islands, where she stayed for several days taking on water, wine and fresh supplies including citrus fruit, bananas and pomegranates (Thomson, 1915: 93-4).

On the leg between Tenerife and Rio de Janeiro, a large number of the crew, including assistant surgeon James Innes, suffered from a contagious fever. It was treated by surgeon George Hamilton in a novel way by supplying the sick and convalescent with tea and sugar. According to Hamilton this was the first time tea had been introduced on a naval vessel at sea (Thomson, 1915: 94). In spite of Hamilton's best efforts however, James Johnson, a bosun's mate, died during the Atlantic crossing and was buried at sea off Rio de Janeiro on 1 January 1791.

Edwards called in at Rio de Janeiro specifically for more fresh supplies as he was afraid the fever raging amongst the *Pandora*'s crew would not pass before they reached the dangerous waters off Cape Horn. After a short stay in Rio de Janeiro, the *Pandora* then ran along the coast of South America toward Cape Horn. The crew's health improved because, according to Hamilton, of the cold weather off the Cape and the availability of special supplies, including hot chocolate and spruce beer (Thomson, 1915: 100).

With most of the sick crew rapidly recovering, the *Pandora* passed Cape Horn without mishap in early February 1791 and after another uneventful month at sea sighted Easter Island on 4 March 1791. The voyage would certainly have been very different if Captain Edwards had realised that Pitcairn Island, the elusive *Bounty* mutineers' final refuge, was within a relatively short sail of Easter Island. However, the fate of Fletcher Christian and his followers was to remain unknown until 1808 when the crew of the American whaler *Topaz* put in at then uncharted Pitcairn Island and met John Adams, the sole surviving mutineer, and the descendants of his former shipmates and their Polynesian entourage.

Several more islands were sighted to the west of Easter Island and their position duly recorded in the *Pandora*'s log (Thomson, 1915: 88). Edwards named one of them Ducie Island after his patron Admiral Lord Ducie, under whom he had served as a junior officer and to whose influence he probably owed his current command. But because exploration and cartography were not a priority, Edwards ignored the islands and continued on directly to Tahiti.

AT TAHITI: CAPTURING THE PRISONERS. By heading directly for Tahiti, Edwards was actually giving effect to his orders to make a Tahitian landfall as soon as possible. The reason for this urgency lay in the Admiralty's hopes that a sailor called Jonathan (or John) Brown would be able to provide information on the location of the mutineers. The Admiralty had received a report that Brown had been put ashore from another ship (the *Mercury*) which had visited Tahiti in 1789. Edwards mentions this in his journal when recounting what happened immediately after the *Pandora*'s arrival in Tahiti:

... Jno. Brown, the person left at Otaheite by Mr Cox of the *Mercury*, and from whom their Lordships supposed I might get some useful information, had been under the necessity for his own safety to associate with the pirates ... I entered Brown on the ship's books as part of the complement and found him very

intelligent and useful in the different capacities of guide, soldier and sailor (Thomson, 1915: 30).

The *Mercury* had visited Tahiti in August 1789. Several weeks later Captain Cox had in fact come very close to finding all of the mutineers — as well as the *Bounty* — when the *Mercury* had passed the mutineers' first refuge on Tubuai in the Austral Islands. Fortunately for the mutineers, however, the *Mercury* passed at night, and although fires were sighted ashore, Cox did not bother to investigate. While at Tahiti, Cox had heard of the return of *Titreano* — the Tahitians' name for Fletcher Christian — in the *Bounty*, without Bligh (Denig, 1992: 92-4). The story had puzzled Cox; perhaps he suspected that the mutineers were at Tubuai but considered he was in no position to act. He waited until he was in England to inform the Admiralty (Mortimer, 1791).

Within hours of the *Pandora*'s arrival in Matavai Bay on 23 March 1791, five mutineers gave themselves up. The *Bounty*'s armourer Joseph Coleman was the first to surrender. His example was followed soon afterwards by two midshipmen, George Stewart and Peter Heywood; then by the *Bounty*'s barber Richard Skinner and the nearly blind ship's fiddler Michael Byrne. Two days later three more seamen, Thomas Ellison, Charles Norman and James Morrison, also surrendered. Morrison, Ellison and Norman had spent their time on Tahiti with several others building a schooner in which they had had hopes of sailing for the Dutch East Indies. One of the *Pandora*'s midshipmen, David Renouard, recounts how the mutineers with much perseverance, had built a boat:

... handsomely shaped of about 18 tons which they had named *Resolution*, to underscore their determination to use it as a means of escaping from Tahiti (Maude, 1964).

However, not all of the mutineers gave themselves up. Several managed to elude the *Pandora*'s men by sailing off in the *Resolution*. But Brown informed Edwards that they had taken insufficient water with them and would therefore probably soon return to the Papara district. The *Pandora*'s launch and pinnace were sent to Papara and within a few more days another four mutineers were captured. The remaining two, who had fled to the mountains, were finally captured as a result of information provided by Brown. By 9 April 1791 all of them, 14 in total, had been brought on board. This accounted for the 16 *Bounty* crew left behind on Tahiti, as Edwards was given credible reports about the death of 2 others before the *Pandora*'s arrival.

Captain Edwards confiscated the *Resolution*. After the boat was supplied with canvas sails from the *Pandora*'s stores, she was renamed the *Matavai* and officially commissioned as the *Pandora*'s tender. Crewed by a master's mate (William Oliver), a midshipman (David Renouard), a quartermaster (James Dodds) and six able seamen, she was to be used for inshore reconnoitering of the islands yet to be searched.

Some of the prisoners protested that their Tahitian friends had prevented them from giving themselves up. According to Morrison:

Tommaree told us we must go to the mountains and keep away from the ship. When we refused he said: I will make you go! And his men seized us and was proceeding inland with us. (Rutter, 1935: 120).

This should not be considered as a lame excuse; several of the Tahitian tribal leaders whom the mutineers had befriended, had a vested interest in the *Bounty* men. Association with the mutineers gave them access to firearms for use against traditional enemies or rival leaders. Indeed, Charles Churchill and Matthew Thompson, 2 of the 16 *Bounty* men originally left behind on Tahiti by Fletcher Christian, had died as a result of their involvement in local power struggles (Thomson, 1915: 110).

The 14 prisoners were initially confined under the quarterdeck in leg irons pending completion of a special prison cell, which Captain Edwards ordered to be built on the quarterdeck. This wooden cell was soon referred to by the prisoners as Pandora's Box. It was 11 ft × 18 ft (3.5 m × 5.5 m) on the deck and not quite high enough for Thomas Ellison — at 5'3" (1.57 m) the shortest mutineer — to stand straight in (Rutter, 1935: 123) (Fig. 3).

The building of Pandora's Box took more than one week and was only one of many tasks the *Pandora*'s crew occupied themselves with while at Tahiti. They overhauled the *Pandora*'s rigging and properly fitted out the schooner *Matavai*. Thus, the *Pandora* stayed at Tahiti for several more weeks before resuming the search for the *Bounty* and the mutineers still at large.

During this time Captain Edwards interviewed the prisoners as well as a number of Tahitian leaders to get information about the likely whereabouts of Fletcher Christian and the other mutineers. He also tried to get a clearer picture of the events which had occurred on the *Bounty* after the mutiny. In this he was aided by the journals the captured midshipmen, Stewart and Heywood, had kept. These had been found in the mutineers' sea chests, which Edwards had confiscated after their capture. He also interviewed several

prisoners on specific points in an effort to find out about what had happened since the 14 prisoners had arrived back on Tahiti and, most importantly, where the *Bounty* may have gone to since then (Thomson, 1915: 34).

It is interesting to compare the comments about the prison cell made by the gaolers, Captain Edwards and surgeon Hamilton, with the comments made by prisoners Heywood and Morrison. Not surprisingly they have opposite perspectives and emphasise different aspects. Edwards reasoned that he:

... put the pirates in a round house ... for their more effectual security, airy and healthy situation, and to separate them from and to prevent their having any communication with, or to crowd and incommode the ship's company (Thomson, 1915: 34).

Hamilton relates that the cell was built so that the prisoners would:

... be secure and apart from our ship's company; and that it might have every advantage of free circulation of air, which rendered it the most desirable place in the ship. Orders were likewise given that they should in every respect be victualled in the same as the ship's company, notwithstanding the established laws of the service, which restricts prisoners to two-thirds allowance (Thomson, 1915: 106).

These explanations may appear perfectly reasonable according to the gaolers' perspective, however, a very different light can be cast by contrasting them with Morrison's lament that:

Pandora's Box, was only 11 feet in length and 18 feet wide at the bulkhead, in which were two small scuttles of 9 inches, and one on top of 18 or 20 inches square, secured by a bolt. When it was calm, the heat was so intense that the sweat frequently ran in streams to the scuppers, and soon produced maggots, and the hammocks given to us were full of vermin, from which we could find no method of extricating ourselves ... In this situation we remained for 5 months ... Our miserable situation soon brought sickness on amongst us ... and, as the place was washed twice a week, we were washed with it, there being no room to shift us from place to place, and we had no alternative but standing up until the deck had dried ... (Rutter, 1935: 122).

In a letter to his sister, Netsy, Heywood concurred with Morrison's complaints about conditions inside the cell. He stated that the prisoners:

... were all put in close confinement, with both legs and hands in irons, and were treated with great rigour, not being allowed ever to get out of this den. And, being obliged to eat, drink, sleep and obey the calls of nature here, you may form some idea of the disagreeable situation I was in (Tagart, 1832: 33) (Fig. 3).

The prisoners' treatment while locked up on the *Pandora* is sometimes cited as one of the examples of the harsh discipline 18th century naval crews were subject to. In this regard, Captain Edwards is often considered excessively

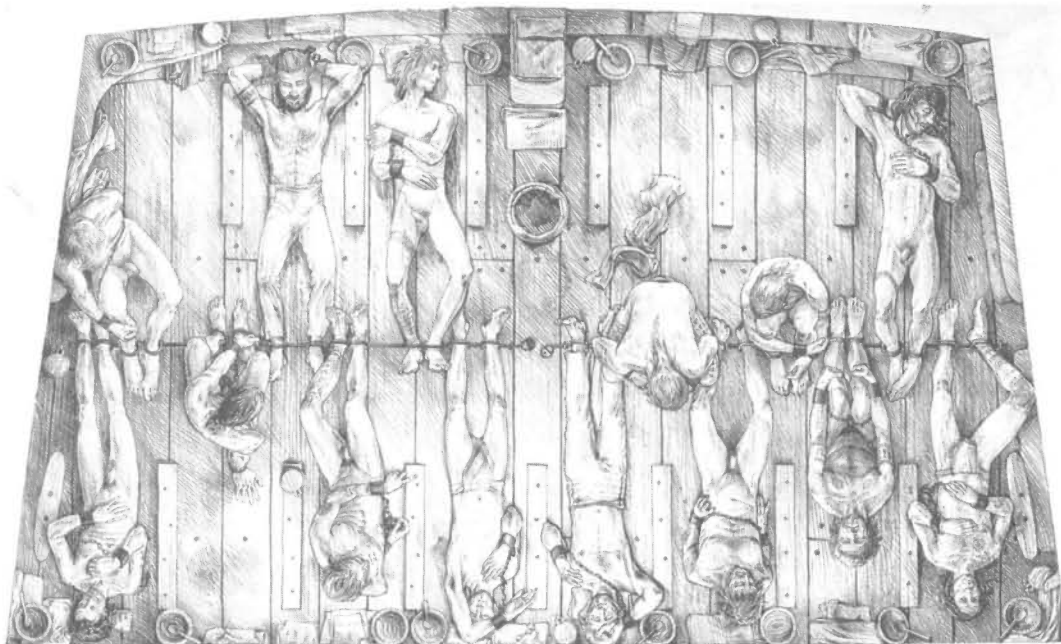


FIG. 3. Artist's impression of 'Pandora's Box' (by Robert Allen). The fourteen *Bounty* crew taken prisoner on Tahiti were Joseph Coleman, Peter Heywood, George Stewart, Richard Skinner, Michael Byrne, James Morrison, Charles Norman, Thomas Ellison, Henry Hillbrandt (or Heildbrandt), John Sumner, Thomas McIntosh, William Muspratt, Thomas Burkitt and John Millward, four of whom (Skinner, Stewart, Sumner and Hillbrandt) did not survive the wreck.

callous, not only because he put the prisoners under close confinement during the *Pandora*'s four month cruise in search of the *Bounty*, but more so because he is reported as having shown very little sympathy for the prisoners' plight after the *Pandora* had struck the reef and during the sojourn on Escape Cay, when the prisoners were allegedly refused shelter against the harsh tropical sun.

How much justification is there to consider Captain Edwards as an excessive disciplinarian? Obviously, he should not be judged by 20th century standards. Most likely, he was simply following his orders, which were:

... to keep the mutineers as closely confined as may preclude all possibility of their escaping, having, however, proper regard to the preservation of their lives; that they may be brought home to undergo punishment due to their demerits (Adm. 2/120).

What obviously mattered to Edwards was that the appropriate judicial processes were to be followed. It was not his prerogative to make, much less act on, judgements or pronouncements about the prisoners' guilt or innocence. They were to be brought home to undergo punishment

due to their 'demerits'. Thus, by keeping them 'closely confined' to preclude escape, all the prisoners were treated in the same manner, in spite of the fact that Bligh had publicly vouched for the innocence of Norman, Byrne, Coleman and MacIntosh. Peter Heywood later acknowledged this during his trial when he stated that Edwards had not acted improperly by imprisoning all of the mutineers but had simply followed the Royal Navy's rules, or, as Heywood phrased it, '... the dictates of the service' (Tagart, 1832: 117).

Captain Edwards was probably also conscious of the need to lock up, guard and separate the prisoners because he was anticipating trouble with some of the prisoners' Tahitian friends. Most of the mutineers had formed relationships with Tahitian women and had also forged bonds of friendship (*taio*-ship) according to Tahitian custom with Tahitian men, some of whom were their consort's father or brothers. Rival tribal leaders had informed Edwards about a plot to rescue George Stewart, which was apparently being hatched by Stewart's '*taio*', who was also Stewart's *de facto* father-in-law. Conceivably the

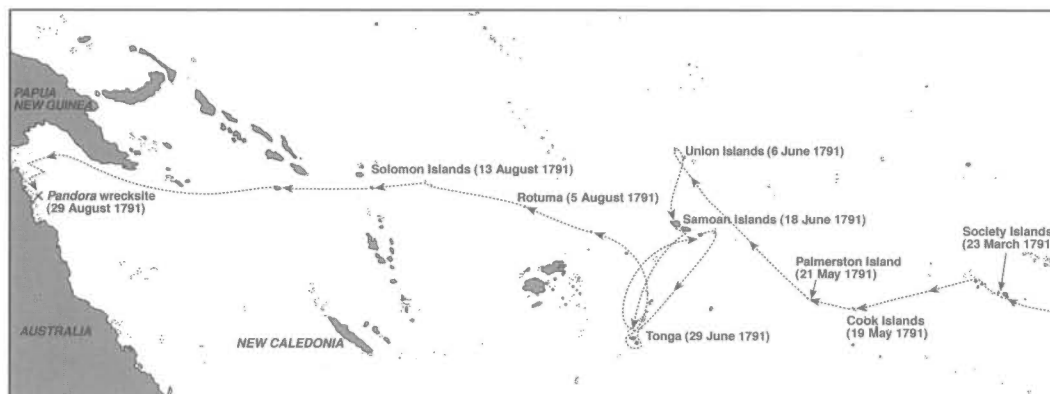


FIG. 4. Track of the *Pandora*'s search for the *Bounty* in the South Pacific.

plot would put not only the prisoners at risk but the *Pandora* as well (Thomson, 1915: 106-7). Viewed in this light then, Edwards' orders to strictly separate and guard the prisoners can be interpreted as the actions of a vigilant commander, primarily concerned for the safety of his ship and its crew. Hence the orders to prevent any communication between the prisoners and their Tahitian friends or consorts. Obviously sometimes these orders, and the orders prohibiting communication between the prisoners and the *Pandora*'s crew, could not always be enforced: for example, as Edwards mentions, during the times that the prisoners were taken forward (to the heads) to relieve themselves (Adm. MS 180, Edwards' papers, bundle 7).

SEARCHING THE SOUTH PACIFIC. After completing the ship's maintenance and his enquiries, Edwards decided to leave Tahiti on 8th May 1791, following the itinerary outlined in his orders. These instructed him to proceed to the island of 'Whytootackee':

... calling ... at Huahine and Uliatea, where you need not anchor as numbers of the natives may be expected to come off to you, of whom you may probably get the necessary information ... (Adm 2/120).

After 'Whytootackee' (Aitutaki, in the Cook Islands) the *Pandora*'s crew searched the Union (Tokelau), Samoan and Friendly (Tongan) Islands (Fig. 4).

Using the *Matavai* or the *Pandora*'s boats and, on one occasion, a sailing canoe hired in Tonga, Captain Edwards sent off armed shore-parties to look for word or signs of the mutineers still at large. On these occasions the *Pandora* usually remained well offshore to avoid the fringing reefs typical of the South Pacific islands. As a result of

this practice the ship's cutter, with five men under command of midshipman John Sival, was lost when it failed to return from a search of Palmerston Island (Fig. 4) on 24 May; it was not heard of again (Thomson, 1915: 86) (Appendix 1).

Sival's cutter was the first of two of *Pandora*'s boats lost. The second one, the schooner *Matavai*, failed to rendezvous with the *Pandora* on 23 June off Samoa. Command of the schooner had been given to William Oliver, a 20 year old master's mate. After becoming separated from the *Pandora* during a storm, he and his crew successfully navigated the schooner from Samoa to Tofua, then along the New Guinea coast via the Torres Strait (Fig. 5), to Surabaya in the Dutch East Indies. This voyage can be ranked with William Bligh's much vaunted open boat voyage to Timor in the *Bounty*'s launch. A transcript of a journal kept by Oliver's second-in-command, 16-year-old midshipman David Renouard, has survived and is of considerable historical interest; particularly because it describes several Pacific islands not previously recorded by European explorers (Maude, 1964). The schooner's crew arrived in Java on 20th September, several weeks before the survivors of the *Pandora* shipwreck; which occurred at about the same time as Oliver and his crew were struggling to get the schooner through the Torres Strait.

However, their woes were not over yet; Renouard recalls, when they made Surabaya:

Mr Oliver immediately waited on the governor to acquaint him with our misfortunes and to implore the protection and assistance due to British subjects in distress. But the fate of the '*Bounty*' had been communicated to (him), in consequence of which the governor suspected the truth of our story. The

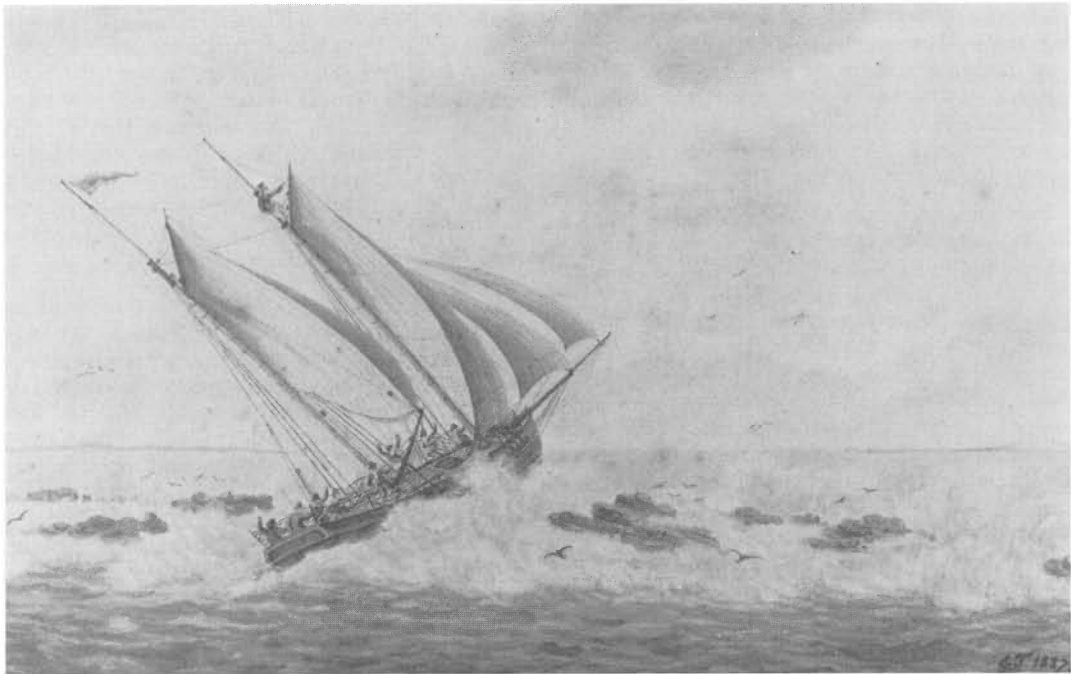


FIG. 5. Watercolour attributed to George Tobin showing the tender *Matavai* struggling through Torres Strait waters. (Reproduced courtesy of the Australian National Maritime Museum)

appearance of our vessel, being built entirely of Otaheitan wood, served to strengthen him in the opinion that we were in reality part of the 'pirates' who had seized on the '*Bounty*'...

As suspected *Bounty* mutineers, the crew was imprisoned in Surabaya. But William Oliver eventually managed to persuade the governor to let them go on to Batavia. On the way there they put in at Samarang where, during the last week of October, they fortuitously met up with their former shipmates who had survived the wreck of the *Pandora*.

Captain Edwards eventually found out why the *Matavai* had failed to turn up at Anamooka. Oliver had been given orders to proceed to Anamooka (modern Nomuka), one of Tongan Island Group, in the event the tender failed to rendezvous with the *Pandora* off Samoa. But while bound for Anamooka, Oliver miscalculated the tender's speed and arrived at Tofua, about sixty miles downwind. Mistaking Tofua for Anamooka, the tender's crew waited there for several weeks, after which Oliver assumed something untoward had occurred to the *Pandora*; consequently he decided to make for the Dutch East Indies (Maude, 1964).

In the meantime as the *Pandora* had waited for the tender off Anamooka, several of the *Pandora*'s crew experienced difficulties in their interaction with the islanders. As related by George Hamilton, one incident involved Captain Edwards' clerk whose clothes were stripped from him and stolen.

Another incident was an assault on lieutenant Robert Corner, who apparently felt sufficiently provoked to shoot dead one of his assailants. None of these incidents appears to have prevented what Hamilton referred to as a 'brisk trade' being carried out between the islanders and the *Pandora*'s men (Thomson, 1915: 132-5). On a previous occasion Hamilton also mentioned trade with islanders, specifically the purchase of objects not related to provisions or the ship's stores at:

...Whytootackee, an island discovered by Captain Bligh ... Here we purchased from the natives a spear of the most exquisite workmanship; it was nine feet long and cut in the form of a Gothic spire ... (Thomson, 1915: 123).

