

Memoirs of the Queensland Museum | **culture**

Volume 9

**Pandora Project Stage 2:
four more seasons of excavation
at the Pandora historic
shipwreck**

by Peter Gesner

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APPENDICES

APPENDIX 1

ADMIRALTY'S ORDERS FOR CAPTAIN EDWARDS (PANDORA)

(PRO ADM/2/120:478-80)

ISSUED: 25 OCTOBER 1790

'Whereas, by an order of the late Board of Admiralty dated the 16th of August 1787, Lieutenant William Bligh was appointed to command His Majesty's Armed Vessel the *Bounty*; And by Instructions from the said Board, dated the 20th of November following, was directed to proceed in that vessel to the Society Islands in the South Seas, in order to procure and transport from thence to some of the British Possessions in the West Indies, Bread Fruit Trees and other useful plants, the product of the said Islands.

And whereas the said Lieutenant Bligh sail'd from Spithead on the 23d of December following, in prosecution of his destined Voyage, and by letter to our Secretary dated at Coupang (a Dutch Settlement in the Island of Timor) on the 18th of August 1789, acquainted us that the said vessel on her return from Otaheite with a large cargo of those plants in a very flourishing state, had been violently and forcibly taken from him on the 28th of April preceding by Fletcher Christian, who was Mate of her and Officer of the Watch, assisted by others of the inferior

Officers and Men, armed with musquets and bayonets, and that he (the said, Lieutenant Bligh) together with the Master, Boatswain, Gunner, Carpenter, Acting Surgeon and others of her crew (being nineteen in number, including himself) were forced into the launch and cast adrift ten leagues to the South-West of Tofoa, the North Westernmost of the Friendly Islands, without fire arms and with a very small quantity of provisions and water; And that having landed at Tofoa, and been beat off by the natives with the loss of one of his party, he bore away for New Holland and Timor and on the 15th of June following arrived at Coupang abovementioned, distant 1200 leagues from the place where the vessel was seized as aforesaid, from whence he and those who have survived are now returned to England:

And whereas the ship you command has been fitted out for the express purpose of proceeding to the South Seas in order to endeavour to recover the abovementioned Armed Vessel, and to bring in confinement to England the abovementioned Fletcher Christian and his associates (a list of whose names you will receive herewith) or as many of them as have survived and you may be able to apprehend, in order that they may be brought to condign punishment; You are hereby required and directed to put to sea, with the first opportunity of wind and weather, & to make the best of your way to Teneriffe, where

you are to take in, with the utmost dispatch, such wine and necessaries as you shall judge proper for the use of the ship's company, & then proceed as expeditiously as possible to the Southward and shape your course round Cape Horn; And having weathered that Cape, make the most direct course to get within the limits of the Trade Wind and steer for Matavai Bay or Oparre Harbour on the North side of Otaheite (one of the Society Islands) which is in Latitude 17.29 South and about the Longitude of 149.35 West.

On your arrival at Otaheite, and not finding the abovementioned Armed Vessel there, you are to endeavor to get the best information possible respecting her; carefully observing yourself, and strictly charging your officers and crew, to avoid saying anything in regard to the cause of the inquiry until you shall have discovered whether the inhabitants of the said island have a knowledge of Lieutenant Bligh's having been dispossessed of her as abovementioned, where she is, & whether any of the mutineers are on that island.

If you shall find that the mutineers or any of them are on the island of Otaheite, you are the first moment it shall be in your power to detain such of the chiefs as you maybe able to get hold of, and, then, declaring the object of your voyage, and immediately appointing a strong party well armed to go in quest of the mutineers, require assistance and guidance to direct the said party where to find them.

In case you shall not be able to gain any information of the mutineers at Otaheite, you are to proceed to the Island of Whytootackee in Lat: 18.52 Sth. and Long: 159.41 West; calling in your way at Huaheine 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, observing however that it will be always in your power to judge of their reports by sailing round the islands

and looking into the bays & harbours, to discover if the abovementioned Armed Vessel be in any of them.

Should the mutineers not be at Whytootackee, which there is reason to think is the place of their resort, you are, before you get farther to the Westward, to make a circuit of the neighboring islands in search of them.

Having so done, and not finding them at any of the abovementioned islands, you are to proceed to Annamooka Road in the Friendly Islands (touching at Palmerstone's and the other islands in the way) and pursue the like means for finding them: And having succeeded, or failed, in your endeavours for that purpose, proceed on your return to England through Endeavour Straits which separate New Guinea from New Holland; passing to the Southward of Java unto Princes Island in the Straits of Sunda; And as in the route the prevailing winds are to be attended to, it is necessary you should remember that the changes of the Monsoons, amongst the islands to the Eastward of Java & about Endeavour Straits are about May and November; there being no dependence (of which we have any certain knowledge) of passing the Straits after the month of September or beginning of October, altho' it may perhaps be accomplished in the month of November.

From Princes Island you are to make the best of your way, by the Cape of Good Hope, to England, repairing to Spithead, from whence you are to send to our Secretary an account of your arrival and proceedings, and where you are to remain until you receive further orders.

In case you are so fortunate as to fall in with the abovementioned Armed Vessel and mutineers, or any of them, you are to put on board her such of your officers, Petty Officers and Foremastmen as you can best spare and you shall judge best qualified and most to be

depended upon, to navigate her to England; furnishing her with such stores & provisions from the ship you command as may be necessary for that purpose;

And you are 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 the punishment due to their demerits.

During your passage out and home, you are to take every advantage of the rains to keep up your stock of water; And if you find it necessary to stop for a supply on your way out, you will observe that Rio Janeiro and New Year's Harbour in Staten Island, are the most eligible places for that purpose.

Given the 25th October 1790 - signed: Arden - Hood - A. Gardner

LIST OF THE MUTINEERS REFERRED TO IN THE ACCOMPANYING INSTRUCTIONS.

Fletcher Christian:	Master's Mate
Peter Haywood [sic]:	
Geo. Stewart:	Midshipmen
Edward Young:	
Chas. Churchill:	Master at Arms
John Mills:	Gunner's Mate
Jas Morrison:	Boatswain's Mate
Thos Burkitt:	Able Seamen
Mathw Quintal:	
Jno Sumner:	
Jno Millward:	
Wm McKoy:	
Henry Hillbrant:	
Michael Byrne:	
Wm. Muspratt:	
Alexdr Smith:	
Jno Williams:	
Thos Ellison:	
Isaac Martin:	
Rich Skinner:	
Mathew Thompson:	
Wm Brown:	Gardner
Josh Coleman:	Armourer
Chas Norman:	Carpenter's Mate
Thos McIntosh:	Do. Crew

APPENDIX 2

ADMIRALTY BOARD MINUTES (ADM/3/107)

FOR AUGUST 1790:

- 6 Aug 'Captain Edwards to be appointed captain of HMS *Pandora*'
- 10 Aug 'Captain Edwards... to have one week's leave ...to attend his private affairs' *
- On 11 Aug in the *Pandora's* log, there is the following entry:

received a letter from Mr Stephens, secretary of the Admiralty directing me [Edwards] to attend Ld Chatham at the Admiralty without loss of time and informing me that one week leave of absence was directed to be given...for that purpose"

FOR OCTOBER 1790:

- 20 Oct – Captain Edwards again given leave to “come to Town” to attend their Lordships [NB: Edwards was presumably briefed about his orders at this meeting in the Admiralty building in London - although the written orders were not issued until 25th October by which time the *Pandora* was already off Spithead. The log does not mention that Edwards left the ship to travel to London during the last week of October; he must have received them at Portsmouth, alternatively his absence from the ship while he travelled to London to personally receive a written copy of the orders was not recorded.

- 22 Oct – Navy Board are “to cause the sum of £80 to be impressed to Captain Edwards to enable him to purchase presents for the natives of different islands he may fall in with in the course of his present intended voyage”
- 26 Oct – Thomas Hayward appointed to *Pandora* as 3rd Lieutenant

APPENDIX 3

SOUTH PACIFIC ISLANDS SIGHTED OR VISITED BY THE *PANDORA*

Ducie Island	Sighted on 18 March 1791
Tahiti	Arrived 23 March 1791, departed on 8 May 1791; extensive interactions with islanders.
Moorea	Sighted on 8 May 1791 No crew ashore
Huahine	Arrived on 9 May, departed on 10 May 1791; boats sent ashore.
Ulietea	Boat's crew briefly ashore during 10 and 11 May 1791
Otaka	
Bora Bora	<i>Tatahu</i> , the "king" of Bora Bora came on board
Maurua	Sighted on 12 May 1791; no crew ashore.
Aitutaki	Boats' crews briefly ashore on 19 May 1791; extensive description by Hamilton of a pearl oyster shell gorget and a spear resembling a 'Gothic spire' (Hamilton 1793:65-66)
Palmerston's Islands	Boat's crew ashore (Corner); found <i>Bounty's</i> driver yard. Midshipman Rickards circumnavigated the main island in the cutter; Hayward and Corner ashore on other islands that are part of the Palmerston group. Sival came back with strange 'curiosities' (canoes resembling human, or fish or animal shapes) (Hamilton, 1793:68) Sival's jolly boat was subsequently lost on 22/23 May 1791
Duke of York Island	6 June; boats ashore; deserted huts discovered.
Duke of Clarence Island	12 June; boats ashore, saw islanders, but no contact with them.

Chatham's Island (Savai, Samoa)	18 June; contact with islanders
Tutuila (Samoa)	21 June; contact with islanders; many 'curiosities' acquired, birds, parrots; lost contact with the <i>Matavai</i> tender commanded by William Oliver.
Falafagee Island	Sighted
Anamooka (Tonga)	29 June landed; Hayward in canoe to Ha'apai; extensive interaction with islanders on Anamooka;
Tofua	Side-trip by Lt. Hayward, while the <i>Pandora</i> remained at anchor at Anamooka; shore-parties interacted with islanders; various tense incidents and physical confrontations. The <i>Pandora</i> left Anamooka on 11 July (Refer Chapter 7 – An incident at Anamooka).
Vavua (Tonga)	Sighted
Manua	Islanders on board
Tutuila (Samoa)	15 July; found evidence of La Perouse visit (De Langle massacre)
Vavua (Tonga)	19 July; named Curtis Sound; islanders came on board with parrots; named Howe's Islands
Bickertons' Island	Sighted
Pylstaart Island	Sighted 23 July 1791
Tongatabu	Landed for provisions 27 July 1791

SOUTH PACIFIC ISLANDS SIGHTED OR
VISITED BY THE *PANDORA*

cont.d

Anamooka (Tonga)	29 July; second visit, waited there until 3 Aug for missing tender <i>Matavai</i> ; during this time there was extensive contact between Islanders and the <i>Pandora's</i> crew. Not always friendly, e.g. a watering party attacked (Lt. Corner shot dead one assailant – Refer Chapter 7 – <i>An incident at Anamooka</i>).
Niua'foo	5 August; named Proby's Island ; short stay (according to Hamilton only a 'few hours')
Wallis Island (Uvea)	Islanders on board
Rotumah	8 August; numerous canoes 'came off' to the <i>Pandora</i>
Mitre Island	Sighted 12 August 1791
Cherry Island (Tikopia)	Sighted 13 August 1791; no boats ashore
Vanikoro Island	Sighted 13 August 1791; no boats ashore
Cape Rodney (PNG)	
Cape Hood (PNG)	
Murray Island (Mer) (GBR)	Sighted and named by Edwards on 26 August 1791
Entrance Cay (GBR)	Sighted 28 August 1791
Escape Cay (GBR)	Sighted 29 August 1791
'Craggy Rock' Island (McLennan Cay? GBR)	Sighted 31 August 1791
Plum Island (East Strait Island?)	Sighted 1 Sept 1791
Laforey Island (Horn Island)	Sighted 2 Sept 1791

GBR – Great Barrier Reef

APPENDIX 4

CAPT EDWARD EDWARDS' NARRATIVE RELATIVE TO THE LOSS OF HMS *PANDORA*¹ (MINUTES TAKEN AT A COURT MARTIAL ASSEMBLED ON BOARD HIS MAJESTY'S SHIP HECTOR IN PORTSMOUTH HARBOUR ON THE TENTH DAY OF SEPTEMBER 1792) (TNA:ADM. 1-5330)

After finishing the search for His Majesty's Armed Vessel the *Bounty* in the South Sea, I was proceeding towards England by way of Endeavour Straits agreeable to my orders, and as I supposed Capt Cook was the only person that had gone that way in a ship², I had recourse to the account given in his Voyage for information on the subject and as I perceived by it that he encountered great difficulties and dangers in getting through the Reef that extends along the coast of New South Wales to the southward, and also in passing between the islands, keys and shoals within it in his passage from thence to the Straits mouth which determined me not to follow his track, at least until I had searched for a safer and more commodious opening or clear passage to the Northward, and I was the more readily induced to pursue the search that way as it was warranted by the opinion of so able a navigator as Capt Cook³

1 This is the narrative provided to the Court Martial enquiring into the loss of the *Pandora*; the *Pandora's* senior officers (Larkan, Corner, Hayward and Passmore) were all asked whether they 'believed' this narrative to be correct ("*just and true*") It was recorded that all answered affirmatively.

