# MARITIME HERITAGE ASSOCIATION JOURNAL

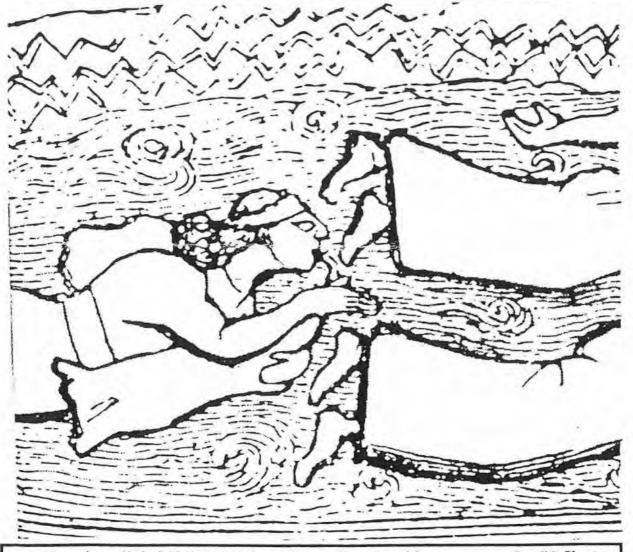
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A quarterly publication of the Maritime Heritage Association, Inc.

C/o: 4 Cunningham Street, Applecross, W.A. 6153.



Editor: Peter Worsley. 294 Chapman Rd., Geraldton, 6530.



An Assyrian relief of 885BC showing a diver using a breathing apparatus. See "A Short History Of Diving" by Jill Worsley.

Maritime Heritage Association

All of the Association's incoming journals, newsletters, etc. Are now archived at Porthole Prints, South Terrace, Fremantle, and are available to members on loan.

(If you have an unwanted collection of magazines of a maritime nature, then perhaps its time to let others enjoy reading it. Contact the Association: we may be interested in archiving the collection.)

The Maritime Heritage Association Journal is the official newsletter of the Maritime Heritage Association of Western Australia, Incorporated.

Material for publishing or advertising should be directed, preferably typed or on disk, to: the Editor, 294 Chapman Road, Geraldton 6530, Western Australia (08) 9921 3046.

Articles will be published at the earliest opportunity.

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#### **EDITORIAL**

This is my first effort at producing a journal and I would ask all readers to bear with me until I become a lot more proficient with the computer. Having been away from home for some two months and therefore having little time to collate articles, type them and place them in a readable format this edition is well below the high standards set by Chris.

I have a couple of topics I wish to bring to the attention of members.

Firstly, the Maritime Heritage Association's main contact with its members is through this Journal. Via the articles which are published here information, hopefully of interest to most readers, is disseminated. Over the last couple of years the majority of these articles have come from only three or four contributors. By your being a member of the Association I presume you have an interest in maritime matters. Why not write an article, short or long, for YOUR Journal. In another section of the Journal I have put forward some suggestions regarding topics on which articles could be written.

Secondly, I would like to bring readers attention to the letter from the Secretary, Albany Whaleboat Association, Wayne McCartney, reprinted in the Journal. The sport of whaleboat racing is one which the Maritime Heritage Association should encourage. The cost of a boat, while high, is achievable given enough interest and some sponsorship. A competition between say Fremantle, Albany, Bunbury and Geraldton with the occasional race with Warrnambool would keep alive an historical boat type and the traditional skill involved in its construction. I suggest members go back to Volume 6, No. 1. March 1995 of the Maritime Heritage Journal and read the article on page 9. Should we be doing a little lobbying and promotion work in this matter?



# Maritime Heritage Association: President's Report to the Annual General Meeting.

This time last year I described a year of innovative achievement. This last year has seen rather less achieved.

The MHA has continued its role as a lobby group for the preservation and promotion of various aspects of heritage. We have, for example, written to the Premier expressing concern about the situation of Leeuwin in the middle of last year, and also written to him asking for clarification of proposals for the new Maritime Museum and proposed Maritime Heritage Precinct. Thanks to some Government action and Bob Johnson's energy, Leeuwin has been got back into sea-going operations and is now operating successfully under new management.