The remainder of the *Pandora*'s voyage through the south west Pacific was comparatively uneventful. Shortly after leaving Anamooka on 1st August an auction of the tender crew's

possessions was held. In his papers Captain Edwards mentions the sale of William Oliver's and David Renouard's personal possessions among the *Pandora*'s officers. This was done prematurely, in light of the fact that the crew of the tender were to be reunited with the *Pandora*'s crew two months later.

Several discoveries of small islands were also made, including Rotumah (Fig. 4). On 13 August an island Edwards named Pitt's Island (Vanikoro Island) was sighted in the Santa Cruz Group. Hamilton describes it as mountainous and assumed it was inhabited because of smoke observed in various parts of it (Thomson, 1915: 140). However, a shore party was not sent out to investigate. Possibly some of these fires were associated with the survivors of the French explorer La Perouse's expedition, whose last known port of call had been Port Jackson, in February 1788, after which his vessels *La Boussole* and *L'Astrolabe* had not been heard of again. If the *Pandora* had stopped to investigate, further light may have been thrown on the mystery of La Perouse's disappearance. But definitive information on the loss of La Perouse's ships would not be available until 1827, when the sandalwood trader Peter Dillon went to Vanikoro to investigate reports about the source of European objects he had found on neighbouring Tikopia (Dillon, 1829: 33ff). However, somewhat surprisingly, Edwards did not stop to investigate and ordered a:

... course to the westward between the latitudes of 10° and 9°33' S, keeping the mouth of Endeavour Straits open, by which means (he) hoped to avoid the dangers experienced by Captain Cook in his passage through the reef in higher latitudes ... On 25th August at 9 in the morning, we saw breakers from the masthead ... (Thomson, 1915: 70).

These breakers were named Look-out Shoal and Edwards attempted to by-pass them by setting a south-westerly course in the hope of finding a direct channel to Endeavour Straits. On this course the *Pandora* encountered the islands and reefs around Mer at the eastern entrance to the Torres Strait. Edwards named them the Murray Islands but did not land on them. In order to by-pass them, a southerly course was followed. However, no suitable passage was found during that day or the next. He kept the ship well away at night and came back to the reef's edge during the day. A large opening was sighted two days later. The yawl was launched and lieutenant Corner was given orders to reconnoitre inside the entrance. The *Pandora* hove to outside the opening. When Corner returned late in the afternoon, he signalled

from the yawl that a navigable passage through the reef had been found. It is interesting to note that Edwards mentions that at this stage the yawl was 'outside the reef' (Adm. MS 180, Edwards' papers, bundle 16). This indicates that by this time the *Pandora* may have already drifted into Pandora Entrance while waiting for the yawl's return. Whatever the case, as night was approaching, Edwards, ever prudent, ordered it back to the ship, to get it on board before nightfall.

THE WRECKING. In ordering the yawl back to the ship, Edwards was undoubtedly acting as a precaution against losing another of the ship's boats. With 15 men already missing as a result of misadventures with the schooner *Matavai* and the cutter, the *Pandora* could ill afford the loss of another boat and more men. Undoubtedly this accounts for the ship actually venturing into the entrance late in the afternoon to pick up Corner's yawl. With the sun low on the western horizon, visibility would have been greatly reduced and any reefs lying ahead difficult to see. Hove to, the vessel was especially vulnerable to the strong tidal current which must have driven her further west into the entrance, where it was low tide at approximately 5.30pm (L. Hiddens, pers. comm.).

It is not difficult to imagine that at this point the crew may have been distracted by signalling between the ship and the yawl (Fig. 6). More importantly, with sunset at approximately 6pm and the sun low on the western horizon after approximately 5pm, it would have been very difficult for the lookouts to discern waves breaking on the small submerged coral outcrops located in this part of Pandora Entrance to the west of *Pandora*'s location.

Edwards' account of the wrecking describes how the vessel ran aground when:

...at about twenty after seven the boat was seen close in under our stern and at the same time we got soundings in 50 fathoms. We immediately made sail, but before the tacks were on board the ship struck upon the reef when we were getting 2 fathoms on the larboard side, and 3 fathoms on the starboard side. An hour and a half after she had struck there was eight feet of water in the hold and we perceived that the ship had beat over the reef where we had 10 fathoms water (Thomson, 1915: 72).

Thus, an unfortunate combination of factors caused the ship to run aground on a coral outcrop not much larger than a cricket oval. This outcrop is now unofficially referred to as Pandora's Reef and is surrounded on all sides by depths in excess of 30 metres (15 fathoms). It is one of several, mainly submerged, small reef outcrops within Pandora Entrance.



FIG. 6. The *Pandora* 'hove to', waiting to take on board Lt Corner's yawl (artist's interpretation, watercolour by B. Searle, 1995).

Possibly, the vessel might have cleared the reef, or at least not have impacted on it as heavily if she had run onto it several hours later when high water would have been at approximately 11pm. At this time there would have been between three to four metres of water over the reef (Fig. 7).

Aided by the rising tide, the crew managed to refloat the vessel just before midnight and to prevent her from striking adjacent reefs by anchoring the stricken vessel '... in 15 fathoms with both anchors' (Rutter, 1935: 125). Morrison adds how:

Coleman, Norman and Macintosh were ordered out to the pumps and the boats got out. But as soon as Captain Edwards heard that we had broke our irons he ordered us to be handcuffed and ironed again ... the Master at Arms and Corporal were now armed with each a brace of pistols and placed as additional centinals over us, with orders to fire among us if we made any motion (Rutter, 1935: 126).

One can only speculate why Captain Edwards ordered handcuffing of the other prisoners who had not been let out of their cell to help at the pumps and why he ordered several armed men on

top of the prison cell. Possibly he was afraid they might steal a boat, interfere with the crew's efforts to save the ship, or disrupt plans for the orderly evacuation of the ship.

By all accounts the crew behaved splendidly. They worked hard to prevent the sinking of the ship; at the pumps, attempting to stop leaks, repairing equipment or hull damage below decks, fothering the hull, or heaving guns overboard to lighten the ship.

They continued to do so in spite of two fatal accidents during the night. Hamilton describes vividly how the:

... guns were ordered thrown overboard; and what hands could be spared from the pumps were employed thumbing a topsail to haul under her bottom to endeavour to fother her ... We baled between life and death ... She now took a heel, and some of the guns they were endeavouring to throw over board run down to leeward, which crushed one man to death; about the same time, a spare topmast came down from the booms and killed another man ... During this trying occasion the men behaved with the utmost intrepidity and obedience, not a man flinching from his post (Thomson, 1915: 143).

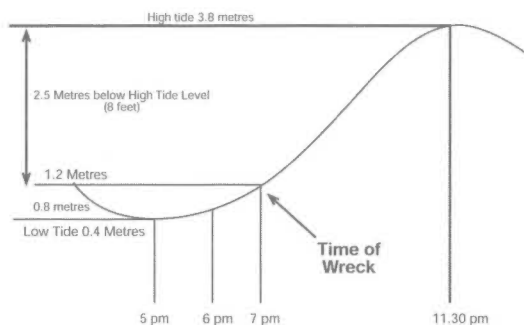


FIG. 7. Tidal range at Pandora Entrance on 28 August 1791. (Courtesy L. Hiddens)

The identity of the two men killed before the *Pandora* sank is unfortunately not revealed in Captain Edwards' list of the 31 crew lost with the ship (Adm. MS 180, Edwards' papers).

Early next morning it was clear that nothing more could be done to save the stricken vessel. Orders were given to abandon ship and to release the eleven remaining prisoners from Pandora's Box. It appears the armourer's mate, Hodges, acted too slowly here. According to Morrison, the ship began to sink before Hodges was able to release all of the prisoners from their fetters:

At daylight the boats were hauled out and, most of the officers being aft on top of the Box, we begged that we not be forgot, when by Captain Edwards' orders Joseph Hodges, the armourer's mate, was sent down to take the irons off; but Skinner, being too eager to get out, got hauled up with his handcuffs on, and there being two following him close, the scuttle was shut and barred again. I begged the Master-at-Arms to leave the scuttle open when he answered 'Never fear my boys, we'll all go to hell together!'. The words were scarce out of his mouth when the ship took a sally and a general cry of there she goes' was heard. Burkitt and Heildbrandt were still handcuffed and the ship under water as far as the mainmast and it was now flowing in fast on us when Divine providence directed William Moulter to the place. He was scrambling up on the box and, hearing our cries, took out the bolt and threw the scuttle overboard. On this, we all got out except Heildbrandt (Rutter, 1935: 127).

William Moulter's solicitude, which undoubtedly saved several other prisoners from certain drowning, was recognised in 1984 when one of the sand cays in Pandora Entrance was named after him. The cay at the eastern approach to Pandora Entrance, referred to by Edwards as Entrance Cay, is now called Moulter Cay to commemorate Moulter's humane deed.

ESCAPE CAY. Thirty-one of the *Pandora*'s crew and 4 of the prisoners did not survive the wreck. Among the casualties were the two extra guards posted on top of Pandora's Box, master-at-arms



FIG. 8. George Reynolds' pen and ink drawing showing a shipmate in the water after the wrecking. (Private collection)

John Grimwood and ship's corporal William Roderick, as well as prisoners, George Stewart, Henry Heildbrandt, John Sumner and Richard Skinner. The survivors, 89 crew and 10 prisoners, reached a small sandcay about three miles to the west of the wreck. Incredibly, several of the prisoners managed to stay afloat in spite of still wearing their handcuffs (Fig. 8).

Peter Heywood described the survivors' plight in a letter he later wrote to his sister, adding in the margins of his letter:

... two little sketches of the manner in which HMS *Pandora* went down on 29th August, and the appearance we who survived made on the small sandy key within the reef, about ninety yards long and one hundred athwart, in all ninety-nine souls. Here we remained three days, subsisting on a single wineglass of wine or water, and two ounces of bread daily, with no shelter. Captain Edwards had tents erected for himself and his people, and we prisoners petitioned him for an old sail which was lying useless, but he refused it, and all the shelter we had was to bury ourselves up to the neck in the burning sand, which scorched the skin, we being quite naked, entirely off our bodies, as if dipped in large tubs of boiling water (Tagart, 1832: 71) (Fig. 9).

The identity of the sandcay Heywood described has not yet been definitively established. However, it is likely to be Preservation Cay (Fig. 10). The survivors called it 'Escape Cay' to distinguish it from 'Entrance Cay' (Moulter Cay), the sandcay marking the entrance to Pandora Passage. Edwards placed both cays on latitude 11°23'S (Thomson, 1915: 89). However there is a problem with this determination as neither Moulter Cay nor Preservation Cay are actually on the latitude recorded by Edwards. On modern charts their actual latitude is at approximately 11°25'S (Great Barrier Reef Marine Park Authority, 1985). The discrepancy of two minutes can be attributed to the accuracy of Edwards' instrument, which was probably an octant or quadrant.

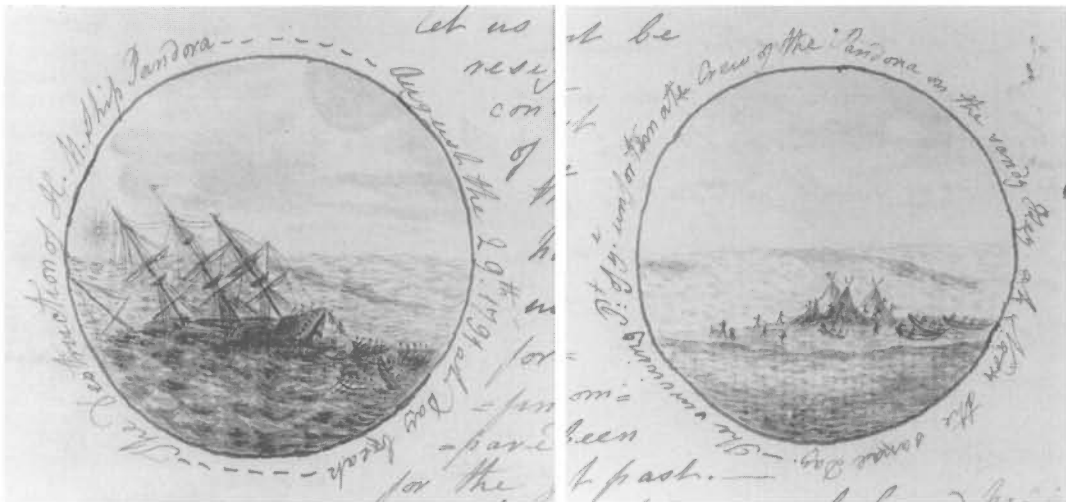


FIG. 9. Thomas Heywood's sketches of the wrecking and the survivors on the cay. (Courtesy of the Newberry Library, Chicago)

The identification of Preservation Cay as Escape Cay becomes more likely with the addition of details from Morrison's accounts. Morrison mentions that the cay was the middle of three similar cays within Pandora Entrance:

... the whole of it being no more than a small sandbank washed up on the reef which, with a change of wind, might disappear, it being scarcely 150 yards in circuit and not more than 6 feet from the level of high water. There are two more of the same kind of which this is in the middle; between it and the one to the southward is a deep channel through which a ship might pass in safety (Rutter, 1935: 128).

Looking at the modern configuration of cays within Pandora Entrance (Fig. 10) (Great Barrier Reef Marine Park Authority, 1985) and assuming this reflects the situation in August 1791, there are three cays and two sandbanks. At spring tides the sandbanks sometimes dry, but generally they are submerged and do not warrant being called sand cays proper. For this discussion, they have been disregarded. Morrison's description appears to suggest that the three cays in question are aligned along a north-south axis. However, there are only two cays oriented approximately along that axis (Fig. 10); the third cay (Moulter Cay) being well to the east. One explanation for Morrison's description could be that one of the two sandbanks to the north of 'Melbourne Cup' Cay (Cay 11-088 on BRA Q 102) (unofficially named Melbourne Cup Cay by members of the Queensland Museum's 1983 *Pandora* expedition to mark the location of a piggy-back horse race on Melbourne Cup race day in 1983) was a

substantial cay in 1791, but has eroded since then. If this was the case at the time of *Pandora*'s loss, then Melbourne Cup (Cay 11-088) Cay may be Escape Cay. However, this explanation is unlikely in view of Morrison's mention of a 'safe' and 'deep' channel between the middle cay and '... the one to the southward'. The channel referred to is unlikely to be any of the narrow, east-west running passages between Melbourne Cup (Cay 11-088) Cay and Preservation (Cay 11-091) Cay or between the string of small reefs directly to their south. None of these east-west aligned passages is wider than 100m. While they may be reasonably safe for modern motor-driven vessels, a navigator attempting to pass through them under sail would be reckless in the extreme because of the strong tidal flows and eddies which occur inside the passages. It therefore seems more plausible that Morrison's use of 'southward' in designating the 'safe' channel's position should actually be interpreted as a channel leading to the southward rather than lying to the southward. The wide opening between Moulter Cay and Preservation Cay is certainly wide enough and does lead to the south.

Possibly then, this opening is the channel explored by lieutenant Robert Corner, which the *Pandora* would have taken the next day if she had not run aground while manoeuvring to take on board the yawl. The three cays Morrison mentioned are most likely to be Moulter (Entrance) Cay, Preservation (Escape) Cay (Cay 11-091)

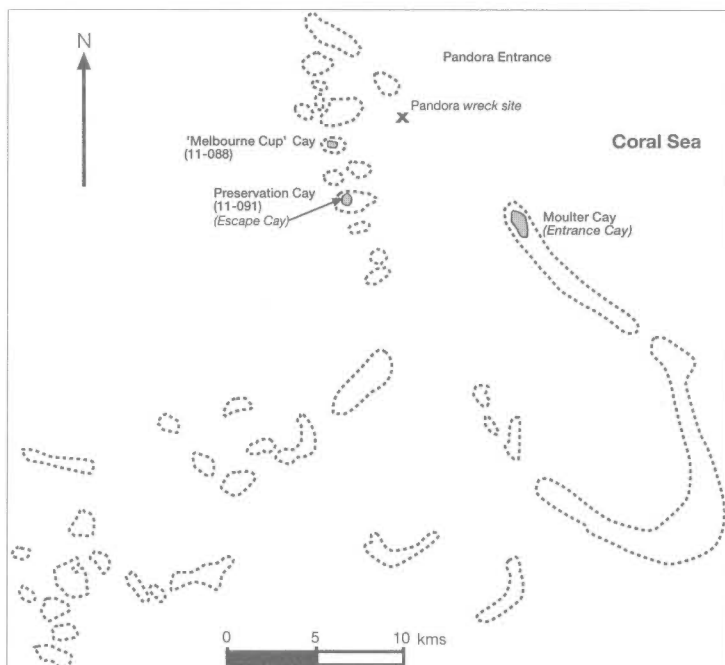


FIG. 10. Pandora Entrance, modern situation (map drawn from GBRMPA, BRA Q102).

and the unnamed cay, now referred to unofficially as Melbourne Cup (Cay 11-088) Cay (Fig. 10).

During the two days which the survivors spent on Escape Cay, the majority of the men were idle, although a number of them were undoubtedly involved in making more seaworthy the four boats saved from the *Pandora*. While one boat went off to fish, another was sent back to the wreck the next day to see if anything worthwhile could be salvaged (Fig. 11). They returned '... with part of one of the Top Gallant Masts ... and a cat ... found sitting on the crosstrees ...' (Rutter, 1935: 129). The cat is not mentioned again in any other source, and its fate is unknown.

THE SURVIVORS' JOURNEY TO ENGLAND. *Escape Cay to Mount Adolphus Island.* By sending lieutenant Corner in the yawl to reconnoitre Pandora Entrance, Edwards was not being overly cautious. Undoubtedly most watchful commanders would have done the same, especially in light of the remarks about the intricacies and dangers of navigating in Great Barrier Reef waters made by navigators of James Cook and William Bligh's calibre.

Captain Edwards was to use the information gathered by Corner to give effect to what may have been another aspect of his orders, which was

to find, in a more northerly latitude, an easier passage through the Great Barrier Reef than the track from Providential Channel to Endeavour Strait followed by Cook in 1770. Edwards described the passage the *Pandora*'s survivors followed, saying that they left Escape Cay on:

... the 31st August ... at half past ten in the forenoon (and) embarked and steered N.W. by W. and W.N.W. within the reef. This channel through the reef is better than any hitherto known. In the run from thence to the entrance of Endeavour Strait there is a small white island on the larboard end of the channel which lies in latitude $11^{\circ} 23' S$ (Thomson, 1915: 75) (Fig. 12).

Edwards omits to name the island at the end of this channel, but with reference to modern charts it is reasonable to assume that the track followed by the *Pandora*'s boats took them through what is now named Denham Pass.

Edwards' 'small white island' (Thomson, 1915: 75) can therefore be identified as either Cholmondsley Island or Wallace Islet (AUS 835).

However, the passage pioneered by the *Pandora*'s boats was never generally adopted nor recommended in 19th century sailing directions. Edwards' claim about the superiority of the passage was not followed up; presumably because of a general perception among merchant captains that advice from ships' commanders who had lost their ships ought not to be heeded. More importantly perhaps, how could Edwards have hoped to be compared to such accomplished navigators as Cook and Bligh (whose reputation as a skilled navigator and very capable hydrographer was never adversely affected by the debate concerning his qualities as a naval commander). Edwards' and Hamilton's descriptions of the survivors' route refer to landmarks and geographical features noted by both James Cook and William Bligh. Other landmarks and features are also noted and named.

Distributed among the four boats, the 99 survivors set off for the mainland; before nightfall the boats formed into single file, the launch in front with each boat successively in tow (Fig. 13). At daylight on 1 September 1791, the mainland

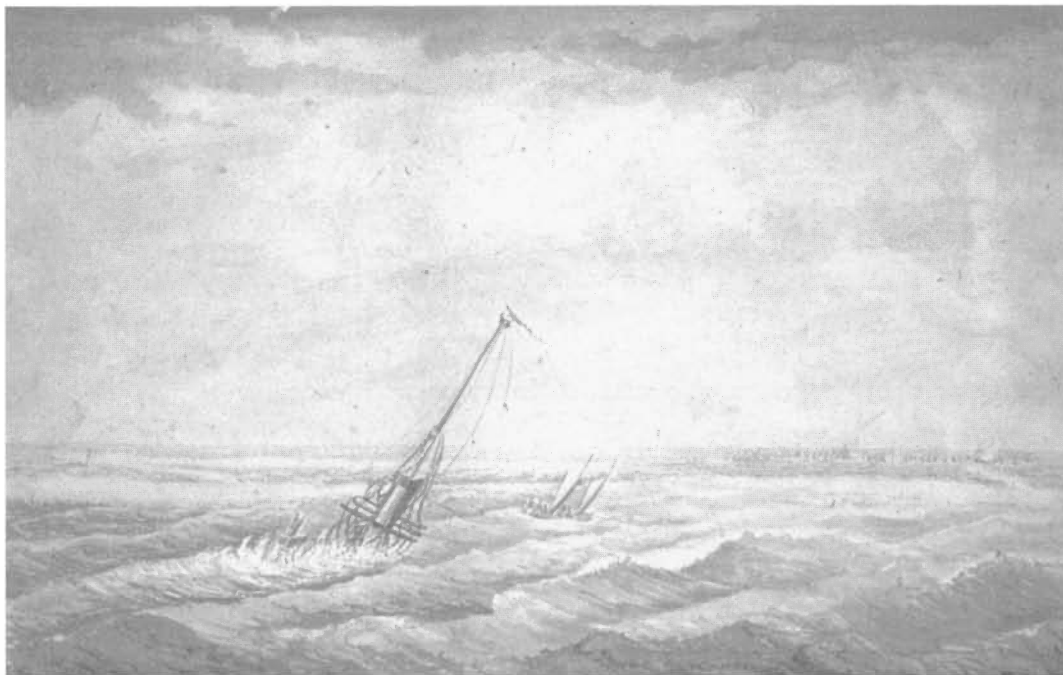


FIG. 11. George Reynolds' water colour of the masts protruding from the waves. (Private collection)

was sighted and the two yawls sent ashore at Freshwater Bay to search for water, while the launch and pinnace made for Mount Adolphus Island.

Morrison and Hamilton's accounts are most informative about the survivors' progress after Escape Cay. Their accounts give interesting details about Cape York, the Torres Straits and their inhabitants.

Morrison recalls that the survivors:

... embarked in the following manner: McIntosh, Ellison and myself in the pinnace with Capt Edwards, Lieut. Hayward and 19 officers and men ...; in the Red Yawl went Burket & Millward with Lieut. Larkan and 19 officers and men; in the Launch, Peter Heywood, Josh Coleman & Michael Byrn, with Lieut. Corner & 27 officers and men; in the Blue Yawl, Norman and Muspratt, with the master and 19 officers and men, making ninety-nine souls in all ... next morning, the 1st of September, we made the land ... and the two yawls were sent in to the land, while we stood on towards an island where we hoped to get water. In the afternoon we were joined by the yawls who had got water and having filled their vessels followed us ... We stood in for a bay to search for water and as we approached a beach found that there were some inhabitants on it, ... The natives appeared on the beach to the amount of 18 or 19 men, women and children, who appeared to be all of one family; they came off freely to the boats when we found that the colour of their skin was heightened to a jett black by means of either soot or

charcoal ... some had holes in their ears which were stretched to such a size as to receive a man's arm. We made signs that we wanted water which they soon understood, and half an anker being given to one of them & some trifles by way of encouragement, he soon returned with it almost full which (we poured) into a brecco and we gave it to him again. He then called a young woman who stood near him and sent her for the water ... Meanwhile two of the men began to prepare their weapons, and a javelin being thrown ... several muskets were fired ... (Rutter, 1935: 129-30).