2 Edwards appears to be indicating here that he was well aware that Bligh had also traversed these waters in the *Bounty's* launch. For some reason he appears to be distinguishing between observations and remarks made (by Capt. Cook) from a ship and those made in a launch. On the other hand, he may only have had a copy of Cook's account; a copy Bligh's accounts may not have been available to him. Although he does refer to "Bligh's Mountainous Island" which Bligh charted when in the launch.

3 Evidently Edwards was prepared to head as far south as Providential Channel (in latitude 12° 35' S) and then, finally, follow Cook's track if he did not first find a more suitable opening and channel to the north.

and with that view I hauled⁴ in to make the land when we were by our account a little to the westward of that part of New Guinea named by Mons. Bougainville *Louisiade*⁵ and I saw two Capes, the easternmost I named Cape Rodney and the westernmost Cape Hood. In passing the latter it was perceived that the land inclined to the Northward to the Westward of that Cape, and in that situation there is probably a passage through the land usually called by us New Guinea, or at least a very deep bay, and I desisted from pursuing the coast of New Guinea and I steered to the westward in the latitude of Endeavour Strait⁶ with the intention to fall in to the Northward of, and to make an island distinguished by Lt Bligh by the name Mountainous Island⁷ with a very high round hill, until ½ past 9 of the morning of 25th August 1791 when breakers were seen from the masthead bearing from WNW to WbS⁸ and we hauled up to the SW in order to pass them to the Southward and to windward of them, a few nights previous to making the Capes Rodney & Hood until this time it had been our usual custom to lye to during the night and to sound frequently, and this precaution was taken because Mons. Bougainville had represented this part of the Ocean to be particularly dangerous and because after we had passed to the Westward of his track it was also supposed to be entirely

4 By 'hauling to the land' – i.e. towards New Guinea – it seems Edwards thought it likely he may find a more suitable, more northerly opening through the reef than Providential Channel – pioneered and described by James Cook. As it was to transpire, Edwards was right, but it was Bligh who found it during the second breadfruit voyage (Oliver 1988).

5 The *Louisiade* archipelago, named by Bougainville in 1767.

6 10° 35' S

7 Modern-day Moa Island; in the *Pandora's* log (2 Sept 1791) Edwards gives the latitude of Bligh's 'Mountainous I.' as 10° 16' S; apparently Edwards assumed he would be able to approach it from the east along the same latitude; he did not realise that the outer GBR lay at least 100 miles to the east; in fact it was so far away as to make impossible any sighting of 'Mountainous I.' from the outer barrier at that latitude and, more importantly, strewn with and interspersed by so many reefs and shoals as to make impossible a direct East-West traverse along this latitude.

8 West by South

unknown⁹, before Noon another Reef was seen and we passed to the west of it, it obtained the name Stony reef isle¹⁰, and the breakers first seen were named Look Out Shoal.¹¹ At Noon¹² we were in the Lat 9°50' S and Long 215° 27' W – before two o'clock¹³ we bore away more to the westward and afterwards saw a small high island to the westward of us, at 2 saw a reef bearing about SWbS we afterwards steered a little to the Northward of West to keep clear of the last mentioned Reef or shoals and with the intention to pass to the Northward of the small island then in sight, this and some small islands near it were named Murray's Isles¹⁴, we continued that course till about ½ past 5 when we perceived that our passage was obstructed that way by a reef that extended from the island to the NW and we hauled our wind to the southward and stood off and on during the night, in the morning¹⁵ we steered to the SW-ward with intention to pass to the southward of Murray's Isles but our passage was also obstructed on that side by a reef that joined to the isles and we pursued our way with caution in the direction of the reef to the southward in search of a channel, but none was found that promised safe passage for a ship, until the 28th of August in the morning when an opening was perceived in the Reef which we flattered ourselves would serve our purpose.

9 After Torres in 1606, the *Pandora* was the first (documented) European ship to traverse north western Coral Sea waters and approach the GBR from the east in this latitude; Bougainville's most westerly position was Bougainville Reef in latitude 15° 30' S. where he had turned back on his track opting to head north towards the Louisiade Archipelago. Cook had mainly stayed within the GBR in 1770, or had skirted its eastern edge after exiting the GBR at Lizard I. and re-entering at Providential Channel.

10 Modern-day Boot Reef; like some names Capt Edwards bestowed on islands or reefs, this one was among several not retained.

11 Pandora Passage between Portlock Reef and Boot Reef (refer AUS 377) Later to be recommended by Matthew Flinders (1814)

12 i.e. the beginning of 26th August (days were reckoned from noon until noon)

13 2pm 26th August 1791

14 Mer

15 26th August 1791

A little before Noon¹⁶ Lieut. Corner was sent in the Yawl with directions to examine one of the channels for there appeared to be two and then if the weather would permit to return on board as soon as possible, at Noon we were in Lat 11° 23' 40" S and 216°15' 22" W and a sandy key¹⁷ on the outside of the reef...the opening S 75° W dist. 3 or 4 miles, in the afternoon¹⁸ the wind was moderate and the sea was smooth, between 4 & 5 in the afternoon, but I cannot be very exact as to times, a signal was made from the boat to inform us that the channel through the reef was sufficient for a ship but I wished to have every information relative to it before I attempted to run through, and I also thought the day too far advanced¹⁹ at that time to risque so hazardous an enterprise and to expose the ship to uncertain danger on the inside of the reef after dark, and in consequence of these considerations a signal was made soon after for the boat to return on board, and some time after that the signal was repeated for the same purpose, at first I little doubted of her getting on board before night, and although she did not make the progress towards the ship I expected, she was on the outside of the reef²⁰ before dark and I expected and flattered myself that she would have increased her distance from it in her approach towards the ship. A tender which had been fitted out at Otaheite for the purpose of covering and attending on boats in the search for the *Bounty* etc. and which upon this occasion would have been of particular use, unfortunately was separated from us some

16 28th August 1791

17 Now named Moulter Cay in 1983 (Edwards referred to it as Entrance Cay)

18 29th August 1791 (i.e. the afternoon of the same day Lt Corner's yawl left the ship to reconnoitre)

19 Edwards is referring to the fact that the afternoon sun was too low on the western horizon, causing glare and reflection on the water to impair the look-outs' ability to discern shoal water ahead.

20 Edwards appears to be suggesting that the yawl was in blue water, to the east of Moulter Cay and the reef extending to the southward. This would mean that Corner had found what was later called Raine Island Entrance.

time previous to this and I was apprehensive she was lost, I had also lost another boat and boats crew and these disastrous events greatly increased my anxiety for the safety of a third and as I had given positive orders to Lieut. Corner if possible to come on board with the boat and perceiving that she was on the outside of the reef endeavouring to put those orders into execution I thought it my Duty to use my utmost exertions to endeavour to take them up, after dark²¹ false fires were burnt and muskets fired from the ship, and answered by the Boat by firing muskets reciprocally to point out the place of each others situation. The flashes of the muskets fired in the boat were distinctly seen by us, and she was reasonably and anxiously expected on board every minute both on account of the safety of the boat and the people in her, and for the assistance and information we expected from the knowledge they had acquired of the channel through the reef, all hands were kept upon the deck, the deep-sea lead frequently hove but had no bottom at 110 fathoms until about 20 minutes after seven²² when we got soundings in 50 fathoms water, the boat at the same time was seen close under the stern, sometime previous to this the ship had been lying to with the main and fore yards kept nearly square to prevent the ship from forereaching, upon getting soundings the topsails were fitted but before the jacks were hauled on board and other sail made and trimmed the ship struck upon a reef, we had $\frac{1}{4}$ less 2 fathoms on the larboard side, and 3 fathoms water on the starboard side, the sails were braced about different ways to endeavour to get her off but to no purpose, they were then clewed up and afterwards furled, the T Gallt yards got down and the top gallt' mast struck, boats were hoisted out with a view to carry out an anchor but before that could be

effected the ship struck so violently on the reef that the carpenter reported that she made 18 inches water in 5 minutes and in 5 minutes thereafter there was 4 feet of water in the hold, finding the leak to increase so fast it was thought necessary to turn the hands to the pumps and to bail at the different hatchways, but she still continued to gain upon us so fast that in a little more than an hour and a half after she had struck there was $8\frac{1}{2}$ feet of water in the hold²³, at about ten perceived that the ship had beat over the reef and we had 10 fathoms, we let go the small bower anchor and veered away a cable and let go the best bower in $15\frac{1}{2}$ fathoms water underfoot to steady²⁴ the ship, some of the guns were thrown over board and the water gained upon us only in a small degree, and we flattered ourselves that by the assistance of a thrummed topsail²⁵ which we were preparing and intended to haul under the ships bottom we might be able to lessen the leak and to free her of water, but these flattering hopes did not continue long, for as she settled in the water the leak increased again, and in so great a degree that there was reason to apprehend she would sink before daylight, during the night two of the pumps were unfortunately for some time rendered useless, one of them however was repaired and we continued bailing and pumping the remainder of the night and every effort that was thought of was made to preserve the ship and to keep her afloat – day light fortunately appeared and gave us an opportunity to see our situation and the surrounding danger, and it was evident that the ship had been carried to the northward

21 Sunset was at approx 6pm

22 It would have been dark by then, well after sun set, which was at approximately 6 pm

23 By approximately 9,00pm then the storerooms at platform deck level would have been awash with at least 2 feet of water

24 This is the large anchor situated in the stern area of the wreck site – Plate 12

25 Also referred to as “fothering” the hull – a thrummed sail is one which has short lengths of rope yarn sewn onto it; the intention is that the chunks of yarn stop up any holes to reduce the influx of water.

by a tide or a current. The officers²⁶ whom I had consulted on the subject of our situation gave it as their opinion that nothing more could be done for the preservation of the ship, it then became necessary to endeavour to provide and to find means for the preservation of the people, our four boats which consisted of one launch, one eight oared pinnace and two six oared yawls with useful hands²⁷ in them were kept astern of the ship, a small quantity of bread, water and other necessary articles were put into them, two canoes which we had on board were lashed together and put into the water, rafts were made and all floating things upon deck were unlashd, at about ½ past six o'clock in the morning of the 29th August the hold was full and water was between decks, and it also washed in at the upper deck ports and there were strong indications that the ship was on the very point of sinking, and we began to leap over board and take to the boats and before everybody could get out of her she actually sunk²⁸. The boats continued astern of the ship in the direction of the drift of the tide from her and took up the people who had hold of rafts and other floating things that had been cut loose for the purpose of supporting them in the water, the double canoe that was able to support a considerable number of people broke adrift with only one man and was bulged upon a reef and afforded us no assistance when she was so much wanted on

this trying and melancholy occasion, two of the boats were loaded with men and sent to the small sandy island (or rather key) about 3 to 4 miles from the wreck and I remained near the ship for sometime with the other two boats and picked up all the people that could be seen and then followed the two first boats to the key, and after landing the people and clearing the boats, boats were immediately dispatched again to look about the wreck and the adjoining keys for people that were missing, but they returned without having found a single person.