We would like to be involved in the discussion of what Fremantle's Maritime Precinct might be if it is ever proclaimed, but it is difficult to say where that discussion is being held, if it is happening at all. Increasingly there seems to be a tactic of introducing these things by stealth rather than fanfare.

Just recently we put out a press-release condemning the closure of Swan Dock and the tendency to an ever more theme-park version of Fremantle the port city. Swan dock was a complicated situation which I don't claim to fully understand, but the underlying trend to move port and shipbuilding operations away from Fremantle is something we wish to counter. Bob Johnson represented the MHA at and FPA consultation session last year. The session was promoted as being consultation with clients, stake-holders and the community but turned out to be very much focussed on clients' requirements.

Wooden Boat Works has been entirely independent of the MHA for two or three years now. We congratulate them on their continuing success in difficult times, surviving by virtue of their considerable reputation, determination and flexibility.

Our quarterly Journal, edited by Chris Buhagiar, continues to be a publication of real quality. Chris's own contributions to the Journal have been interesting and of very high quality. Chris has decided to go bush and become a farmer which means that he can no longer edit the journal - there will be no electricity to run the computer in his humpy. I know everyone will want to join me in a vote of thanks to Chris for his years of excellent editorship.

The loss of Chris as editor could have been disastrous for the Journal. It is with great pleasure and relief that we welcome Peter Worsley who is taking over as editor and whose contributions in the past show that he will continue a publication of real quality.

However, there is always some doubt as to whether the Journal will have enough material to continue with the twenty page format, so, please, if you've got an article in you, get it out and send it to Peter.

Bill Brown continues to run our video library. A number of videos have been purchased from maritime museums in Australia, Britain and America, they are variously about sailing ships, rounding the Horn, pre-WW II yachting and liners, and traditional sailing craft. They are available for members to borrow for a nominal fee from Porthole Prints in South Fremantle. In addition to the video library, the Association receives journals and newsletters including those of Fremantle and Burnie Branches of the World Ships Society, Australasian Shipping Records and the ANMM's Signals. We have recently subscribed to the English journal Maritime History. These are also kept in a small library for members at Porthole Prints in South Fremantle thanks to Bill and Susanne Brown.

This last year the Classic and Wooden Boat Show was not held. Leeuwin Ocean Adventure felt unable to underwrite the considerable costs, and the planning committee felt that a year's rest might re-invigorate the event. Some persons and organisations have expressed disappointment with the cancellation and the opinion that they should have been invited to take over the organisation. However, they were in fact represented on the organising committee that took the decision to cancel the event.

Bob Ivery has community service (voluntary, not the result of a criminal prosecution) commitments which conflict with MHA committee meetings. Hence he is not here tonight and is not standing for re-election to the committee. Bob was the main organiser of the successful Maritime Art Exhibition which the MHA ran last year. Many thanks to Bob.

Tana Bailey has resigned from Leeuwin Ocean Adventure last year and is no longer our membership secretary. Bob Johnson has taken on the role and attempts to keep disorganised members such as myself as financial members. Our thanks to Tana for several years of service. The fact that Bob who is MHA treasurer is now also, by default, membership secretary, and that the committee has for two years, or is it three years, had no minutes secretary (that role shared by Mike Igglesden and myself) might shed some light on why the Classic and Wooden Boat Show committee were not dismayed to call-off the show for a year, and why the MHA is not as active as it once was. The work falls to a smaller band of people each year.

I fear that we shall increasingly have to spend MHA funds on viands and fine wines to make committee meetings more attractive.

Nick Burningham

# The Ditty Bag

An occassional collection of nautical trivia to inform, astound, amuse and inspire.

(The inspiration could take the form of contributions to this page!).

 The Preussen was the only five masted fully rigged ship to be built. Constructed of steel in 1902 she was lost off Dover, UK, in 1910.
 The following is a list of the rope and chain used in both her standing and running rigging.