Morrison's ability to recall such details as the number of men in the boats, which prisoners went with which officers and in which boat is remarkable. Looking at his published account, the amount of detail he is able to recall about many aspects of the voyage suggests he had a journal, notebook or some paper to make notes. This is corroborated by Captain Edwards' mention that he suspected that some of the prisoners were engaged in a secret correspondence with some of the *Pandora*'s crew (Adm. MS 180, Edwards' papers bundle 7). Alternatively, he may later have had access to one of the *Pandora*'s officer's journals; perhaps when he was writing his 'memorandum' while a prisoner awaiting his court martial in Portsmouth (Du Rietz, 1986).

Possibly Hamilton's notes or journal were accessible to Morrison, as Hamilton records similar

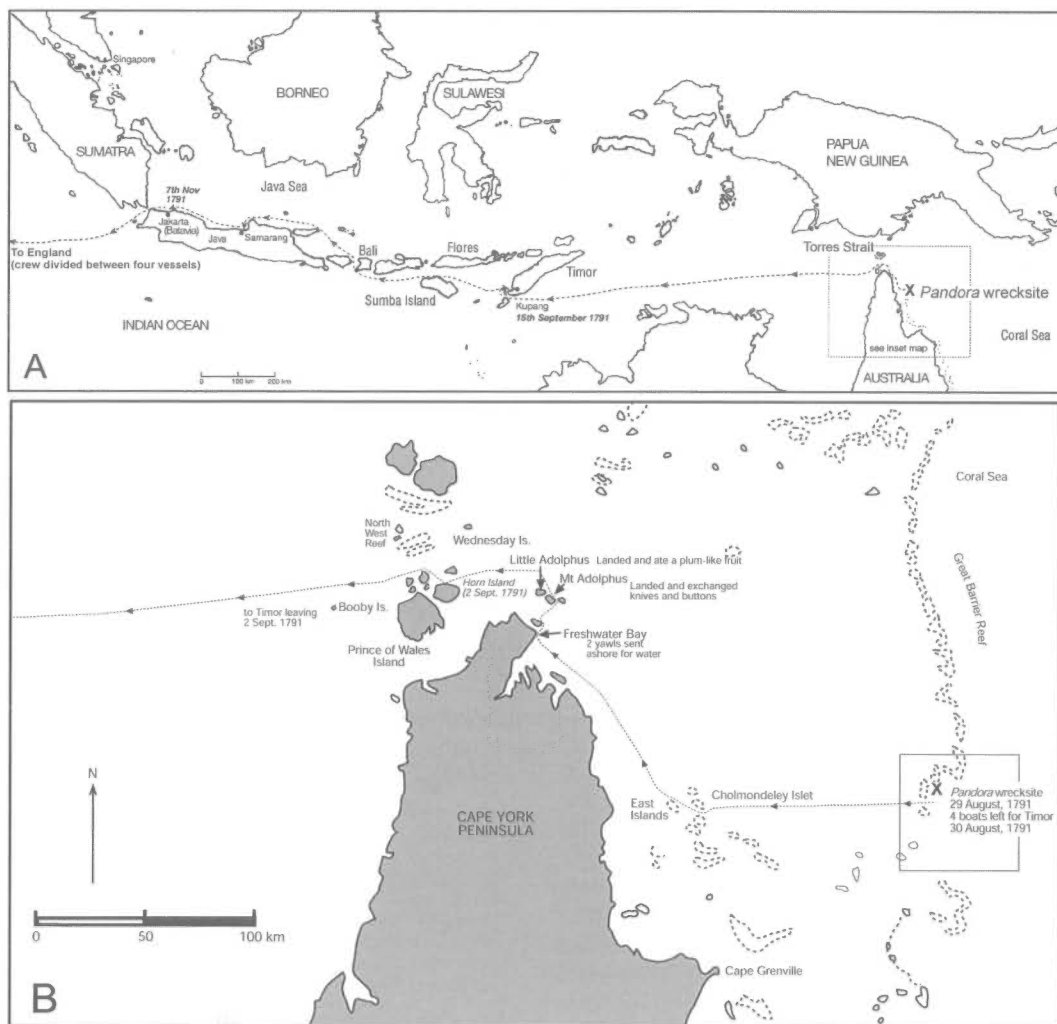


FIG. 12. A, B, Survivors' route to Timor.

details about the survivors' progress from Escape Cay:

... we embarked and laid the oars upon the thwarts, which formed a platform, by which means we stowed two tiers of men ... At meridian we saw a cay [Cholmondeley Island] bounded with large craggy rocks ... At eight in the morning, the red and blue yawls were sent ahead ... to investigate the coast of New South Wales ... On entering a very fine bay [Freshwater Bay] we found most excellent water rushing from a spring at the very edge of the beach. Here we filled our bellies, a tea kettle, and two quart bottles. The pinnace and launch had gone too far ahead to observe any signal of our success; and immediately we made sail after them ... In two hours we joined the pinnace and launch, who were lying to for us ... After running along, we came to an inhabited island [Mount Adolphus Island] from which we promised ourselves a

supply of water. On our approach, the natives flocked down to the beach in crowds ... we made signals of distress to them for something to drink, which they understood; and on receiving some trifling presents of knives and some buttons cut off our coats, they brought us a cag of good water. They would not however bring it the second time, but put it down on the beach and made signs to us to come on shore for it. This we declined as we observed the women and children ... supplying the men with bows and arrows. In a few minutes, they let fly a shower of arrows amongst the thick of us. Luckily we had not a man wounded ... We steered from these hostile savages to other islands [Little Adolphus Island] (Thomson, 1915: 148).

There is a slight difference between Edwards' account and Morrison's and Hamilton's account



FIG. 13. The *Pandora*'s boats in tow while making for Timor. (Private collection)

of the survivors' first contact with the Australian mainland, the Torres Strait's islands and their inhabitants. Edwards glosses over the hostile nature of the encounter.

Hamilton and Morrison are more forthcoming, although they do not distinguish whether the people were Aborigines or Torres Strait Islanders. However, Hamilton's mention of the bows and arrows used against the *Pandora*'s boats suggests that the encounter was with Torres Strait Islanders, as Aborigines did not use this kind of weapon. From Hamilton's account, it appears that after the hostile encounter on Mount Adolphus Island an armed party probably landed on Little Adolphus Island to look for water before setting off for Horn Island (called Laforey's Island by Hamilton).

Mt Adolphus Island to Timor. Edwards named Little Adolphus Island Plum Island, after an abundant fruit — probably the bountiful Torres Strait 'nonda' plum — found growing there by the shore party. They left the island before nightfall and steered a westerly course towards the Prince of Wales Islands, west of Cape York. Several of the islands were named by Edwards, however, not all of these names were adopted to be passed on and recorded on modern charts.

Edwards recounts how in the evening they:

... steered for the islands which we supposed were those called Prince of Wales' Islands by Captain Cook, and before midnight came to, near one of these islands, in a large sound formed by several of the surrounding islands, to several of which we gave names, and called the sound Sandwich Sound. It is fit for the reception of ships, having from five to seven fathoms of water. There is plenty of wood on most of the islands, and by digging we found very good water ... (Thomson, 1915: 149).

Although Edwards probably chose the names of the various other islands making up the Prince of Wales Group, he does not mention any of them in his text. However, Hamilton does mention them individually:

We steered for those islands which we supposed were called the Prince of Wales' Islands; and at about two in the morning came to anchor ... along side of an island we called Laforey's Island [Horn Island] ... The morning was ushered in with the howling of wolves ... Lt. Corner and a party were sent at daylight to search again for water... As we landed, we discovered a footpath which led down into a hollow ... and on digging we had the pleasure to see a spring rush out ... On traversing the shore, we discovered a moray, or rather a heap of bones ... among them two human skulls, the bones of some large animals, and some turtle bones. These were heaped together in the form of a grave, and a very long paddle, supported at each end by a bifurcated branch of a tree, laid horizontally along it ... There is a large sound formed here, to which we gave the name of Sandwich Sound [Flinders Passage (AUS 293)], and commodious anchorage for shipping in the bay, to which we gave the name Wolf's Bay, Hammond's Island lies north west ... Parker's Island [Wednesday Island (AUS 293)] from north by west to north and by east ... Sandwich Sound is formed by Hammond's, Parker's and a cluster of small islands on the starboard hand at its eastern entrance [Tuesday Islets (AUS 293)] and near the centre of the sound is a small dark-coloured, rocky island [Channel Rock (AUS 293)] (Thomson, 1915: 151).

From Hamilton's account, it is obvious that a shore party landed on Horn Island (Hamilton calls it Laforey Island) and traversed part of its northern shoreline. It is assumed that the shore party landed just west of King Point on its north eastern shore, where the coast forms a shallow bay towards the south (i.e. Hamilton's Wolf's Bay). However, they do not appear to have traversed very much of the shore as Hamilton omits to mention Thursday Island, which, if they saw it, they must have assumed to be part of

Hammond Island because of its height. From their vantage point at Wolf's Bay the channel between Thursday and Hammond Islands would not have been apparent; Thursday Island would therefore have appeared an integral part of Hammond Island.

The survivors made off from Horn Island as soon as they had filled their containers with water. They left Sandwich Sound by the entrance, now called Flinders Passage, between Hammond and Wednesday Islands (AUS 293), entered Prince of Wales Channel and last sighted the Australian coast late in the afternoon when, west of Goods' Island, they finally cleared Prince of Wales Channel (Thomson, 1915: 77) (Fig. 12B).

Although there is no record of third lieutenant Thomas Hayward's thoughts at the sight of Prince of Wales Island receding from view, it would be understandable if he had been overheard muttering to himself that as far as he was concerned this was the last time he wanted to set eyes on this part of the world. After all, having been with Bligh in the *Bounty's* launch in 1789, it was the second time within as many years that he had been in Torres Strait waters in such distressing circumstances. For as Morrison recounts:

... the heat of the weather made our thirst unsupportable and as the canvas bags soon leaked out, no addition of allowance of water could take place, and to such extremity did thirst increase, that several of the men drank their own urine ... (Rutter, 1935: 131).

The survivors' progress through the Arafura Sea was comparatively uneventful in spite of the extreme deprivations suffered as a result of hunger, thirst and the heat of the sun. Some of the prisoners' lot was even worse as they not only suffered hunger and thirst, but were also made to lie down on the boats' floor with their arms pinioned. Morrison relates how he and Ellison apparently had done or said something to provoke Captain Edwards' wrath, and were subsequently ordered to be pinioned with a cord and lashed down in the boats' bottom (Rutter, 1935: 131).

Timor was finally sighted after 12 days in the Arafura Sea. The boats eventually made the Dutch East India Company's (VOC) settlement at Coupang several days after the survivors had spent a day and night ashore near a small village about seventy miles to the southwest of Coupang, where they bartered for water and food with local Timorese (Thomson, 1915: 156).

Upon arrival at Coupang, their reception by VOC officials was cordial. The Dutch authorities did everything possible to ensure a speedy and

full recovery from the ordeal of the 15 day open boat voyage. They were soon fit enough to make the journey to Batavia (Jakarta) where they would be able to embark on VOC vessels bound for Europe.

During the five weeks which the survivors spent in Coupang, Edwards took charge of another group of prisoners. This group of eight men, one woman and two children had arrived in Coupang two weeks before the *Pandora's* survivors. Led by William Bryant, they were escaped convicts from New South Wales and had made the long sea voyage in a small fishing boat from Port Jackson along the east coast of Australia to Torres Strait and across the Arafura Sea (Martin, 1991).

Timor to England. While on the journey from Coupang to Batavia, the ten surviving *Bounty* prisoners were confined to the lower deck of the VOC ship *Rembang*, which, but for the exertions of the *Pandora's* survivors who helped to crew her, was almost wrecked in a storm off the north coast of Java. The *Rembang* was then forced to put in at Samarang for repairs. Initially this delay was a setback for the *Pandora's* survivors. However, it later proved beneficial as it resulted in a fortuitous reunion with William Oliver's crew from the *Matavai*, who had been lost off Samoa and given up for dead nearly four months earlier.

For William Oliver the pleasure of the reunion with the rest of his shipmates was short-lived. His name is to be counted among the thirteen crew listed as deceased after the survivors reached the Dutch East Indies (Appendix 1). Some probably died as a result of the extreme conditions they had been exposed to during the open boat voyage (Thomson, 1915: 145), but most died of diseases contracted in Batavia, where the survivors arrived on 7 November 1791. Oliver's second in command, David Renouard, was lucky to survive the rigours of Batavia's pestilential climate. Able seaman Barker, one of the *Matavai's* crew, had died before Oliver's group got to Samarang. (Adm. MS 180, Edwards' papers, bundle 7).

Once in Batavia, Captain Edwards made every effort to get berths on ships bound for Europe for himself and his crew. He negotiated with the VOC and agreed to sign on most of the *Pandora's* survivors as crew on three of the Company's ships returning to Holland from Batavia. (Thomson, 1915: 81). Edwards negotiated a passage for himself, George Passmore, Gregory Bentham, two midshipmen and his prisoners, again in iron fetters, on board the *Vreedenburg*. (Thomson,

1915: 163) The remainder of the *Pandora*'s crew were divided into three groups, each under one of the three lieutenants, and were mustered as crew onto the VOC ships *Horssen*, *Hoornweg* and *Zwaan*.

Brown, the beachcomber who had been entered on *Pandora*'s muster list at Tahiti, was paid off in Batavia. Only one man was too sick to travel and was left behind in hospital in Batavia. (Thomson, 1915: 87). No records about the fate of these two men have been found to date.

When the *Vreedenburg* arrived at Cape Town, Edwards transferred his party to HMS *Gorgon*, homeward bound from New South Wales. There are accounts of this voyage, several of which mention Edwards' presence on board — one by Mary Ann Parker, the wife of the *Gorgon*'s captain, who apparently enjoyed Edwards' company during the voyage home (Parker, 1795). Unfortunately Mrs Parker omits to mention the prisoners, responsibility for whom Edwards partially ceded to Captain Parker.

Edwards was the only officer to transfer his party, including the escaped New South Wales convicts, to the *Gorgon*. The remainder of *Pandora*'s crew remained on board the other three home bound VOC ships as mustered crew and eventually got home to Britain via Holland. Together with sixteen of *Pandora*'s men, Robert Corner was mustered on the *Horssen*. They arrived in Den Briel on 21st July 1792, where Corner drew an advance of £30 on the Admiralty. He used this money to pay for his men's subsistence and their passage to England from Holland (Adm. 106/1317). The groups under Larkan and Hayward's charge arrived in England sometime afterwards; Hayward's group arrived in Den Briel in the *Hoornweg*, while Larkan's group arrived in Rammekens in the *Zwaan* on 12 August 1792.

COURTS MARTIAL AND SUBSEQUENT CAREERS. HMS *Gorgon* arrived in England in early June 1792. The fate of the ten *Bounty* prisoners remained undecided for another three months; they were detained as prisoners on HMS *Duke* in Portsmouth Roads until their courts martial. Hearings started on 11 September 1792.

Michael Byrne, Joseph Coleman, Charles Norman and Thomas McIntosh were immediately acquitted because William Bligh had vouched for their innocence. Tom Ellison, John Millward and Thomas Burkitt were found guilty, sentenced to death and were eventually hanged on board HMS *Brunswick* in October 1792 (Denning, 1992:

39-40; 46-48). In spite of also being found guilty of mutiny and sentenced to death, Peter Heywood and James Morrison were recommended to the King's mercy and were eventually pardoned; William Muspratt was acquitted on a legal technicality.

Peter Heywood remained in the navy and rose to the rank of post captain. He retired in 1819 after a distinguished career as a sea-going officer. His service record included duty as signal midshipman, master's mate and acting lieutenant on various ships in the Channel Fleet until 1798. Upon receiving his lieutenant's commission he was given command of the brig HMS *Amboyne*, attached to the India Station at Madras. While serving at the India Station he surveyed northern Australian waters as the commander of HMS *Vulcan* between 1800 and 1801. During this time he had occasion to visit many islands in the Dutch East Indies, including Timor, where he had landed ten years earlier as one of Captain Edwards' prisoners. In 1807 Captain Heywood collaborated with James Horsburgh, the British East India Company's hydrographer, assisting him with information and the production of the charts which accompanied Horsburgh's Sailing Directions 'for the navigation of the Indian Seas' (Tagart, 1832: 164ff).

James Morrison also stayed in the Navy and had an exemplary career as a warrant officer, fighting in a number of major naval battles during the Napoleonic Wars. He drowned in 1807 while serving as the gunner on HMS *Blenheim*. While in prison in 1792 awaiting his court-martial, the Reverend William Howell, vicar of St John's in Portsea, assisted him with the preparation of a journal and a separate memorandum detailing his experiences of the mutiny in the *Bounty*, his life as a mutineer in the South Pacific and his imprisonment on board the *Pandora* (Rutter, 1935; Du Rietz, 1986; De Lacy, 1997).

Edward Edwards was exonerated for the loss of his ship. However, he never commanded at sea again. He was twice appointed as a 'regulating' (i.e. recruiting) captain; first for Argyleshire and then for Hull. His various requests to the Admiralty for another sea command were never acted upon. He was, however, eventually promoted to Admiral's rank (Syrett & Niardo, 1994). A reputed link between Edwards and the '*Pandora Inn*' in Restrouguet, near Falmouth, UK, of which Edwards is said to have been the landlord during his retirement, has not been confirmed. This link appears apocryphal as the

correspondence with the Admiralty, in which Edwards sought further appointments as a sea-going officer, is post-marked from his London residence or from Edwards' home in Lincolnshire. He died in 1815 and was buried in St Remegius cemetery in his native village, Water Newton in Huntingdonshire. Edwards' obituary in *The Lincoln, Stamford & Rutland Mercury* of 21st April 1815 mentions that he had felt 'to the latest period of his life', the effects of the hardships he experienced during the open boat voyage to Timor.

John Larkan later served as first lieutenant on HMS *Defence* under Lord Gambier; he saw action at the Battle of the 1st June (1794) and soon afterwards was promoted to commander. This was his last sea going appointment. He returned to Ireland where he subsequently was given command of an Irish division of Sea Fencibles (Marshall, 1825: 250).

Robert Corner appears to have continued in an active naval career; there is evidence that Lloyds Patriotic Fund awarded him one of their presentation swords for distinguished conduct while serving as a lieutenant on board HMS *Thisbe* during action against the French frigate *Veloce* in 1803 (May & Annis, 1970: 70). He ended his career as Superintendant of Marine Police in Malta and died in 1820 (Marshall, 1825: 38).

Thomas Hayward's naval career was cut short when he perished with his crew, while in command of the sloop HMS *Swift*, which was lost with all hands during a typhoon in the South China Sea in 1797 (James, 1886: 462).

George Hamilton published an account of the *Pandora's* voyage in 1793 (Thomson, 1915; Kenihan, 1990; Hamilton, 1998). Upon his return to Britain, his next naval appointment was as surgeon on board HMS *Lowestoff*, which was part of the British Mediterranean fleet under Lord Hood. Hamilton was discharged in April 1794 having lost an arm, probably after being wounded in action against French fortifications on Corsica (Pigott, 1995: 24ff). It is assumed he returned to his native Northumberland sometime during 1794, where he lived in retirement on a naval pension until his death in 1796 (Kenihan, 1990: xvii).

George Passmore's career did not remain unblemished; he appeared before a court martial in 1793. The nature of his offence is not recorded but was apparently unrelated to his conduct as the *Pandora's* master. Whatever the offence, it was serious enough to cause the Navy Board to decline an appointment as master of HMS

Daedalus, in spite of representations from the captain and recommendations by Admiral Sir Charles Knowles (Adm. 106/1317).

The rest of the *Pandora's* crew have receded into historical obscurity, although undoubtedly anecdotal information about some of them, e.g. on master's mate George Reynolds, is extant in private collections as well as in public records repositories. Archival information on many of the others should also be recoverable, as their names will appear in such documents as muster lists and pay books, as well as in private collections, or obituaries in contemporary newspapers.

However, what remains of them in a very tangible way are their personal possessions and professional equipment — their material culture — which was lost with the *Pandora*. Much of this appears to have been preserved within and around the hull and can be retrieved using systematic archaeological methods and analysed and interpreted using models developed in material culture studies. This, then, is the rationale for conducting an archaeological investigation of the *Pandora* wreck, which provides the functional context of a well preserved collection of objects in use by a microcosm of late 18th century British society (Rodger, 1986: 14).

Finally, as far as the *Pandora* is concerned, neither the Admiralty nor the colonial authorities in New South Wales apparently made any attempts to salvage material from the wreck. There is no evidence that the wreck was disturbed until its rediscovery in November 1977 by documentary film makers Steve Domm, John Heyer and Ben Cropp, with Royal Australian Air Force assistance.

ARCHAEOLOGICAL INVESTIGATION

SITE DESCRIPTION AND DISTRIBUTION OF THE WRECKAGE

LOCATIONAL INFORMATION. The wreck is located within Pandora Entrance (Figs 10, 12B), approximately 5km to the NW of Moulter Cay. This sandcay is on the outer Great Barrier Reef about 140km ESE of the tip of Cape York in north-eastern Australia.

Although the wreck lies inside Pandora Entrance, it is exposed to the force of swells from the Coral Sea generated by easterly winds, prevalent between July and December. Within a radius of approximately 200m to the SE, E, N and W, the wreck is surrounded by four small submerged reefs which provide some protection against ocean swells. These reefs also deflect the flow of

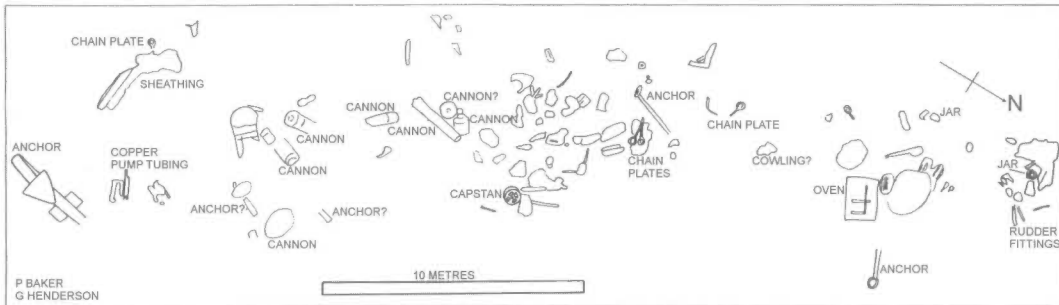


FIG. 14. *Pandora* wrecksite 1979: predisturbance site plan drawn from photomosaic. (P. Baker & G. Henderson)

tidal currents. The pattern of these currents has not yet been determined definitively, although preliminary measurements have been recorded (Ward et al., 1998). However, divers have experienced their considerable strength, sudden onset and unpredictability. Consequently conditions for marine archaeological recovery operations are challenging. Underwater working conditions are further complicated by depths of between 30m and 35m which impose limitations on (air breathing) diving operations.

