Met.O. 827

The Marine Observer

A quarterly journal of Maritime Meteorology

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THE MARINE OBSERVER

A QUARTERLY JOURNAL OF MARITIME METEOROLOGY PREPARED BY THE MARINE DIVISION OF THE METEOROLOGICAL OFFICE

VOL. XL No. 228 APRIL 1970

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Editorial

In the foreword to Volume I of *The Marine Observer*, written in October 1923, Dr. G. C. (later Sir George) Simpson, C.B.E., F.R.S., Director of the Meteorological Office, expressed his gratitude to a whole army of marine observers for their unselfish work which had extended our knowledge of the winds, weather and currents into the uttermost parts of the sea. The taking of the observations at the correct time in all kinds of weather and often in difficult and dangerous conditions, the drudgery of compiling 'fair' registers, and the constant care of instruments having all been done in the faith that the observations would lead to a knowledge of the laws of the atmosphere which would prove of use and comfort to future generations of sailors. Attention was also drawn to the desire of the Meteorological Office to extract this knowledge from data provided and hand it back to the seaman in a form which he can understand and suitable for use in daily life at sea.

The main purpose of bringing *The Marine Observer* into being was to provide information useful in navigation concerning winds, weather, climate, currents and ice and to stimulate interest in observations and practice of meteorology at sea. Also to provide an interesting journal, as a tangible link between the corps of voluntary observers in British ships, to which seamen and meteorologists would contribute. The originator of the idea and therefore the first Editor was Captain Brooke Smith, Marine Superintendent of the Meteorological Office. He was succeeded, on retirement, by Commander Frankcom who continued the Editorship until last year so from 1924 to 1969, apart from the war period when publication was suspended, there have only been two Editors. Now it is the intention of the new Editor that the main purpose of this journal will continue as in the past.

It is sometimes said that seafarers are most conservative and reluctant to accept changes, new ideas or new equipment. Although this may have been true many years ago it is not true of the present-day sailor who has been pleased to accept, during the last three decades, the introduction of bridge control of main engines, bow thrust units, automatic helmsman, and various types of compasses, radars and other pieces of equipment. The bridge of a modern ship, in fact, bears no resemblance to that of a ship built 30 years ago. Ships themselves have also changed and to navigate a large, fast ship requires more attention and no less skill than was necessary in the days when Volume I of *The Marine Observer* went to press. In that edition Captain Brooke Smith wrote, "It has been said that shipping and seamen since the advent of steam have lost interest in meteorology. Post-war [1914–18] experience emphatically disproves such a contention." It could equally well be said today that with large and powerful ships, well equipped with modern aids to navigation, meteorology is of less consequence to a sailor but, again, experience shows this to be incorrect. Meteorology has progressed possibly beyond anything envisaged in 1924 when satellites and computers were unknown and communication systems, which play such an important part, bore no resemblance to those of the present day. Forecasters today can forecast with greater accuracy and give more detail for longer periods ahead. If the information is used to good advantage by mariners then ships may avoid heavy weather, reduce damage to ship and cargo, save both time and fuel on passage and thus reduce running costs. In these days of keen competition from foreign owners, when fewer Red Ensigns can be seen, surely it is in our interests to utilize all services at our disposal and thus make the British shipping industry more efficient. It is, therefore, more important than ever that we should accept changes and new ideas and not be content with methods of working simply because they were introduced 50 or 100 years ago.

The seamen's interest in meteorology throughout the years has not waned and, in spite of the growing use of artificial satellite photographs and computers, their observations are as important now as ever they were. Healthy and desirable progress in weather forecasting is still dependent on observations at sea; from the data which seafarers provide the Meteorological Office can extract knowledge and, as Sir George Simpson said, hand it back to the seaman in a form which he can understand and suitable for use in daily life at sea.

G. A. W.

Report of Work for 1969

(MARINE BRANCH AND MARINE CLIMATOLOGY SECTION OF THE METEOROLOGICAL OFFICE: VOLUNTARY OBSERVING FLEET AND OCEAN WEATHER SHIPS)

1. Voluntary Observing Ships

At the end of the year the British Voluntary Observing Fleet was comprised as follows:

(*a*) 499 Selected Ships which are supplied with a full set of meteorological instruments on loan and which make observations in code form FM21.D every six hours and transmit them to the appropriate coastal radio station wherever their voyages take them.

(*b*) 59 Supplementary Ships, including 20 trawlers, which make less detailed observations than Selected Ships and are supplied on loan with only a barometer, air thermometer and screen. They use abbreviated code form FM22.D for their messages.

(*c*) 77 coasting ('Marid') vessels, and one lightship, which make sea-surface temperature observations in U.K. coastal waters and transmit them in a special code by W/T or R/T. When in the North Sea, the coasting ships include in their messages wind, weather and visibility observations.

(*d*) 15 lightships which make observations of wind, waves, visibility, air and sea temperatures; 13 of these send coded reports by R/T, the other two record their observations for climatological purposes only. The *Dowsing*, *Galloper* and *Royal Sovereign* lightships report barometric pressure using the precision aneroid, and their reports are included in the BBC 5-minute weather bulletins for shipping. The *Galloper* also reports barometric tendency. The time limit imposed on BBC weather bulletins does not permit the inclusion of the barometric tendencies of the other two lightships.

(*e*) 33 trawlers which make non-instrumental observations only and transmit them by W/T or R/T using the first five groups of FM21.D to radio stations in the U.K., Canada, Iceland, Norway or U.S.S.R. depending on the area in which they are fishing. In addition to these, 20 trawlers now figure in the Supplementary Ships' List.

(*f*) 52 Auxiliary Ships which make and transmit visual observations similar to those made by trawlers, with the addition of pressure and air temperature readings from the ships' own instruments (using the 'Shred' code). These ships do this work only when in areas where shipping is known to be sparse.

The total number of British Voluntary Observing Ships taking part in this scheme represents about 13 per cent of the world total of some 5,800 observing ships belonging to various maritime countries. The entire British merchant fleet is now about 13 per cent of the world total so our contribution to this scheme is already appreciable. However, the problem of recruiting 50 extra ships every year for the next few years as part of the U.K. contribution to World Weather Watch is an exacting one in the face of a numerically shrinking Merchant Navy. This gradual decrease is due to a building programme of larger and faster ships and also by the gradual replacement of conventional cargo ships by container ships; (in shipping circles it is confidently expected that eventually 9 container ships will be able to do the work of 80 conventional ships). It is not only a problem of recruiting new ships but also of finding replacements for ships which are being sold or broken up and Port Meteorological Officers throughout the year have been fully extended on this work. In the first six months of 1969, for instance, the size of the Voluntary Observing Fleet increased by only 7 Selected and Supplementary Ships but this modest increase in numbers involved 55 movements of a complete set of instruments when

24 ships were withdrawn and 31 were recruited. The problem has been somewhat aggravated by contractual difficulties concerning the supply of instruments, by the gradual changeover from Fahrenheit to Celsius thermometers (which is not yet complete) and by the long-hoped-for changeover from marine mercurial barometers to the precision aneroid which has been disappointingly slow.

An increasing number of British ships are sold to foreign shipping companies or to shipbreakers during their outward voyages and the recovery of Meteorological Office instruments from them is often a problem. The Marine Branch is much indebted to many Commonwealth and foreign Port Meteorological Officers who, often at very short notice, have removed the instruments, and to the many shipmasters who have brought them home.

The British Voluntary Observing Fleet includes ships of over 100 shipping companies and Table 1 shows the variety of trade routes on which they are engaged.

Table 1. Average numbers of British Selected and Supplementary Ships on main trade routes to and from the U.K.

Australasia	91	Pacific Coast of North America	13
Far East	98	Europe	35
Persian Gulf	37	Falkland Islands and Antarctic	1
South Africa	31	World-wide 'tramping'	90
North Atlantic	92	Near and distant-water fishing grounds	20
West Indies	33		
South America	17		

Voluntary observing ships are supplied with the necessary instruments on loan and observations are made every six hours throughout their voyages and recorded in logbooks. During the year 1,052 meteorological logbooks were received from the regular observing ships in addition to 227 completed forms from Auxiliary ships which are not supplied with instruments. As many as possible of these observations are transmitted by radio to the most convenient coastal radio station, addressed to the meteorological service responsible for the area through which the ship is passing (for instance, ships in the eastern North Atlantic send their reports to the British service through GPO coastal radio stations). The number of radio weather messages so transmitted must depend largely on the number of radio officers carried in a particular ship (the majority of British ships carry only one) and whether the synoptic hour falls within a period when the radio officer is on duty. But shipmasters are becoming increasingly aware that a ship's observation can be of considerable use to a meteorological service (thus contributing to the safety of his own ship) even if transmission has to be delayed until watch is resumed, and there is a satisfactory increase in the proportion of observations transmitted. It is also not uncommon for a radio officer to break into his off-duty time solely for the purpose of sending a radio weather message.

During two typical days, one in June and one in December, the total number of reports from ships received in the Central Forecasting Office at Bracknell from various sources is shown in Table 2.