Standing rigging	35,424 feet.
Wire running rigging	43,394 feet.
Hemp running rigging	54,613 feet.
Chain running rigging	2,296 feet.
TOTAL	137,727 feet.

This is 26 miles or 42 kilometres of rigging. There were some 1206 blocks and 248 rigging screws associated with her all steel mast and yards.

- The first steamship to be built of iron was the Aaron Manby in 1820. Her first voyage was London to Paris which she completed at an average speed between 8 and 9 knots.
- The first iron ship to make an ocean voyage (from Liverpool to the Niger in 1832) was the Alburkah, a paddlewheel steamer of 55 tons.



Everyone has heard of the Dutch East India Company, known as the VOC, and the English East India Company, known as the Honourable East India Company. Did you know that there were six other countries which also had East India Companies? These were France, Denmark, Scotland, Spain, Austria and Sweden. The East Indies attracted big business then just as it has in recent years.





# Dewaruci

Nick Burningham is an expert on Indonesian sailing vessels and the visit to Fremantle of the *Dewaruci*, the Indonesian Navy's sail training ship, earlier this year led him to put pen to paper (finger to keyboard?) regarding her rig and rigging.

The Indonesian Navy's sail training ship Dewaruci recently visited Fremantle on her return from the Sydney-Hobart Tallships race in which she won the Cutty Sark trophy.

Dewaruci was built in 1952 and is a near sister of the Belgian training ship Mercator which has been out of commission for a decade or three.

Dewaruci's barquentine rig shows some interesting Indonesian adaptation. Like many of the European owned trading craft that operated in the Indies during the late 19th century and early 20th century, Dewaruci brails her gaff sails into the mast rather than lowering the gaffs as the normal way of tacking in sail. The gaffs can be lowered in heavy weather. Ratlines between the forward shroud and the mast enable crew to put gaskets around the brailed sail to effect a secure furl if necessary.

This is an adaptation for sailing in a region where winds are generally light to moderate but violent squalls of relatively short duration are also common. There is little requirement for reefing but a need to take in and reset most of the sail quickly and easily.

The large cargo-carrying perahu pinis which operated in Indonesia without engines until the late 1970s carried a purely Indonesian development of the brailing standing gaff which combined in a single wire cable the peak halliard, throat halliard and jackstay for setting the head of the sail. Dewaruci shares another regional adaptation with the perahu pinis. This relates to the problem of staying forward the mizzen mast on a gaff ketch, a barquentine and

a three mast schooner where the mizzen is shorter than the main. A triatic stay from the mainmast cap to the mizzen cap would foul the main gaff. Traditionally ketches often have the forward shrouds on the mizzen well forward of the mast so that no other staying forward is necessary. But this requires that the main boom be cut shorter than it otherwise could be so that it will not foul the mizzen shrouds. Pearling luggers had a single pendant tackle / running forestay which had to be shifted to windward of the mainsail every time the lugger changed tack. Three mast schooners and barquentines usually had port and starboard running forestays. I had running forestays on the mizzen of my gaff ketch Hati Senang. They work well; they are one more thing to shift when changing tack but you can do it before going about. However, I noticed that a number of people who sailed with me, and who were keen on traditional sailing craft, regarded those running forestay as an abomination. There are potential problems with them - if you made an uncontrolled gybe in a strong breeze the main boom would swing across and smash into a running forestay if it had not been triced up out of the way (as it should be when running before the wind). And if you sheet in hard in a stiff breeze without setting up a running forestay you will see the mizzen mast bending aft in an alarming way (I did that once when the dinghy's painter parted and I immediately put Hati Senang hard on the wind to retrieve the dinghy).

Western Australia's sail training barquentine Leeuwin does not have mizzen running forestays, instead she has unusually sturdy topmasts (Dewaruci's are relatively tall and slender) making it possible to stay forward the mizzen with a stay from the truck of the main topmast to the mizzen cap. But this is not a traditional arrangement and would make it impossible to sail with the main topmast truck or carried away.