An area with a radius of 500m, centred on the site at the intersection of latitude 11°22'40"S and longitude 143°59'35"E, has been declared a protected zone under Section 7 of the Commonwealth's *Historic Shipwrecks Act* (1976). Entry to this zone is subject to a permit issued by the Director of the Queensland Museum, who is the Minister's delegate under the *Historic Shipwrecks Act* (1976), responsible for historic wrecks in Commonwealth waters off Queensland.

SITE DESCRIPTION. The bulk of the wreck lies buried within a layer of predominantly carbonate sand which contains a significant proportion of algal, coral, mollusc and foraminiferal detritus. This layer is thought to be up to 3m thick, extending in all directions around the site and appearing to be fairly mobile. To date the depositional history of this sand layer is imperfectly understood, although preliminary analysis has been undertaken (Ward et al., 1998).

From the ordered distribution of wreckage on the seafloor it is evident that the hull was intact when it sank, coming to rest on the seabed on its starboard side. It appears to have settled into, and/or have been gradually buried by, deposits of coralline sand. However, while these deposits were building up within and around the hull, the vessel's top sides, including its upper deck levels, appear to have disintegrated as a result of marine

borer activity. Currents, and to a lesser extent, wave motion probably also played a role in its disintegration. The ordered distribution on the seafloor of the visible features of the wreck attest to a process of sediment accumulation in and around the lower hull and the gradual disintegration of the hull's exposed upper deck levels.

The most prominent features of the site are several large iron objects standing proud of the seabed, including a bower anchor, the vessel's Brodie stove, a number of cannon and various other large, coral encrusted objects. There is nothing random about this distribution; it indicates that these heavy iron objects dropped down directly from their original positions on the quarterdeck, focsle deck and upper deck as the vessel disintegrated (Fig. 14).

The bower anchor, which is lying adjacent to the sternpost, is thought to be the anchor dropped 'underfoot' to steady the ship after the *Pandora* had been refloated from the reef by her crew (Thomson, 1915: 72; United Services Magazine, 1843: 418).

The buried hull remains and the bulk of the artefact assemblage lie within an area 20m × 50m on a gently (SE) sloping, featureless, sandy seafloor. This 1,000m² area is the main site. Depending on the height of the tide, depths vary between 30–35m. The outline and orientation of the hull remains are well delineated within the site. This applies especially to the hull's stern, which is indicated by the large, readily identifiable, section of copper sheathing which covered the hull's sternpost. The visible part of the sternpost is lying on its starboard side revealing the embossed draught marks 'XIII' and 'XIV' of its port face (Fig. 15).

Two attempts have been made with remote sensing equipment to determine the extent of the hull remains buried in the seabed (Fig. 16).



FIG. 15. The *Pandora*'s sternpost sheathing (portside view) with embossed draught marks.

However, these efforts only gave indications about the outline and edges of the hull remains. Together with evidence obtained by spot trenching, especially in the stern and midships areas, it appeared that 25-30% of the hull was preserved (Gesner, 1993).

Although it is reasonable to assume that this outline is accurate, there are still a number of unanswered questions about the structural

integrity of the hull remains. However, a very coherent and well-preserved artefact assemblage — the *Pandora*'s contents — definitely lies buried within, around and under the preserved lower hull.

There are also indications that currents may have swept some of the *Pandora*'s smaller, lighter contents, especially from the upper deck, away from the confines of the preserved hull. It is assumed that a dispersal trail, consisting primarily of partially or wholly buried small artefacts, will lead away from the wreck in the direction of the strongest current set. Although some observers suggest this is a south-westerly set, this has yet to be determined

by more reliable oceanographic methods.

IDENTIFICATION. A survey to confirm the identity of the wreck and assess its archaeological significance was commissioned by the Commonwealth government in 1978. Graeme Henderson, the Western Australian Maritime Museum (WAMM) maritime archaeologist who conducted that survey in April 1979, subsequently made recommendations about future

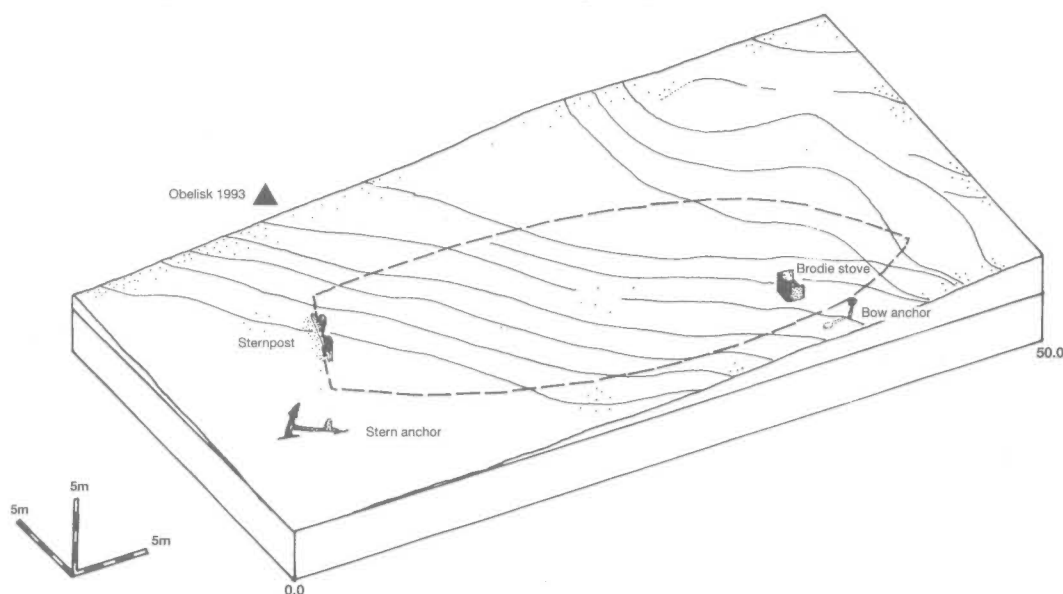


FIG. 16. Isometric drawing of the *Pandora* wrecksite with expected outline and orientation of the hull remains. (B. Jeffery)

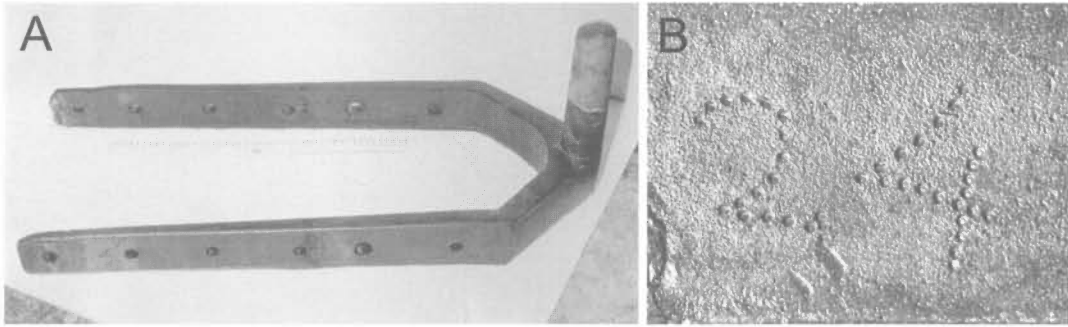


FIG. 17. A, bronze rudder pintle with embossed broad arrow and punched number '24'; B, punched '24' (detail).

use and management of the wreck (Henderson, 1979).

Rudder fittings from the wreck, retrieved by Domm, Heyer & Cropp in November 1977, were sent to the WAMM's laboratory for conservation and analysis. One of these fittings, a pintle, was marked with a series of dots punched onto the surface in the form of the number '24'. It also had the name 'FORBES' in raised letters, in addition to a raised broad arrow identifying the pintle as the property of the British government (Fig. 17A, B). These were the most positive clues that the wreck was a 24 gun Royal Navy frigate of the *Pandora*'s size. Archival information subsequently provided confirmation that the wreck was the *Pandora*, as a foundry operated by William Forbes was documented as a supplier of fittings to the Deptford yard where the *Pandora* was built in 1778.

After the initial survey, WAMM photographer Patrick Baker compiled a photomosaic of the site (Fig. 18). By analysing the distribution of objects recorded on the photomosaic, Henderson concluded that the wreck had been intact after it had settled onto the seabed. Although its topsides appeared to have disintegrated, it was assumed that its lower levels would very likely be substantially intact and would certainly contain a well-preserved collection of artefacts representing the cargo and the crew's possessions.

Three of the main identifiable features in the photomosaic were the ship's Brodie stove, the *Pandora*'s best bower anchor and a section of the sternpost. Draught marks on the sternpost in Roman numerals indicated not only that a substantial part of the lower hull probably lay buried in the seabed but also that the hull had settled onto its starboard side.

The *Pandora* wreck was regarded to be of considerable archaeological significance.

Because its position had become known, extra surveillance and additional protection were invoked in July 1981 through Section 7 of the *Historic Shipwrecks Act* (Henderson, 1986: 129-35). Excavation of the wreck's contents was also recommended (Henderson, 1979: 33-4).

Responsibility for management of the wreck was subsequently delegated to the Queensland Museum, which established a Maritime Archaeology Section in April 1982 and appointed as curator its senior exhibition designer, Ronald Coleman.

FIVE SEASONS OF EXCAVATION

DELINEATING THE EXTENT AND CONDITION OF THE WRECK: 1983 SEASON

October 1983 saw the beginning of the first season of archaeological excavation. The Commonwealth Government, through the Department of Home Affairs & Environment, funded the excavation. Planning had started at the Queensland Museum in 1982 under the direction of Ron Coleman. In terms of personnel the expedition was a national effort, with participation of volunteers as well as professionals from museums and State heritage management agencies in Western Australia, South Australia, Victoria and Tasmania. The archaeological excavation was directed by the Western Australian Maritime Museum's (WAMM) maritime archaeologist Graeme Henderson.

Sailing from Cairns in a converted prawn trawler, the RV *Flamingo Bay*, a 22 person archaeological team arrived in Pandora Entrance in late October 1983. Using Baker's 1979 photomosaic (Fig. 18) as a guide, the expedition's main objectives were: 1, to establish a permanent grid reference system over the main area of wreckage; 2, to determine,

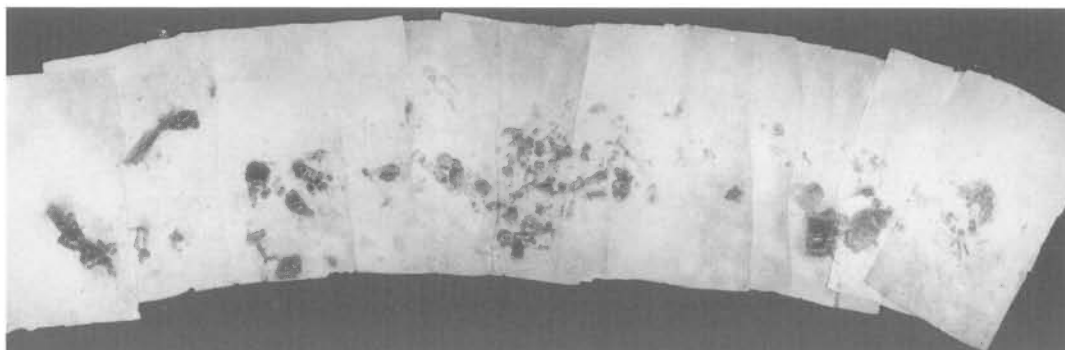


FIG. 18. Predisturbance photomosaic. (P. Baker, 1979)

by limited trenching, the extent and orientation of the hull remains; and, 3, to assess the condition and range of artefacts to be expected from the site (Henderson, 1986: 136ff).

METHODS. A reference grid network was established over a 20m×50m area of the wrecksite.

A network of reference poles was established around the wreck using a pre-measured spacing device called a 'horizontal plumb frame', which enabled poles to be erected at 5m, 2m or 1m intervals. They were guided into the seabed with another pre-fabricated device, a 'vertical plumb frame', which ensured that the poles were placed vertically.

Using a tensioned stainless steel wire as a guideline, three parallel lines of 50m length, each 10m apart, were set out. The first line was designated as the primary baseline and was used to establish, by trilateration, the other two parallel lines. Nine grid reference poles were established at 5m intervals along the primary baseline and numbered according to their distance along the X-axis of the site (Fig. 19). Six more reference poles were established by triangulation from the primary baseline along each of the other two parallel lines.

The grid reference poles were subsequently labelled with their X and Y co-ordinates. Datum was marked on the 0.0 pole and then transferred to all other grid reference poles. This datum served as the benchmark for recording an artefact's Z co-ordinate. Site profiles were obtained by measuring, at each of the reference poles, the height of the datum mark above the seabed.

Pre-fabricated rigid, aluminium grid frames, measuring either 2m×5m or 2m×2m were erected over three selected areas of the wreck site.

Trenches were excavated by scuba diving archaeologists using airlifts (Green, 1990: 130-5) within the grid frames. Artefact location was recorded with reference to the corners of the grid frames.

Using Scuba equipment, a team's dive time was usually limited to 18 minutes 'bottom time' on the first dive of the day. Most diving teams were able to carry out a second dive in the late afternoon; however, due to nitrogen loading from the first dive, bottom time was limited to a maximum of 15 minutes. Depending on the type of work a diver was performing, an individual's first dive was sometimes less than 18 minutes as a diver could run low on air before available time had elapsed. Decompression diving extended a diver's time on the bottom, sometimes by 10 minutes; however, this was not a satisfactory solution to increasing dive time because a subsequent decompression stop at 6 or 3m depth for another 20 minutes was required, thus preventing other divers from descending while decompression was being completed by the previous team.

RESULTS. *Trench 1.* The first probe, a trench measuring 2m×5m, was excavated around the sternpost (Fig. 19). The rationale for this trench was to dig from the 'XIII' foot draught mark, which was visible at the seabed surface, down along the port face of the sternpost (Fig. 15) and progressively follow the draught marks to expose the junction between the sternpost and the keel. Due to the almost horizontal lie of the sternpost on the seafloor, its edge initially trended at a slightly oblique angle into the seabed. However, at approximately the 'IX' foot draught mark a greater angle was observed, indicating that the junction between sternpost and keel lay substantially deeper in the seabed; approximately 1.5 to 1.8m (Fig. 20).

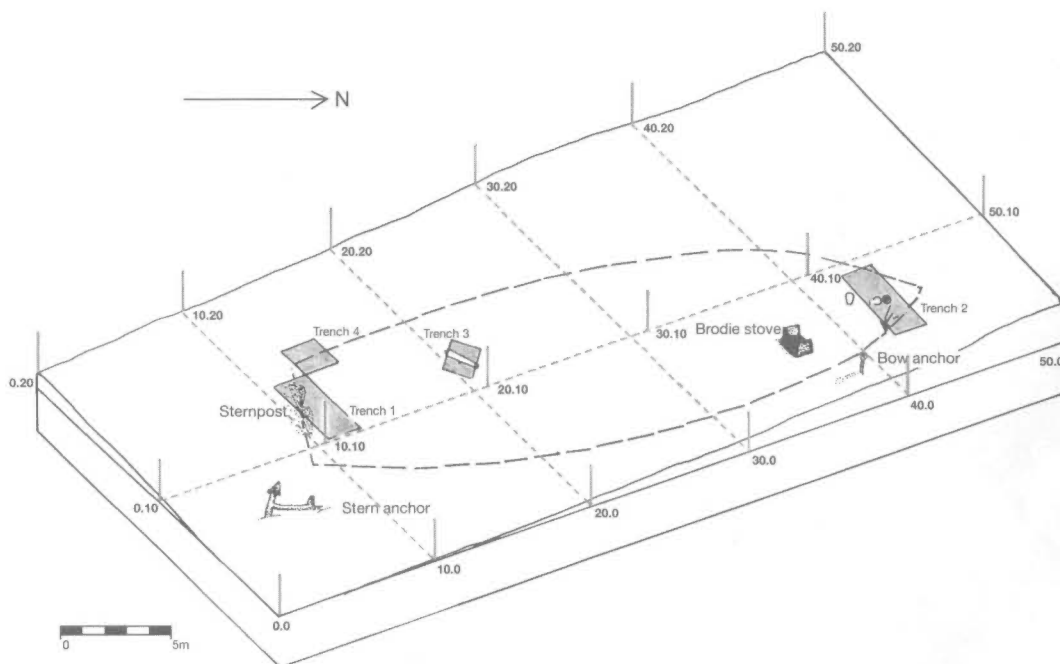


FIG. 19. *Pandora* wrecksite: grid reference network and trenches excavated during the 1983 expedition.

Within several days of probing in trench 1, it became apparent that the junction of the sternpost and keel would not be reached easily. Due to the sediment's loose and coarse-grained composition, it could not be contained without shoring the trench's sides. Thus, with constant collapse of the sides, a wider than intended area was exposed. A deep trench over a small area of the wreck could therefore not be excavated.

Within one week of excavation it was obvious that deeply buried hull remains, especially the keel, keelson, deadwood and heel of the sternpost, would not be exposed easily. As sheathing from the hull's portside became exposed, it also became apparent that at approximately the 'IX' foot draught mark the sheathing from the port side of the hull had been pulled down in crumpled layers toward the hull's centre line. This indicated that the port timbers had collapsed toward the centre line of the hull (Fig. 20).

The dense concentration of artefacts exposed as the sediment was removed also prevented penetration into deeper layers of the wreck. The majority of diving time was spent on recording in three dimensions the location of the exposed artefacts before they were retrieved from the seabed.

The trench extended no deeper than 0.5m into the seabed. It was estimated that the junction of sternpost and keel lay under a layer of sediment at least another meter thick; consequently the orientation of the hull remains was not determined during the first season.

Trenches 2 and 3. A second trench (2m×5m) was started in the bow area (Fig. 19). It appeared to contain substantial timbers at a depth of approximately 0.5m. However, the timbers were not actually sighted as they were covered by copper sheathing; but tactile probing suggested their presence under the sheathing. A distinctive feature of this area of sheathing was that it opened outward toward the port side, whereas in the stern section the portside sheathing had collapsed toward the centreline of the hull. This suggested a possible twisting of the hull as it broke up, i.e. the hull's sides falling away from the centreline in the bow and falling toward the centreline at the stern.

In addition to sheathing remains, the bow trench contained two large earthenware storage jars (MA138 & 139) as well as several fittings from the rigging, remnants of an iron box and a full set of spare bronze rudder fittings. Small areas of large section timbers were briefly sighted under the earthenware jars; however, dimensions could not be adequately recorded as the timbers were

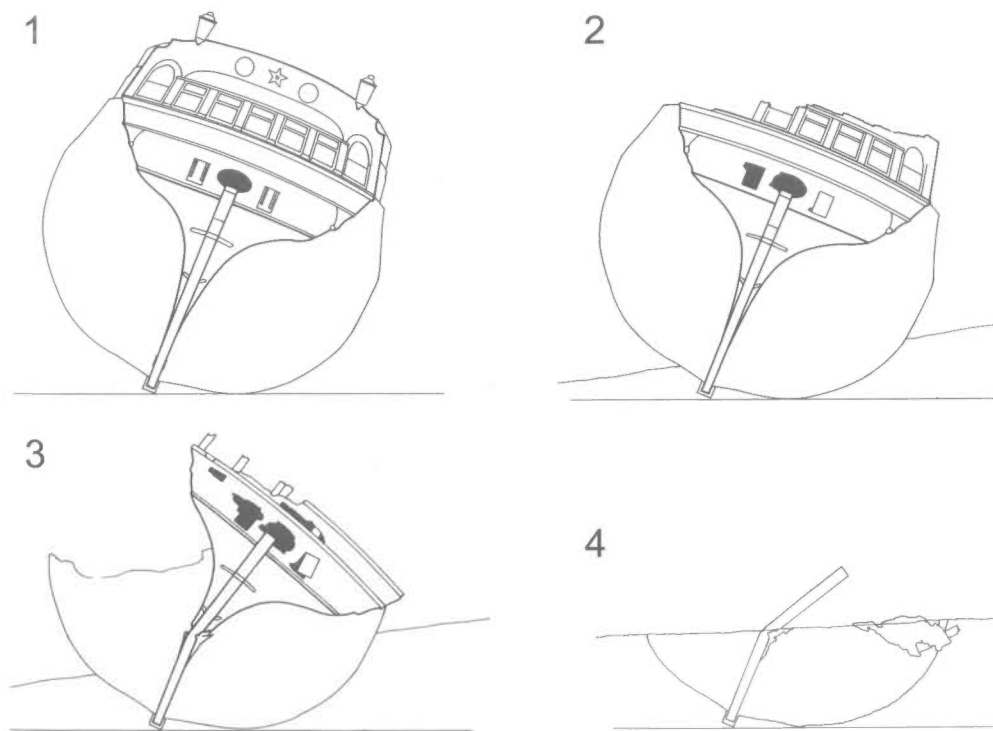


FIG. 20. Hypothesised collapse sequence of the sternpost and port side stern timbers.

too deeply buried and time constraints prevented a concentrated effort.

Subsequently, a 2m×2m trench (Trench 3) was excavated in the midships area around a cannon lying on the sea floor.

This midships trench contained a spectacular diversity of very small and fragile objects, densely clustered under one of the twenty '6-pounder' cannons (MA148) with which the *Pandora* was armed. More than 120 objects were retrieved from the sand under and immediately adjacent to the cannon. These objects were all retrieved from the top (i.e. <50cm) layer of sediment (Fig. 21).

Artefacts retrieved during the 1983 season were given field numbers and later accessioned into the Queensland Museum's Maritime Archaeology Collection through assignation of 'MA numbers' (i.e. Maritime Archaeology Collection) MA010-157 and MA300-354.

Other Projects. Before excavation started, a network of grid reference poles was erected over an area of 20m×50m. The network was established by hammering into the seabed three parallel 50m lines of poles, each spaced at 10m

intervals and each line comprising at least six poles. The poles, each 4m long and with a diameter of 40mm, were driven in vertically to a depth of about 1.25m (Fig. 19).

A photogrammetric project was undertaken by Paul Clark. Using a specially constructed photo tower, to which a camera bar was fitted containing two Nikonos III underwater cameras (Fig. 22), Clark methodically covered the entire 20m×50m wrecksite and obtained 250 stereo-pairs of photographs.