2. Ocean Weather Ships

The British Weather Ships completed 22 years' service in the North Atlantic during the year; the present four ships have now been operating for about 10 years and continue to give good service. These ships co-operate with French, Dutch and Norwegian vessels in maintaining four ocean weather stations in the eastern North Atlantic while a number of other countries make financial contributions towards the cost; weather ships of the U.S. Coast Guard similarly man four stations in the western Atlantic. All these ocean weather stations are constantly manned, and hourly

Table 2. Total number of reports received at Bracknell by various sources from ships during two typical days in 1969

	JUNE	*DECEMBER*
Direct reception from		
British ships in North Atlantic	90	93
Foreign ships in North Atlantic	8	58
British trawlers in North Sea	13	14
British merchant ships in North Sea	28	12
	139	177
Via other European countries		
Ships in North Atlantic	327	250
Ships in Mediterranean	77	50
Ships in North Sea	91	102
Ships off North Russia	37	35
Ships in Pacific	18	36
Ships in other waters	16	15
	566	488
Via North America		
Ships in North Atlantic	464	431
Ships in Pacific	641	604
Ships in other waters	15	22
	1120	1057

surface and six-hourly upper-air observations (radiosonde and radar-wind) to an average height of about 65,000 feet are transmitted by radio. In addition the British ships make observations of global solar radiation and radiation balance, of sea temperatures and salinity at various depths down to the sea bed, and record magnetic variation. Deep echo-soundings are made and some marine biological work, including plankton sampling and squid fishing, is regularly done.

Communication facilities and routine navigational aids were provided for transatlantic aircraft by all the weather ships and their air/sea rescue equipment was kept in a constant state of preparedness. Comprehensive search and rescue exercises were frequently carried out in which RAF aircraft sometimes participated.

3. General

The Marine Branch worked closely with the Board of Trade in fitting out the trawler support vessel *Orsino* for duty on the fishing grounds north-west of Iceland from 1st December 1968 to 30th April 1969. Trawler skippers were very glad of the weather advice they received from the *Orsino*, based on the local weather forecasts prepared by the meteorologist on board from area forecasts and other information issued from Bracknell. Although the weather conditions were much the same as in the winter of 1967–1968 when two British trawlers were lost off Iceland, no British trawler was lost last winter, which is a measure of the value of a support vessel in this dangerous area. The *Orsino* left Hull on 1st December 1969 to resume duty on the Icelandic fishing grounds.

4. Ice and Surface Ocean Currents

There has been a welcome increase in the number of ice reports received from civil aircraft during the year, mainly from those on polar routes. Improved satellite photographs have been very useful in determining the distribution of ice.

Some 30,000 observations of surface ocean currents were extracted from ships' logbooks during the year and entered on punch cards. Quality control of these observations by computer was continued and ocean current data were supplied to the Navy Department for new Routeing Charts of the Indian Ocean. The ocean current and sea-ice sections of six volumes of Admiralty *Pilots* were revised during the year.

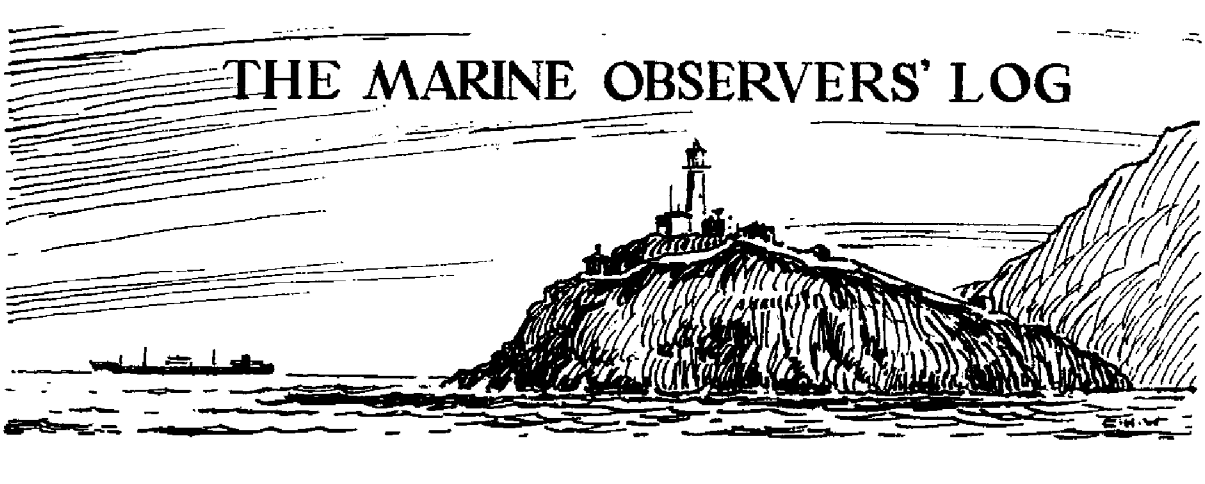
5. Publications

New editions of the *Marine Observer's Handbook* and the *Marine Observer's Guide* were published during the year. The preparation and printing of *The Marine Observer* continued as usual.

6. Awards to Voluntary Observing Ships

Annual awards of books were made to the masters, principal observing officers and senior radio officers of the 100 ships who sent in the most carefully kept meteorological logbooks during the year. Similar awards were made to the masters and officers of four vessels in the short sea trades for their contribution in making sea-temperature observations and to five trawler skippers and five radio operators who had the best records in making and sending non-instrumental observations from the Arctic. Barographs were presented to the four shipmasters whose long records and consistently good service were considered as deserving special recognition.

The books selected for awards were *Cassell's English Dictionary*, *The North Sea* by George Morey and *The University Atlas.*



April, May, June

The Marine Observers' Log is a quarterly selection of observations of interest and value. The observations are derived from the logbooks of marine observers and from individual manuscripts. Responsibility for each observation rests with the contributor.

Observing officers are reminded that preserved samples of discoloured water, luminescent water, etc. considerably enhance the value of such an observation. Port Meteorological Officers in the U.K. will supply bottles, preservative and instructions on request.

SQUALL

North Atlantic Ocean

s.s. *City of Bedford.* Captain T. Mallory. Cape Town to Dakar. Observers, Mr. B. K. Keith, Chief Officer and Mr. G. E. Shearer, 2nd Officer.

18th June 1969. At 1710 GMT, as the vessel was clear of traffic, it was decided to investigate an oil slick or discoloured water at 2 to 3 miles' distance on the starboard side and course was duly altered to 340°. An extremely dense nimbus cloud was observed lying roughly N–S about 5 miles east of the vessel. It was estimated that the vessel would pass clear to the northward of this squall but it surprised us by the speed of its approach which was conservatively estimated at 40 kt. The wind, which had been SW'ly, force 3 at 1600, veered to N'ly and then dropped to calm about 1700. As the squall approached no phenomena were observed as described on page 49 of *Africa Pilot*, Vol. 1. However, several small whirlwinds were seen along the edge, the most marked of which were three just forward of the vessel and one which passed right across the stern. These, although whirling, were not really funnel clouds as such, being about 50–70 ft high, causing a lot of whirling spray and rain across 20 ft or so. Although disturbances involved the sea surface there was little or no sucking up of water and no involvement with the cloud base which was about 100 ft. At 1715 the squall struck the ship and the wind, which was ENE, force 7, rapidly increased to force 12, with very heavy rain causing visibility to be reduced to less than $\frac{1}{4}$ mile and the vessel to heel over. The radar showed the squall line to run 020°/200° before it was blanketed by rain. The sea was practically flattened by the wind and was white with breaking water. The swell from S'E was only about 3 ft high but had a well-defined period of about 6 sec. At 1730 the wind and rain moderated and 20 min later it was NE, force 5. At 1800 moderately dense rain clouds were seen to be lying in regular bands about 7 miles apart in a direction 077°/257°. At 1935 there was continuous lightning and occasional thunder which lasted about an hour before the weather started to improve. One thing of note about the squall was the remarkably straight and long edge. Needless to say, the original reason for the diversion was forgotten after the sudden onslaught of the squall. At 1800: Air temp. 73·4°F, wet bulb 72·7°, sea 82·1°. Wind NE, force 5.

Position of ship: 7° 48′N, 15° 24′W.

Note. In general the description of line-squalls in this region given in the *Africa Pilot,* Vol. I does not differ markedly from this account except that the speed of approach and, probably as a result, the highest gusts were exceptionally great.

THUNDERSTORMS

Caribbean Sea

m.v. *British Freedom.* Captain C. Herbert. Dublin to Amuay Bay, Venezuela. Observer, Mr. K. J. Butler, 2nd Officer.

20th May 1969. At 0200 GMT a heavy thunderstorm started, giving torrential rain and reducing visibility to almost zero. During the downpour both forked and sheet lightning was observed from the ship and estimated to be at a horizontal distance of between 5 and 10 miles. Although these flashes appeared close to the ship and at very frequent intervals the loud thunder usually associated with lightning was not audible. Approximately one in ten of the flashes was accompanied by a short rumble lasting about 3 sec. Bearing in mind the principles of thunder being caused by the rapid expansion of the air in the immediate vicinity of the lightning, the phenomena of so much lightning without thunder remains unexplained to the observer. At the end of the storm, lightning from all directions continued to light up the area and at times was so frequent that the periods of light exceeded the periods of darkness. At 0600: Air temp. 74·3°F, wet bulb 73·8°, sea 80·1°. Wind NE'E, force 3.

Position of ship at 0600: 19° 48′N, 62° 06′W.

Note. Since the lightning was estimated at 5 miles or more from the observer much of the sound of the thunder would have been swamped by the sound of the ship's engines and of the passage of the ship through the water.

North Atlantic Ocean

m.v. *Tamworth.* Captain K. B. Jewell. Liverpool to Baltimore. Observers, Mr. A. G. K. Hamilton, 3rd Officer and Mr. P. J. Griffin, Radio Officer.