To get back to Dewaruci; she has a (double) standing mizzen stay from the hounds to the mainmast just above deck level. Similarly perahu pinis have a mizzen stay set up to a ringbolt immediately abaft the main hatch. The standing mizzen stay necessitates a boomless mainsail which can be sheeted to port or starboard of the mizzen stay like a staysail. Now this is not without problems - it means that the largest sail on the ship has flailing

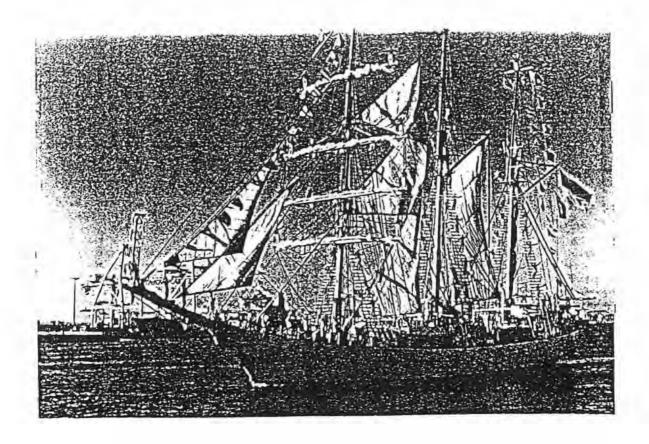
Maritime Kerilage Association

sheets that need to be tended when going about. The perahu pinis have a sheeting arrangement that could only be used by competent professional seamen of the old school. There is no tackle on the mainsheet, it is just a length of heavy hawse. It has to be cast off, shifted around the mizzen stay and made fast to the massive thwartships rail before the ship pays off on the new tack. Sheeting in underway requires luffing up and the whole crew tailed onto the sheet. It is not an appropriate arrangement for Dewaruci with her trainee crew and cluttered decks. Dewaruci has port and starboard main sheets which have long wire cable pennants. They are rove through single blocks (port and starboard) on a thwartships horse just forward of the mizzen mast, then up to another-single block at the mizzen hounds; from there a four part tackle on the fall allows the crew to operate the sheets like hauling on a halliard. When the upper block of the tackle is close up under the hounds there is enough slack in the cable to get the clew of the sail around the mizzen stay. There's rather a lot of line in the tackle but there are no flailing sheet blocks.

There are few published photographs of Dewaruci and most of them don't really flatter her. She has more sheer than most steel-hulled ships, her rig is fairly tall and the masts well raked. She was looking reasonably well maintained with her topsides painted white which suits her better than her usual naval grey. The Indonesian crew are wonderfully hospitable. I understand that they won the hearts of everyone in Hobart with their music-making and dancing.

The Dewaruci was built by H C Stulcken & Sohn, Hamburg, and launched on 24 January 1953. She is capable of 12.8 knots under sail and 10.5 knots under her diesel engine. She is 191.25' LOA and 136.25' PP. She has a beam of 31.25' and draws just under 14'. There is 1305 sq yds of canvas in her sails....Ed.

Nick's photograph of *Dewaruci* is shown below.



## HAVE A SAY -GET PUBLISHED!

It is time that more of our members contributed to this Journal! As mentioned in the Editorial it is time that there were more contributions coming in to the Editor to keep this Journal alive and well, interesting and informative. It is the lifeline of our Association.

Contributions on any relevant topic will be most welcome and the writers of these articles need not necessarily be members of the MHA. I intend contacting people with maritime knowledge and interests outside the Association to endeavour to bring you information of interest. There are a multitude of topics which can be covered. Have you an interest in:-

- rigging,
- · ship or boat construction,
- · maritime art,
- the history and development of a particular type of boat, ship or rig.
- shipwrecks old and new.
- · diving history or stories,
- · maritime buildings, wharves, lighthouses,
- yacht sailing,
- building your own boat,
- building models.
- · whaling history,
- the fishing industry,
- fishing boats and fishing methods,
- the history of sealing,
- the grain trade
- the sailing ship races between clippers in the tea, wool or grain trade,
- do you draw or paint maritime scenes,
- · navigation history, methods and instruments,
- · charts old and new.
- · war time incidents and tales,
- sea shanties and sea poetry.
- Nautical archaeology.