On mustering it appeared that 89 of the ship's company and 10 of the mutineers who had been prisoners on board were saved and that 31 of the ships company and 4 of the mutineers were lost with the ship. The boats were hauled out in order to be fitted out for our intended voyage to Timor, and we were two days employed in this business, in the meantime boats were sent to the wreck to endeavour to procure something from thence, they got a little of the top gallt rigging, the head of the top gallt mast which would serve for a spare mast for a boat and part of the chain of a lightning conductor which was converted into nails, and these I believe were the only useful articles procured from the wreck after she sunk.

The boats were all raised by surrounding them with a breadth of canvass nailed to boats sides below the row ports and supported upwards by uprights secured to the sides and washboards²⁹, this broke off the sea and contributed greatly to the preservation of the boats and the people that were in them, we put ourselves without distinction of person to a very scanty allowance of water and provision from the time of our landing on the key³⁰,

26 It is possible that Lt Corner was not consulted, as he may have still been in the yawl through-out the night of the wrecking. However, Morrison mentions that Corner reassured the prisoners during the night of the wrecking that they would have the same opportunity to save themselves as the Pandora's crew in the event the order to abandon ship was given. (Rutter, 1935:126) Probably then, Corner had somehow managed to get back on board during the night

27 This is a noteworthy phrase; presumably Edwards means able seamen. This may to some extent account for the fact that all of the landsmen drowned during the wrecking, while no officers and comparatively few petty officers and able seamen shared that fate; however, all remaining ordinary seamen were also drowned.

28 There is no mention at all of the prisoners in the box, nor that orders had been given to free them; that the armourers' mate Hodges was in fact in the 'box' freeing the prisoners of their fetters when the ship sank..(Morrison, 1935:127)

29 With so many men in each of them, the boats would have been very deep in the water; by attaching the canvas they added more freeboard to the boats' sides

30 The morning of 29th August

and the boats being finished on the 31 of August they were launched and at ½ past 10 o'clock in the morning³¹ we all embarked to the number of 99 in the four boats and steered to the NWbW and WNW towards Endeavour Straits.

On 1st September in the morning³² saw land which we supposed was part of New South Wales, two of the boats hauled in for it and got a small supply of water, a very small supply was also got by one of the boats at Mountainous Island³³ from the natives, but they gave us certain proof of their hostile intention which prevented us from landing in that part of the island, however we landed at different parts of this and also another island³⁴ near it without being able to procure any. We then stood for the Prince of Wales' Islands where we got into a sound formed by those islands and called by us Sandwich Sound.³⁵ Water was procured from here on an island on the SE part of the sound which we called Laforey's Island³⁶. Canvas bags were made and other expedients used, yet we had no vessels and means sufficient to contain a gallon of water for each person in the boat, and with this small quantity we left the sound on the 2nd September and stood through Endeavour Straits³⁷ for the island of Timor and all fortunately arrived safe at Coupang in that island between the 17th and 19th September 1791.³⁸

I might have been more prolix, but I conceived that it would be only intruding on the time of the court without throwing any light upon, or that would be useful to elucidate the subject before them, and I should therefore humbly beg leave to submit this short narrative to the consideration of the court and if they find what I have asserted in it to be true, I flatter myself they will think it as sufficient indication of my conduct and exculpate me from censure.

(Signed) Edward Edwards

NB: Attached to these papers there is a signed statement (Pandora dd. 28 August 1791)

'It being the unanimous opinion of the 3 lieutenants & master that nothing further could be done for the preservation of H M Ship it was concluded as next expedient to endeavour to save the lives of the men. To the truth whereof we this day put our hands'

(Signatures) Geo Hamilton, Surgeon, Gy. Bentham, Purser

31 The morning of 31st August, i.e. two nights had passed since the sinking

32 i.e. nearly 24 hours later

33 Edwards is referring here to Mt Adolphus I

34 Little Adolphus I

35 Modern-day Flinders Passage; Edwards' name for it was not retained

36 Most likely this is modern-day Horn I. The name Laforeys' I. was not retained.

37 They actually went through modern-day Prince of Wales Channel

38 The launch and the pinnace sighted the south-east coast of Timor on 14th September but did not reach Coupang until 16th September 1791; the two yawls arrived in Coupang two days later.

APPENDIX 5

SOURCES FROM EIGHTEENTH CENTURY BRITISH ENGLISH NEWSPAPERS

- A) Extract from James Atkins' Journal
- B) Authentic Particulars (via Capt Edwards)
- C) Reports re letters by Edward Edmonds and Edward Bowling

NB: The extract from Atkins' journal appeared in a report from Harwich dated 29 May 1792. The same report appeared in several London newspapers, e.g. *Evening Mail*, 1 June 1792, *Morning Herald*, 2 June 1792, *Lloyd's Evening Post*, 1 June 1792

Other newspapers also reported "Authentic particulars" regarding:

- the loss of the *Pandora*, e.g. *The Star* (London) 31 May 1792, and
- the fate of the *Bounty* e.g. *Morning Herald* (London) 1 Dec 1792

Clearly new items regarding the stories – about the *Bounty* mutiny and of the *Pandora* voyage as the sequel – were eagerly awaited by readers. This is evident from the tone of the reporting as well as from the fact that any snippet about the *Bounty* or the *Pandora* or regarding a member of its crew was apparently considered newsworthy. For instance, under the heading 'Authentic Particulars re loss of the *Pandora*, frigate, Captain Edwards', *The Star* remarked that the object of the *Pandora's* voyage was 'so well known as not to require any clarification, further than may be collected from the subsequent narrative, which we are fortunately enabled to lay before our readers'.

Letters written by some of the *Pandoras* were also reported, witness the *Public Advertiser* story about Edward King Edmonds' letter to his father and the *Evening Mail* story reporting Edward Bowling's letter. Also, details concerning the returned *Pandoras* were considered newsworthy, e.g. details relating to the mugging of George Reynolds in November 1792 [*The World* (London) 14 Nov 1792].

A) AN EXTRACT FROM JAMES ATKINS' JOURNAL [*Evening Mail*, London, 1 June 1792] Reported from Harwich, May 29 1792

HARWICH, May 29

"Yesterday a fishing smack landed here, Mr Larking¹, the first lieutenant; Mr Reynolds, master's mate; Mr Magson², midshipman and fourteen men of His Majesty's late unfortunate ship, the *Pandora*, Edward Edwards Esq. commander, lately sent out in search of his Majesty's ship *Bounty* and her crew, and to make new discoveries, but lost on a reef of rocks on 28th August last. The above people got their passage in the *Swan*, Dutch East India-man, from Batavia, and landed in Middelburgh³, on the 26th instant; they left at Batavia, Capt Edwards, Dr Hamilton, Lieutenants Connor⁴ and Hayward, Mr Patmore⁵, master, Mr Harris⁶ doctor's mate, Mr Parker gunner, Mr Cunningham boatswain, Mr Oliver, master's mate; and thirty-one of the *Pandora's* men, and prisoners of the *Bounty*, and also nine men, one woman and two children, taken at the island of Cropang⁷, transports to Botany Bay, some of their names as under, Hanson, Cox, Allen, Wilson, Bryant, his wife and two children; the names of the other transports not recollected. Mr Seville⁸, an inferior officer and thirty-five men belonging to the *Pandora* were lost and drowned; and nine men died on the voyage.

The following are authentic particulars of the *Pandora*. Taken from the journal of Mr James Atkins⁹, an old officer in the navy, on board said ship; that the said ship sailed

-
- 1 Larking = Larkan
 - 2 Magson = Matson
 - 3 Middelburgh, capital of the Dutch province of Zeeland.
 - 4 Connor = Corner
 - 5 Patmore = Passmore
 - 6 Harris = Innes
 - 7 Cropang = Kupang or Cupang on the island of Timor
 - 8 Seville, also spelled as Sival (ADM 35/1360)
 - 9 Atkins was mustered on as a midshipman

from South Yarmouth (Isle of Wight) on 16th November 1790 and arrived on Otaheite on 23rd April¹⁰ following, at which place we found a number of the *Bounty's* people, who to defend themselves had built a schooner of about 35 tons, armed with small arms, which we took possession of, and also 14 of the *Bounty's* people, after many days search, trouble, fatigue, hardships and starving them out; by whom we learnt that Christian, the ringleader of the people, and some of the natives, had left Otaheite about three months¹¹ before the arrival of the *Pandora*, but to what place we could not discover; that from this time to the time of our misfortune, we visited a number of islands in search of Christian, but could not hear any account of him. On 28th August, in searching for a passage between New Guinea and New Holland, the ship struck upon a reef never before seen, or any breakers thereon to give us the least notice of our danger, and there being a very heavy sea, we every moment expected the ship would be dashed to pieces.

We kept pumping and bailing in hopes of keeping her up till daylight; hove the great guns overboard to ease and lighten the ship; but long before daybreak the water came in at her ports¹² and the sea made free passage over the ship; and the night being as dark as darkness could be, nothing else was expected than all hands to be swallowed into eternity every moment; notwithstanding which, both officers and men behaved with the greatest bravery, coolness, and fortitude, and nothing was omitted to preserve the ship and lives. Just before daybreak of the 29th, the pinnace was hoisted out, and soon after the ship went down; but that every officer and man, without distinction, might have

an equal chance for their lives (too much cannot be said, of the gallant behaviour of our noble commander, and officers) two or three hands only were admitted into the boats and cut adrift, that the rest might do their utmost to save and not desert the ship, whilst the boats kept at an *offen*¹³ to see her fate and be in readiness to assist and save their lives. The water soon after making over her gangway, no alternative was left for the preservation of our lives than for everyone to take the best means he could, some on yards, booms, casks or anything floatsom he could lay hold of; while others with horrible shrieks and cries begged of Almighty God to preserve them. Our worthy commander was fortunately saved, and was a principal in saving many of our men; he afterwards in coming off himself to save and preserve all he could; we got on shore on Sandy Island (which we named the Unfortunate *Pandora's* Island) thrown up by the sea, and without a tree upon it, and measured at low water only 35 yards long and 25 yards in width; and when a spring tide or a high wind it was entirely covered by a dreadful sea; in this situation, our boats were hauled up, and the number of officers and men mustered, and the quantity of provisions and stores accounted; when it appeared that 31 of our men and four prisoners were drowned; and the provisions saved were only 2 cwt. of bread, 15 gallons of wine, 18 gallons of water, 50 pounds of portable soup and a small cag of tripe, all of which were put into a common stock; the boats were then hauled up, and tents made of the boats' masts and sails; Capt. Edwards, finding his stock of provisions so small that he would only allow two ounces of bread, half a gill of wine and a

10 The *Pandora* actually got through the Needles (off IoW) on 7th November 1790 and arrived in Tahiti on 23 March 1791 (See Primary Source 1)

11 The *Bounty* was in fact last seen in Tahiti in September 1789 – i.e. approx 18 months before the *Pandora's* arrival in Tahiti (on 23 March 1791)

12 Ports = gunports

13 *offen*=offing

gill of water¹⁴ per man per day; but only half the portion of bread and wine, and no water, for the day we got on shore. The sand being moist and the sun intensely hot, not an officer or man remained but what was scorched to such a degree, that the skin peeled off them the same as if they had been scalded with boiling water. Much praise we must give to lieutenant Connor¹⁵, and three of our men, who sat up one night to boil salt water into fresh, but their efforts were fruitless, being able to obtain only a few drops. One of our men¹⁶ by drinking salt water (not being able to satisfy his drought without) went so mad that a guard was obliged to be set over him; he afterwards got better, but is since dead. Our boats, which were damaged, were repaired in the best manner we could, and sent several times to the wreck to endeavour to save some materials and stores, but all in vain, except a cat, and the main top gallant mast, which we cut up for firewood to boil some shellfish, and the lightning chain was converted into nails to repair the boats. On the 30th our two yawls with Lieut. Connor and Mr Pasmore went to sound the channel we had discovered, and found it was exceeding good, there not being less than 15 fathoms water.