21st June 1969. At 1105 GMT, after lightning had been observed all night, a thunderstorm was encountered. Flash counts were made and varied from 3 to 19 sec intervals. Thunder was heard at intervals of possibly 2 or more min. At first the storm showed on the radar as an E–W line-squall but later extended to N–S lines also. One fibreglass aerial (main receiver, whip type) was struck by lightning and split apart down the centre. Another flash seemed to travel parallel to the accommodation down an outboard alleyway and yet another is suspected of causing a scorch mark on the paint on the boat deck. At the start the wind was W'S, then backed to S'E and later veered to W'ly, mainly force 4–5. At 1155 the barograph, which had been fairly steady, showed a sudden increase of 0·5 mb. Between 1200 and 1330 the vessel was subjected to violent rain-squalls from a W'ly direction but these decreased in intensity as the day progressed, finally ceasing by late evening. At 1200: Air temp. 71·2°F, wet bulb 70·7°, sea 82·1°.

Position of ship: 37° 49'N, 66° 38'W.

SPRAY

South African waters

m.v. *Glenlyon.* Captain J. A. Dougall. Durban to London. Observers, Mr. I. M. Grant, 2nd Officer and Mr. G. H. Walker, Cadet Officer.

12th June 1969. Between 1500 and 1530 GMT the vessel was steaming on a course of 210° parallel to the coast at a distance of 6 miles. Along the entire length of the shoreline between Port Shepstone and North Sand Bluff a mist was observed, its appearance being like white smoke. The vertical extent of the mist was approx. 200 ft. Detail on shore, beyond the mist, was fairly clear. We assumed the mist was caused by spray from the swell breaking on the shore. Air temp. 66·7°F, sea 70·6°. Wind SW'S, force 5.

Position of ship: 31° 00'S, 30° 42'E.

Note. The explanation given is almost certainly the correct one. A fresh off-shore wind would generate a great deal of spray from the oceanic swell breaking on the coast, the effect being made more apparent since the spray would be between the observer and the setting sun.

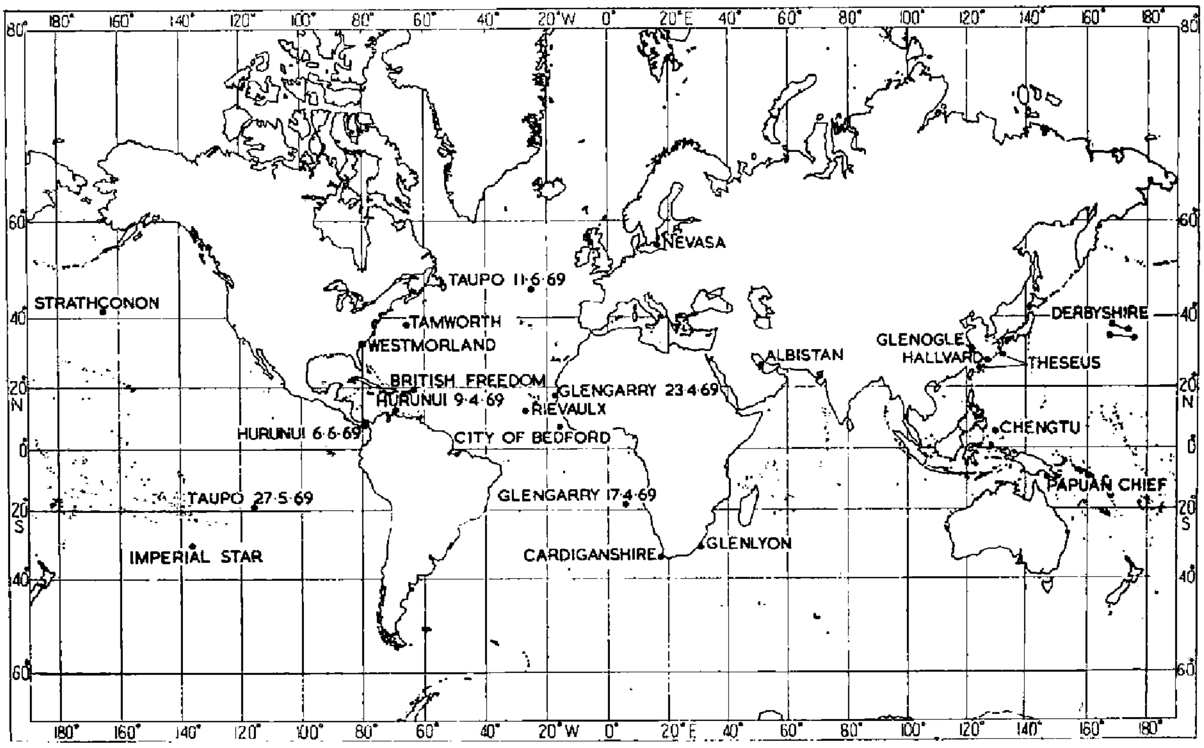
BIRDS

Caribbean Sea

m.v. *Hurunui.* Captain S. G. Robinson, M.B.E. Curaçao to Nelson, N.Z. Observers, all officers and many crew members.

9th April 1969. At 2100 GMT a pelican landed on the port ship's side rail at No. 3 hatch. It was about 2½–3 ft in length and a member of the same species frequently seen in the waters around Panama. The pelican remained perched on the rail in a rather precarious fashion for about 5 min, using its wings to balance. When disturbed by a crew member trying to get close-up photographs the bird flew around the ship several times and then alighted on one of No. 5 hatch derricks (which were down at the time). This happened several more times and on each occasion the pelican chose somewhere difficult to land. Having been with the vessel for about 25 min it was finally driven off by a flock of about 20 gulls which were accompanying the vessel.

Position of ship: 12° 17'N, 69° 41'W.



Position of ships whose reports appear in "*The Marine Observers' Log*".

Persian Gulf

s.s. *Albistan*. Captain M. Robinson. Bahrain to Doha, Persian Gulf. Observers, the Master and Mr. A. P. Sweeny, 2nd Officer.

9th April 1969. During the morning we observed on the starboard bow at a distance of 2 miles what appeared to be a thick, black oil patch on the sea. This turned out to be a very large flock of birds (cormorant type) on and hovering just above the surface. The extent of the flock, which gave an excellent echo on the radar, was about 1 mile.

Position of ship: 26° 17'N, 50° 47'E.

South Pacific Ocean

s.s. *Imperial Star*. Captain G. Stubbings. Lyttleton to Panama. Observer, Mr. A. Whittard, 3rd Officer.

7th June 1969. Near midnight (local time) a bos'n-bird [tropic-bird] landed on the deck, apparently not distressed but attracted by the lights on the after-deck. At 0430 I had a close look at the bird. It had a thick, red-orange beak $1\frac{1}{2}$ inches long, snow-white plumage except for black marking near the eyes and the distinguishing centre tail-piece was long, thin and red. The nearest islands were Pitcairn, Henderson and Ducie some 300 miles to the north. No one could recall seeing this type of bird very far from land. I launched the bird a little later when it flew up into the air with a few surprised squeaks, seemingly quite happy.

Position of ship at midnight: 30° 24'S, 128° 30'W.

North Atlantic Ocean

m.v. *Rievaulx*. Captain G. Murray. Middlesbrough to Vitória, Brazil. Observers, all officers.

23rd June 1969. At 1200 GMT the ship was joined by a medium-sized hawk. The bird established itself on the mainmast yard-arm and used the navigation light table to devour its prey. It killed about 10 storm-petrels per day with evident ease. They did not appear to take any avoiding action as the hawk almost casually approached them. One kill was actually seen and the hawk splashed into the sea but had no difficulty in getting airborne again. (It remained with the ship until 0930 on the 25th.) Air temp. 77·9°F. Wind NE'N, force 3.

Position of ship: 13° 12'N, 26° 30'W.

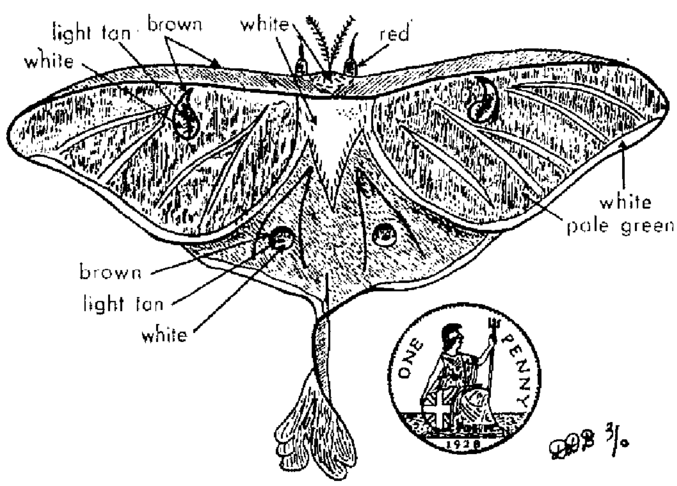
MOTH

Charleston Harbour

m.v. *Westmorland.* Captain J. A. North. At anchor. Observers, the Master and Mr. D. De Barr, 3rd Officer.

11th April 1969. When at anchor in Charleston Harbour, South Carolina at 2030 LMT a pale-green moth was found on the lee bridge wing. It was brought into the wheelhouse where it settled with its wings outstretched in the position shown in the sketch [reproduced half-scale]. When disturbed, the moth usually jumped a few inches and settled in the same position but, on occasions, it took off and flew in slow, jerky movements. It was assumed that the moth had been carried by the force 5 ENE wind from the marsh area of Sullivan's Island. We later identified the moth, from an encyclopedia, as a "Moon Moth, a well-known Indian species".