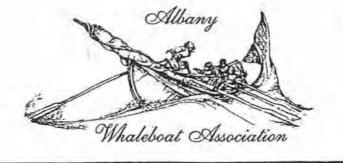
Do you know people who would be willing to write articles for submission? There is no expectation of professional thesis, very few of us have that ability!

### WHALEBOATS AND WHALEBOAT RACING

Opposite is the letter from the Albany Whaleboat Association mentioned in the Editorial. During the Anzac long weekend Wayne McCartney and family called in at Geraldton and we talked about their hopes for their Association to promote the building and racing of whaleboats in this state. Wayne said that the cost quoted to them of a completed boat, with sails and trailer, was about \$25,000. This is a large sum of money but, in comparison with such projects as the Duyfken and Endeavour, it is an achievable amount with suitable sponsorship and grants. This is a project that The Maritime Heritage Association should involve itself in to provide Fremantle with a boat suitable to race against Albany. Encouragement to Bunbury and Geraldton to form whaleboat racing organisations should also be made.



11 th March 1998



The Secertary 9 Fleet Street Albany 6330

The Editor Peter Worsley 294 Chapman Road Geraldton 6530

Dear Peter,

As a member of the Albany Whaleboat Association I read with much interest your article on whaleboats in the March Maritime Heritage Association Journal. Our association which is a subcommittee of the Albany Maritime Heritage Association is dedicated to the realisation of a project to which we have been working steadily towards for the past three years. This project being the construction of at least two traditionally built, fully rigged whaleboats for use by the community both here in Albany and statewide.

I believe the Fremantle Maritime Heritage was working on a similar project some years ago and after reading your article it was encouraging to see an interest in whaleboats other than our own within Western Australia as part of our plan is to revive the sport of whaleboat racing on a state, national and international basis. The state competition would include Albany, Bunbury, Fremantle and Geraldton from which teams would vie for the right to represent the state in a national competition and ultimately compete on a international basis for the Captain Mills Cup as described in the pamphlet distributed by the Fremantle Maritime Heritage Association some years ago. Racing is only part of a many faceted plan which would include a broad section of the community and we are currently gauging how each individual group would use these boats and would appreciate any input to help us achieve this.

I read with some concern the MHA in Crisis notice in the same journal and offer support and encouragement for this essential link to help keep alive Western Australia's rich maritime heritage.

regards,

Wayne McCartney

1. Mance

Secretary Albany Whaleboat Association.

# A Short History of Diving

The MHA Journal has from its inception carried articles primarily concerned with ships, boats and harbours. An area of interesting study has been missed - the study of underwater activities. In order to address this imbalance Jill Worsley presents the first in a series of very brief articles on the history of diving and the development of submarines.

#### Early Historical Times To 1830

I recognise that "in all warm seas people without histories have been diving for thousands of years, not necessarily without apparatus". Dugan.

The earliest classical record I can find to diving occurs in Homer's <u>Iliad</u>.

Patroklos: "See now, what a light man this is, how agile an acrobat. If only he were somewhere on the sea, where the fish swarm, he could fill the hunger of many men, by diving for oysters; he could go overboard from a boat even in rough weather the way he somersaults so light to the ground from his chariot." Book 16 - 745.

It is not clear whether Homer is referring to unassisted free diving or assisted diving possibly by carrying down a large stone.

The generally accepted date of the <u>Iliad</u> is about 800BC.

In the Middle East the Assyrians were also diving, as shown in the illustration on the front cover of this Journal. The swimmer on the relief appears to be breathing from an air filled leather bag on his chest. In practice this method could only be used for short distances, but if the shape on the swimmer's back is a weight-filled bag then the method should work.