The rest of the hands being employed in fitting out the boats and at twelve we were distributed as follows, viz in the pinnace, Capt Edwards, Lieut. Hayward, and twenty-three men; Lieutenant Connor, and thirty men in the launch; Lieutenant Larken, Dr Hamilton and twenty two men in the red yawl; and Mr Passmore and twenty men in the blue yawl; and then committed ourselves to the mercy of the winds and the

sea; in search of land, promising to keep all the boats together as near as possible; and after experiencing the greatest hunger and thirst, heat, cold, gales and calms, fogs and mist, sickness and fatigues, danger of being devoured by wild beasts in the islands we made and sent on shore in search of fresh water, risk of being killed by the natives, and other calamities not to be described, we all arrived at Couppang¹⁷ on the 19th and 22nd September, a Dutch settlement on the island of Timore in the East Indies, where every attention possible was given by the Governor, lieutenant governor, Surgeon and principals of the place, both to our officers, Dr Hamilton and men, and we all began to recover very fast.

In this place we found Cox, Hanson, Allen, Wilson, Bryant, his wife and two children, and four other men, all transports deserted from Botany Bay, who were all delivered up to us, and made prisoners. Cox had drawn money on the British flag, pretending that he was captain of a ship bound with provisions for Botany Bay, but castaway on his passage. On the 6th October all the officers, doctor, men and prisoners embarked on board a Dutch ship called Rembang, bound for Batavia, but on coming through Lieutenant Bligh's Strait¹⁸, met with a violent monsoon, thunder, lightning, rain and wind, which cleared the yards of every sail and the ship became so leaky, that the pumps could not be left, and the Dutch commander, his officers and men gave up all for lost; therefore Capt Edwards took the command, and with his officers and men providentially got her safe through the Straits; and about the middle of November arrived in Batavia.

14 Cwt. = hundredweight (approx 47kg)
Bread = ship's biscuit
1 gallon = approx 4.4 litres
1 pound = approx 0.45kg
Cag = keg, a small barrel (approx 57.6 litres)
2 ounces = 56 g
1 gill=142ml (0.142 litre)

15 Connor = Corner

16 James Connell (died later in Batavia Hospital)

17 Cupang or Kupang (the DEI Co. settlement in Timor)

18 Bligh's Strait = Allis Strait, between Lombok and Sumbawa (Sunda Islands)

B) AUTHENTIC PARTICULARS RE LOSS
PANDORA (VIA CAPT EDWARDS)
 [The Star (London) 31 May 1792]

“The object of the voyage of this vessel is so well known as not to require any clarification, further than may be collected from the subsequent narrative, which we are fortunately enabled to lay before our readers.”¹⁹

On 7th November 1790, HM Frigate *Pandora*, sailed from England in quest of the Pirates who had forcibly seized HM Store ship *Bounty*, commanded by Lieutenant Bligh, and after refreshing at Tenerife they proceeded towards the Pacific Ocean.

On 23rd March they arrived at Otaheite, where, after some difficulty, they secured fourteen out of sixteen of the Pirates that had been left there by the *Bounty* (the other two having been murdered, either amongst themselves or by the natives) as also a small schooner they had built with the assistance of the natives, with an intention to carry them to India. They had really sailed, but meeting with bad weather, and disagreeing among themselves, concerning the abilities of the person they had appointed to command her, had returned to Otaheite sometime before the *Pandora*'s arrival.²⁰

The *Bounty* left Otaheite, with Christian the chief, and eight others of the pirates, some time in September 1789, after dividing the arms, ammunition and small stores equally with the abovementioned pirates; and although the *Pandora* cruised three or four months in those seas, and examined a great number of islands (several of which were new discoveries) they could not get the least intelligence, either of the *Bounty* or of the remaining pirates.

From the journals kept by the pirates on board the *Bounty*, it appears that after

forcing Lieutenant Bligh, his officers and men out of the ship, they went to Torbanai²¹ [?] an island in those seas discovered by Capt Cooke, where they proposed to settle, but having destroyed the breadfruit and other plants that were on the *Bounty*, and finding themselves greatly in want of many other necessaries to complete their scheme, they returned to Otaheite to get such articles as they were in want of. On their arrival they told the natives that they had met with Capt Cooke at an island where he intended to make a settlement and had left the breadfruit plants with him and Lieutenant Bligh and the other absentees to assist him in the business he had in hand and that Capt Cook had appointed Christian commander of the *Bounty* and had sent him to Otaheite for more breadfruit, plants, hogs, fowls etc.

The natives, overjoyed to hear that Capt Cook had settled so near to them, in a short time supplied them with 300 hogs, a bull, a cow and a great quantity of poultry and other articles; also with some of the natives of both sexes; and with which they returned to Torbanuai (...) After making some progress with their fortification, they disagreed among themselves, and had frequent skirmishes which were generally occasioned by their depredations and other violences, the work on the fort ceased and Christian, finding that he had entirely lost his authority amongst them, proposed that they should consult together and consider what was best to be done and that he would put into execution the resolution that was favoured by the greatest number of votes. After long conversations among themselves, it was at last agreed to relinquish their plan to settle at Torbanai and to return to Otaheite; and that those that chose to stay there, might, and others that chose to stay with the ship, might go where they thought proper.

¹⁹ News of the *Bounty* mutiny had caused a considerable furore and generated a lot of attention in the press

²⁰ The schooner had actually departed from Tahiti the day before the *Pandora*'s arrival and returned several days later. The men actually returned a few days after the *Pandora*'s arrival; Morrison's ability to navigate possibly being called into question.

²¹ The mutineers had at first all opted to settle in Tubuai (one of the Austral Is.)

They accordingly proceeded to Otaheite, and separated as before mentioned.

Captain Edwards, having given up all hopes of finding the remaining pirates, was returning home via Endeavour Straits, where the Pandora was unfortunately lost on a reef off New South Wales (...) Ninety nine people were saved by the boats, thirty four²² were lost in the ship, amongst whom four of the pirates. They went in the boats to a small island three miles from the wreck, where they landed the few articles of provisions etc they had saved, and immediately returned in search of the people that were missing, but had not the good fortune to find any of them.

(...)

On the 31st August, having completed the boats, they launched them and embarked – having been on the following allowance of provisions and water since the loss of the ship to their arrival at Timor: to each man two ounces of bread, two glasses of water and one glass of wine, the three being nearly equal to half a pint²³; half an ounce of essence of malt, and half an ounce of portable soup.

After a passage of 3 days they touched at the Prince of Wales islands (...) and filled every vessel that they had that would hold water, which barely amounted to a gallon for each man, after which they proceeded through Endeavour Straits to Timor, where all the boats arrived between the 16th and 18th September (...) They had unfortunately parted company with the schooner they took from the pirates (which Capt Edwards had armed and fitted as a tender) off the Navigators' Islands. They arrived with the schooner at Samoran²⁴, on the island of Java,

22 Actually 35 men were lost during the wrecking: 31 Pandoras and 4 prisoners (Adm. 36/11136)

23 ½ pint= approx 0.52 litre

24 Samoran = Semarang

Actually the men in the tender arrived in Surabaya first, where they were initially suspected as being *Bounty* mutineers and locked up – they met up with Edwards and the surviving Pandoras at Semarang weeks later, while they were bound for Batavia in the tender under armed escort. The survivors were in a DEI Co ship (*Rembang*) also bound for Batavia from Timor. Lt Larkan and 16 Pandoras were the first to leave in the VOC ship *Zwaan*.

nearly at the same time as Capt Edwards did at Timor, after enduring great hardships for want of provisions and water. (...)

The beginning of last December Capt Edwards had agreed to send twenty of his people home in each of the Company's ships that sailed first for Europe, and an officer with them; to go with the last division himself, and to take the prisoners with him.

C) REPORTS RE LETTERS BY EDMONDS AND BOWLING AND NEWS RELATING TO PANDORA'S CREW

"Mr Edmonds, of St Mary Axe, received a letter by the Penny Post on Saturday 26th May, from his son (late of the Pandora) dated Cape of Good Hope 18th March 1792. What ship brought it is unknown; it mentions many circumstances in the voyage of the Pandora, her wreck on the 29th of August 1791, the arrival of such of the crew as survived in Batavia; and lastly his own at the Cape of Good Hope." [*General Evening Post* (London) 31 May 1792]

"By a letter from Edward Bowling, of York, a master's mate of the late Pandora, frigate, to his friend in that city, dated Batavia December 8, we learn that 108 of the crew of that unfortunate ship were, after having encountered innumerable difficulties, safe and sound in good health at that place, waiting for the sailing of the DEI ships for Europe ..." [*Evening Mail* (London) 30 May 1792]

"Wednesday evening last, as Mr G. Reynolds, late of the Pandora frigate, when passing from Rotherhithe to Deptford, he was attacked by some footpads²⁵, from whom, after a struggle and knocking down the one who had immediate hold of him, he disengaged himself, but was soon surrounded and overpowered, when the villains rifled him of his money, hat, shoes and several papers." [*The World* (London) 14 Nov 1792].

25 in modern parlance: muggers, highwaymen on foot.

APPENDIX 6

REPORT ON THE BOW AREA EXCAVATION DURING 1998 AND 1999 SEASONS, BY WARREN DELANEY¹

1998 PANDORA EXPEDITION: BOW AREA EXCAVATION

Objectives

1. To begin the first systematic excavation of the bow section of the wreck with a view to:
 - locating the starboard edge of the intact hull remains (already delineated in the stern and mid-ships areas by the upper edge of the run of copper sheathing) and
 - defining the extent of these hull remains by extending the excavation in-board
2. To recover and interpret artefactual material from the excavated area, this interpretation allowing and recognising that the bow was:
 - where the ships galley and Brodie stove were originally located (Main deck),
 - where the bulk of the crew, the ordinary seamen, were quartered (Lower Deck),
 - where various petty officer's storerooms were located (Platform deck)

Summary of previous work in the bow section

1977: During the discovery dives on the wreck a large earthenware olive oil jar (MA003) was recovered from that area of the site between the ship's stove and the bow, as indicated by the extremity of visible wreckage. This jar was found lying proud on the sea floor, consequently very little disturbance of the seabed was required by its recovery.

¹ Except for some editing and annotation (by Peter Gesner), these reports are by and large as presented in Warren Delaney's original draft typescripts reporting archaeological excavation in the bow area during each of the two seasons under discussion.(1998 and 1999).

1983: Grid control was established by the museum's divers through the establishment of a 50m long baseline and two subsidiary parallel lines. A trench was excavated in the bow area (trench 983/2) The trench revealed a variety of bronze rudder fittings (not recovered) as well as several large earthenware storage jars (olive oil jars) –two of which were recovered (MA138 and MA139)

1984: Systematic excavation commenced at the stern of the wreck site in grid squares starting between the 0.0 and 2.0 grid reference poles. Notwithstanding, an encrusted object protruding from the sand 4 meters aft and 2 meters inboard from the ship's stove (i.e. in the bow area) was excavated and recovered; because of its shape and position, it was thought to be the ship's bell. However, the object proved to be the cowling from the stove. Referred to in the 1984 season as the 'cowling grid', excavation in this area also exposed deck planking, apparently running fore and aft, at a shallow seabed depth - < 50 cm.

1993: A shallow seismic survey was conducted to produce sub bottom profiles over the gridded area.² Interpretation of all profiles identified well defined wreck debris buried under the recent sediment in the southern (stern) section of the site grid. Data from the northern (bow) end of the grid suggested a dislocation of wreckage to the east and extending outside (i.e. east) of the base line. This seismic signature was attributed to one or a combination of the following scenarios:

- The vessel may have broken its keel, with the forward section shifting the bow eastward relative to the aft section.
- The port side of the hull may be more degraded in the bow section of the wreck than in the stern

² Refer Chapter One.

- During the disintegration process the starboard side of the vessel at the bow may have collapsed outwards (i.e. to the east across the base line).