Position of ship: 32° 40'N, 80° 00'W.



Note. Dr. D. R. Ragge, Deputy Keeper of Entomology at the Natural History Museum, was interested to see this report and sketch. He agrees that this is a moon moth—the North American one, *Actias luna.*

MARINE LIFE

North Pacific Ocean

m.v. *Strathconon.* Captain E. Snowden. Nagoya to Balboa. Observers, Mr. D. H. Willis, 3rd Officer, Mr. A. C. Ruscoe, Radio Officer, and other officers.

13th April 1969. During the morning a large number of small oval objects were seen to be floating on the surface of the water. At first sight they had the appearance of leaves and were clearly seen as black specks standing out against the whiteness of the ship's wash. Inquiries showed that these objects had first been sighted around noon the previous day and they continued to be seen until the following day although in reduced numbers. The trail must have been several hundreds of miles long.

With the aid of an improvised net two specimens were caught but, due to the speed of the ship (22 kt), they were rather badly damaged in the net. However, during the night, several dozen were blown on board with the light spray being shipped at the time.

The basic construction of these organisms was a horizontal elliptical plane surmounted by a semi-elliptical vertical sail of the same rigid, transparent, cartilage-like material which was about 4 cm long. At the intersection of the planes there was

a slightly corrugated core, presumably some sort of buoyancy chamber. Suspended below the main body was a bright ring of turquoise-blue grassy tentacles and a deep aquamarine translucent jelly. Air temp. 52·7°F, sea temp. 51·8°. Wind SW's, force 6.
Position of ship: 41° 11'N, 166° 06'W.

Note 1. Mrs. Mary Rowe of the Coelenterate Section, Department of Zoology, Natural History Museum comments:

"The specimens collected were species of the genus *Velella.* This is a medusa, related to the Portuguese man-of-war, but much smaller and without the gas-filled float."

Note 2. A drawing of *Velella,* the 'by-the-wind sailor', is given in Fig. 2 of the article on p. 65.

North Pacific Ocean

m.v. *Derbyshire.* Captain R. Weir. Vancouver to Muroran, Japan and Kushiro, Japan to Balboa. Observers, Mr. J. F. Egan, Chief Officer, Mr. M. J. Hunter, 2nd Officer and Mr. P. Howland, 3rd Officer.

15th and 17th April 1969. On the 15th, between 1700 and 2000 GMT, long streaks of what were first thought to be seeds were observed lying along the direction of the wind, then SW'ly. The same was observed at 0300 on the 17th; this time a sample was obtained. The 'catch' turned out to be a far cry from any seeds. They were small, anemone-like plants/animals, the largest being about 3–4 inches across, made up of numerous fleshy stems, pale yellow in colour. At the end of each stem was a brittle blue-grey shell, enclosing approx. eight pairs of tentacles. No mouth or similar orifice was seen. There was a moderate sea running. Sea temp. 64·4°–68°F.

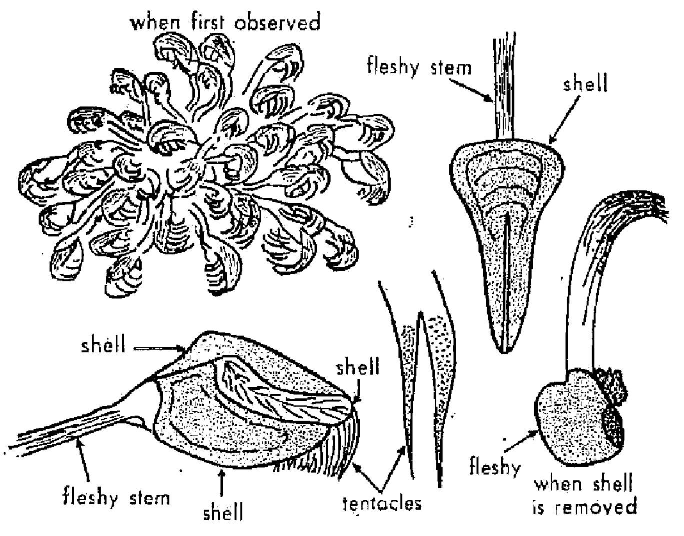
Position of ship at 1800 on 15th: 33° 36'N, 176° 30'E.

Position of ship at 0001 on 17th: 33° 48'N, 167° 36'E.

4th and 5th June 1969. After completing discharge and loading again we sailed for Panama and at 0800 on the 4th the creatures were sighted again. This time long streaks of rusty-coloured plankton were seen accompanying the creatures. They were seen again at 2330 on the 5th. Slight sea. Sea temp. 60·8°–64·4°F.

Position of ship at 0800 on 4th: 38° 00'N, 168° 00'E.

Position of ship at 2330 on 5th: 36° 12'N, 174° 06'E.



Note 1. Dr. K. G. McKenzie of the Entomostraca Section, Department of Zoology, Natural History Museum, comments:

"These animals are certainly barnacles of the genus *Lepas* and possibly belong to the species *Lepas anatifera* Linnaeus 1758. The specific name *anatifera* means 'goose-bearer' and refers to an old legend first written down in a History of Ireland during the twelfth century. According to the medieval scholar: "There are in this place many birds which are called Bernacae: Nature produces them against Nature in the most extraordinary way. They are like marsh geese, but somewhat smaller. They are produced from fir timber tossed along the sea, and are at first like gum. Afterwards they hang down by their beaks as if they were a seaweed attached to the timber, and are surrounded by shells in order to grow more freely. Having thus in process of time being clothed with a strong coat of feathers, they either fall into the water or fly freely away into the air. They derive their food and growth from the sap of the wood or from the sea, by a secret and most wonderful process of alimentation. I have frequently seen, with my own eyes, more than a thousand of these small bodies of birds, hanging down on the sea-shore from one piece of timber, enclosed in their shells, and already formed." The legend connecting birds with small crustaceans gained credence possibly because barnacle geese are only winter visitors to the British Isles and breed in Spitsbergen and Greenland. The story was old long before it was written down and, once in print, it persisted in tome and treatise for over 600 years, descending at last to a Sunday paper (!) in which it was reported, on 24th May 1807, concerning a "Barnacle Tree, or tree-bearing geese, found at sea by Captain Bytheway and now on show at Spring Gardens" (Heron-Allen, 1928).

"This bit of blarney has a peculiar piquancy for sailors because *Lepas* is commonly called the Ship's Barnacle and is a notorious fouling organism which helps to run up a bill for the U.S. Navy alone totalling $280,000,000 annually (*Sea Frontiers*, 1968). Anything which causes so much damage is worthy of careful study although, to give them due credit, scientists had been interested in the barnacle well before its economic significance was fully realized. Chief among their number was that great naturalist Charles Darwin who classified over 300 species (or different kinds) of Cirripedes—the scientific name for barnacles, which refers to the feathered limbs with which these animals sweep the water in search of food.

"We know that many barnacles begin life as young larvae called nauplii which are swept out from the parental shell by the cirri at a rate of about 250 per minute. Barnacle nauplii are very similar to the nauplii of shrimps and crabs, wood lice and water fleas all of which are crustaceans too. Two other stages of development follow—the latter of these called the Cypris stage. It is during the Cypris stage that the young barnacle (now a tiny bivalve) starts looking about for somewhere to settle. For barnacles settling down is scarcely a problem. They do it literally standing on their heads! The little Cypris larva presses its head to the chosen spot and immediately begins to pour out a limy cement from glands in its frontal limbs. Soon it casts off the bivalve shell, dons the familiar limy plates of the adult form and its cirri take up their ceaseless search for sustenance from the sea. The stalked barnacle grows its stalk—about one to four inches in length—shortly after its first attachment to the settlement site and, suspended from this stalk, sways comfortably to and fro in the water for the rest of its life. Beach flotsam often includes a washed-up ship's timber which is heavily infested with *Lepas anatifera*, seafarer extraordinary and an expensive item in the maintenance accounts of any shipyard."

Note 2. The *Derbyshire* is a Canadian Selected Ship.

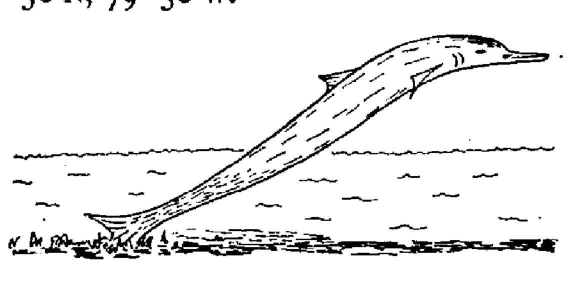
FISH

Gulf of Panama

m.v. *Hurunui*. Captain S. G. Robinson, M.B.E. Port Chalmers, N.Z. to Panama. Observers, Mr. W. A. F. Killackey and Mr. H. M. Close, Jnr. 3rd Officer.

6th June 1969. As the vessel was steaming towards Panama a silvery-coloured fish. about 2½ ft long and 3–4 inches in diameter was observed propelling itself across the surface of the calm sea. It appeared to be able, by means of a very rapid movement of its tail in the water, to hold the rest of its body above the water in the form of a shallow S. It only did this for a short distance, approx. 10 ft, before flopping back into the water, only to come up 2 ft or so further on. A flock of brown booby-birds was accompanying the vessel at the time and showed a considerable interest in the fish but did not attempt to attack it. Sea temp. 86°F.