During the siege of Syracuse (734BC)
Thucydides records divers being used to saw
through the wooden barriers which had been
erected underwater in the harbour entrance
to prevent Greek ships from entering the
harbour.

Aristotle (without detail) describes divers using breathing apparatus to draw air from the surface. This may have been a metal tube. He also describes a metal vessel filled with air which was let down to a diver. This would seem to be an early application of a diving bell.

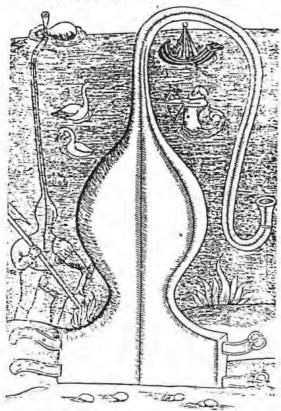
Alexander the Great, ruler of Macedonia, according to legend entered the sea in a glass "barrel" or "cage" in the 4th century BC.

He was probably both the first and last reigning monarch to use a diving bell.



An early woodcut showing Alexander the Great seated on a bale of cordage.

The earliest known mention of a diving helmet is by Vegetius in 1511. He illustrated a diver wearing a tight fitting helmet to which was attached a long pipe with a bell mouth. This was supported on the surface by a bladder, but curiously (fatally?) there does not seem to be any method of getting rid of exhaled air.



A more practicable descent was made by two Greeks in 1538. They used a huge upside-down vase with attached ropes and weights, and were lowered into the Tagus River at Toledo in Spain. Charles V ruler of the Holy Roman Empire watched from the safety of the bank. He was obviously not made of the same stuff as Alexander. It is not recordered how long the divers were held at the botom of the river, but according to several reports they emerged dry and comfortable.

In 1679 an Italian, Alfonso Borelli, devised an apparatus whereby air was forced down to a diver by means of a bellows. This allowed considerably deeper diving than the earlier methods. His diver walked on the seabed and wore claw-like footwear. This was an improvement on Leonardo da Vinci's earlier design of hand fins, which are of little practical use to divers.



Leonardo da Vinci's 16th C design for hand fins.

Vegetius's diving helmet.

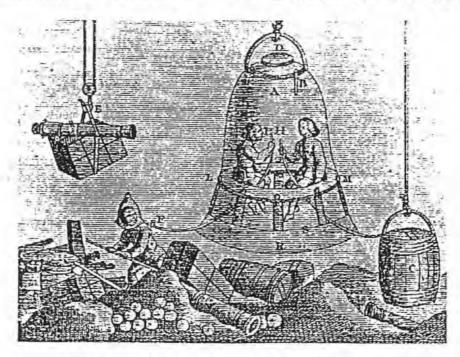
The diving bell again came to notice in 1690 when Edmund Halley (of comet fame) invented a sophisticated system of wreck recovery using the bell as a reservoir of air for a diver working outside and assisted by companions inside the bell.

Further freedom was devised by John Lethbridge of Devonshire in England, who in 1715 invented a watertight leather suit which entirely covered the diver while still allowing movement of arms and legs. The suit held (as well as the diver) half a hogshead of air, this being sufficient to sustain life for up to 30 minutes. The suit was used for salvage work on ships in depths to 9 metres.

A great advance was made by the German inventor C. H. Kleingert in 1797. His diver wore a leather suit and a domed metal cylinder which went over his head and extended to hip level, where it attached to his breeches. Air was drawn in

through a pipe to the surface, as in the Vegetius model. A second pipe took foul air to the surface. The first pipe was held in the mouth, and the second was activated as the diver breathed out through his nose and then expanded his chest to breathe in again. A glass window in the cylinder allowed vision. Lead weights hooked on to the bottom rim took the diver down to the required depth, and ascent was made by unhooking these weights and attaching them to a lifting line so that they could be hauled up independently.