Rationale for selection of the initial target area

The selection of grid s to be excavated in the bow area in 1998 was based on the following suppositions:

- The timbers in the 'cowling grid' had been identified as deck planks; it was therefore assumed that any planks encountered in the bow area would also be associated with the lower deck.
- During the disintegration process, as the main deck collapsed, the Brodie stove dropped from the galley on the upper deck to the lower deck and slid down this deck towards the starboard side of the hull, the angle of the deck's repose being approximately 30°.
- The line of sheathing which marks the edge of the hull in the stern excavations when projected forward would pass, allowing for the curvature of the hull as the bow is approached, between the Brodie Stove in its current position and what is referred to as the "Bow Anchor"

To examine these suppositions, grid s 162, 164, 166, 181, 183 and 185 were chosen to be excavated. These cover a 4 by 6m centre trench extending from the base line to the Brodie Stove or, as delineated by site co-ordinates, the 24m² area bounded by 00/34, 00/38, 6/34 and 6/38.

The 1998 Excavation

Excavations commenced at the base line and progressed towards the centre line of the wreck site. In grid 181 at a shallow depth (about 400 mm) a tangle of large iron concretions appeared, dominated by the top section of a massive (200 mm square)

anchor shank with the intact ring (750 mm outside diameter) attached. The shank was uncovered for a distance of 100 cm towards the stern of the wreck site, the orientation of the ring indicating that the arms were lying in a horizontal attitude beneath the sediment in this direction (i.e. in grid 161) Adjacent to this anchor (best bower?) on the inboard side, another smaller anchor ring (estimated diameter 400 mm) was partly uncovered together with two iron straps which because of their rectangular configuration have been interpreted as bands from a disintegrated wooden anchor stock.

The amount of tangled concreted material increased as excavation progressed into grid 183 and interspersed within the wreckage the first non structural artefacts appeared, a metal cooking pot, bottles, a ceramic jug, pulley sheaves and shell collections.

This progression from barren sediment at the base line through entangled concretions to the first artefact clusters mirrors the sequence encountered in previous excavations in the stern of the wreck. Drawing on the results of this earlier work it was considered that the advent of the smaller artefacts indicated proximity to the edge of the copper sheathing. Deepening of the excavation along the boundary between grid 183 / grid 185 exposed over a distance of 1.25m the anticipated upper edge of the sheathing.

Intact ship's timbers overlay the sheathing and extended into grid 185 towards the Brodie stove. These timbers were interpreted as outer planking and lower frames. Planks were measured at 80 mm thick and 300 mm wide, three frame timbers were exposed measuring 200 mm wide and spaced centre to centre at 500 mm between the aft most two frames measuring 750 mm in length with a 35 mm width.

To further delineate the extent of the hull timbers, the excavation was turned towards

the stern into the grid 166. This shift of direction enabled the exposed edge of sheathing to be followed as a guide, a change made necessary also by the proximity of the Brodie stove in grid 185 to the initial excavation face.

Sheathing and planking were traced to grid 166 where the sheathing line became masked by a jumble of concreted metallic objects. These included lengths of shaped lead sheeting, in one case channel sectioned with dimensions of 190 mm by 140 mm exposed over a distance of some 1800 mm, in another a 950 mm long curved scupper shaped section, and two heavy gauge iron bands. These measured (including the concreted coating) 670 mm in diameter with a band width of 120 mm and thickness of 46 mm. They are thought to be mast straps from the fore mast.

As excavation moved through grid 166 towards grid 168 a tightly compacted ridge of sediment containing small fragments of wreck debris hindered progress. This feature trended roughly parallel to the extrapolated centre line of the hull and proved difficult to remove by dredging. However, as it was in the form of a horizontal carpet or blanket up to 300 mm thick, it could be undercut to some extent. The excavation was also broadened back towards the base line and into grid 164 to try and relocate the line of sheathing.

No sheathing was observed in either grid 166 or grid 164, however as excavation deepened more ships timbers were uncovered. In the centre of grid 166 a lodging knee cut from grown timber (i.e. the grain of the timber followed the curvature of the knee) was partly exposed. The athwart ships length of the knee was traced for 100 cm before being masked by the concreted ridge, the fore and aft section was measured over a similar distance. The timber was 300 mm wide across the "bend" of the knee and the outside angle of the "bend" was greater than 90°, this

being compatible with a location towards the starboard bow where the side of the vessel has commenced to swing towards the stem. Immediately forward of the knee is a large degraded timber running athwart ships, perhaps a deck beam, and two sections of longitudinal planking (hull planking?) were visible at the bottom of the excavation.

Throughout grid 166 further concentrations of smaller artefacts, personal possessions, ships' stores and fittings were encountered amongst the wreckage. Items included spirit and medicine bottles, a spoon, a second metal cooking pot, coconuts, shell collections, ethnographic curios (carved wooden clubs, worked pearl shell, fish lures, an adze), buttons, fragments of leather, some possibly part of a shoe, pulley sheaves and a pane of glass etched with a broad arrow. Quantities of axe cut dunnage were scattered throughout the deposit.

A similar deposit sequence was encountered in grid 165 with the direction of excavation again being influenced by the continuity of the compacted sediment ridge. Dredging uncovered further intact ships timbers, a section of what appears to be a lower frame and planking. The frame measured 170 mm across and has a depth to the planking of 300 mm. Two copper bolts of similar dimension to the bolts found in grid 185 run through the frame. Underlying the frame were two lengths of planking, these measured 280 mm wide by 110 mm thick and were exposed over a length of 400 mm. The line of the top edge of the sheathing projected sternwards from where it can be seen in grid 183 lies towards the base line from the position of these planks, but no sheathing was detected beneath the timbers.

On the base line side of the excavation and towards the bow from the timbers described above is a "L" shaped concretion, the long arm exposed over 800 mm in a fore and aft

direction and at its forward end the short arm is visible running in-board for some 300 mm. It is suggested that this concretion was one of three iron standards stepped along both sides of the lower deck towards the bow.

The artefact assemblage and other non structural material from grid 165 included a shell armband, parts of glass bottles, a spruce jar, an intact earthenware jug with distinctive whorled sides tapering to a rounded base, pulley sheaves, rope, quantities of axe cut dunnage and immediately forward of the frame and plank timbers the collapsed remains of a wooden barrel. The fragmented barrel staves were estimated to have been 750 mm length when intact and the barrel ends to have been 300 mm in diameter.

The 1998 bow excavation did not proceed beyond grid 165. However, before backfilling commenced, time did permit some deeper exploratory probes adjacent to the stove in grid 185. In addition to further ethnographic material (shell adze, fish lures, an octopus lure), shell collections and quantities of coconuts, these probes also located an intaglio seal stamp (MA8222), a stick of sealing wax (MA8231) a spirit bottle and a small glass medicine phial.

Interpretation and discussion

Structure

Based on the relative positions and/or dimensions of the upper edge of the hull sheathing (grid 183), the lodging knee (grid 166) the concretion suspected to be one of 3 starboard side standards (grid 165) and floor frames and planking (grids 185 and 165), a tentative interpretation of the structural elements has been made in order to establish the precise location of the bow excavation within the wreck remains. The internal hull structure as presented in *The 24 Gun Frigate Pandora* (McKay & Coleman, 1992) has been used as a reference for this interpretation,

however the conclusions drawn will need to be verified or nullified by further excavation during the 1999 season.

A primary objective of the 1998 bow excavation was to locate the starboard side of the intact hull remains. In the stern of the wreck this corresponds approximately to the upper edge of the copper hull sheathing, a height some 300 mm (approximately 1 foot) above the level of the lower deck timbers. In the bow trench the line of the top of the sheathing ran through grid 183. Here the direction of the trace of the sheathing edge differed to its direction in the stern indicating that at this location the side of the hull has commenced to trend in towards the bow of the vessel.

Tacks protrude through the sheathing, pointing upwards establishing that the individual sheets are in their original orientation, albeit lying almost horizontal due to the starboard cant of the angle of heel of the hull and/or the outward collapse of the side of the vessel during the disintegration process.

Using the builder's draught station points (McKay & Coleman 1992, D2/7) as a scale reference, the curvature of the side of the hull towards the bow at the lower deck level commences at station G. Lodging knees forward of this station differ in shape to those along the midships length of the hull in so far as the angle is greater than 90° between the face of the knee abutting the deck beam and the face against the side of the ship. On knees aft of Station G these two faces are at right angles (90°) until hull curvature towards the stern post dictated a return to obtuse angled knees.

The lodging knee located in grid 166 has an obtuse angle between the pertinent faces and the length of both arms exceeds 1000mm. From the drawings it can be seen that there are 5 lodging knees forward of Station G at the lower deck level (McKay & Coleman, 1992: 55). The geometry and dimensions of the knee in grid 166, supported by other

structural information to be discussed below, indicate that it is compatible with the lodging knee at Station N abutting deck beam 17 (McKay & Coleman, 1992:55). The two knees forward of this location have obtuse angles between the faces greater than the angle observed on the knee in grid 166; the two knees aft of Station N are at locations not consistent with the other observed supportive structural information.

Similarly, lodging knees supporting the platform deck in the hold forward from Station G have different shapes and dimensions to the knee in grid 166 and this again supports the suggestion that the structure is compatible with being the lower deck lodging knee at Station N.

Other drawings indicate that 3 standards are positioned between Stations L and R along both port and starboard sides of the lower deck (McKay & Coleman, 1992: 56). Whilst they are shown as being timber standards, it is understood that on *Pandora* at least some standards were iron. Indeed in the bow area of the wreck site one arm of an iron standard can be seen in the bow photo mosaic, an L shaped iron concretion in grid 165 (Figure 51).

During the course of the 1998 excavation this object was not closely examined and in the 1999 season it may be identified as some other structural element. However, for the purpose of this report it is postulated that the concretion is the aft most of the 3 starboard lower deck standards. Before disintegration this standard would have been stepped on the lower deck between Stations L and N in a location immediately towards the stern from the grid 166 lodging knee. The relative positions in the excavation trench of the lodging knee and the "standard?" support this interpretation.

It is difficult to draw any precise conclusions regarding the floor timbers/frames and planking in grids 185 and 165. If it is accepted

that the lodging knee in grid 166 is the lower deck knee at Station N and that it is still in its original position, then the following comments apply. The middle frame of the three exposed in grid 185 lies 1500 mm forward from the lodging knee. Drawing B5/1 (McKay Coleman, 1992: 33) indicates this position equates with frame No. 12 and that here the next lodging knee forward abuts deck beam No. 13. The 500 mm spacing measured in the excavation centre to centre between the three frames is consistent with this interpretation. This separation is reflected in drawing B5/1 between frames Nos. 11, 12 and 13.

It is suggested that the two long copper bolts found in the middle frame could be lodging knee fastenings. Several bolts were used to fasten both lodging and hanging knees. Those used in lower deck knees varied in length from 4 feet (1280 mm) to 2 feet 4 inches (740 mm) with a diameter of 1 1/8 inches (29 mm). The bolts exposed in grids 185 and 165 had diameters of 35 mm (1 3/8 inches) and the one bolt recovered from grid 165 measured 750 mm (2 feet 5 1/2 inches) in length, so the correlation is not direct. Alternatively the bolts may have been frame fastenings (first to second futtock?) A similar tentative explanation can be put forward regarding the intact timbers in grid 165. These lie 2500 mm towards the stern from the forward face of the grid 165 lodging knee. With reference to drawing B5/1, this position equates to frames 25 and 26, to timbers which are flush against each other. Only one substantial intact frame was obvious in the excavation; however some degraded timber was recorded adjacent to this frame on the aft side. The intact frame measured 170 mm wide and 300 mm deep, compatible with the dimensions shown in the drawings for frame 25 at the water line (i.e. at the lower deck level). The comments made above regarding copper bolts are equally applicable to the fastenings seen in the grid 165 timbers.

Interpretation of the structural elements as put forward in the preceding paragraphs positions the 1998 excavation trench between Stations N and R for the first 4 meters of its length. In this section the trench ran across the site from the base line towards the Brodie stove and then turned towards the stern and continued a further 3 meters longitudinally down the length of the site. In this second section the trench ran from Station N to station I.