Position of ship: 8° 30′N, 79° 30′W.



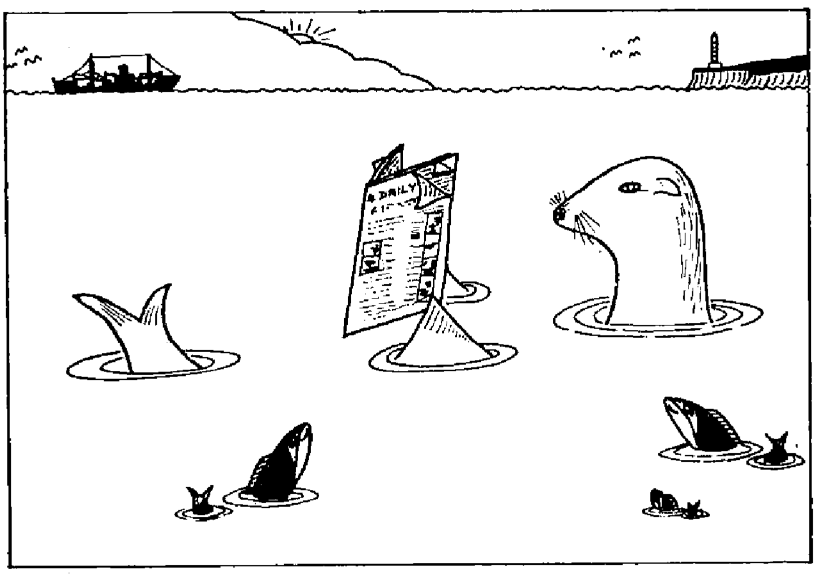
Note. Mr. G. Palmer of the Fish Section, Department of Zoology, Natural History Museum, comments: "This may have been a member of the garfish family, Belonidae."

SEALS

South African waters

m.v. *Cardiganshire*. Captain D. M. Belk. Durban to Las Palmas. Observers, the Master and all officers.

7th June 1969. An exceptional number of seals were observed throughout the day during the passage from Cape Agulhas to off Cape Town. They were a greyish-brown in colour and appeared both singly and in groups of up to 5 or 6. Several times they were not noticed until birds, believed to be gannets and skuas, were seen on the water apparently waiting for any remnants of fish from the seals. On other



occasions the seals just appeared to be basking in the sun, unconcerned that the ship was passing within a few yards of them except for an almost human glance over the shoulder. Air temp. 58°–63°F, sea 61°–64°. Wind variable, force 1–2. Low s'ly swell.

Position of ship at 1200: 34° 30′S, 18° 30′E.

SEA SNAKE

Coral Sea

m.v. *Papuan Chief*. Captain F. Cunningham. Port Moresby. Observers, Chief Engineer and 3rd Officer.

2nd April 1969. At 1600 LMT, whilst swimming with face masks at the edge of the reef near Ela Beach, Port Moresby, the Chief Engineer and 3rd Officer saw a black and white banded sea snake appearing from under a growth of coral. The size of the snake, comparing it with the Chief Engineer, was about 6 ft long and $1\frac{1}{2}$–2 inches in diameter—only a quick look before swimming for shore as quickly as possible!

Note 1. Miss A. G. C. Grandison, Curator of Herpetology, Natural History Museum, comments:

"If the size and girth can be relied upon, the snake is likely to have been one of three different genera: *Laticauda, Hydrophis* or *Acalyptophis*. To the best of my knowledge these are the only sea snakes that attain a total length of about 5 ft, have a conspicuous banded pattern and occur in the New Guinea waters. Unfortunately it is impossible to be more precise and the size and pattern do not give us sufficient information to identify the snake to species. The taxonomy of sea snakes being based on the size of the belly shields, position of nostrils, number and position of the teeth and the arrangement of head scales, it is not altogether surprising that an observation made by a swimmer does not give us sufficient details to make specific identifications."

Note 2. The *Papuan Chief* was an Australian Selected Ship at the time.

WHALES

North Atlantic Ocean

m.v. *Taupo*. Captain F. C. Taylor. Cristobal to London. Observers, Mr. D. Venning, Jnr. 3rd Officer and Mr. R. Robertson, A.B.

11th June 1969. At 0600 GMT a group of approx. 20 whales was observed travelling W's, surfacing at frequent intervals. The mammals varied in size from 10 to 20 ft and were black with a small, curved dorsal fin. They surfaced and dived in such a way that they gave the appearance of being a long sea-serpent. They passed within 250 yd of the ship and 5 min later two more groups were sighted. One group, of approximately 10, was stationary. The whales had formed a circle on the surface with their heads pointing to the middle and it appeared that the heads were actually touching. As the vessel approached them the whales dispersed and headed W's. Also seen was one larger (25 ft) whale travelling behind and in the same direction. Weather calm. Sea temp. 41·7°F.

Position of ship: 45° 18′N, 25° 14′W.

LUMINESCENCE

South Pacific Ocean

m.v. *Taupo*. Captain F. C. Taylor. Timaru, N.Z. to Balboa. Observers, Mr. B. O'Dea, 3rd Officer and Mr. A. Simpson, Seaman.

27th May 1969. At 0710 GMT parallel bands of milky sea were observed at intervals of 100–150 yd running 350°–170° for some considerable distance. Unfortunately there was only a half moon high in the heavens so it was impossible to determine the full extent of the bands which were some 10–15 yd in width. An Aldis lamp was flashed on the surface and the sea took on a more vivid milky-green hue which highlighted the many darting red 'fire-flies'. The colouration became deeper and more vivid close to the wake where expansive upwellings were seen. The radar was switched on. No effect was observed but, on flashing the Aldis again, the green light was seen to be distinctly brighter as were the red flashes. On short-range scan (7½ cables and 1½ miles), the phenomenon was echoed as bright spot targets (like those recording the presence of other vessels on greater ranges). The targets were few and lasted 3 sec (one scan). At 0600: Air temp. 77°F, sea 77°. Wind variable, force 1.

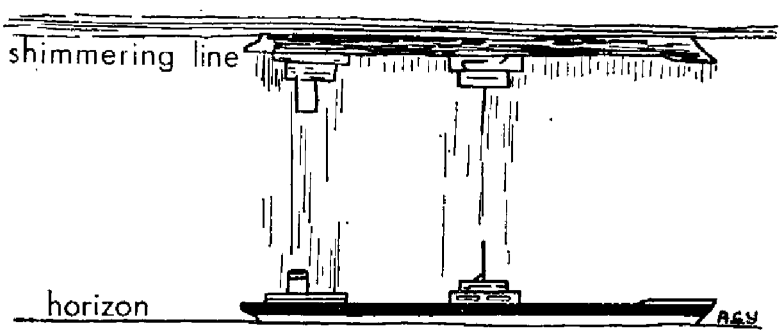
Position of ship: 19° 45′S, 117° 44′W.

ABNORMAL REFRACTION

Baltic Sea

s.s. *Nevasa*. Captain F. A. J. Downer, D.S.C., R.D. Cruising in the Baltic. Observers, 1st Officer, Mr. A. G. Yates, 3rd Officer, Cadet and Q.M.

8th June 1969. Between 1550 and 1745 GMT abnormal refraction was observed. A complete shimmering line appeared all round and slightly above the horizon, the maximum vertical sextant angle between this line and the horizon was 36′ at times.



Inverted images of Christiansø Island, Bornholm Island and numerous ships in the area were clearly visible. These inverted images of ships in many cases were seen long before the ships themselves appeared on the horizon. At 1630 a very good example of a British tanker was observed (at a distance of 11·7 miles) with colours of hull, boat topping and superstructure clearly distinguishable in the images. Air temp. 55°F, wet bulb 50·4°, sea 50·4°. Wind SW'W, force 5.

Position of ship: 55° 45'N, 15° 35'E.

Note. The synoptic chart for 1200 GMT on 8th June showed an anticyclone over the area, thus accounting for the low-level inversion shown in the sketch as a shimmering line.

SCINTILLATION

Western Pacific Ocean

m.v. *Chengtu.* Captain R. F. D. Pook. Hong Kong to Rabaul. Observers, the Master, Mr. D. M. Simpson, Chief Officer, Mr. A. W. Curtis, 2nd Officer and Mr. P. R. Eamer, 3rd Officer.

9th April 1969. At 1100 GMT the star Arcturus was seen to be flashing red, green, yellow and normal star colour, plainly visible with the naked eye. At this time the star was bearing 072° at an altitude of approx. 7°. This effect continued and at an altitude of approx. 13° all the colours of the spectrum were visible, including the violet and blue shades which were not visible at an altitude of 12°; as many as four colours were visible at one time, providing a most interesting spectacle. At approx. 1115 all other stars between altitudes of 0° and 43½° were scintillating colours to some extent, the highest being Sirius which was only showing various blue shades. Other stars between approx. 13° and 35° were showing all the colours of the spectrum but stars below 13°, e.g. Polaris, were only showing red, green and yellow. The phenomenon was continued until 1315 by all 1st and 2nd magnitude stars, despite thin As invading the sky. At 1130: Air temp. 81°F, wet bulb 77·3°. Wind NE'E, force 3. Cloud 3/8 Sc. Excellent visibility.

Position of ship: 05° 17'N, 129° 52'E.