DISCUSSION. Although not entirely successful in terms of providing definitive information about the extent of the hull remains, the 1983 season did give a wealth of information about the range and condition of the artefact assemblage. The survival in the midships trench (Trench 3) of such fragile organic material as a pencil (MA81) indicated that at deeper levels of the wreck there was a favourable environment for the preservation of ship's timbers and other, more fragile organic objects. This was confirmed by the sound condition of timbers briefly sighted under an earthenware olive oil jar in the bow trench (Trench 2) at a sediment depth of nearly 0.55m.

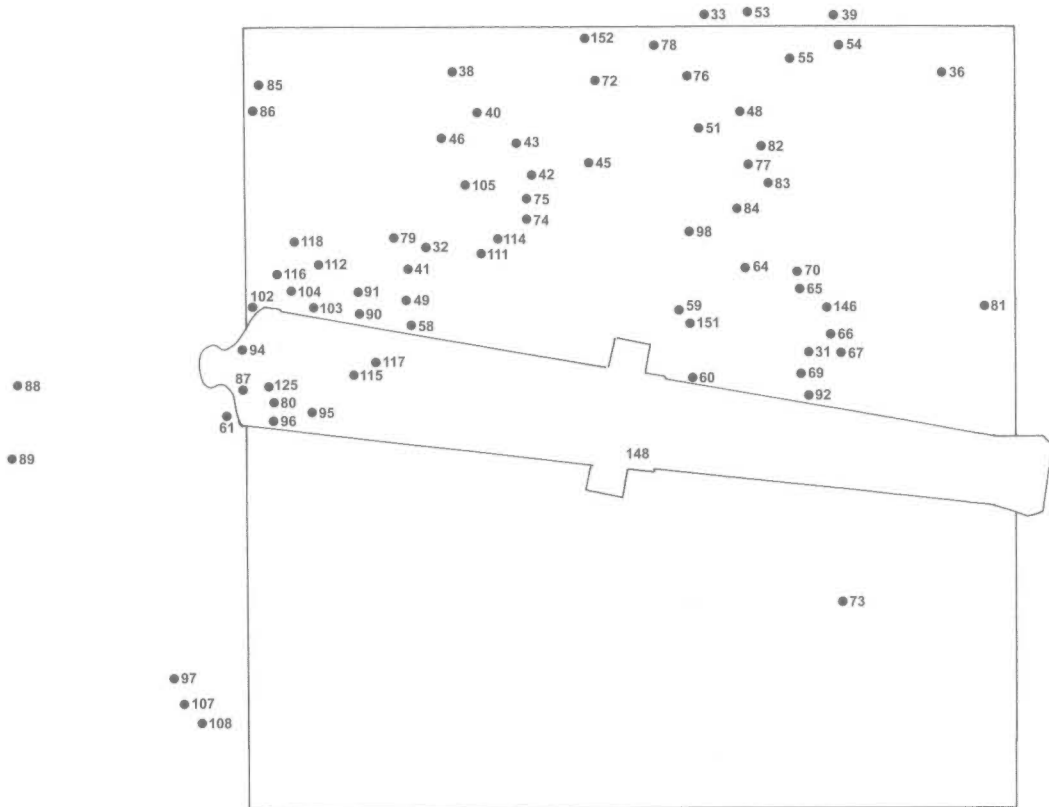


FIG. 21. Artefact plot in trench 3 (1983 season). MA31, bronze coak; 32, stoneware jar; 33, stoneware jar; 36, stoneware jar; 38 wrought iron concretion; 39, six case bottle sherds; 40, creamware plate sherd; 41, six stoneware jar sherds; 42, 101 musket balls; 43, six musket balls; 45, stoneware jar; 46, eight pane glass sherds; 48, two wine bottle sherds; 49, apothecary bottle; 51, glass bottle sherd; 53, coconut husk pieces; 54, three case bottle sherds; 55, two glass bottle sherds; 58, timber fragment; 59, four cast iron round shot; 60, two pane glass sherds; 61, wide-mouthed bottle sherd; 64, seven case bottle sherds; 65, stoneware jar; 66, unidentified organic material; 67, eight wood fragments; 69, stoneware jar with cork; 70, five wood fragments; 72, hairbrush/shoehorn; 73, ivory brush; 74, syringe; 75, turned ivory knob; 76, case bottle base; 77, two brass buttons; 78, brass buckle; 79, three bone buttons; 80, three wood fragments; 81, wooden pencil; 82, pane sherd; 83, apothecary bottle; 84, butt plate for musket; 85, trigger guard; 86, Polynesian wooden tool; 87, case bottle sherd; 88, glass bottle sherd; 89, two case sherds; 90, neck and shoulder case bottle; 91, wide-mouthed bottle sherd; 92, twelve musket balls; 94, three barrel stave fragments; 95, two bricks; 96, case bottle; 97, wood fragment; 98, wood fragment; 102, tourniquet clamp; 103, clear glass sherd; 104, ivory brush handle; 105, glass bottle stopper; 107, two bottle sherds; 108, case bottle base; 111, eleven case bottle sherds; 112, glass bottle base; 114, lice comb; 115, glass bottle stopper; 116, stoneware jar; 117, two glass bottle sherds; 118, copper sheeting fragment; 125, brick; 146, cannister shot; 148, cannon; 151, wrought iron bolt; 152, bar shot.

It was obvious that the context of the artefacts and their condition and diversity called for a systematic approach to artefact retrieval and to the recording of locational information. The immediate challenges were to decide on the most efficient method of making an accurate spatial record of artefact distribution and how to interpret the apparent jumble of material.

Upon analysis of the spatial artefact information, many of the finds from the midships trench (Trench 3) appeared to be associated with the *Pandora's* surgeon, George Hamilton. This interpretation was supported by 18th century naval architect's plans of a vessel of the *Pandora's* class. These plans show where cabins were located on the lower deck and to which officers, including the surgeon, they had been assigned

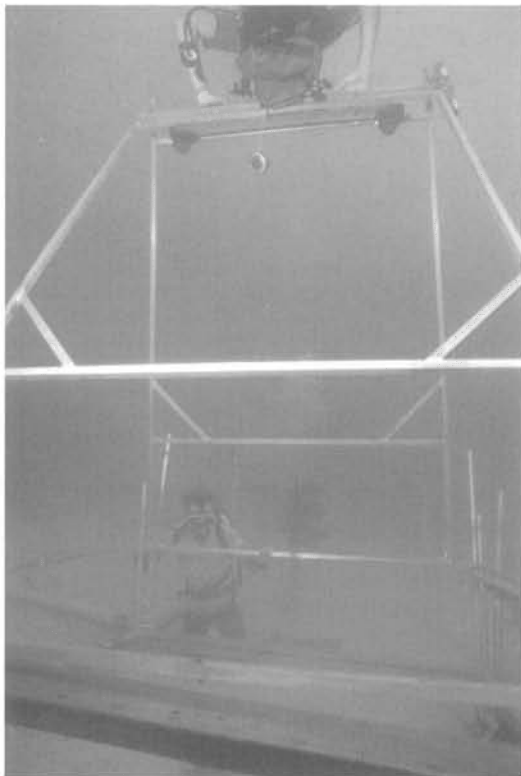


FIG. 22. Stereographic phototower in use.

according to the 'establishments', i.e. standing Admiralty instructions (Lavery, 1987: 156-68).

With this information, a reliable clue was available about the orientation of the buried hull remains and about the deposition of artefacts within the hull remains. Thus, working on the assumption that the midships trench (Trench 3) area corresponded with the foremost portside cabin on the lower deck, assigned to an officer of George Hamilton's rank (a warrant officer), the distance between the midships' trench and the sternpost was thought to be indicative. Allowing for some displacement due to the wrecked hull's angle of heel to starboard, which likely would have caused artefact clusters from the port side of the lower deck to be deposited toward the hull's centre line, the distance was found to approximate the actual distance between the sternpost and the surgeon's cabin on the naval architect's plan (Fig. 23).

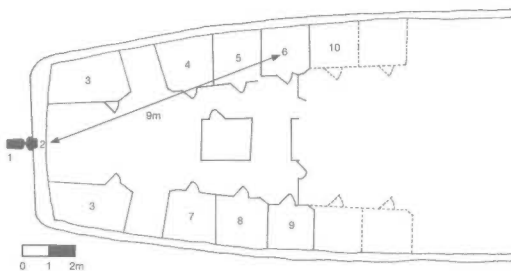


FIG. 23. Plan of lower deck showing the linear distance on deck between the surgeon's cabin and the sternpost. 1, Rudder; 2, sternpost; 3, breadbin; 4, Purser's cabin; 5, Master's cabin; 6, Surgeon Hamilton's cabin; 7, 2nd Lieutenant Corner's cabin; 8, 1st Lieutenant Lakan's cabin; 9, 3rd Lieutenant Hayward's cabin; 10, removed cabins.

SYSTEMATIC EXCAVATION: 1984 AND 1986 SEASONS

1984 SEASON. Excavation commenced in November. This second major season was again funded by the Commonwealth Department of Home Affairs & Environment and organised by the Queensland Museum. This expedition was also a national effort with a number of volunteers and professional maritime archaeologists and conservators seconded to the expedition from museums and heritage management agencies in Western Australia, South Australia, Tasmania and Queensland. Overall project coordination was again by the Queensland Museum's maritime archaeology curator Ron Coleman, with archaeological direction again provided by the WAMM's Graeme Henderson. A team consisting of 22 diving archaeologists, photographers, conservators and technicians spent 35 days at the wreck using as a mother vessel the *MV Reef Seeker*, a 65-foot catamaran, purpose-built for diving expeditions on the Great Barrier Reef.

METHODS. During the 1984 season a systematic approach to excavation was adopted. The wreck site was divided into 250 numbered grid squares, each measuring 2m×2m (Fig. 24). These were used as fixed reference areas and also served as a guide for excavation teams. The grids consisted of rigid aluminium angle-line lengths, each cut, mitred and welded to form 2m×2m squares. Grid squares could be bolted to each other on any side; thus allowing for pairs extending along the site's X axis or Y axis. Individual grid squares had four 40mm holes cut into their corners allowing them to be fitted over

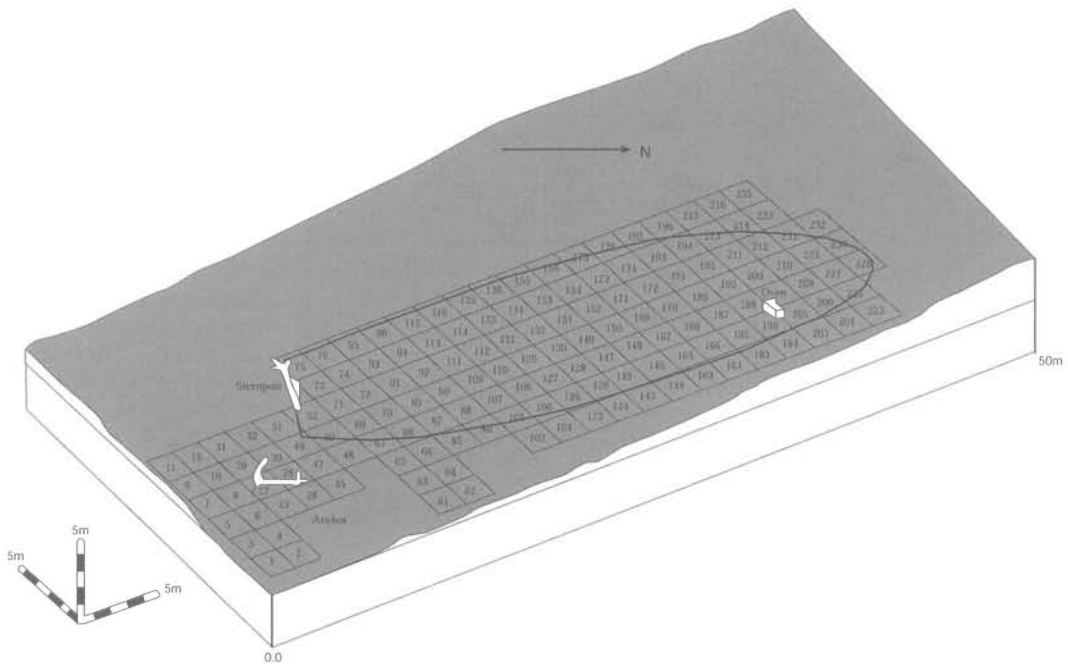


FIG. 24. Grids superimposed over the estimated outline of the hull remains. Primary excavation areas: 1984 – grids 1-12, 25-32, 45, 47, 49, 51 & 52 excavated; 1986 – grids 61-76; 1993 – grids 104, 106 & 125 excavated; 1995 – grid 70.

the aluminium grid reference poles or the intervening grid supports. A gusset in each of the corners containing stainless steel set screws provided for levelling of each grid square through tensioning of the set screws against the vertical reference poles.

Scuba equipment continued to be used for all diving operations. This enabled most divers to dive twice a day for a total of approximately 32 minutes per day; typically a first dive would comprise 18 minutes bottom time; the day's second dive would be for approximately 14 minutes. Two weeks into the fieldwork, decompression diving was also conducted, extending total daily times spent on the seabed by an additional 8 to 10 minutes.

Divers used a water dredge to remove sediment (Green, 1990: 136). The water dredge was diver controlled as well as surface controlled. Divers were able to regulate suction on the seabed by operating a valve, and at the surface the amount of water pumped down to the water dredge was controlled by a throttle. Sediment was directed to a spoil heap which, after systematic sifting, was redeposited as backfill into the trench during the last days of excavation work.

RESULTS. Excavation started in grids 1 & 2 and proceeded systematically to grid pair 11 & 12, moving along the site's Y axis; i.e. approximately athwartships (Fig. 24).

Although grid square 1 lay at least 12m to the SE of the estimated outline of the hull remains and at least 18m away from the artefact cluster thought to correspond with the surgeon's cabin area, it was deliberately selected as the starting point because allowance had to be made for the known starboard heel of the hull. It was assumed that this heel may have caused deposition of artefacts well outside the estimated starboard edge of the hull remains. Also taken into consideration was the effect of tidal currents which were likely to have swept artefacts from the disintegrating hull, depositing them either side of the hull remains.

During the first ten days of excavation no artefacts were located in the top sediment layer (i.e. <0.5m) in grids 1-12. The direction of excavation was therefore changed to that of parallel to the site's X axis (i.e. approximately along the ship's centre line) and so excavation of grids 13-20 was not started. This excavation was done by erecting grid pairs 27 & 28 and grids 30-34, to



FIG. 25. Bulkhead fireplace in-situ (grid 28).

which grids 49-52 and 71 were later added. This 'leap frogging' of grids was achieved by bolting grids 29 & 31 to the sides of grids 10 and 12 and by bolting grid 27 to grid 8 (Fig. 24).

During the third and fourth weeks as excavation progressed toward the centre of the site, i.e. into grids 30-34 and 47-52, increasing numbers of artefacts were revealed. Artefacts were located in the top sediment layer (i.e. <0.5m depth) within all of these grid squares. Among the objects located directly adjacent to the estimated outline of the hull remains was a bulkhead fireplace which was uncovered lying directly on top of the bower anchor next to the sternpost (Fig. 25).

A substantial diversity of artefacts was retrieved. Using Nick Rule's 'direct survey method', they were co-ordinated to the nearest centimetre in three dimensions (X, Y and Z axes).

Artefacts retrieved during the 1984 season were given temporary field numbers and later accessioned into the Queensland Museum's Maritime Archaeology Collection through assignment of accession numbers MA500- MA779.

DISCUSSION. The 1984 season proved that systematic artefact retrieval within the grid squares was a useful and rewarding approach. Plots of artefact location revealed progressively larger concentrations closer to the estimated outline of hull remains; especially in grids 30-34 and 47-52, 55 and 71 (Figs 26 & 27).

Most importantly, the first of the *Pandora*'s surviving timbers, later identified as ceiling,

frames and outer planking on the starboard quarter, were uncovered in grid 71 during the last day of excavation. This was the first direct physical confirmation of the expected outline of the hull remains.

Excavation in grids 52 and 55 exposed the edge of copper sheathing on the starboard quarter as well as the sheathing which had been attached to the deadwood and under the *Pandora*'s starboard transom. Although no transom timbers, deadwood or outer planking were encountered, the sheathing appeared to have retained its original

position and shape. This was apparent from the alignment of the sheathing tacks which indicated that the planking had simply deteriorated after the weight of the transom timbers had caused collapse of the stern (Fig. 20).

An analysis of fastenings retrieved during the season was undertaken by Mike McCarthy of the WAMM. This analysis also contained a discussion about the amount of hull likely to be preserved; estimated at approximately 25% of the original (McCarthy, 1983).

A shallow seismic survey, using 3.5KHz equipment, was conducted by consultants Dr David Johnson and Kevin Hooper from James Cook University's Geology Department. The survey delineated a 'tapering, tubular object beneath the site' and concluded that while it is possible that this object represented buried coral growth or fallen reef blocks, it is most likely to be the remains of the ship now covered by surficial sands up to 5m thick' (Johnson, 1984: 2).

1986 SEASON. The third Queensland Museum expedition was an international effort, funded by the Commonwealth and Queensland governments, again under the leadership of Ron Coleman. Archaeological direction was by the WAMM's Graeme Henderson, with co-direction by the author, then the Queensland Museum's assistant curator of maritime archaeology. The expedition team was assisted by a group of international volunteers from the United Kingdom-based youth adventure training

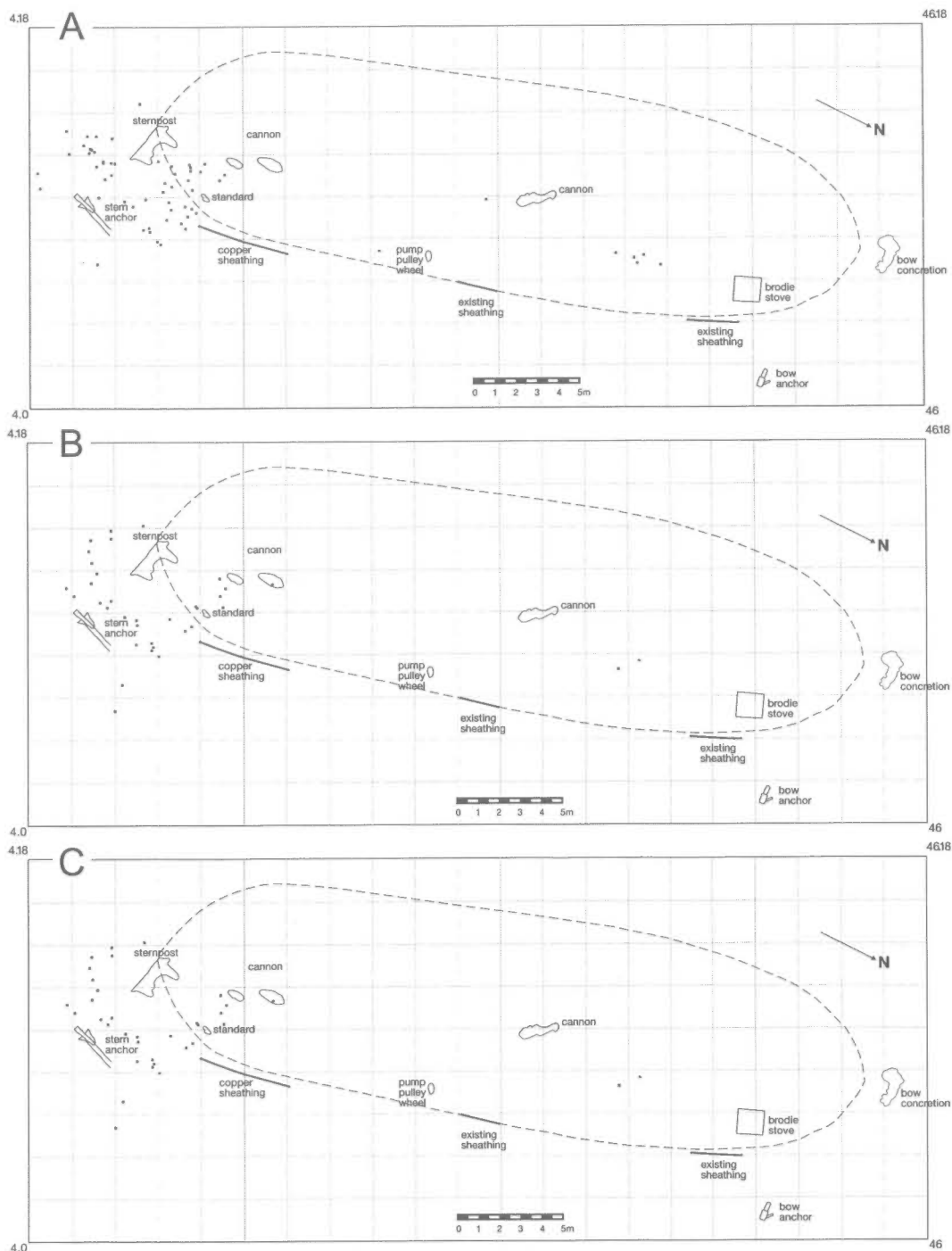


FIG. 26. Artefact plot recorded during the 1984 excavation. A, parts of the ship; B, ship's furniture and fittings; C, weapons and accessories, tools and instruments, domestic equipment, utensils and accessories, clothing and accessories, artificial curiosities.

organisation Operation Raleigh (OR). This was the largest expedition to the wreck site, involving 37 divers, 17 ships' crew and 20 OR staff and assistants. In terms of diving operations, the expedition was also the most complex and challenging to date, due partly to the number of divers and partly to the oversized mother vessel, OR's *Sir Walter Raleigh*.

RESULTS. Using the same Scuba diver-controlled water-dredging techniques as the previous seasons, systematic excavation within the grid system was continued. In a six week period during October and November 1986, a 4mx16m trench, encompassing grids 61-74, was excavated (Fig. 24). Excavation started at the baseline in grids 61 & 62 and the trench was progressively expanded by addition of grid pairs along the Y axis until grid pair 73 & 74 was reached. Depth of excavation increased as the estimated outline of the hull remains was approached. Thus, in grid pair 61 & 62 sediment was removed to a depth of approximately 0.3m, whereas in grid pairs 69 & 70 and 71 & 72 the depth reached was nearly 1.4m. It was felt a trench transecting the hull remains would give a good indication of the extent of the preserved hull.

Compared to the 1984 season, a similar diversity of artefacts was retrieved. As excavation approached the edge of the preserved hull, a similar density of clustered artefacts was also encountered. The grids spanning areas within the confines of the hull remains appeared to contain a greater proportion of personal possessions. This was apparent in grids 69 & 70, where artefacts were clustered on top of the lower deck planking and against the side of the vessel (i.e. the spirketting) in an area which corresponded approximately with the aft-most cabin on the starboard side of the lower deck. If the establishments were followed during the *Pandora's* South Pacific voyage, this cabin was probably occupied by the *Pandora's* second lieutenant, Robert Corner (Fig. 27).