Further evidence to support this interpretation was provided by material found at the start of the trench in grid 181. There dredging partly uncovered a large (bower?) anchor and nested inboard of this what appeared to be a smaller anchor. The shank of the larger anchor ran towards the stern of the wreck site parallel with the top of the sheathing. *Pandora's* best bower anchor measured 14 feet six inches (464 cm) along the shank; extrapolating this figure, the buried crown of the larger anchor would lie between Stations I and L (i.e. in grid 161), the top of the shank and ring as seen exposed in grid 181 lies between Stations P and R.

Work on the *Pandora* site to date has identified 6 anchors:

- i. The "Stern anchor"
- ii. The "Bow anchor"
- iii. An anchor in the midships region of the site (grid 130)
- iv. The "Stove anchor" (grid 188)
- v. Two anchors buried in grid 181

The vessel would have been equipped for her voyage with at least 4 bower anchors, a stream anchor and a kedge. Additionally a bower anchor left by the *Bounty* in Matavai Bay, Tahiti, was recovered and taken on board.

When underway *Pandora* would have two anchors ready for use on the catheads, the other spare anchors would normally be stowed alongside the foremast chains.

After beating across the reef top Edwards states in his account of the wrecking episode how he 'let go the small bower and veered away the cable and let go the best bower under foot in fathoms to steady the ship' (Appendix 4). It is difficult because of lack of detailed description, to reconstruct *Pandora's* precise movements and hence orientation immediately before striking and during the time she was on the reef top. However it could be argued that with the south east trades blowing, as they normally do in August, the ship would have been driven north westerly, broadside across the reef top, but it can not be determined whether the bow was pointing south west or north east at this time.

On reaching the deeper water inside the reef Edwards dropped the small bower: played out cable allowing *Pandora* to continue drifting before the wind until the anchor took hold, the ship's head swung to the anchor, i.e. to the south east and he then apparently dropped the "best bower" underfoot.

It can be argued that the "stern anchor" on the wreck site is this "best bower". The anchor is "picked in" indicating it had the weight of the vessel on it and the shank is orientated toward the north suggesting *Pandora's* movements were influenced primarily by the south easterly wind direction. The "stern anchor" is the largest anchor seen on site (shank measured 4.5 meters or 14 feet 9 inches, diameter of ring including concretion 850 mm or 2 feet 20 inches) and this is compatible with the dimensions of the best bower given by McKay and Coleman (1992). The "small bower" dropped by Edwards is probably in the deep water close to the inside edge of Pandora Reef, at a distance from the actual wreck site, and has not yet been located.

The two nested anchors uncovered in grid 181 are considered to be a bower and, judging by its relative size, the kedge. Their location on site and orientation indicates they would

have been secured to the starboard side fore mast chains which extend from Station G to Station P. During the disintegration process these two anchors have dropped vertically to their current position. Three metres further forward is the “bow anchor” which, extrapolating from the ring diameter (500 mm including concretion) is intermediate in size between the kedge and the best bower.

Pandora's stream (or small bower) anchors measured 9 feet (2.88 meters) along the shank with an outside ring diameter of 1 foot 4 inches (400 mm). The “bow anchor” is interpreted as being a stream anchor which at the time of sinking was suspended from the starboard side cathead.

By the process of elimination the two anchors dropped by Edwards would have been port side anchors, the “small bower” let go at the reef edge would have been on the port side cathead, whilst the “best bower” (or in the museum’s site terminology, the “stern anchor”) presumably was secured at the port side foremast claims from where it was hurriedly deployed.

If this scenario is correct it is interesting to speculate why the bow of the wreck points northward, i.e. away from the “stern anchor”, and not southwards towards this anchor on which *Pandora* was holding. One possibility is that when the ship was about to make the final “sally”, the wind abated and the strong, intermittent south west surface (tidal) currents which characterise the site sprang up sufficiently to swing the vessel through 180°. *Pandora's* bow would then be pointing northwards over the “stern anchor” and when she sank bow first she moved forward again to the position in which she now lies, with the anchor Edwards dropped “under foot” (the “stern anchor”) located at the stern end of the site.

To re-iterate and speculate further, Edwards dropped two anchors before the *Pandora*

sank. It is suggested that both these anchors were port side anchors, the first one dropped has not been located as it is well off site, the second anchor dropped “under foot” is now seen as a prominent feature at the stern of the site. Furthermore the two nested anchors, a bower and a kedge, in grid 181 are considered to have been stowed in the starboard side fore mast chains and the anchor visible in grid 182 (the “bow anchor”) to have been on the starboard cathead. During disintegration of the wreck these starboard side anchors have dropped vertically to the sea floor with little or no lateral dislocation from their original stowage position.

To complete the interpretation of the anchors seen on site it remains to comment on the so-called “Stove anchor” in grid 188. The ring dimension on the “Stove anchor” is 450 mm, comparable with the 500 mm diameter, including coral growth, ring on the “bow anchor”. The shank is visible running for 1200 mm towards the stern, the crown and the arms remain buried. These dimensions suggest this anchor could be another small bower (or stream anchor) and its present position near the conjectured centre line of the vessel suggests it may have been stowed on the port side, perhaps nested in the fore mast chains with the best bower which Edwards dropped, and that during and after the sinking it has moved forward and then down the slope of the canted deck toward the starboard side of the wreck.

The anchor in grid 130 is more problematic. Whilst not in the bow area, for the sake of completeness some mention is justified. One palm and part of the arm are visible, the palm being of a similar size to the “stream anchor” palm. The anchors’ current orientation suggests it may have been lying flat on deck in the waist of the ship with the stock removed. This could be the *Bounty* anchor recovered from Matavai Bay and stowed midships for the voyage back to England.

The major feature of the bow area of the wreck site is the Brodie Stove, now standing upright proud of the sea bed in grids 185 and 186, adjacent to the 1998 excavation trench. The location of the stove in relation to the structures seen in the trench indicates that the stove shifted forward and towards the starboard side of the wreck and has dropped down a deck during the disintegration sequence of the wrecked hull.

Using the interpreted identification of the structural timbers in the excavation as a datum and dimensions taken from McKay and Coleman (1992), the location of other features of the *Pandora* can be extrapolated. Thus a line can be drawn representing the longitudinal centre line (line of the keel) of the hull and onto this components such as the Brodie Stove, the fore mast and the stem can be plotted. The line runs through grids 168, 187 and 188.

Originally the Brodie Stove was on the main deck, on the centre line and between Stations I and L, in its current location it is on what is believed to be the lower deck, off centre towards the starboard side of the vessel and between Stations P and R, a lateral movement of 3 meters. When the stove's original position is scaled onto the projected centre line it coincides exactly with the 1984 'Cowling grid' in which the cowling, the exhaust chimney protruding from the top of the stove through the forecastle deck, was found. This correlation reinforces the credibility of the interpretation of the timber structures exposed in the bow excavation.

The interpretation of the ship's structural remains in the bow trench as detailed in the preceding paragraphs relies on accepting that the lodging knee in grid 166 is the lower deck knee at Station N.

The 1998 excavation did not encounter the extent of intact *insitu* ships timber, planking, and bulkheads and internal partitioning that

work in the stern area of the site has revealed to date. Arguably *Pandora's* impact onto the seafloor, given that she sank bow first, may have caused greater damage to the bow than the stern of the vessel.

Additionally, the bow, because of its narrow steep profile where it sweeps towards the stem, would have been less supported by the seafloor and accumulating sediment than the midships section of the hull where the hull profile is more rounded, thus providing greater contact with the seafloor and hence more support. As a consequence in the bow movement of heavy objects, such as the galley stove and the anchors, could have accelerated destruction of decking and more pronounced outward collapse of the starboard bow of the hull.

One explanation of the sub bottom profile anomaly east of the base line in the bow area would be that the anomaly represents material that spilled out as the side collapsed, the trajectory of some objects, e.g. cannon from the main deck, taking them beyond the base line, others such as the Brodie Stove or anchors, tending to fall within or immediately adjacent to the wreck. During the course of the 1998 field season some shallow water dredge probing was undertaken outside of the base line in the pertinent location without finding any objects or wreckage. As the sub bottom profiler relied on surface buoys to establish the position of the recording tender relative to the site grid and because surface conditions are influenced by wind and current, the degree of accuracy of the position fixing and hence anomaly plotting is questionable. Indeed it is tempting to attribute the recorded anomaly to the mass of dense material uncovered in grid 181, the extrapolated extension of this material into grids 161 and 162 and to the buried section of the "Bow anchor" in grid 182.

Artefacts

The artefact assemblage from the bow area exhibited a diversity of similar magnitude to items from the stern excavations. Bow material can be allocated to four broad categories:

- Ship's fittings
- Items relating to the galley
- Personal possessions
- Souvenirs ("curiosities")

The following comments are not intended to be a comprehensive interpretation of the artefacts from the bow area; that exercise must wait until excavation in the bow has been completed, but rather initial observations on some of the material to be added to or amended as future results indicate.

Ship's fittings

The anchors have been discussed in the previous section dealing with ship's structure, in particular how their position can be used to establish the location of the trench. The two mast bands in grid 166 indicate proximity of the trench to the lower section of the foremast, their position relative to the projected location of the mast step suggesting the mast fell to starboard.

The large partly exposed double block in grid 185 appears to be of a size compatible with it being one of the jeer blocks (20 inch) which were positioned on the forecastle deck adjacent to the foremast.

The lead channelling in grids 166 and 185 invites question. Lying close to the Brodie Stove it can be speculated that it was associated with the galley, one suggestion being that the lead could be ducting from the lower deck ventilating apparatus. This device operated by using the hot air up draught from the stove to evacuate stale air from the deck below. On the other hand it is interesting to note that in the case of the channel length

with the fabricated angle at one end that the geometry of the bend is the same as the shape of the forward jeer bitts. These were mounted on the main deck immediately astern of the foremast and may have been protected with a covering of lead sheeting.

Items relating to the galley

The Brodie Stove is the dominant feature of the bow area and many of the artefacts recovered during the 1998 excavation can be related to the activities in the galley. Two pots, one of copper (dimensions, 250 mm deep, 400 mm maximum diameter)(MA7781) and one of iron (this one not recovered but of similar dimension), a pewter spoon, a bone (with butchering mark?), knife handle, earthenware containers, a spice jar, coconuts and animal bones are all indicative of food preparation and cooking. The largest case gin bottle (by an order of magnitude) yet found on site came from grid 166, again in the vicinity of the stove (MA7845). This measured 348 mm in height and 140 mm wide at the shoulder and one could perhaps surmise that 18th Century cooks, like many of their 20th Century counterparts, had a penchant for a tippie.

From the same area a quantity of leather was recovered. The pieces were sheet-like in form, some exhibiting stitch holes around the periphery; one suggestion being that the leather is the remains of an apron used by galley workers, another that it may be remnants from a satchel.

Two unusual stoneware containers were recovered; unusual is so far as both were styles of vessels not previously encountered in the site. In one case the artefact could be described as a jug with an elongated narrow neck lacking a pouring spout but possessing a small round handle similar to a demijohn.(MA7945) The jug measured 142 mm high, 60 mm across the base rounding out to 98mm at the shoulder, the neck diameter being 32 mm.

In the second case the vessel was a demijohn type of jug measuring 310 mm high 260 mm across the shoulder and tapering down to a pointed base. (MA8073) The jug has a short neck, 85 mm in diameter at the lip, no spout or handle and the sides have a distinctive whorled form giving it the appearance of a coil built pot. Because of the pointed base it is thought this jug may have been originally encased in wicker basket work designed to be suspended rather stowed on a flat surface and that both vessels may have contained wine or spirit. The jugs have a Mediterranean or Latin American appearance and perhaps were purchased by a crew member at Teneriffe or Rio de Janeiro, ports visited by *Pandora* on the passage from England to the South Pacific. A Brazilian copper coin minted in 1715 found near the whorled jug reinforces this suggestion.

Finally, pieces of dunnage were a common occurrence in the bow trench. There comprises length of axe cut 'bush timber' and presumably was used to fuel the galley stove.