Note 1. The *Marine Observer's Handbook* gives a good description of scintillation, a phenomenon due to the refraction of light rays through shallow atmospheric layers of differing density. The fact that the colour blue was not observed from any scintillating star below an elevation of 13° is due to scattering of light rays at the shorter (blue/violet) end of the spectrum, an effect which increases with lowering elevations since the light rays then travel through more atmosphere. It has been suggested that the best displays of scintillation would be seen in temperate regions but the brilliant display observed from the *Chengtu* was over the equatorial Pacific Ocean.

Note 2. The *Chengtu* is a Hong Kong Selected Ship.

UNUSUAL RADIO RECEPTION

South Atlantic Ocean

m.v. *Glengarry.* Captain R. J. Paterson. Cape Town to Las Palmas. Observers, Mr. R. G. J. Wiltshire, Extra 2nd Officer and Mr. M. J. Phillips, 3rd Officer.

17th April 1969. At 0600 GMT we carried out a radio conversation with British ship *Lord Strathcona.* From a comparison of our star positions we were 132 miles apart. Apart from slight hissing the reception was good but, as the sun rose, it became intermittent and distorted with a lot of background crackling. Contact was soon lost. (Cossor Set 124 ME 28, Series B.)

Position of ship: 18° 13'S, 5° 13'E.

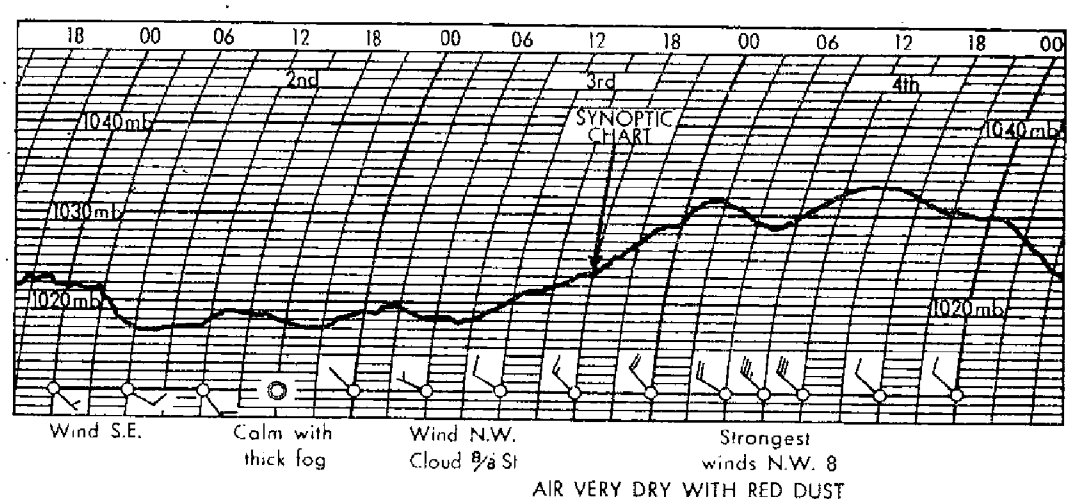
23rd April 1969. At 2100, when 140 miles north of Dakar, a further radiotelephone conversation was carried out with the *Lord Strathcona* when the vessels were 155 miles apart. Reception was excellent and quite as clear as if at close quarters.

DUST

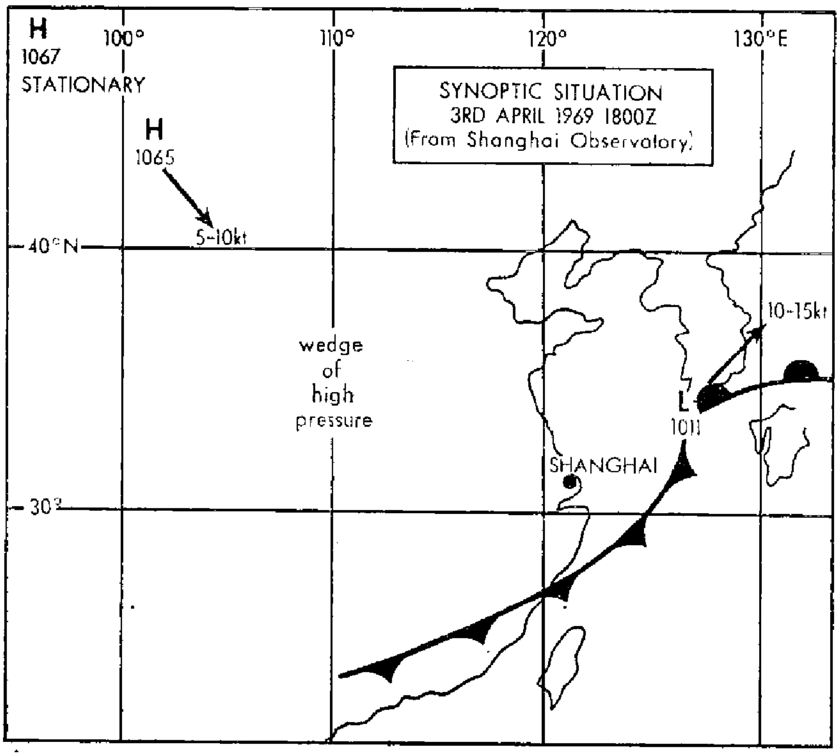
off Wu-sung

m.v. *Glenogle*. Captain R. C. Riseley. At anchor. Observers, the Master and Mr. J. A. Matthews, 2nd Officer.

2nd–4th April 1969. While at anchor off Wu-sung, some bad weather was experienced in connection with very high pressure over North China. As will be seen



from the barograph, the pressure fell at first with a SE'ly wind followed by calm with thick fog and rain. Pressure then started to rise steadily but the sky was completely covered by stratus. There was a freshening NW'ly wind. After the first high-pressure peak was passed the wind kept increasing and reached its maximum of force 8 at 0900 GMT on the 4th. When pressure started to rise again the wind decreased.



During this sequence the air was very dry with a thick haze and red dust settled on the ship. As the wind was NW'ly we surmised that the dust came from the interior of China. On reaching Tokyo a week later this was confirmed by newspaper reports of the dust falling on Tokyo. At 0830 on 4th: Air temp. 45·0°F, wet bulb 39·3°, dew-point 30°.

Position of ship: 31° 24'N, 121° 31'E.

East China Sea

m.v. *Hallvard*. Captain H. M. Yndestad. Moji, Japan to Bangkok.

5th–7th April 1969. Shortly after departing from Moji pilot station on the evening of the 5th the vessel ran into strong W'ly winds which prevailed for the next 24 hours, increasing to force 7 and varying in direction from SW to WNW. The wind gradually eased after 1300 GMT (2200 LMT) on the 6th. On the morning of the 7th the ship was found to be completely covered from mast tops to water-line by a film of brownish-grey dust or sand. The weather during this period was hazy with a visibility of less than 5 miles.

Position of ship at 2130 on 6th (0530 LMT on 7th): 28° 45′N, 127° 18′E.

Note. The *Hallvard* is a Hong Kong Selected Ship.

s.s. *Theseus*. Captain I. Webster. Hong Kong to Yokohama.

10th–11th April 1969. Between positions 26° 18′N, 123° 06′E and 29° 54′N, 130° 48′E a light layer of dust was deposited on the vessel. Winds during the period veered from ENE to SSW and back to SE's force 3–4. Visibility was restricted by slight haze. At 0001 GMT on 11th: Air temp. 73·8°F, wet bulb 70°, sea 73·5°.

Note. Although there was a volcano erupting in the Philippine Islands about this time its deposit was described as whitish-grey and of course it was well south of the positions reported by the *Glenogle*, the *Hallvard* and the *Theseus*. The likeliest origin of the dust deposits on all these ships seems to be wind-blown soil from China, as indicated by the observers on the *Glenogle*.

AURORA

The following notes have been received from Mrs. Mary Hallissey of the Aurora Survey:

"Listed briefly below are reports from British ships of positive aurora for the months April–June 1969. These have been extracted from logbooks at the Meteorological Office Marine Branch and forwarded to the Balfour Stewart Auroral Laboratory of the University of Edinburgh.

"Geomagnetic activity during April kept at a steady level, 4 and over (in a scale of 0–10) being recorded on 19 days, and no prolonged periods of minimum values. But on only a few nights in the middle of the month was overhead aurora seen south of the auroral zone (i.e. Φ67°).

"Sunspot and solar-flare activity during May and June was relatively high—provisional estimates showing it to be as high as at any time since 1960, though comparing oddly with the far higher figures of the last solar maximum. There is no reflection of this solar activity in the planetary geomagnetic index figures, the most active period, geomagnetically, being, seemingly unrelated, in mid-May. Between 14th and 16th the 3-hourly figures varied between 6 and 8. At this time of the year, however, a combination of circumstances—long daylight hours, cloud, moonlight—can make visual observing of aurora almost fortuitous. Reports from observers in two Selected Ships and in a Dutch ship and aircraft showed at least that aurora was behaving according to generally accepted ideas. On 14th/15th May observers in the *Maskeliya* gave a useful height measurement of the rayed arc. This helped to confirm estimates from land-based observers that for several hours before and after midnight aurora was overhead in northern Scotland, while observers in aircraft over the Atlantic reported coronal forms overhead after midnight GMT in similar geomagnetic latitudes.

"The noctilucent-cloud-observing season began at the end of May and cloud was reported on 14 nights in June from land bases, with one possible sighting from the Western Atlantic on 29th/30th June. Displays were sparse and less bright than in the previous year."