The timbers uncovered in grid 71 during the previous season were re-exposed. In doing so, more timbers were uncovered in adjacent grid squares. Grids 68-70 revealed the wreck's first

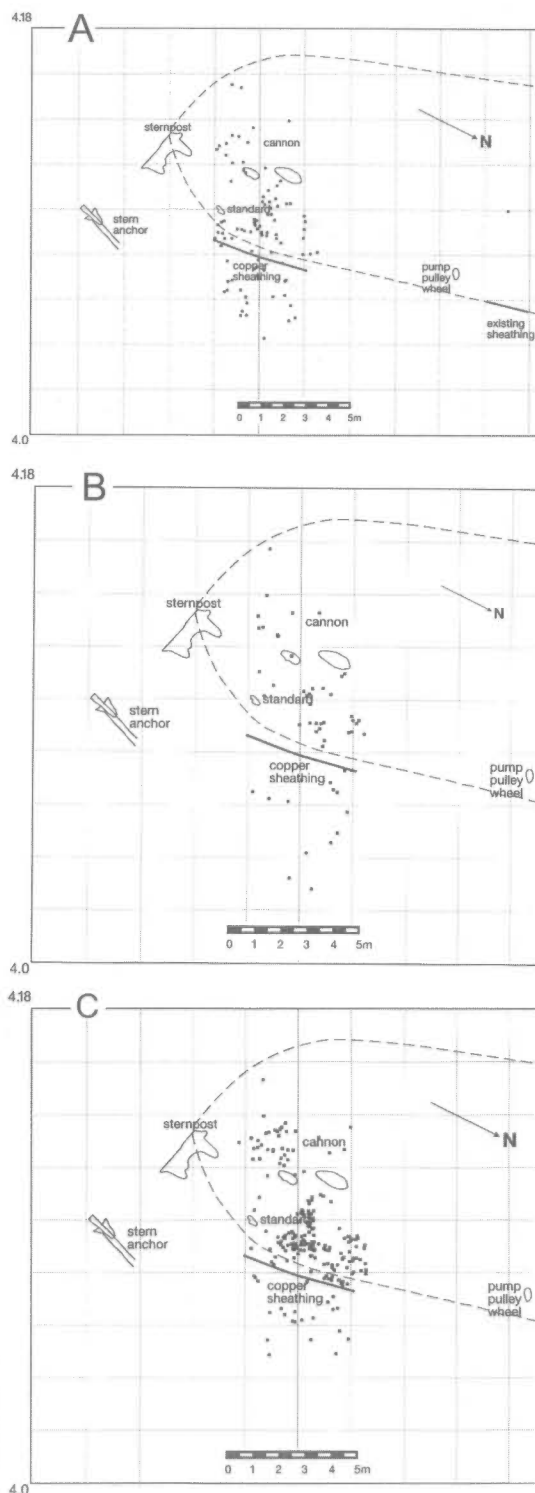


FIG. 27. Artefact plot recorded in the 1986 season. A, parts of the ship; B, ship's furniture and fittings; C, weapons and accessories, tools and instruments, domestic equipment, utensils and accessories, clothing and accessories, artificial curiosities.

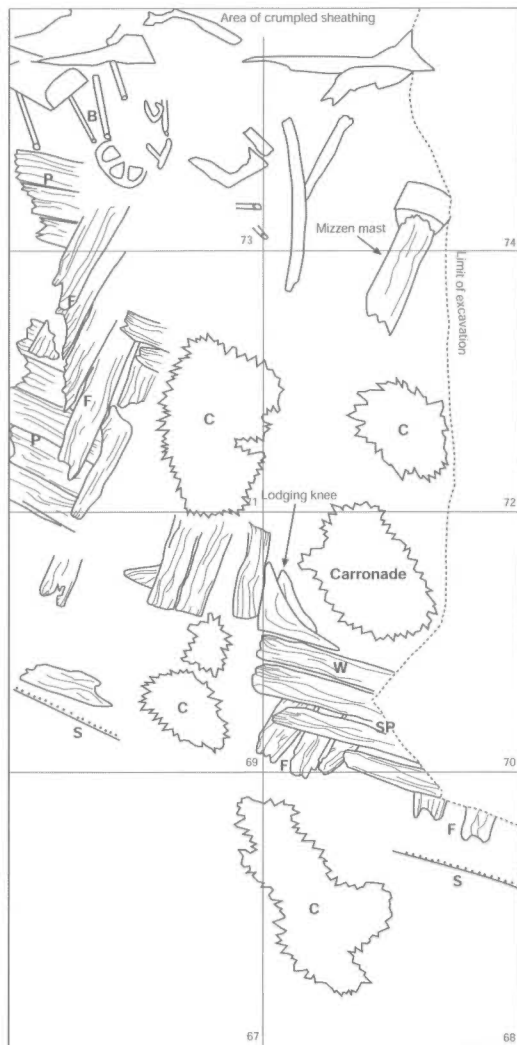


FIG. 28. 1986 trench after excavation. B = deadwood bolts; C = concretion; F = frames; P = outer planking; S = starboard sheathing; W = lower deck waterway; SP = spirketing.

immediately identifiable timbers, which included outer planking, a lower deck lodging knee, cant frames, ceiling planking and remnant of the mizzen mast (Fig. 28).

Most importantly, grid 68 revealed the top edge of the uppermost run of starboard sheathing, indicating that in the starboard quarter the hull was preserved from slightly above the waterline down to the keel. The sides of the hull along the port quarter were not exposed as any remaining timbers and plank from this side were obscured

under sheets of crumpled sheathing in grids 73 & 74 (Fig. 29).

Although not the easiest of seasons in terms of logistics and coordination of diving operations, the 1986 season was more productive than the 1983 and 1984 seasons. Seven hundred and eighty-six artefacts were retrieved over a five week period, compared to 256 in 1983's six-week expedition and 283 in 1984's five-week expedition. Almost 50% of the 1986 collection could be provenanced to grids 69 & 70. As during previous seasons, the 1986 collection was accessioned into the Queensland Museum's Maritime Archaeology Collection through assignment of accession numbers MA1000-1786.

Other projects. Photogrammetry again featured prominently as a project during this season (McCafferty, 1988). Several features of the preserved hull were shown prominently on a photo-mosaic (Fig. 30) which was compiled from photographs of the excavated trench (grids 63-74). Among the features clearly delineated on the photo-mosaic were the starboard edge of the sheathing, starboard cant frames, inner planking, a lower deck lodging knee, a lower section of the mizzen mast as well as several large copper bolts used to fasten the deadwood to the keel. These bolts were considered a clear indication of the heel to starboard of the hull, 34° off the vertical (Fig. 31).

DISCUSSION. Artefact distribution in the 1986 trench revealed that larger concentrations occurred along the starboard edge of the hull remains. This clustering of artefacts was obvious against the inboard edge of the hull remains in grids 69 & 70, suggesting that, as the vessel sank and settled onto the seabed, objects kept in the wardroom and the second lieutenant's (Robert Corner's) cabin had fallen onto the (lower) deck and collected on the deck planking against the starboard side of the hull (Fig. 27).

Comparison of the artefact plots made from the records of the 1986 excavation and from the 1984 season's plots, indicated differences between the types of artefacts lying inside, and outside, the hull remains. Those inside the hull remains were predominantly small and light, or very large and heavy objects (e.g. cannon). Artefacts lying outside the hull were mainly the ship's fastenings, such as heavy bolts, or internal furnishings including the bulkhead fireplace and a sandstone water filter. The latter items had both probably been installed in the great cabin on the upper deck. However, the main differences were their

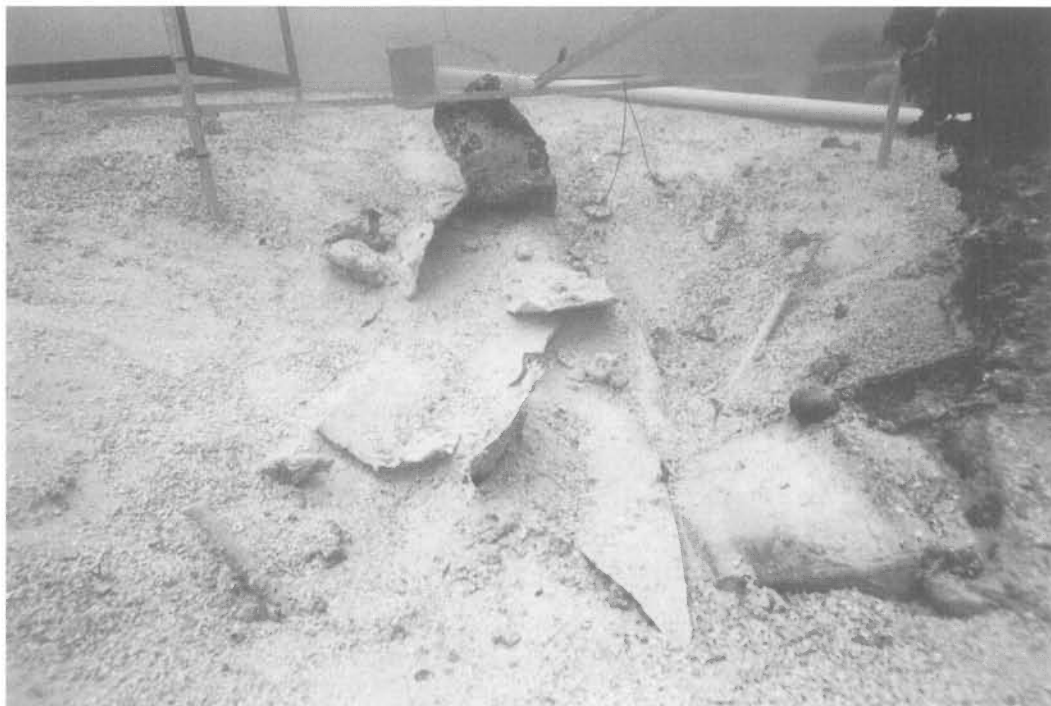


FIG. 29. Crumpled portside sheathing in grid pair 73-74.

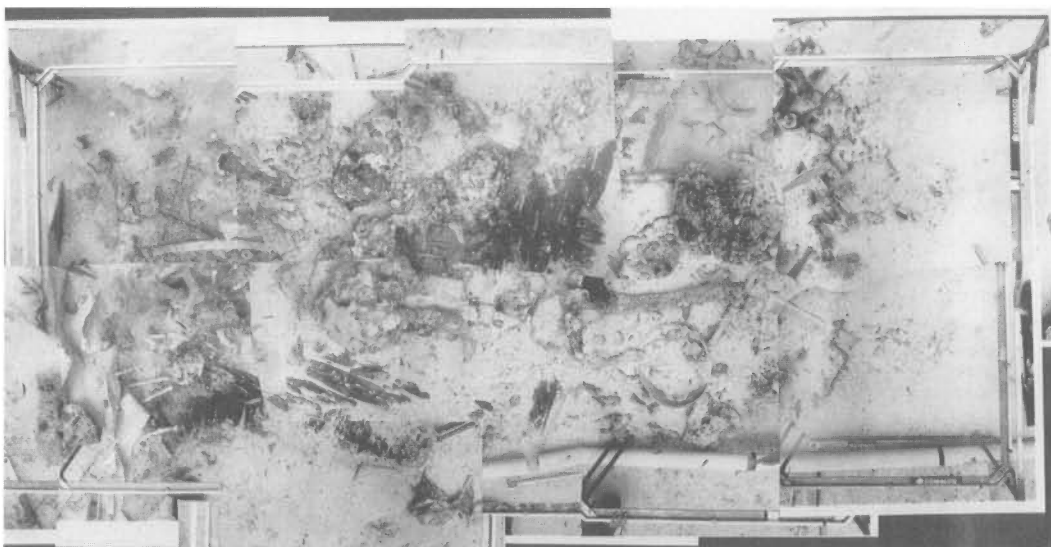


FIG. 30. Photo-mosaic of the 1986 trench compiled from stereo-photographs. (M. McCafferty and AAM Surveying & Mapping)

original function. The small, light artefacts found within the hull could predominantly be classified as personal possessions or as professional equipment belonging to the *Pandora*'s officers; most



FIG. 31. Row of deadwood bolts (looking aft) showing the wreck's 34° angle of heel to starboard.

likely to second lieutenant Robert Corner. However, some intrusion of material from the wardroom and the officers' pantry, adjacent to the second lieutenant's cabin, or from the warrant officers' cabins (possibly purser Gregory Bentham's or master George Passmore's cabins) opposite the second lieutenant's cabin, could not be discounted.

Because of their weight, the heavy objects had simply dropped down as the upper and quarter-decks disintegrated, and then settled on top of, or next to, clusters of objects which had been kept in the spaces or cabins on the lower deck or the platform deck below. This accounts for the dense artefact cluster found immediately around the cannon retrieved during the 1983 season. The cannon had settled onto an artefact cluster mainly containing surgeon's equipment.

The ships' fastenings and cabin furnishings (in particular the fireplace and water filter) associated with the upper deck appear to have been deposited outside the hull remains because of the starboard heel of the hull. Both the fireplace and stone water filter were most probably fitted in the great cabin on the upper deck. With the disintegration of bulkheads it is likely they rolled

across the upper deck and came to rest against the top starboard side of the hull. Subsequently, when the hull's top sides disintegrated, they both dropped off the exposed upper deck onto the seabed adjacent to the edge of the hull remains (Fig. 32). The fireplace's position can be considered particularly revealing as it was found directly on top of the stock of the anchor which was dropped 'underfoot' before the *Pandora* foundered. The level of the stock is significant as it probably indicates the level of the seabed at the time of the wreck. The keel apparently came to rest between 8m to 10m from this anchor.

The apparent dearth of smaller, lighter artefacts from higher deck levels outside the confines of the hull remains can not be easily accounted for. Several scenarios may explain this pattern. Most likely, they were dispersed from the wrecked hull as they dropped out of the hull and became exposed to currents; alternatively they have already deteriorated completely. The fact that some small and light material was found clustered around the bulkhead fireplace may be an indication that large objects from the upper deck level acted as barriers, trapping some of the small and light material which dropped out of the hull,

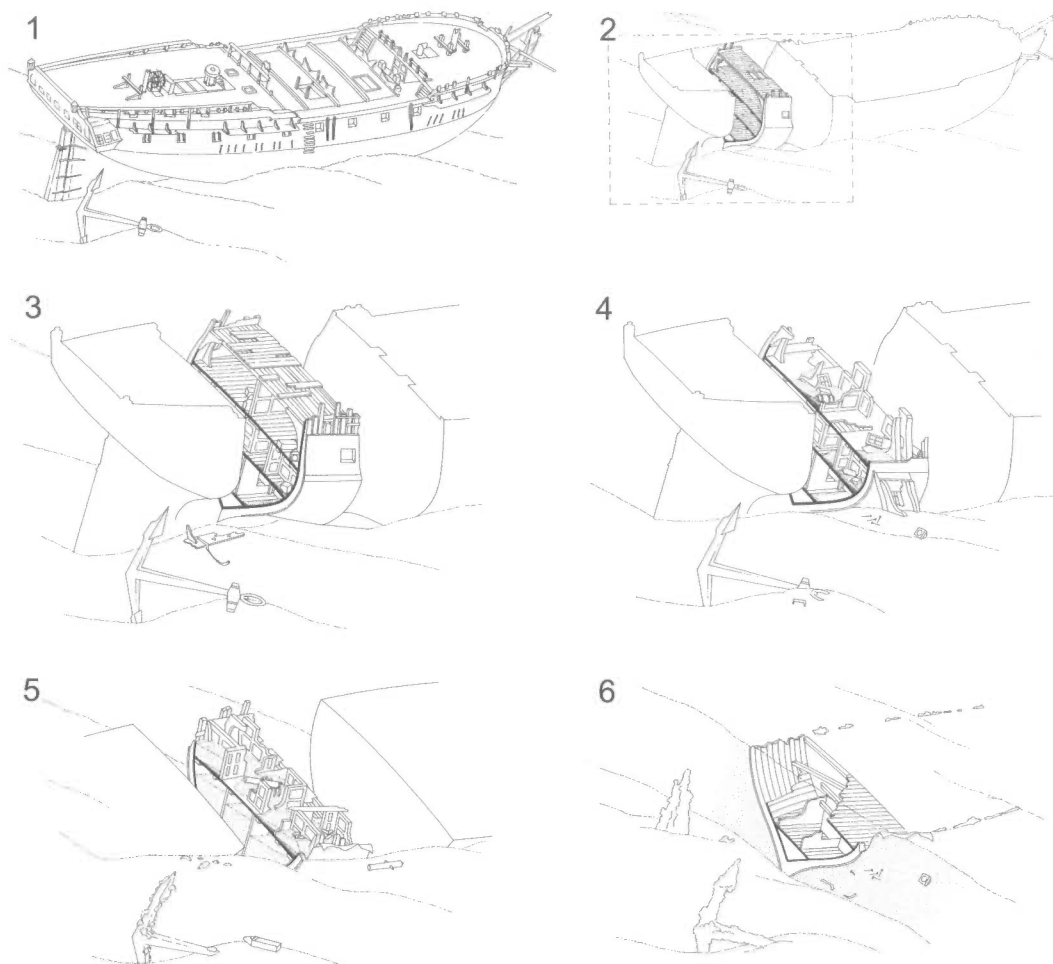


FIG. 32. Artist's impression of the wreck disintegration sequence (cf. Fig. 33). (R. Brunke, QM)

thereby preventing them from being dispersed by currents. Alternatively, they were swept under the stern of the hull, where they were subsequently trapped by the final collapse of the starboard quarter. Excavation under the hull remains, especially under the transom, will ascertain whether this has been the case.

A HYPOTHETICAL DISINTEGRATION SCENARIO. Exposure of a section through the hull remains in the stern area, and subsequent analysis of the artefact distribution, suggests a disintegration scenario (Fig. 33) that posits four distinct stages in the disintegration of the hull (cf. Gesner, 1991: 22). They are as follows:

Stage 1 – Between one and two years after sinking, masts and rigging have broken off and floated away; weakened quarterdeck planking

and top sides' timbers break off and are dispersed by currents or trapped against the hull (1). Internally, artefacts accumulate on decks in clusters (2) or against bulkheads and other partitions. Gradual internal silting up occurs as organic materials decay and fine waterborne particles are trapped and settle within enclosed hull spaces. Artefact clusters begin to be buried by these trapped and settling fine-grained sediments (3).

Stage 2 – Two to five years after sinking, major parts of the quarterdeck, the upper deck and top sides have deteriorated or collapsed, primarily due to marine borer activity. Some of the top side timbers fall away onto the seabed or are swept under the hull in the stern. (4) Currents begin to deposit coarser sediments into semi-enclosed

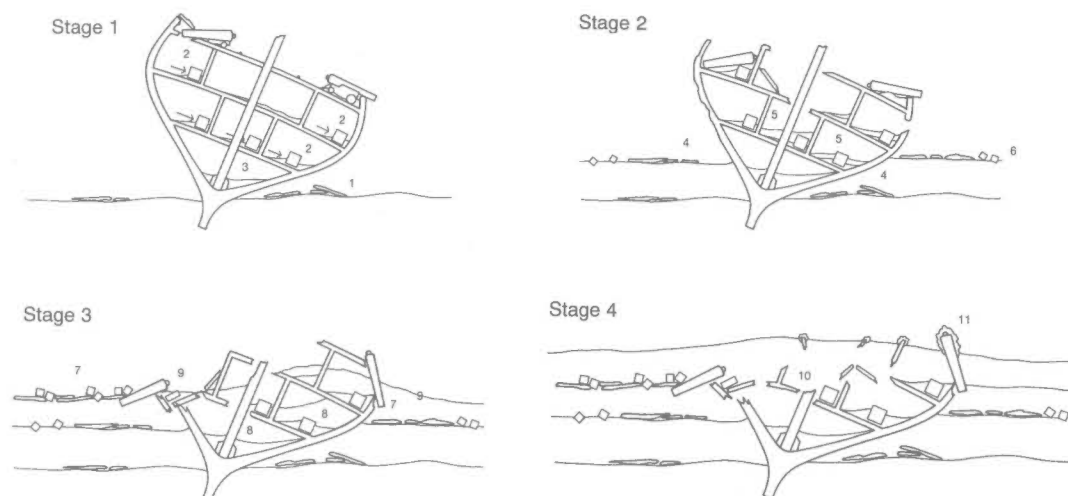


FIG. 33. Hypothesised disintegration sequence.

hull spaces (5). In more open spaces, currents begin to effect light artefacts as they become exposed or as they drop out of the hull. These are gradually dispersed. Gradual seabed build-up occurs under and along the sides of the hull (6). Fine particles continue to be deposited within enclosed spaces inside the hull, gradually mixing with or being overlain by coarse sediment as enclosed spaces become more exposed.

Stage 3 – Five to fifteen years after sinking, processes started in stage 2 intensify, with more collapse of timbers (e.g. the transom) and dispersal of artefact clusters from the upper deck level. For instance, the bulkhead fireplace from the great cabin falls out as the hull's upper sides disintegrate and is deposited on top of the bower anchor's stock. A substantial collection of artefacts, particularly from the upper deck, falls out of the hull and is trapped under the stern (7) prior to its final collapse. Due to lack of seabed build-up supporting the transom and cant frames, these collapse. The weight of the transom causes the upper sternpost to break off at approximately the 'IX' foot draught mark, and fall down to starboard onto the seabed. Fine particle build-up within confined spaces continues, especially at lower deck and platform deck levels, and a mixture of fine and coarse sediment accumulates within semi-enclosed spaces (8). Build-up continues around the hull. Heavy iron objects, for instance cannon (9) and the galley stove, drop down onto lower deck levels and consolidate artefact clusters which have accumulated against

the ship's sides and bulkheads at lower deck levels.

Stage 4 – Fifteen to twenty years after sinking, the wreck approaches stabilisation. All remaining spaces within the hull remains have been filled with compacted sediments or have become overlain or mixed with coarser grained sediments (10). Seabed build-up has stopped. Marine borer activity is minimal due to sediment cover which has insulated the lower hull timbers and organic materials stored within the hull remains from oxygen-rich water. About one quarter of the hull is left intact. Artefact clusters from lower and platform deck levels are contained within their original spaces, especially along the starboard side. Several fittings, for instance the ship's sternpost and anchor, remain exposed and protrude from the seabed where they start to be colonised by coralline algae to form concretions (11). Mobile sediment layers are alternatively deposited or eroded over the wreck depending on water movement.

Implications of the disintegration scenario. If this is the way the hull actually deteriorated, artefact deposition should approximate the hypothesised disintegration sequence. Therefore, if artefacts were deposited in clusters within the entire length and breadth of the hull remains (approximately 35m×12m), it should be assumed that 130 of the 250 grid squares (Fig. 34) constitute the primary area within the 20m×50m site.