Modern assisted diving was introduced by Augustus Siebe in 1819. He was born in Germany but later moved to England. He devised an "open" leather dress with a metal helmet and breast plate. It worked in conjunction with a pump which forced air down to the diver at a pressure depending on the depth. Air supply was regulated through an inlet valve. Exhaled air escaped through the open gap between



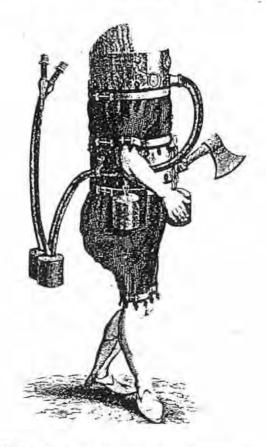
Halley's diving bell and helmet from a late 18th C engraving.

the suit and helmet, rather in the manner of a diving bell. This system worked well, providing that the diver could remain upright on his feet!

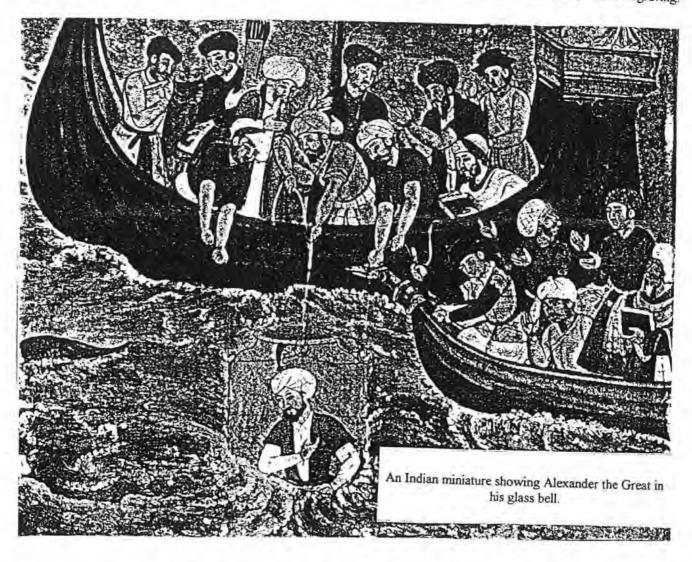
Siebe introduced an even better model, a "closed" suit, in 1830 probably following discussions with the Deane brothers who were also developing breathing apparatus about this time. The contribution to diving made by the Deane brothers will be the subject of a further paper.

#### References

Dugan, J., 1960, Man Explores The Sea. London. Hass, H., 1975, Conquest Of The Underwater World. Melbourne. Homer, Iliad, Lattimer translation. Kemp, P. (Ed.), 1976, The Oxford Companion To Ships & The Sea. London. McKee, A., 1968, History Under The Sea. London.



Kleingert's diving suit from an early 19th C engraving.



## DUYFKEN 1606 REPLICA FOUNDATION WINS MARITIME HERITAGE AWARD

The Duyfken 1606 Replica Foundation, which is building the Duyfken replica ship in the grounds of the Western Australian Maritime Museum, Fremantle, has won an award "for its outstanding contribution to maritime heritage".

The award was presented at the annual Fremantle Heritage Awards on 25th April. Special mention was made of the Duyfken Foundations troop of volunteer guides led by Jenny Gibbs. The guides show visitors through the Lotteries Duyfken Village Shipyard which is open seven days a week. The citation also praised the Foundation's strong commitment to education and community involvement. Up to three school groups per day are taken on conducted tours through the shipyard. The Foundation has developed a schools pack and has special activities for Science Week this year. The Foundations Web-site (www.duyfken.org.au) has a model boat making competition with downloadable plans for a cutout model Duyfken.