Date (1969)	Ship	Geographic Position	Λ	Φ	I	Time (GMT)	Forms
15th Apr.	*Illyric*	43°35′N 69°40′W	360	55	+73	0200–0210	RA
16th	*Iron Ore*	66°24′N 10°36′E	110	66	+76	0001–0230	HB, RB
18th	*Iron Crown*	69°48′N 16°45′E	110	67	+78	2130	RB
14th May	*Maskeliya*	St. George's Channel	080	56	+67	2200–0150	RA, RR
16th	*Bamburgh Castle*	47°30′N 42°10′W	030	57	+69	0030–0200	N

KEY: Λ = geomagnetic longitude; Φ = geomagnetic latitude; I = inclination; HB = homogeneous band; RA = rayed arc; RB = rayed band; R(R) = ray(s); N = unidentified auroral form.

The Portuguese Man-of-War

By Ailsa McGown Clark

(British Museum (Natural History))

The Portuguese man-of-war (Latin name *Physalia*) is an oceanic animal, related to the jellyfishes, living generally within 35°N or S of the equator, sometimes in very extensive shoals. For instance, in mid-summer 1969 a huge shoal was observed in the vicinity of Cape Verde, reported on 18th May and again on the 27th by the m.v. *Mabel Warwick*, on the 30th by the m.v. *Clan MacDougall*, on 5th June by the m.v. *Port Caroline*, on 16th June again by the *Mabel Warwick*, on 8th July by the s.s. *Mawana* and on the 9th by the m.v. *Port Townsville*. On 27th May the *Mabel Warwick* took an hour at 11 knots to traverse the main part of the shoal. The summer of 1969 with its long spells of good weather in British waters, presumably coupled with sustained south-westerlies, brought quite a few specimens of *Physalia* into the English Channel, which only happens about one year in five.

The name Portuguese man-of-war is thought to have originated from the extensive use of caravels with fore-and-aft lateen rig by the Portuguese in the fifteenth and sixteenth centuries. Unlike the true jellyfishes, *Physalia* is a colonial animal consisting of numerous individual polyps modified for catching and stinging the prey (fishes and plankton), or for engulfing and digesting it through their numerous mouths or for reproducing the species. These polyps are linked together under an inflatable pink- or purple-tinted semi-transparent flotation bladder, shaped something like a Cornish pasty, bulging on one side and flattened on the other, the join in the pastry having its equivalent in the extensible vertical crest running longitudinally and often rather puckered in appearance (Fig. 1). There is an internal gas-gland for re-inflating the bladder and crest. Most of this float projects above the surface of the water, unlike the bell of a jellyfish which is normally submerged. In fact the crest is not perfectly longitudinal but is angled to right or left relative to the submerged part of the animal so that it takes up an attitude about 45° offset from the wind direction. In the largest specimens the longest tentacles may be as much as 70 feet long when extended, corresponding to a float length of about 12 inches, though most specimens seen are much smaller than this with floats about six inches long. The great extent of the submerged part acts as a drogue and the general direction of drift is more than 90° to leeward of the angle of the crest, resulting in a course offset from the wind direction by about 35–40°. For instance, if the wind was due north a 'left-handed' animal would take up a position with the crest aligned from north-west to south-east, on starboard tack as it were, with the submerged part trailing from the bulging side approximately towards the north-north-east and the line of drift would be about south-south-west. Inevitably all these angles are subject to modification by variations in the direction of the current relative to the wind as well as differences in the rate of drift, larger specimens usually travelling faster and further off the wind than smaller ones. Each specimen seems to be permanently biased to right or left so that there is no question of tacking. The origin of the right- or left-handed condition is thought to date from an initial bias given when the young animal first starts to project above the surface as the float develops, followed by asymmetrical growth of the submerged parts. Most shoals seem to consist of specimens on the same tack since the wind inevitably tends to separate them out, left-handed ones travelling south-south-west in the northerly wind given in the example above, while right-handed ones would go south-south-east. Very few observations on Portuguese men-of-war from ships include any mention of which tack they are sailing on, so this has had to be estimated by examination of specimens netted or stranded on shore. The information obtained in this way indicates that there are more right-handed specimens in the

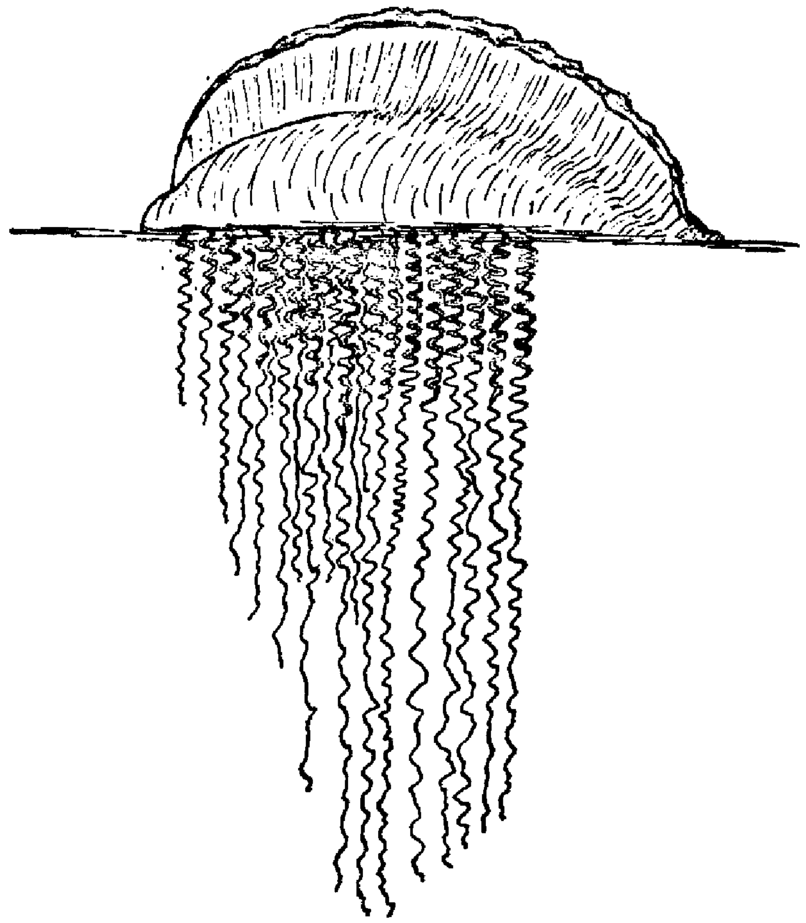


Fig. 1. The Portuguese man-of-war, *Physalia.*

northern hemisphere and more left-handed ones in the southern, although both forms have been observed in places like the Canary Islands and Sydney, New South Wales. The anticyclonic wind systems in the North Atlantic and North Pacific must drive right-handed men-of-war (on port tack) in directions centrifugal to the circulation, while the same result is achieved by the cyclonic wind systems acting on left-handed specimens south of the equator. This is clearly helpful in bringing about a dispersal of the species and would also tend to prevent the *Physalia* population of the North Atlantic from congregating in the Sargasso Sea, where the weed might foul up their tentacles. It has been suggested that natural selection operates to encourage segregation of right- and of left-handed specimens in the north and south hemispheres respectively, the corollary of which is that the direction of the asymmetry could be inherited. However, attractive though this theory might seem, it is not generally accepted. Wind fluctuations, especially in the doldrums, must bring about an appreciable amount of transequatorial migration and random dispersal of both forms while there is a much greater risk of mass mortality by stranding if all the specimens in each hemisphere were driven centrifugally. Also the bias to right or left can be attributed to environmental factors during growth. Even so, there is still considerable uncertainty about the life history of *Physalia* which can only be resolved by more information from sightings in the open sea. This is where watch-keeping officers of merchant ships could be of immense help if they know what is needed. Even though individual observations may not seem very important, they could be assembled into a mass of data of considerable significance. Ideally, observations should include not only position, wind direction and speed, as well as an estimate of the size and density of the shoal (factors which have usually been included up to now), but also the tack adopted by the men-of-war, whether any are on the opposite tack, the usual angle of their crests to the wind, the angle of drift and an estimate of the size range of the floats. This may be asking a lot of observers standing thirty feet or more above sea level, moving at ten to fifteen knots in half a gale but there must be times when some of these features could be detected. Yachtsmen are obviously much better situated to do this but the whole project is very much a cumulative one.

Apart from jellyfishes which differ in not projecting above the surface and in having pulsating bells, almost the only marine animal likely to be confused with the Portuguese man-of-war is its smaller relative the 'by-the-wind sailor', *Velella* (Fig. 2). It also has a float but this rarely exceeds three inches in length and the crest is like a thin semi-rigid fin; its colour is blue rather than purple. Oceanic observations on *Velella* are needed just as much as for *Physalia.*

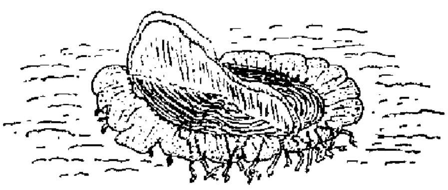


Fig. 2. The 'by-the-wind sailor', *Velella.*

The stinging properties of the Portuguese man-of-war are well known but may have been over-exaggerated owing to confusion with some of the more toxic kinds of jellyfish. No authentic cases of fatality in man have been recorded, though the tentacles can inflict extensive and very painful weals. Their countless minute stinging cells have been known to eject their threads with sufficient force to penetrate heavy-gauge surgical gloves. These threads are associated with poison sacs, the toxin from which, when tested on laboratory animals, produced somnolence, anaesthesia, paralysis—especially of the respiratory centres, digestive disturbances, anaphylactic shock and, in small animals, even death. The recommended treatment is by anti-histamines, either applied in the form of a cream to the part stung or taken by mouth.