This area should contain the preserved remains of the hull, encapsulating the bulk of the ship's fittings, furnishings, cargo and the crew's

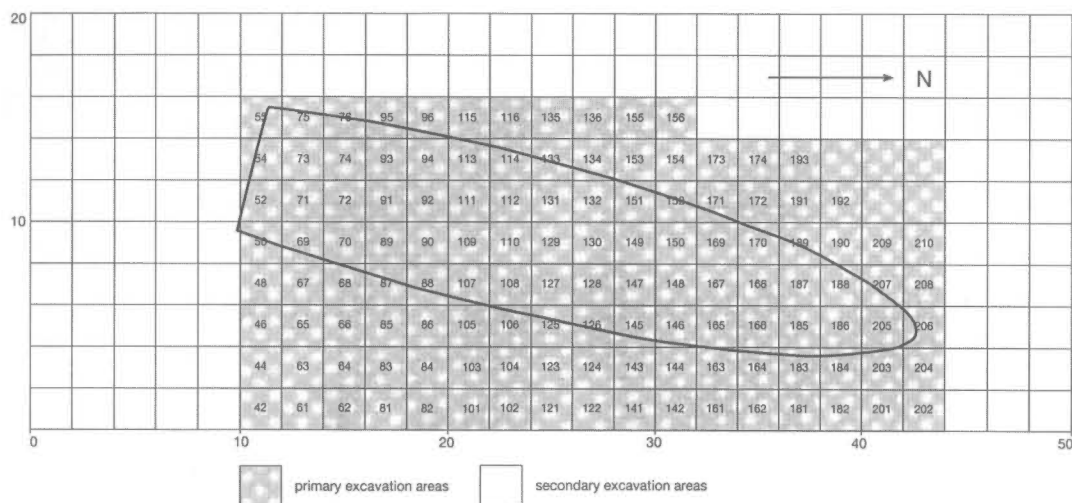


FIG. 34. Primary and secondary site areas within the 250 grid squares.

belongings. Because artefacts from the lower and platform deck levels were buried within the intact lower hull structure, especially along the starboard side, they were probably subject to the least amount of disturbance during disintegration. Consequently, the distribution of artefacts within the primary site area should represent an excellent opportunity to record the functional context of such items as the tools, stores and personal possessions of the crew.

Further, artefacts known to have been used or stored on the quarterdeck and the upper deck should be located under the hull remains, in particular under the collapsed transom in grids 50, 52 and 69-72 (Fig. 34). They may also be located outside the primary area, where they were deposited by currents after they dropped out of the hull and were no longer protected by bulkheads and partitions. Others may be trapped under the collapsed stern section.

The hypothesised disintegration sequence implies that within the primary site area the artefacts originally used and stowed on the lower deck and the platform deck will be found juxtaposed to, or on top of, strata containing artefacts from the upper deck or the quarterdeck (Fig. 35). However, this will not apply where artefacts from these two levels have been dispersed by currents; in such cases dispersed objects will most likely be encountered adjacent to the primary area on the edges of the 20m×50m site area or even entirely outside the site. Nor will this apply in the case of large, heavy items, e.g. the cannon and the Brodie galley stove, both originally placed on the upper

deck which, because of their bulk and weight, were less susceptible to currents and simply dropped down on top of artefacts clustered on lower deck levels.

It can be expected that the 130 grid squares making up the primary site area will contain the most dense concentrations of artefacts; especially the grids spanning the preserved edge of the starboard side of the hull in the stern and bow areas (grids 87-92, 162, 164 and 181-184).

This expectation is supported by the analysis of the artefacts retrieved from grids 68-72 during the 1986 season, which demonstrated that a substantial number of artefacts can be classified as objects reflecting the social fabric of the ship — i.e. the crew's personal belongings. In the 1986 trench, this class of artefact was found to predominate in grids spanning the inboard starboard edge of the hull remains (grid pair 69 & 70). This is evidence of the clustering of artefacts characteristic of stage 1 of the hypothetical disintegration sequence.

The densest artefact concentrations reflecting the ship's social fabric, especially the personal and professional possessions used on the lower deck and/or stowed on the platform deck, are therefore likely to be found in grid nos 85-94 and grid nos 105, 107, 109, 111 and 113, which span the aft area (the officers' quarters) and grids 163-168, 183-188 and 203-206, which span the focsle area (the 'ordinary sailors' quarters). Objects stowed in the hold areas and within partitioned areas on the platform decks are to be encountered in even deeper strata in these grid squares. For

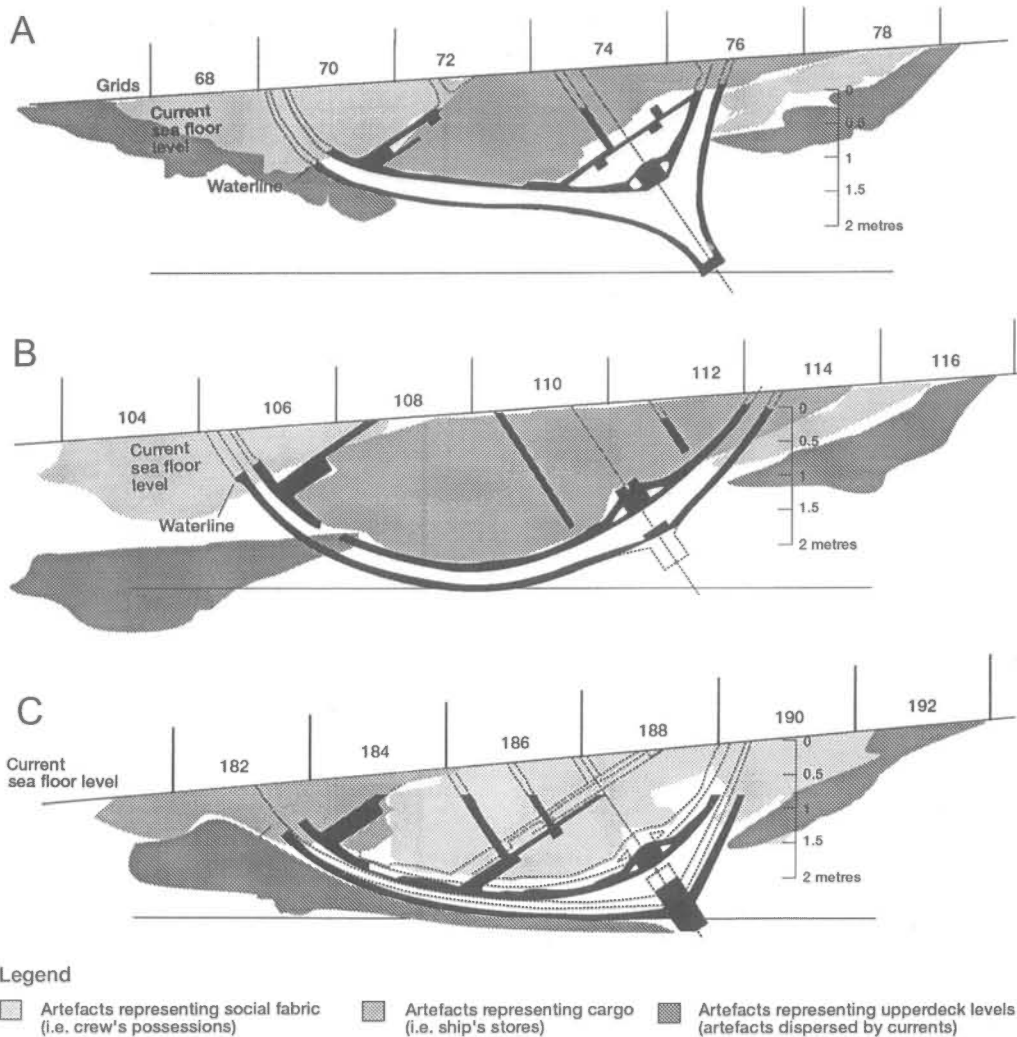


FIG. 35. Assumed stratigraphy within the primary and secondary site areas. Sections through the site (looking aft) at grids: 68 to 78 (A); 104 to 116 (B); 182 to 192 (C).

example, during the 1986 season, excavation reached a depth of nearly 1.65m in one corner of grid 72 with no indication of having reached the ceiling planking or platform deck. In some grids excavation can therefore be expected to extend an additional 0.5m, possibly to a maximum depth of as much as 2.2m into the seabed. Grids spanning the midships' section are not expected to contain any artefact clusters of the crews' belongings, as this part of the hull was primarily hold space for the ship's equipment and stores.

As far as artefacts from the higher deck levels of the ship are concerned, it can be expected that

some will be encountered under the hull remains, especially in the stern section (grids 69-74) and some will be encountered a distance away from the preserved hull remains.

MANAGING *PANDORA*'S BOX: THE 1993 EXPEDITION

The Queensland Museum's next major expedition was not until January 1993. The objectives were changed from excavation to management-oriented ones. This situation had several consequences. The most important management issue was the recognition that discontinuation of

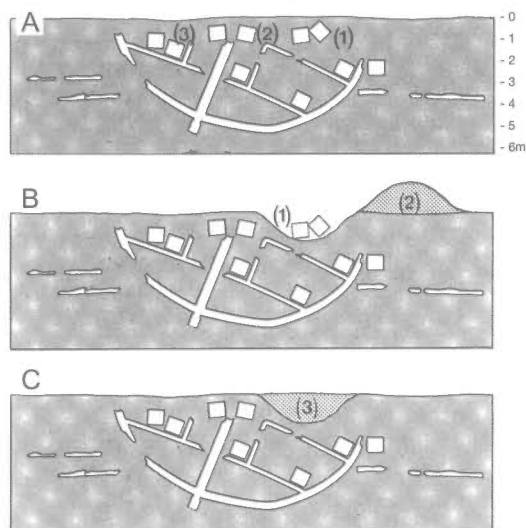


FIG. 36. Diagram showing the excavation-backfilling process. A, predisturbance situation: artefact assemblages (1, 2, 3) etc and hull remains sealed from oxygenated waters by compact sediment layer 0.5–1.0m thick. B, excavation of artefact assemblage 1: sediment layer gradually removed and deposited on spoilheap (2); artefact assemblage (1) recorded in 3 dimensions, retrieved over a period of ca. 4 to 5 weeks. C, backfilled excavation area (3) using sediment from spoilheap; from observation, backfill is of less compact nature and of different material composition due to loss of fines.

excavation would place at risk the hull remains and the artefact assemblage still buried within and around it. Accelerated deterioration of buried organic wreck material due to destabilisation of sediment cover was recognised as the major risk, especially in areas which had already been excavated and subsequently backfilled.

Faced with the prospect of continued lack of funds, the decision was made to close down the site. However, before this could be done, it was necessary to assess the extent excavation had adversely effected the stability and effectiveness of the sediment layer covering the wreck; of particular concern was the longevity of the hull remains and the artefact assemblages encapsulated within it. One urgent issue was to determine whether micro-biological deterioration, especially of the organic remains and particularly the previously buried parts of the hull remains, had been accelerated as a result of the exposure to oxygenated waters (Fig. 36).

The objectives of the 1993 expedition were therefore essentially management oriented, in

particular towards gathering data to base measures to counteract possible adverse impact on the buried hull remains. It was felt that this data could be used to inform effective strategies for long term conservation and management of the site.

The 1993 season's objectives were to:

- 1) gather sediment samples to assess the biological stability of the wreck and its associated artefacts;
- 2) experiment with physical means to protect the wreck site, especially the backfilled areas, from environmental impacts, particularly currents and wave motion;
- 3) record more remote-sensing images of the buried hull remains; and,
- 4) Undertake limited trenching, in the mid ships and bow sections, to confirm that the edge of the preserved hull lay where it was expected.

FIELDWORK. Fieldwork from the expedition's mother-vessel TSMV *Pacific Conquest* was completed in January 1993. During this expedition the majority of diving operations were carried out by divers using surface supplied breathing apparatus (SSBA), which enabled a substantial increase of each diver's bottom time. Using SSBA each diver would be able to dive effectively, once a day, and spend between 40–45 minutes on the seabed without risking extreme exposure to potentially harmful nitrogen loading and without relying on Scuba technology for decompression diving. This technique was a considerable improvement on diver safety, efficiency and effectiveness.

The expedition team was lead and archaeologically directed by the Museum's second curator of maritime archaeology, the author, and comprised an 18 member expedition team of volunteers and professionals from Queensland as well as interstate agencies in Western Australia, South Australia, Tasmania and New South Wales.

SEDIMENT SAMPLING. Sediment samples were extracted manually from pre-disturbance and post-disturbance locations (Fig. 37) to gather data for a microbiological research project titled 'The effect of sediment disturbance on bacterial activity; its relationship to preservation of buried organic 'wreck materials''. This project was designed in collaboration with a consultant, Dr David Moriarty, and the University of Queensland's Department of Microbiology, to determine whether biological differences within sediment layers were evident between pre- and post-disturbance site locations. The project was carried out as research toward a PhD thesis in

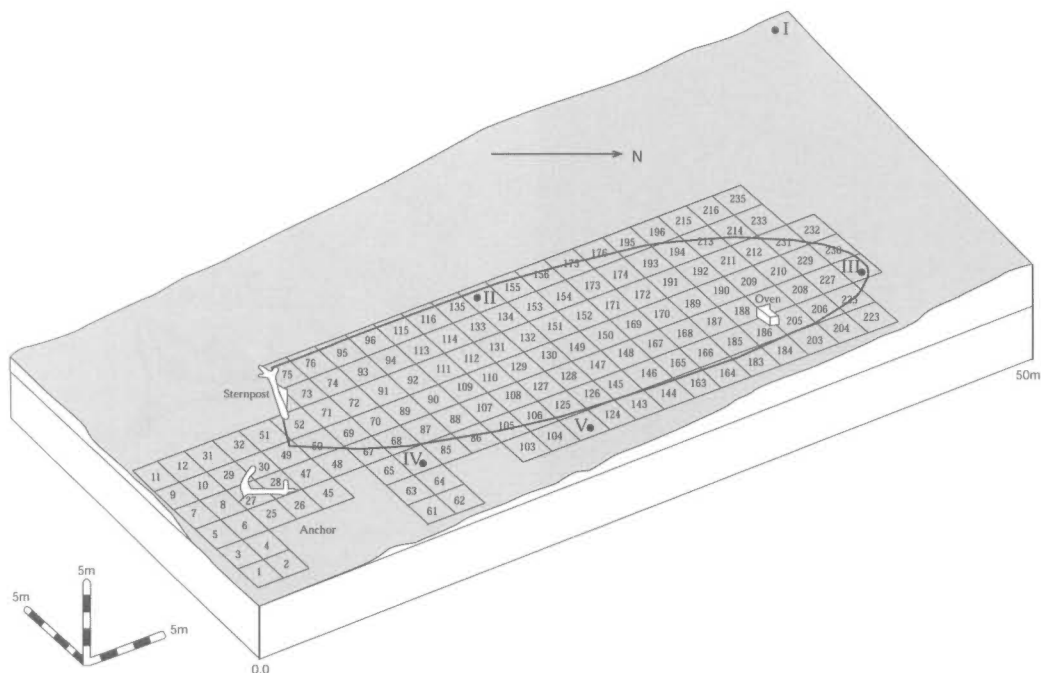


FIG. 37. Sediment sampling locations. I, pre-disturbance sample location (off site); II, pre-disturbance location near hull remains; III, post-disturbance location 1983 excavation; IV, post-disturbance location 1986 excavation; V, post-disturbance location 1993 excavation.

microbiology at the University of Queensland by Jodie Guthrie (Guthrie et al., 1994, 1996).

REMOTE-SENSING SURVEY AND TRENCHING. Geologists from James Cook University visited the site for three days with a 3.5KHz sub-bottom profiler to conduct a remote sensing survey. The profiler was towed across 10 transects at 5m intervals on the surface directly above the site area. By conducting the survey across these 10 transects, a close-plot image was obtained of the sub-surface site area (Carter & Hooper, 1993).

Trenching was carried out to verify the projected outline of the starboard hull remains. A small trench was excavated in grids 104, 106 and 125 (Fig. 24) to locate the starboard edge of the sheathing at mid ships. After several days of excavation, the edge of the sheathing was exposed in the expected area (Fig. 38).

Subsequently, it was possible to follow the top edge of the sheathing for nearly eight metres towards the bow section, i.e. into grid 163. Thus excavation confirmed that the orientation of the hull remains on the starboard side was as projected.

In the course of fieldwork, a second method was used to determine the depth of the hull remains. An hydraulic probe (Green, 1990: 137) was placed vertically on the seafloor and activated along the 22, 24 and 30m transects. Divers Henderson and Sullivan operated the probe at each selected location until it struck an obstacle. The probe holes were spaced at intervals of approximately 1m on transects between 6 and 16m long; the probe was able to penetrate to a depth of between 0.5-0.7m before striking obstructions.

With this information and the images from the sub-bottom profiler, it was then possible to determine more accurately the extent of the hull remains (Fig. 39). This was done by tilting the hull at the 34 degree angle of heel measured in 1986 from the angle of the deadwood bolts in grid 74.

Excavation conducted in the mid ships' trench (grids 102, 104 & 106) also revealed that this area did not contain similar artefact clusters to those located in the grids spanning the starboard hull remains in the stern section. No artefacts were located on top of the remaining midship's timbers; several fastenings and a copper cauldron



FIG. 38. Starboard edge of the sheathing exposed at mid ships (grid 125).

(MA3010) were located in grid 104 well outside the confines of the preserved hull (Fig. 37).

This information further confirmed the hypothesised disintegration sequence, indicating that no artefact clusters similar in density or diversity to those encountered in 1986 were located on top of or within the confines of the hull remains at mid ships. This was not surprising since the vessel's mid ships' section (i.e. the well between quarter-deck and focsle deck) was not used as a living area. Clusters of personal or professional possessions would therefore not be expected here.

PHYSICAL PROTECTION. Although further consolidation of the 1986 trench had been considered a special priority at the beginning of the expedition, time had been lost during this short season due to three days of adverse weather conditions. Consequently, little work could be undertaken to consolidate and stabilise trenches back-filled and covered during previous excavations.

The temporary nature and untextured surface of the plastic protective sheet used in 1984 and 1986 was not satisfactory. It hindered the

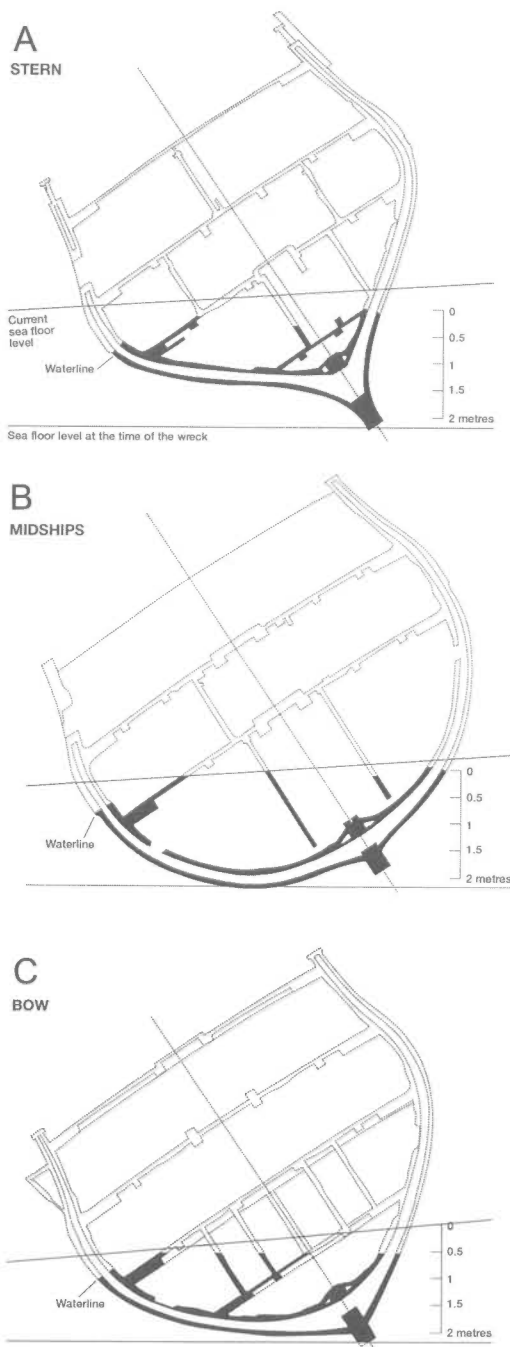


FIG. 39. Sections (looking aft) through the stern (A), midships (B) and bow areas (C), indicating the extent of expected hull remains. Solid lines = remains, dotted lines = deteriorated hull.

compacting of the layer of backfill by preventing bonding between it and the underlying, undisturbed sediment. This had been conclusively observed during a monitoring dive in April 1988 when the author accidentally dropped a small hammer while swimming across the site several metres off the seabed. The hammer almost disappeared into the sediment after it struck the seabed. Having seen where the hammer came to rest, it was retrieved and in doing so the quicksand-like state of the seabed was observed. Upon further inspection, it was found that the quicksand-like sand layer only occurred where backfill had been deposited on top of plastic lining. It appeared that the backfill was loosely suspended on top of the plastic lining and thereby unable to bond with the underlying sediment. In view of this, the use of plastic sheet was discontinued and the mid ships' trench (grids 104, 106 and 125) was stabilised by back filling and consolidated with approximately 8m² of a nylon mesh fabric (shade cloth) instead. The shade cloth was spread out and weighted down with sand-filled polyurethane bags.

During an inspection dive in August 1994 conducted by Warren Delaney, the Maritime Archaeology Section's technical officer, the bags weighting down the shade cloth were observed to be almost completely buried, indicating that they acted as traps for current borne sediment. A recently deposited layer of approximately 30cm had covered the shade cloth and sandbags, indicating the effectiveness of this method.

RE-INTERMENT OF HUMAN SKELETAL REMAINS. Another expedition objective was the consecration and placement on-site of a memorial obelisk containing the skeletal remains of one of the *Pandora*'s crew. These remains had been retrieved from grid 70 during the 1986 excavation. After a 'Service for burial at sea' (RAN, 1979) conducted by HMAS *Cairns*' chaplain Mark Wallbank, the obelisk was lowered from the deck of the expedition's mother-vessel and placed on the seabed adjacent to the wreck site (Fig. 40). Set into the obelisk was a perspex plaque inscribed:

The 24 gun frigate *PANDORA* was sent into the South Pacific in pursuit of the *BOUNTY*. After a search of 4 months the frigate was returning to England with 14 mutineers imprisoned in a temporary cell constructed on her quarterdeck. The *PANDORA* struck a submerged reef to the east of this site. This monument contains the skeletal remains of one of *PANDORA*'s crew who perished with 30 of his shipmates and 4 mutineers when the *PANDORA* foundered and came to rest here on 29 August 1791. This wreck is a



FIG. 40. Consecrated obelisk containing human remains being lowered on-site from the mother vessel.

protected historic site (Historic Shipwrecks Act, 1976) and has been partially excavated by the Queensland Museum.

Prior to re-interment, the skeletal remains had been examined. Anatomical studies indicated that they were of an adult male of between 22-25 years of age, who had been approximately 1.65m tall and had possibly suffered from rickets as an adolescent (Wood & Hodgson, 1996).