Personal possessions

One of the principal objectives of excavation in the bow area was to investigate that part of the ship where the ordinary seamen were quartered. Consequently it was anticipated that the artefacts from the bow trench would include items used by sailors during the routine of daily ship board life and that these would differ from items used for similar purposes by the officers whose cabins and messes were in the stern of the ship, this difference being regarded as a reflection of the stratified structure of eighteenth century European society. Thus wooden bowls and mugs could be expected in the bow rather than the creamware (Wedgwood?) dinner service, delicate wine glasses and glass decanters, associated with the officers and recovered to date from the excavation in the stern area. Certainly no such "quality" item

has yet been exposed in the bow trench, but the cruder wooden utensils have not been exposed either! This could simply be because wooden objects did not readily survive the harsh seabed environment; alternatively it may be because work in the bow is only at a preliminary stage, with further excavation required before any conclusive statements can be made.

Some of the personal possessions that were recovered in the bow do not fit the expectation that only "quality" items would be found in the great cabin or ward room areas and "cruder" material in the forecabin. Coins, buttons and a metal thimble are compatible with either location in the ship, but it can be argued that the intaglio (MA8222) would be an item more likely to be in the possession of an officer and gentleman than an ordinary seaman or a pressed landsman, who probably would use his disposable income to purchase a jug of Tenerife wine in preference to an ornate appendage to complement his going ashore attire.

Souvenirs

A feature of the stern excavation artefact assemblage has been the quantity of material collected by crew members from the various island groups visited during *Pandora's* passage across the Pacific. These souvenirs included both "natural curiosities" (shell collections) and "artificial curiosities" (ethnographic items, stone, shell and wooden tools, implements, weapons and ornaments) and were procured by individuals not only for their own private collections but most probably for resale at a substantial profit to other collectors in England.

It would be easy to conclude that these collecting and business activities were conducted only by people of education and substance; on the *Pandora*, this categorisation could be expected to exclude the crew accommodated in the bow. However the 1998

bow excavation also produced a similar variety of souvenirs as has been found previously in the stern. Shell collections: a stone adze, poi pounder, shell ornaments and fish lures, wooden clubs with incised chevron designs, and an octopus lure. Like the intaglio their occurrence in the bow could be attributable to the presence of midshipmen in that area of the ship; alternatively the seamen were aware of the commercial opportunities provided by the “collectables” and were purchasing or trading on their own account. Whether the purchases were transacted by bartering with trade goods obtained by the seamen prior to the voyage (unlikely, because of the costs involved) or with items purloined from the ships stores (nails, pieces of iron etc) is debatable.

Another question to be considered is, if the seamen were collecting with a view to reselling who were their potential customers, *Pandora*'s officers or the collectors in England?

Conclusions and recommendations

1. The 1998 Excavation Trench was located between builder's stations R and N, this position being determined by interpreting that a lodging knee located in grid 166 is in its original position and is in fact the lower deck knee at Station N (McKay & Coleman, 1992:55).
2. The starboard side of the intact hull remains as defined by the upper edge of the sheathing runs through grid 183 close to this grid's boundary with grid 185. Unlike the stern excavation areas, no *in-situ* deck timbers were located. This may be a function of greater impact damage to the bow and outward collapse of the ship's side as she hit the seafloor or simply because excavation in the bow has not yet proceeded far enough into the wreck.
3. The position of the Brodie Stove as it is seen on the site is 3 meters (forward and to starboard) and apparently one deck lower than its original position on the upper (main) deck. The position of the lodging knee located in grid 166 was used as a datum for the calculation of this movement.
4. It is suggested that the sub bottom profile anomaly plotted east of the base line can be attributed to the mass of concreted material, including two large anchors, in grid 181. That the anomaly plot falls outside this grid is most likely the result of inaccurate position-fixing of the recording boat at the time of the profile survey.³
5. To confirm the preceding statements it is recommended that the 1999 bow programme concentrate on continuing excavation from the extremity of the 1998 trench on grid 165. The extension should be aligned athwartships, in both inboard and outboard directions.

Along the inboard direction the trench should be cut into grid 167, location of projected centre line of the ship and the 'cowling grid', a distance of 2.5 metres. This would enable the planking seen here in 1984 to be re-examined to determine if these planks are deck planking or not. Provided the projections are correct the trench would also present the opportunity to locate the lower section of the aft riding bits, massive vertical timbers, hopefully preserved and recognisable, and the remains of the forward hatch and companionway. (In the stern excavation the carlings adjacent to the aft hatch at the platform deck level have been tentatively identified.)

Outboard trenching should continue towards the base line until the edge of the sheathing is again located to delineate the lateral extent on the starboard side and longitudinal direction of the intact hull remains.

³ Refer transect 45 reading (p. 41, Insert 1)

6. The artefact assemblage recovered from the 1998 bow excavation contained items which can be related to cooking and messing activities, this is consistent with the trench being located in that section of the ship where the galley and seamen's quarters were located.
7. Other items in the assemblage included "artificial curiosities" indicating that perhaps the seamen in the bow as well as the officers quartered in the stern were collecting souvenirs, possibly for resale at a profit.
8. The presence of quality items not normally expected in a seamen's kit, such as the intaglio, can be attributed to midshipmen's berths being relocated in the bow.

1999 PANDORA EXPEDITION BOW AREA EXCAVATION REPORT

Objectives

These are itemised in "Pandora Expedition Archaeology and Procedures, February 1999" (Gesner & Jeffery, 1999) and include:

1. "To recover personal belongings of the officers and crew, the artificial curiosities collected by them, and the equipment, instruments and every day items used aboard the vessel".
2. "To record and recover this material in context with the ship's structure (...) to make an effective record of structural details"
3. To focus on the lower and platform deck areas below the galley and to trace the starboard side of the intact bow remains to their forward extremity, i.e. the cutwater.
4. To resurvey critical areas in the bow using the High Precision Acoustic Survey System (HPASS) provided by the Centre of Excellence (Green & Souter)
5. The excavation to commence in grid 163, expose the edge of the copper hull sheathing and trace this feature forward. Also the trench is to be deepened to follow the outside curve of the hull down towards the keel in grid s 144 and 163.

Excavation

Two site locations, separated by the 1998 excavation area, were examined. Towards midships from the 1998 trench, dredging took place in the following grid squares 144, 146, 161, 163 and 164: this area is referred to as 'The Cannon Excavation' (Figure 38 – Bow excavation plan 1999)

The second area was located in the forward of the 1998 bow trench. Here a trench was dug along the trace of hull sheathing from grid reference 38.0 to the extremity of wreckage

visible proud of the seafloor (to grid reference 45.0). For the sake of convenience in this report this trench is subdivided as follows:

- 'Brian's Trench' grids 183, 184, 203
- 'The Block Hole' grids 204, 206
- 'The Ali Baba Pit' grid 208

The Cannon Excavation

Based on the alignment of copper sheathing (as uncovered during the 1998 season) the 1999 bow excavation commenced in grids 144 + 146. As predicted, dredging revealed intact sheathing along the same trend. This sheathing was attached to degraded hull planking (190 mm wide), the topmost plank, still with sheathing, being detached and collapsed outwards towards the baseline.

The excavation was directed beneath the sheathing and extended to a vertical depth of 80 cm below the edge of copper and horizontally for approximately 100 cm beneath the curvature of the hull. At this stage, because of this 'undercutting', the weight of sediment, concretions and artefacts inside the hull together with the timbers was causing the sheathing to buckle dangerously; consequently the undermining operation was abandoned. The upper edge of sheathing was exposed for 120 cm through grids 144, 146 and 163.

In grids 163 and 165 dredging reached the edge of 1998 trench. Here a large copper bolt through an *in-situ* frame uncovered in 1998 was again clearly visible. Also in grid 163 an increasing number of concretions and degraded iron structures were encountered. In this direction lay the projected position of the crown of the large bower anchor partly excavated in 1998 in grids 162 and 181. Excavation was extended towards the baseline to locate and record the anchor crown and to examine the other ferruginous metal emerging there.

In this area two cannon were partly uncovered; measurements taken suggest they are '6 pounders' identical to the other long guns already recovered from the site. This is not surprising since the *Pandora* is known to have been armed with 20 of these guns. One of the cannon lies over the crown of the large bower anchor. Adjacent to the second gun is an iron bracket consisting of three arms, joined at their extremities into a "triangle". Two arms are straight and at right angles measuring 9900 mm and 720 mm, the third forms an inward curving arc. This shape suggests it may have been one of the brackets attached to the bulwark in the waist of the ship to support the starboard side gangway.

The guns and the gangway support bracket are from the upper deck of the ship, their current position on the site (outside the line of sheathing) indicating the outward collapse of the upper sections of the vessel's side as it canted to starboard during the wrecking and subsequent disintegration. Indeed sections of timber were observed beneath the gun perhaps as part of the waist bulwark. It could also be conjectured that one of the guns originally was at a port side gun station and that it rolled across the deck as *Pandora* settled to starboard on the sea floor.

The Block Hole

To expedite tracing the hull sheathing forward from where it had been located in the 1998 excavation, the dredge was 'leapfrogged' into grid 204 and positioned on the projected extension of the copper. Here lying across the site is a round iron beam disappearing into the seabed towards the base line. Dredging delineated this beam over 3.5 meters to its extremity where it terminated in a confusion of large diameter multi sheaved pulley blocks. The beam has a circumference of 34 cm and two reinforcing rings are evident along its length. Given its location on the site (near the bow) and

the presence of the heavy-duty blocks, it is suggested that the beam is the fish davit used to lift the anchor to its stowage position in the foremast chains.

Forward from the fish davit the anticipated line of sheathing was exposed in the excavation intermittently over 2 meters. Dredging uncovered 5 in situ frames with some ceiling planks attached. Frames ranged from 220-260 mm in width and 400 mm distance between centres. Inter frame spaces varied from 120-200 mm wide. Ceiling planks measured 210 mm wide.

Dubbed the 'Block Hole', this section of excavation produced a varied assemblage of artefacts, some of which suggest platform deck material. On this deck level were designated storage spaces, notably carpenter's, bosun's and gunner's stores, the pitch and tar room and sail rooms. Items uncovered in this area included:

Tools

Supporting the platform deck interpretation are two wooden fids (MA 8616 and MA 8630), a section of wood plane (MA 8629) and two wooden "toggles" (MA 8809 and MA 8810) all compatible with equipment found to be in the carpenter's store.

Ship Fittings

Single and multiple sheaved pulley blocks, broken sections of glass panes, rudder gudgeons and pintles (these are considered to be spares for use as replacements on the *Pandora* if required⁴) are all fittings which would be expected in either the bosun's or gunner's store.

Galley and messing Artefacts:

A wooden tub containing bones from butchered meat; broken bottles; coconuts;

pieces of coal can all be related to cooking and messing activities. A cast bronze spoked pulley found in the Block Hole is similar to those on the Brodie Stove trench. However, the question is has it moved forwards and down in the ship during the disintegration process or is it a spare in the store? Similarly the presence of coal can be attributed to the proximity of the coal bunker located beneath the bow section of the platform deck.

Personal Possessions:

These included brass buttons, a small brush? A wooden handle, a pair of shoe buckles and a small pewter (?) jug.

Souvenirs:

Ethnographic material and other souvenirs from The Block Hole were similar to assemblages from previous expeditions: fish lures, worked mother of pearl ornaments, a badly degraded carved wooden club and shell collections.

The 'Ali Baba Pit'

From the end of The Block Hole an offset trench was cut into grid 208 inside an arcuate coral outcrop which marks the limit of visible wreckage at the end of the site. In 1983 two olive oil storage jars ("Ali Baba" jars) were recovered from inside the outcrop, whilst outside, centred on co-ordinates 44 X/ 8 Y, sheets of crumples port side sheathing were uncovered over a distance of 2 meters. The 1999 excavation re-opened and extended this same area.

Adjacent to the group of rudder fittings at the end of The Block Hole lies a rectangular open iron tank. Partly excavated in 1983 this object was more precisely delineated in 1999. The tank measures 700 mm in width, 1020 mm in length and is at least 300 mm deep. Dredging did not reach the bottom of the tank.