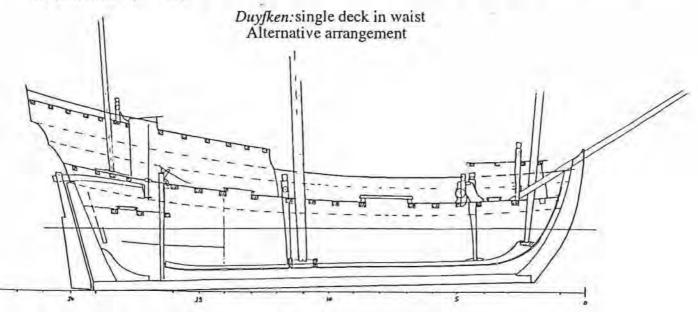
The award comes at the end of week which saw the visit to the project of the world's foremost authority on Dutch sailing vessels of the 17th century, Mr Ab Hoving from the Rijksmuseum, Amsterdam. Ab Hoving was delighted by what he saw.

"Seeing the revival of the ancient ship-building techniques used as a

"Seeing the revival of the ancient ship-building techniques used as a research tool to determine the design of a full-size replica ship is most impressive - I'm most impressed by the courage of the shipwrights." he said.

The above is a report by Nick Burningham on the recent award to the Duyfken 1606 Replica Foundation.

Everybody associated with this worthwhile project is to be congratulated. This is an enterprise which has the support of the Maritime Heritage Association and those members who have not been to see the ship in construction have missed out on a fascinating piece of maritime history. - Ed.



### BOOK REVIEW

Here is a short book review by Nick Burningham. Why don't you submit a short review on one of your favourite or interesting books?

SOUTH SEA ISLAND TRADER: Narrative of a voyage to the islands of Melanesia on the M.V. Malaita 1950
Wal Bird

Published by Wal Bird, 233 Greenacre Road, Wollongong, NSW 2500; 1996. 73 pages, paperback, 19 B/W illustrations.

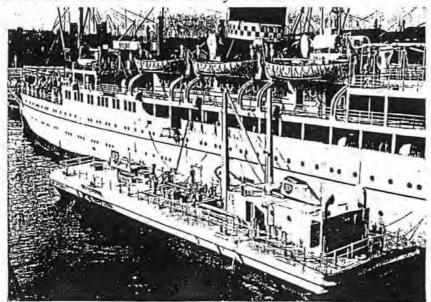
Wal Bird kindly sent to the MHA, for review, a copy of his account of a round voyage from the Brisbane river to the Territory of Papua New Guinea (as it then was) and New Britain.

MALAITA was the former Burns Philp flagship, by 1950 she had been replaced in that role by BULOLO, but MALAITA remained the queen of the fleet in the eyes of many including Captain Brett Hilder who has also written about her.

Wal Bird was an AB during his voyage on MALAITA, at the end of the voyage he was paid off and found another ship, as was the practice then because of long turn-round times.

The narrative of the voyage is a charming account, without major drama, pretension or claim to particular heroism on the part of the author. Descriptions of colonial administrators and indigenous people are written without censure. It is a gentle and sympathetic reminiscence but not idealised or proselytising.

One third of the slim volume is "Notes on the Narrative" which are under alphabetically arranged headings and range from an account of Burns Philp's brief and deplorable foray into "blackbirding" (kidnapping of Melanesians for slave labour) in the 1890's to care and use of the patent log, examination for a Certificate of efficiency as a Lifeboatman, and use of a lead line which was still standard as recently as the 1950s.



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## SOME OF THE VIDEO TITLES HELD AT PORTHOLE PRINTS

#### **U-Boat War**

55 mins

"They were the only thing that really frightened me" said the imperturbable Winston Churchill of the German Navy's U-Boat Fleet - the dreaded Wolf Pack that stalked the Atlantic depths. Together with the formidable surface fleet, the U-Boats challenged the Royal Navy's traditional supremacy of the oceans.

#### Around Cape Horn

37 mins

In 1929, the last great days of commercial sail were passing. During that year, Captain Irving Johnson sailed and filmed aboard the massive Bark Peking. In this video, he narrates the passage in the style that made him a favorite on the lecture circuit around the world. The most spectacular scenes are filmed during a wild storm as the Peking rounds the feared Cape Horn.



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