The identity of this individual has not yet been determined. It is suggested here that he may have been one of the two sailors whom surgeon George Hamilton mentions were killed while the *Pandora*'s crew were trying to save the ship after she had been refloated from Pandora Reef (Thomson, 1915: 143). It is possible that, in the interests of keeping up the crew's morale, the two dead sailors were taken below, to be buried at sea after the ship had been saved. To date, the names of these two individuals has not determined.

Alternatively, it has been suggested that the skeletal remains may have been of one of the four mutineers who drowned when the ship sank

(Wood & Hodgson, 1996). However, this is unlikely in light of information provided by James Morrison, one of the surviving mutineers, who mentions that immediately after the *Pandora* foundered, the roof of the prison cell (Pandora's Box) had floated up and had been used as a raft by several of the survivors. (Rutter, 1935: 128) Thus, any of the prisoners who were drowned inside the cell while the ship was sinking would either have floated out of the wreck when their corpse became bloated upon decomposition, or have been devoured by fish. According to Morrison the only prisoner who remained trapped inside the cell was the *Bounty's* cooper, Henry Hildbrandt (Rutter, 1935: 127). The remains are therefore more likely to be one of the thirty one crew whom Captain Edwards lists as lost with the vessel (Appendix 1).

REFINING SYSTEMS: THE 1995 SEASON

The Museum's next season was of the same duration as that of 1993 and comprised, with five changes, the same personnel. The team spent 16 days at the wreck.

The expedition was made possible through the assistance of the Queensland Museum's Board of Trustees, which made available a special advance to the Pandora Foundation to carry out further excavation work.

The Pandora Foundation had been established in August 1994 as a result of a ministerial initiative. The Foundation's initial purpose was to carry out fundraising for the Museum. In particular, its intention was to capitalise on a subsidy offer made by the Queensland Government, which in March 1994 agreed to allocate \$1 million, as a \$1 subsidy of every \$2 raised by the Foundation.

Revitalisation of the *Pandora* project was initiated by the Hon. D. Wells (then Queensland's Attorney General and Minister for the Arts) after the Museum's senior management conducted a review of three options for the continuation of archaeological work at the *Pandora* wreck site. Two of these options included the retrieval, conservation and display of the hull, along similar lines to the *Mary Rose* Project; the third option addressed recovery and conservation of the wreck's moveable contents only.

The review took into account the wreck's cultural significance as well as the earning potential of its public display. It concluded that any informed decisions regarding the raising of the hull could only be made with reliable information about the exact extent and structural

coherence of the hull remains. In light of the fact that such information would not be available until the contents of the hull had been retrieved, a decision was made to concentrate first on the recovery of the hull's contents. Consideration of the feasibility of recovering the hull remains along similar lines as the *Mary Rose* Project in Portsmouth (UK) was therefore postponed to further review, to be conducted at an unspecified time, if appropriate.

The review's summary concluded that it was:

... premature to discuss the potential of the '*Pandora*' in terms of a *Mary Rose*-like project because there is no definitive indication of how much hull is preserved ... The two conclusions at this stage are: 1) raising the hull is considered unjustifiable, firstly in terms of its potential to advance knowledge and, secondly, in economic terms with respect to developing a tourist attraction, and 2) retrieval/conservation/display of the artefact assemblage is justifiable in terms of the cultural significance of the material and threats from vandalism or further inevitable weathering.

With the formulation of a less ambitious and, arguably, more realistic project outcome, the Museum's Curator of Maritime Archaeology (the author) was tasked to make an assessment of resources required for archaeological retrieval and conservation of the wreck's moveable contents only.

This assessment found that with favourable operating conditions and requisite resources, five major expeditions could complete retrieval of a representative sample of the wreck's contents. Ideally these expeditions — each of approximately six weeks duration — should be completed by a multi-skilled expedition team comprising a minimum of 25 site-experienced diving archaeologists and/or assistants. The cost of the five expeditions (in 1994 figures) was estimated to be approximately \$320,000 per expedition with additional outlays of approximately \$180,000 per year to provide for additional temporary specialist staff. At least three additional full time staff and several consultants, as well as a timely and expeditious program of artefact conservation and curation were deemed to be required. The estimates assumed continued availability of voluntary community and cost-free peer group support from interstate museums and heritage management agencies (cf. Creative Nation, 1994: 77), on-going support from already available Queensland Museum human resources (at least six fulltime staff) as well as resources in the Queensland Museum's Maritime Archaeology, Conservation, Photography, Marketing and Public Programs Sections.

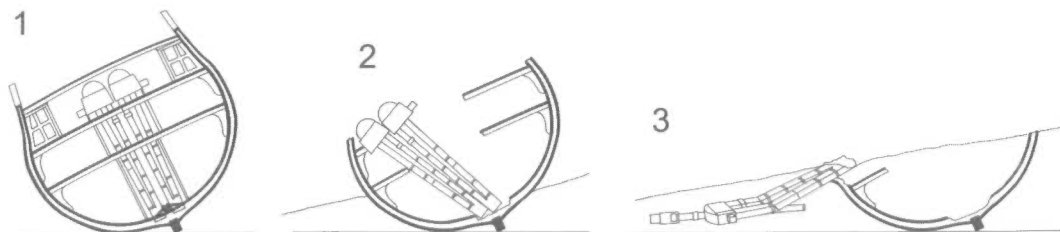


FIG. 41. Illustration of assumed deposition of the pump chamber. (S. Elmer)

The 1995 expedition was conducted as a dress rehearsal for a projected series of five major expeditions, as well as to maintain the revitalised project's momentum and continuity and to provide publicity and promotional material for the Pandora Foundation's planned 1996 fund-raising campaign.

Several objectives were formulated to suit the short duration of the 1995 expedition, including the testing of a newly established 4-point mooring system. Installed by a marine engineering contractor in December 1994, the mooring system was designed to hold the expedition's mother-vessel in position directly over the wreck while surface-supplied diving operations were carried out.

Excavation work was conducted in two areas of the site between 20th January and 5th February 1995 by a team of 16 divers, again operating from the TSMV *Pacific Conquest* and using SSBA equipment and the same type of excavation plant as on previous excavations.

FIELDWORK. Mid Ships Area. A previously excavated trench spanning grids 106 & 125 was partially re-opened because an object partially uncovered during the 1993 season was thought to be a carronade. Initially it appeared the carronade could easily be retrieved. However, further excavation, subsequently identified the object as a length of a pump chamber; most probably associated with the *Pandora*'s chain pump (McKay & Coleman, 1992: 78).

The pump chamber's location prompted speculation about its deposition. It was found lying athwart the edge of starboard sheathing, partially within the confines of the preserved hull. Most importantly, as this length was round, it was determined to be the bottom end of the chamber (cf. McKay & Coleman, 1992: 78, fig. E11/1). The top, square, end of the chamber could not be seen as its length was assumed to extend a considerable distance into the seabed, outside the confines of the preserved hull. This indicated that

the entire pump may have toppled over after the hull's topsides had disintegrated. Consequently, the pump's cisterns probably fell off the upper deck in a similar manner as the cabin fireplace and were deposited adjacent to the starboard hull (Fig. 41).

In addition to the pump chamber, an array of concreted iron or metal fittings associated with the pump assemblage was uncovered. These concreted fittings were attached to the chamber and presented a veritable cat's cradle of objects obscuring the top end of the pump chamber. Further excavation work to disentangle this array and thereby delineate the chamber and locate the cistern was deemed beyond the scope of the 1995 expedition's objectives. Consequently, grid 106 was back-filled and stabilised with mesh cloth and sand filled bags.

Stern Area. The selected excavation area in the stern was in grids 68 & 70 where two large concretions (each measuring approximately 1.3m×1.15m×0.5m) were located; each concretion was expected to lie on top of a complex of fragile artefacts.

The largest concretion, thought to be a carronade, lay within grid 70 and was excavated first. The primary objective here was to retrieve the complex array of fragile objects expected to lie underneath it. This was imperative before the gun could be raised.

During excavation, it became apparent that a diverse concentration of objects were clustered under the concretion. Retrieval of the objects required more time than anticipated as several delicate objects, for example an intact coconut and a ceramic apothecary's jar containing mercury, were found firmly attached to the concretion; it was imperative to dislodge these prior to the raising of the concretion. Gradually the base of the concretion was exposed and smaller objects were dislodged from it and retrieved. As the base of the concretion was not attached to underlying concretions, it was prepared for raising.

A prefabricated iron and timber litter was assembled on the seabed next to the concretion. Having attached air bags and lifting slings under it, divers then filled the air bags and lifted the concretion off the seabed, gently guiding it onto a litter. Once on the litter, the air bags were deflated and the concretion was wrapped in webbing and secured (Fig. 42). The concretion and litter was estimated to weigh between 0.6-0.9 tonne. It was then raised by crane onto the aft deck of the *Pacific Conquest*.

Excavation was subsequently continued in the area where the concretion had been situated. It contained dense and diverse clusters of artefacts, each requiring additional time and concentrated effort prior to retrieval.

Because the recovery of the concretion (MA4190, carronade) had required more effort than anticipated at the beginning of the expedition, time constraints prevented work on the second large concretion. However, during excavation around the first, a swivel gun (MA4028) was noticed in the adjacent grid. Upon inspection it appeared easy to retrieve. One dive team prepared the swivel gun for raising which was achieved on the last day of excavation using another specially pre-fabricated litter, lifting slings, air bag and crane.

SEDIMENT SAMPLING AND OTHER WORK. Sediment samples were collected from various locations within the wreck for microbiological analysis. In addition to locations where samples had been collected during previous expeditions, a series of samples was collected from a 12m transect laid out across the bow section between the 40.0 and 50.10 grid reference poles. This transect covered unexcavated areas as well as excavated areas (Guthrie et al., 1996).

Several minor tasks were also completed; in addition to inspection and monitoring of the stability of grid reference poles, one of the tasks involved consolidation of a number of cardinal grid reference poles by placing 30kg concrete footings at their base. This was achieved on the 0.0, 50.0, 0.10, 50.10, 16.6 and 16.12 grid reference points. Another task involved the clearing of swim lines previously placed on-site to facilitate



FIG. 42. Concretion being secured to the lifting litter.

location of the mooring points. This was carried out as a safety precaution to prevent fouling of the SSB equipment umbilicals.

DISCUSSION. With the raising of the concreted carronade (MA4190) from grid 70 and the swivel gun (MA4028) from grid 72, one of the expedition's main objectives was achieved. It demonstrated again that a large concreted object could be extracted from the wreck without causing undue disturbance to underlying or adjacent objects.

Achieving this objective was largely due to the ability of the *Pacific Conquest* to remain in position directly over the wreck during diving operations. This proved a crucial factor for effective diving and artefact recovery operations involving SSB equipment, as well as for direct lifts of large, heavy objects from the seabed onto the deck of the mother vessel.

Another important factor contributing to the expedition's success was the composition and experience of the expedition team; with more than half of the team experienced in work-diving at the *Pandora* wreck site.

The deposition of the artefact cluster found under the concretion was subsequently analysed and found to be continuous with the cluster retrieved from the adjacent area during the 1986 expedition. Predominantly personal possessions, this cluster is thought to be part of the same assemblage which can be provenanced to the wardroom, the officers' pantry and the second lieutenant's cabin.

ONGOING WORK

During the 1996 and 1997 seasons, systematic excavation continued on the stern. In the 1998 and 1999 seasons systematic excavation continued on the stern and commenced on the bow. Artefacts from these excavations are in the process of conservation, analysis and description, and will be the subject of forthcoming papers in the Cultural Heritage Series of the *Memoirs of the Queensland Museum*. The final excavation will take place in 2001. The reason for the emphasis on the bow and stern sections of the ship is that these are the areas most likely to contain artefacts relating to the social fabric of the crew. By excavating the focsle areas where the *Pandora*'s ordinary sailors lived, ate and slept, it was likely that artefact clusters corresponding with the sailor's sea chests would be found. These were the only spaces within the *Pandora* where the sailors could keep personal belongings. Most of the *Pandora*'s officers were privileged to have a cabin as their personal space. However, the ordinary sailors had to make do with sea chests to store their personal belongings. Moreover, excavation in the bow penetrated preserved platform deck spaces under the lower deck, where a number of the ships specialists (for example the carpenter, gunner, sail-maker and bosun) had their work and storage areas (Gesner, 1997).

By focussing primarily on the stern and bow of the wreck, both which contain material evidence which reflects the personal lives and professional activities of the crew, an analysis of the personal tastes and habits of the crew can be undertaken.

Analysis of their day-to-day lives will add to what is known about the crew from historical sources such as the *Pandora*'s muster list or the eyewitness voyage accounts. The artefacts will be of paramount importance in illustrating object use and acquisition during a period when British society was undergoing tremendous social and economic change due to the commercial revolution which was flourishing after ca. 1760, and which was a precondition for the advent of the Industrial Revolution (McKendrick et al., 1982). Analysis of personal possessions will provide insights into the values and attitudes prevalent among a fairly typical late 18th century naval crew, and thereby provide data to assess whether sailors, a sub-cultural group described as 'fringe dwelling' (Rodger, 1986:15), were susceptible to the same economic, social and cultural changes influencing broader sections of

British society during the last decade of the 18th century.

There are no plans to systematically excavate the ships mid section in the near future. The expectation is that this part of the wreck will contain items reflecting aspects of nautical technology carried in the ships hold such as water barrels, cordage, spare anchors, shot and ballast. Although information on this type of material is of interest to nautical archaeologists, it was not given the same priority as the material reflecting the *Pandora*'s social fabric. There exist other, more comprehensive, archival and printed sources of information about 18th century nautical technology, so there is less urgency to retrieve the material expected to be there.

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APPENDIX 1

PANDORA'S CREW AT THE TIME OF DEPARTURE. Key: + = did not survive the wrecking; # = died on the journey to England after the wrecking, either in the Dutch East Indies or on the way back from Batavia; * = was with William Oliver on the tender *Matavai* and not on the *Pandora* at the time of the wreck; ** = died before the wreck; ++ = lost in the cutter before the wrecking.

Captain: EDWARDS, Edward
 Captain's clerk: EDMONDS, Edward King
 1st Lieutenant: LARKAN, John
 Lieutenant's yeoman: GERMAIN, John
 2nd Lieutenant: CORNER, Robert
 3rd Lieutenant: HAYWARD, Thomas
 Master: PASSMORE, George
 Master's mates: REYNOLDS, George
 RICKARDS, Thomas
 BOWLING, Edward
 OLIVER, William # *
 Surgeon: HAMILTON, George
 Surgeon's mate: INNES, James
 Purser: BENTHAM, Gregory
 Purser's Steward: BOWLER, Robert +
 Midshipmen: ATKINS, James
 FENWICK, John #
 McKENDRICK (or Kendrick), George
 MATSON, Richard
 PYECROFT (or Pycroft), Henry
 RENOUARD, David *
 SIVAL, John ++
 Quartermasters: ANDREWS, John +
 DODDS, James *
 HAYTHORN, William *
 LINDSEY, Thomas
 Quartermaster's mates: MANNERS, James
 MARSHALL, John
 SPENCE, Charles
 WATSON, Thomas
 Caulker: BELL, Christopher
 Boatswain (Bosun): CUNNINGHAM, John
 Bosun's mates: MOULTER, William
 JOHNSON, James **
 CUNNINGHAM, Joseph ++
 Coxwain: WISDOM, William
 Carpenter: MONTGOMERY, Alexander #
 Carpenter's mate: FARRENS, John
 Carpenter's crew: BROWN, Robert +
 YOWELL, John
 Gunner: PACKER, Joseph
 Gunner's yeoman: FOSTER, Robert
 Gunner's mate: STEWARD, William
 Quarter gunners: CAMERON, John
 NICHOLAS, Henry
 PUDNEY, William
 REEVE (or Reeves), Robert
 Sailmaker: JACKSON, Thomas

Sailmaker's mate: ARBUTHNOT, Alexander +
 Cooper: REYNOLDS, Henry
 Master at Arms: GRIMWOOD, John +
 Corporal: RODRICK, William +
 Cook: MAHONEY, Denis #
 Armourer: CLEMENTS, William #
 Armourer's mates: STAPLETON, Philip
 HODGES, Joseph
 Able Seamen: ADAMS, HENRY **
 BARKER, William #
 BEACKIE, Thomas
 BRIXLEY, Thomas +
 BROWN, Allan
 BROWN, James *
 BROWN, John (note 2 below)
 CALLIGHAN, Timothy
 CAMPBELL, John
 CARROLL (or Carrol), Thomas +
 CARTER, William +
 COBB, Francis
 COLLINS, Henry
 CULLEMORE, James +
 CURLING, John Godfrey
 DEDWORTH, William +
 DENEEN, John *
 DOUGHTY, Thomas
 DUNNETT, John
 DURLING, Daniel +
 EGLINGTON, George +
 FARRELL, William #
 FARRENS, Robert *
 FLETCHER, William +
 FUSS, James
 GEORGE, Joseph
 GOOD, James ++
 HAMMOND, Samuel +
 HANZELL, Jacob
 HENRY, Patrick +
 HOUSTON, Hugh
 INGLESBY, (or Ingoldsby) William
 KEMP, William
 KING, Peter
 LAYSSELL, James
 LOFT, Henry *
 LION (or Lions), William +
 MANSON, John
 MURPHY, John #
 MILTON, Robert #
 MITCHELL, Moses
 MURRAY, James
 ORCHARD, Robert
 PATTERSON, John #
 PAXTON, Alexander +
 PERRYMAN, William +
 PILCH, William #
 POWELL, Henry
 PUMMELL, Charles
 RANCE, Silas
 REEVES (or Reeve), William +

ROBINSON, Alexander
 RUFFEY, John
 SCOTT, James ++
 SKELTON (or Shelton), William +
 SMITH, John
 SMITH, Thomas
 SPRACKLEY, Thomas
 SWAN, William +
 SWEENEY (or Swiney), Roger
 TAYLOR, Robert
 THOMPSON, Lewis
 VARLING, Thomas
 WASDALE, William ++
 WELLS, Daniel
 WELLS, William
 WILMOTT, John
 WORLDHAVE (or Wooldhave), Richard *
 Ordinary Seamen: CRAY, William
 FEA, Robert +
 GORDON, James +
 MACKIE, Richard +
 MAYSONER, Martin +
 MILLER, James +
 THOMPSON, William +
 WEBBER, Robert +
 Landsmen: BANDY, Joseph +
 CONNELL, James #
 DAVIS, John #
 JONES, Evan +

Notes: 1, Two crew on board at the time of departure from Portsmouth were not on board on 29th August 1791, having died during the voyage: James Johnson (bosun's mate) died off Rio de Janiero and Henry Adams (Ordinary seaman) died off Vanikoro. Both were buried at sea.

2, John (or Jonathan) Brown, listed above, was on board at the time of the wreck but was not part of the original crew. Brown was the crew member from the Mercury, who had been put ashore at Tahiti where he was living as a beachcomber. Brown assisted Captain Edwards with information leading to the rounding up of the five mutineers who initially eluded capture by the Pandora's men. Brown was mustered as an able seaman at Tahiti. He apparently elected to stay behind in the East Indies when the Pandora wreck survivors got to Batavia. His fate is not recorded.

Crew of the schooner *Matavai* (tender) when lost off Samoa in June 1791; re-united with *Pandora*'s crew in Samarang, October 1791:

Master's Mate: OLIVER, William
 Midshipman: RENOUEAU, David
 Quartermaster: DODDS, James
 Able Seaman: BARKER, William (died in Samarang after the open boat voyage in the *Matavai*)
 FARRENS, Robert
 BROWN, James
 DENEEN, John

LOFT, Henry
 WORLDHAVE (or Wooldhave), Richard

Crew of the cutter when lost off Palmerston Island on 24th May 1791; never seen or heard of again.

SIVAL, John (midshipman)
 CUNNINGHAM, Joseph
 GOOD, James
 SCOTT, James
 WASDALE, William

APPENDIX 2

SOUTH PACIFIC ISLANDS VISITED OR SIGHTED BY THE *PANDORA*.

Ducie Island – Named by Captain Edwards. Sighted on 16 March 1791; no crew ashore.

Tahiti – Arrived on 23 March, departure on 8 May 1791; extensive interactions with Tahitians.

Moorea – Sighted on 8 May 1791. No crew ashore.

Huahine – Arrived on 9 May, departed on 10 May 1791; boats sent ashore Ulietea).

Otaka – A boat's crew briefly ashore during 10 and 11 May 1791.

Bora Bora – Tatau, the 'King' of Bora Bora, visited on board the *Pandora*.

Maurua – Sighted on 12 May 1791. No crew ashore.

Aitutaki – A boats' crews briefly ashore on 19 May 1791; extensive description by Hamilton of the collecting of an ornately carved spear. (Thomson, 1915: 123)

Palmerston Island – A boat's crew ashore (Corner); *Bounty*'s driver yard found. The cutter searched the outer islands (Sival); Hayward and Corner went ashore on other islands. Sival returned with strange 'curiosities' (a canoe and Figurines) (Thomson, 1915: 124). Sival's jolly boat lost off Palmerston I. 22nd/23rd May; never heard of again.

Duke of York Island – Visited on 6 June; boats ashore; deserted huts discovered.

Duke of Clarence Island (Tokelau) – Visited on 12 June; boats ashore; islanders seen, but no contact with crew.

Chatham's Island (Savaii/Samoa) – Visited on 18 June; contact with islanders.

Tutuila (Samoa) – Visited 21 June; contact with islanders; many 'curiosities' acquired, including birds and parrots. Lost contact with the *Matavai*, *Pandora*'s tender commanded by William Oliver.

Falafagee Island – Sighted on 26 June.

Anamooka (Tonga) – Visited on 29th June; Hayward in canoe to Ha'apai; extensive contact with islanders on Anamooka; watering party attacked (Lt Corner killed one assailant).

- Tofua – While the *Pandora* was at Anamooka, Lt Hayward made a separate voyage to Tofua, one of the Friendly Islands, in a hired sailing canoe.
- Vavua (Tonga) – Sighted.
- Manua (Tonga) – Islanders on board.
- Tutuila (Samoa) – 15th July; found evidence of La Perouse's visit (De Langle massacre).
- Vavua – Visited 19 July; named Curtis Sound; islanders came on board with parrots; named Howe's Islands by Captain Edwards.
- Bickertons' Island – Sighted 21 July.
- Pylstaart Island – Sighted 23 July.
- Tongatabu – Landed for provisions 27 July.
- Anamooka (Tonga) – 29 July; second visit, waited until 3 Aug for missing tender; extensive contact with islanders.
- Niua'foo – Visited 5 August; Edwards named it Proby's Island; short stay.
- Wallis Island – Visited 6 August; islanders on board.
- Rotumah – Visited 8 August; numerous canoes came off to *Pandora*.
- Mitre Island – Sighted 12 August.
- Cherry Island – Sighted 12 August.
- Vanikoro I – Sighted 13 August.
- Meriam (Murray Island) – Sighted 25 August; named by Captain Edwards.