⁴ Alternatively they may have been intended as spares for the *Bounty* which, upon recapture, would possibly require some refitting before sailing back to England.

Two “Ali Baba”⁵ jars recovered in 1983 were located forward of this tank at co-ordinates 44X/6Y. Excavation in 1999 located at a third jar a shallow depth, lying on its side at co-ordinates 43X/7Y. This jar was raised – the outcome of that exercise is detailed in the Appendix to this report.

Below the jar a number of longitudinally orientated structural timbers were evident. These were up to 250 mm wide and individual sections were exposed over lengths of up to 900 mm. In four positions the timbers were transixed by large (+/- 35 mm diameter) copper bolts.

In a gap between the planks lay a globular mass (300 mm x 400 mm and of undetermined depth) of hard white material. Samples brought to the surface and tested with hydrochloric acid indicated high carbonate content. It is conjectured this material is lime, now congealed into a homogeneous lump but originally probably packaged as a powder, possibly to be used in the preparation of white wash for painting between decks.

Resting at the top of the timbers was a pile of degraded cordage and concreted into the side of The Ali Baba Pit adjacent to where the 1983 jars had been found, a three legged cast iron cauldron was partly excavated. This artefact is reminiscent of a pot used to boil glue or perhaps pitch.

‘Brian’s Trench’

In the final few days of the 1999 season exploratory probes were made in grids 184 and 203 along the projected line of hull sheathing. Additionally in grid 183 an examination was made of a rounded metal object near the 38X/2Y grid reference point.

Frames and the edge of sheathing were located in grid 184 and a further frame was partly exposed in grid 203 before backfilling

commenced. Channel section lengths of lead identical to those seen in the 1998 excavation were also encountered. Personal items recovered included a pewter (?) spoon, knife (?) handle (wooden or ivory?), buttons and a leather and wood shoe heel. Note that on the accompanying plan the position of the three frames and lead channel are approximate due to a problem with co-ordinate resolution.

The rounded object in grid 183 was fabricated from thin metal formed into a hollow cylinder with a rectangular flange at one end. The cylinder measured 600 mm in length and had a diameter of approximately 450 mm. It is suggested the object may be the lower section of the Brodie Stove flue. The copper stove cowling recovered in 1984 had a diameter of 424 mm.

Discussion

The 1999 bow excavation has further delineated the line of intact copper hull sheathing. The trace has now been followed for a total of 14 meters from grid 146 to grid 204. However the direction and orientation of the trenching has precluded location of sections of *in situ* deck timbers of bulkheads such as have been found in the stern excavation.

Work completed in 1998 and 1999 has enabled the position of the bow excavations to be established in reference to the length of *Pandora*. However as dredging has not been extended down into the inside of the hull, i.e. it has not followed intact frames towards the keel for any distance, decking has not been exposed. Consequently confirmation of the excavation depth relative to deck level, lower - or platform deck, has not been made.

Based on artefact assemblage it can be argued that The Block Hole and The Ali Baba Pit are at the platform deck level; the presence of olive oil jars (platform deck items) in the same context is discussed in the Appendix.

5 A colloquial name for Tuscan olive oil jars.

In 'The Cannon Excavation' dredging was not carried out within the hull, so no insitu frames, deck timbers or supports were exposed. The structural timbers seen in the adjoining 1998 trench, in particular one identified as a lower deck lodging knee, indicate that in this excavation the top of the intact hull timbers is at the same level as the lower deck beams. It is suggested that similar timbers would be encountered if dredging inboard of the 'Cannon Excavation' were to be undertaken.

The identifiable artefactual material in The Cannon Excavation (long guns, skid beam support bracket) derives from the main deck. Together with the bower anchor located in 1998 (grids 161, 162, 181) these objects are outside the hull remains as defined by the line of copper sheathing. Their position on site further explains the presence of the Sub Bottom Profile anomaly discussed in the 1998 Excavation Report.

Numerically the overall artefact assemblage from the 1999 bow excavation shows a bias towards items from the ship's stores- for instance, fittings, cordage, paint, carpenter's tools. This trend was not evident in 1998 when personal possessions, souvenirs and items associated with the galley predominated. Again, this bias points to the platform deck as the likely level of the excavation in The Block Hole and The Ali Baba Pit.

Olive Oil Jars

McKay and Coleman quote from Admiralty sources that a specific area was 'berthed with slats close forward between decks' for the olive oil jars, which 'would occasion considerable breakage of stowage in the hold' (i.e. if stowed on the platform deck) (McKay & Coleman, 1992:8)

Why then, were three of the four jars recovered (2 in 1983, 1 in 1999) found in the location on the wreck where accompanying material suggests they were on the platform

deck? The fourth jar was raised in 1999. It was certainly found forward of the oven and hence in the proximity of the 'Ali Baba Pit'.

It is suggested that all the jars recovered to date were empty of oil at the time of the *Pandora* wreck. No vestiges of the jar's original contents nor their lids were seen. Three of the jars raised were filled with loosely compacted marine sediment, the result of on site burial, the fourth jar, the 1999 jar, proved to contain an array of iron nails, packed in bundles, wrapped in leather, strips of iron roves, small slabs of lead and iron and two ring bolts.

The nails are square in section and range in length from 12 mm to 77 mm, lead slabs usually measure 300 mm long, 100 mm wide and 15 mm thick, the iron measures 100 mm by 30 mm by 2 mm thick. These iron strips have four 2 mm diameter holes centrally aligned down the long axis and on the edges of the long sides, 10 mm from each corner, is a small notch. The slabs and strips appear to have been contained in canvas bags, remnant cloth and hemp rope fastening have been identified. The ring bolts have an outside diameter of 110 mm, and inside diameter of 70 mm and the shank length is +/- 150 mm.

One can speculate as to why the nails and other items were in the jar. Were they as a readily accessible supply for the carpenter's daily needs? Iron nails would be used internally on the vessel about the waterline. Perhaps the stock in the jar was for repairs to the cabin partitions, store room shelving, etc. Or was someone on board pilfering and hiding Admiralty property for use later either on return to England or on the voyage as trade items at the various island landfalls. Iron was a very negotiable commodity in the South Pacific during the initial period of European contact and colonisation. It could be used to barter food, items such as Polynesian souvenirs collected by *Pandora*'s officers and crew and favours from local women.

The empty olive oil jars were destined to be returned to the supplier for a “deposit” refund (pers. comm. Ron Coleman) in much the same way as a soft drink bottle can be returned to the store today. It was the purser’s responsibility to account for these funds and consequently it was in his interest to ensure the safety of the empty jars. The quantity of empty spruce jars recovered from the site can be explained in the same way – they were valuable – to be cashed in at the end of the voyage.

Coleman attempted to calculate how many oil jars would have been loaded on *Pandora* for her voyage based on the number of people on board, projected duration of the expedition, the stipulated Admiralty ration per person and the capacity of the recovered jars. He was unable to reconcile his figure against quantities of “oil” and “butter” listed in *Pandora*’s stores and consequently it is not known what number of jars was actually loaded.⁶ Similarly, it is not known if at the time of sinking there were any full jars still on board and if they survived the sinking intact then as the upper works of the wreck disintegrated and the lower deck became exposed it could be argued that the jars, if undamaged, may have had sufficient positive buoyancy to ride the currents. It this why to date an intact – i.e. lidded- full olive oil jar has not been found?

The jar recovered in 1999, with its iron contents, did not ride the currents; however it did have a dramatic/traumatic ride back to the surface following its excavation from grid 208. When found the jar was lying on its side with its base at a slightly higher elevation than the mouth. Inside, the opening was sealed with a solid concreted mass of foraminiferal sand and coral fragments.

The jar was wrapped in hessian and placed up right inside a wool bale (large woven sack)

fitted with slings. These were attached to a cable from the sea-crane on board the *Pacific Conquest* and a slow lift commenced. When the jar was about three meters from the surface and being guided by a Scuba diver, a sharp bang was heard followed by an abrupt outflow of gas bubbles through the tied top of the wool bale and a rapid retreat by the scuba diver.

When brought on board and unwrapped it was seen that the earthenware jar had fractured around the base and sides revealing the mass of iron objects within. The explosion is believed to have been caused by the gas produced during corrosion of the jar’s contents. The accumulating gas was entrapped inside the jar’s base due to its angle of repose on the sea floor and with the passage of time concrete sediment sealed the opening. Produced and sealed at 33 meters (4.3 ATA) the gas expanded as the ambient pressure was reduced during the lift to the extent that at 2-3 meters depth and approaching 1 ATA – or surface pressure – the jar “embolised”, breaking open its sides.

Fortunately the jar was contained within the wool bale which reduced the possibility of injury by flying fragments and also prevented loss of any of the material. The episode highlights the need to consider entrapped bottom generated gas expansion when raising sealed objects. A hole drilled through the concretion sealing the jar whilst still on the sea floor would have allowed the passive release of gas before lifting, thus removing the danger to personnel and the artefact. If the jar had exploded and fractured when being unwrapped on deck, the result would likely have been much worse.

Survey control

As an aid to future expeditions two star pickets were placed adjacent to the edge of the copper sheathing, one in grid 183 and one in grid 204. The top of the pickets remained clearly visible after back filling. This will enable the intact hull remains to be relocated quickly when excavation is recommenced.

⁶ See also to the discussion in Chapter 7

The 1999 bow excavation programme continued to use the established 2 by 2-meter grid system. The traditional multi tape measurements were taken to co-ordinate structure and artefacts before retrieval. Targets were placed on specific fixed features such as the ends of the fish davit, corners of the Brodie Stove, in situ frames, the bow anchor, etc. These were co-ordinated using the High Precision Acoustic Survey System (HPASS) operated by Centre of Excellence personnel.

Additionally, Mark Lawrence devoted much of his underwater time to taking web measurements using a 30-meter tape between grid reference poles and fixed features of the site.

The accompanying site plan is a compilation based for the most part on HPASS control. During the course of plotting up features measured by the traditional four-tape system, discrepancies between the two survey methods became evident, even when those HPASS plots which were obviously spurious, were not used. The differences were more pronounced when the site plan from the 1998 excavation was amalgamated with the 1999 survey. The plan from the 1998 excavation is offset towards the Brodie Stove by 350 mm from the line as plotted by the HPASS survey. Its position has been adjusted to conform with the 1999 HPASS survey as a consequence of the resulting compilation cannot be regarded as a tightly controlled, precision site plan.

Recommendations

With two seasons of systematic work in the bow completed (1998 and 1999) the deck level of the excavation still has not been positively established. It is recommended that in the coming season (proposed for 2001) efforts will be directed towards exposing a deeper section athwart ships inside the hull rather than pursuing the longitudinal approach adopted in 1999.

This change in direction has the potential to uncover deck timbers and bulk heads *in situ* as have been located in the stern excavation area. However, it is acknowledged that when the *Pandora* sank, the bow was probably the initial impact point of the hull on the seafloor. Because of this impact structural damage could be greater in the bow than the stern, the situation being further confused as objects slid forwards along the sloping decks to collect at the forward end of the ship.

In the 1998 bow excavation report it was recommended that future excavation be aligned athwart ships to deepen and extend the existing bow trench from grids 165 and 166 across the site throughout grids 167 and 168 into the area of the forward hatch and aft riding bitts.

This task (not undertaken in 1999) remains a priority for 2001. The trench should be extended to locate the port side sheathing and deepened inside the hull on the starboard side. This deepening exercise should endeavour to clear all material from within the hull to permit an uninterrupted interpretation of the intact timbers. A similar approach in the stern has achieved rewarding results and if the 2001 season is to be the final excavation season in the current series (Stage 2) then concentrating on completing a specific partly delineated target area would be more productive than 'wildcat' ('leapfrog') trenching in a longitudinal direction.

A second priority for 2001, if time permits, would be to cut a similar trench from the edge of sheathing in grid 204, through The 'Ali Baba Pit' in grid 206 to the port side of the wreck. Deepening of the 'Ali Baba Pit' would enable the timbers seen in 1999 to be interpreted.