Although it feeds mainly on fishes swimming near the surface of the sea, there are certain species of fishes which habitually live in close association with the Portuguese man-of-war, swimming around among the tentacles where attack by larger predatory fishes is unlikely. It used to be thought that these small fishes were immune to the toxin in the tentacles but, when caught in a net with *Physalia,* they can be fatally stung. In life they may be protected by a surface coating of mucus or perhaps they are just artful dodgers.

Being near the bottom of the evolutionary scale, *Physalia* has a very simple nervous system and its behaviour is correspondingly limited in scope. Apart from the feeding reactions of the tentacles and associated organs it is capable of little else but manœuvres of the air bladder and crest. In a calm the crest is usually allowed to collapse but, when stimulated by the wind getting up, it is quickly inflated and erected to adopt the sailing attitude. It is not unusual for the float to be capsized by sudden variations in the wind or by the bow wave or wake of a boat. The considerable drag of the tentacles on the windward side counteracts overmuch heeling to leeward so that capsizing tends to occur towards the wind. It is corrected almost immediately by muscular contractions on the leeward side of the float.

Although its capabilities are clearly limited, *Physalia* can be counted as a successful animal, judging from its wide distribution in the warmer seas of the world and the vast numbers that exist. Its adaptations to utilize the wind and the parallels it shows with sailing ships devised by man are of particular interest.

Editor's note. Many other ships, not named in Miss Clark's article, sent in reports of shoals of Portuguese men-of-war encountered in the Pacific and the Atlantic last summer. Full details (and sketches) were forwarded to the Natural History Museum.

An Automatic Buoy to replace Lightships

(Information supplied by Trinity House and Hawker Siddeley Dynamics Ltd.)

Europe's first fully-automatic unmanned replacement for a lightship—a 40-foot diameter, 84-ton navigational buoy—was handed over to Trinity House by Hawker Siddeley Dynamics Ltd. at a launching ceremony at London's Royal Albert Dock on 3rd December 1969. This prototype, known as LANBY (Large Automatic Navigation Buoy) is the first to be manufactured or used outside the waters of the United States (*see* photographs following page 68).

In 1965 there was a requirement for a very large buoy for oceanographic purposes in the United States to carry out various experiments and the first one was commissioned in the same year (the MONSTER buoy, described by Mottern *et al.*[1]). Later on the U.S. Coast Guard (the Lighthouse Service for the U.S.A.) realized that a buoy of this type might well be valuable for aids to navigation purposes, particularly as that Service was replacing many of their light-vessels by structures in the sea.

Trinity House, which has more light-vessels than in any other country in the world, is of course very interested in cutting down expenditure in this field and a number of solutions have been examined in detail. In November 1966 Hawker Siddeley Dynamics offered to carry out a design study to Trinity House requirements and an outline specification was drawn up between them. Tank tests showed that the discus shape used in the United States was the most suitable for the sea conditions around our coasts and the design study proved sufficiently attractive to place an order for the construction of the prototype.

The first LANBY will be taken to the main Lighthouse Depot at Harwich for operational tests and then possibly to a non-navigational site in the North Sea for further tests under full operational conditions. On satisfactory completion of trials, which is anticipated to be late spring or early summer, LANBY will be towed to its permanent site off Portland Bill Lighthouse to replace the Shambles light-vessel (*see* photograph following page 68).

Construction

The buoy, which can be moored in depths from 30 to 300 feet, is a prefabricated structure made from integrally-welded mild steel and has been designed to withstand severe weather conditions: winds up to 100 m.p.h., waves up to 40 feet high and tidal currents up to 7 knots. It has a maximum diameter of 40 feet (excluding fender) and a total depth of 8 feet. The conical superstructure in the centre of the deck is 12 feet high with a diameter of 15 feet at the base and 4 feet at the top where it forms the base for the mast.

The structure consists of three basic parts: the discus hull, deck-cone and mast. The hull contains most of the systems and services for the buoy and is subdivided into a central circular 'core' compartment surrounded by eight segmental sections. The core contains the three diesel generating sets and the majority of the buoy's piping and electrical cabling. Below the core there is a double-bottom space for water ballast and for the diesel engine cooling-water coils.

Navigational aids

MAIN LIGHT. This is controlled by a daylight sensing switch situated at the mast head with its focal plane 40 feet above sea level. It has an effective intensity of 33,200 candelas through the unusually large vertical arc of 27°, to allow for the rolling motion of the buoy. The beacon consists of an array of sealed beam lamps revolving at 2 rev/min inside a protective lantern house. Six panels of lamps are arranged to form an upright hexagonal cylinder. Each panel contains five pairs of lamps which are angled to produce the required vertical beam characteristics. A double flash every 30 seconds (the light character of Shambles light-vessel) is produced by continuously illuminating two adjacent panels, the remaining panels being stand-by units.

MAIN FOG SIGNAL. This consists of four omni-directional emitters which radiate a signal with an intensity of 127 decibels at 25 feet, giving a range of 3·7 miles. Two pairs of power units are housed in the electronics compartment of the buoy. Each pair has its own coding and trigger circuits and is capable of driving the four emitters. Failure of a monitor signal from the two power units in use will automatically switch the emitters to the second pair. The fog signal is switched on by remote control via the telemetry link. Failure to receive the regular interrogate signal from the shore station will also start the fog signal after a specific period. Shore control monitors the fog signal's operation by a microphone on the mast which feeds an audio amplifier-detector. The time constant of the amplifier output is sufficiently long for the level to remain on for longer than the blank period of a normal fog signal character.

RADAR RESPONDER BEACON. Provision has been made for fitting a radar responder beacon (Racon) at the top of the mast. This will operate in the 9,300–9,500 Mc/s marine radar band. It will receive all signals in the band and trigger the Racon transmitter which radiates a long pulse for every short one received. Both transmitter and receiver operate on the same frequency across the band about once every two minutes. The equipment is completely solid-state including the micro-wave local oscillator and transmitter output. The latter has an output of 150 mW and has a range of 5 to 10 miles depending on the sea state. The aerial has been specially developed for use on the buoy. It is omni-directional in the horizontal plane and has a $\pm$ 27° pattern in the vertical plane permitting operation consistent with buoy movement. With its enclosure it is a separate entity using short wave-guide interconnections.

RADIO BEACON. A radio beacon with an adjustable range from 5 to 70 miles can also be fitted in the buoy. The carrier frequency is controlled to within $\pm$ 0·01 per cent. Maximum radiated power is about 50 W and can be modulated by a tone (frequency tolerance $\pm$ 2·5 per cent) to a depth of about 85 per cent. A time switch regulates the periods at which the beacon radiates a pre-set group of letters. The switch has an accuracy of $\pm$ 2 seconds per 24 hours and is capable of being reset through the telemetry link.

Telemetry

A UHF radio control link carries 2-way data traffic on an f.s.k. system between the buoy and its shore station. A handset for speech facilities is also included. The radio equipment is duplicated to increase reliability. A manual changeover unit is used to bring on the stand-by radio at the shore station, while the stand-by at the buoy has an automatic changeover with remote override.

Emergency aids

An emergency light and an emergency fog signal operate from separate banks of 12-volt dry cells and are independent of all other loads. The light gives a stationary intensity of 200 candelas with an optical range of 7·75 miles. The emitted sound level of the fog signal is 104·5 decibels at 25 feet. Failure of either of the main navigational aids will operate the respective emergency aid; failure of the battery supply will switch on both emergency aids.

Maintenance

The buoy will be visited at six-monthly intervals for simple maintenance checks, refuelling and boosting the batteries. During maintenance periods, two exhaust fans ventilate the engine room and the workshop, battery and electronic compartments.

Shore station

The shore control station can monitor and control up to five buoys depending upon line-of-sight range. The buoys are completely automatic except for the operation of the fog signal. The telemetry system monitors each of the buoy's functions to check its operation and allows remote manual intervention should any automatic facility fail to operate.

Comparative costs

The first LANBY will cost about £160,000, including moorings, although possibly this figure may be reduced in the event of series production. This shows a very real saving when compared with light-vessel costs as a modern vessel of this type costs at least £250,000 to build, has a life of 40 years and requires a crew of 11 men. Apart from providing reliefs for the men and the supply of stores, the fact that you have a crew presents other problems regarding their welfare and conditions.

The cost of keeping a light-vessel on station is about £29,000 a year, whereas the cost of keeping LANBY on station is anticipated to be around £3,000 a year, showing an anticipated net saving of more than £25,000 a year. These figures are to some extent speculative as the overall costs of LANBY may need revision in the light of experience. An in-service assessment of the existing buoy will have to be carried out before any positive arrangements can be made regarding other possible sites where LANBY could be used.

Further capabilities

The buoy is intended solely as a navigational aid but certain features of buoy movement are to be monitored as well as the functional parameters. Approximately five continuous and one sampling (digital) data channels could be provided for monitoring variables associated with meteorology, sea state, and vessel attitude and movement. All channels could be time shared, either on demand by the shore station or by a pre-set programme to cover many more than six variables.

With the spare electrical power and volumetric capacity that exists in the present design there is almost no limit to the variety of meteorological and oceanographic data which could be measured, transmitted and recorded. Each shore control station could be used as a data-collection centre serving up to a total of five buoys.

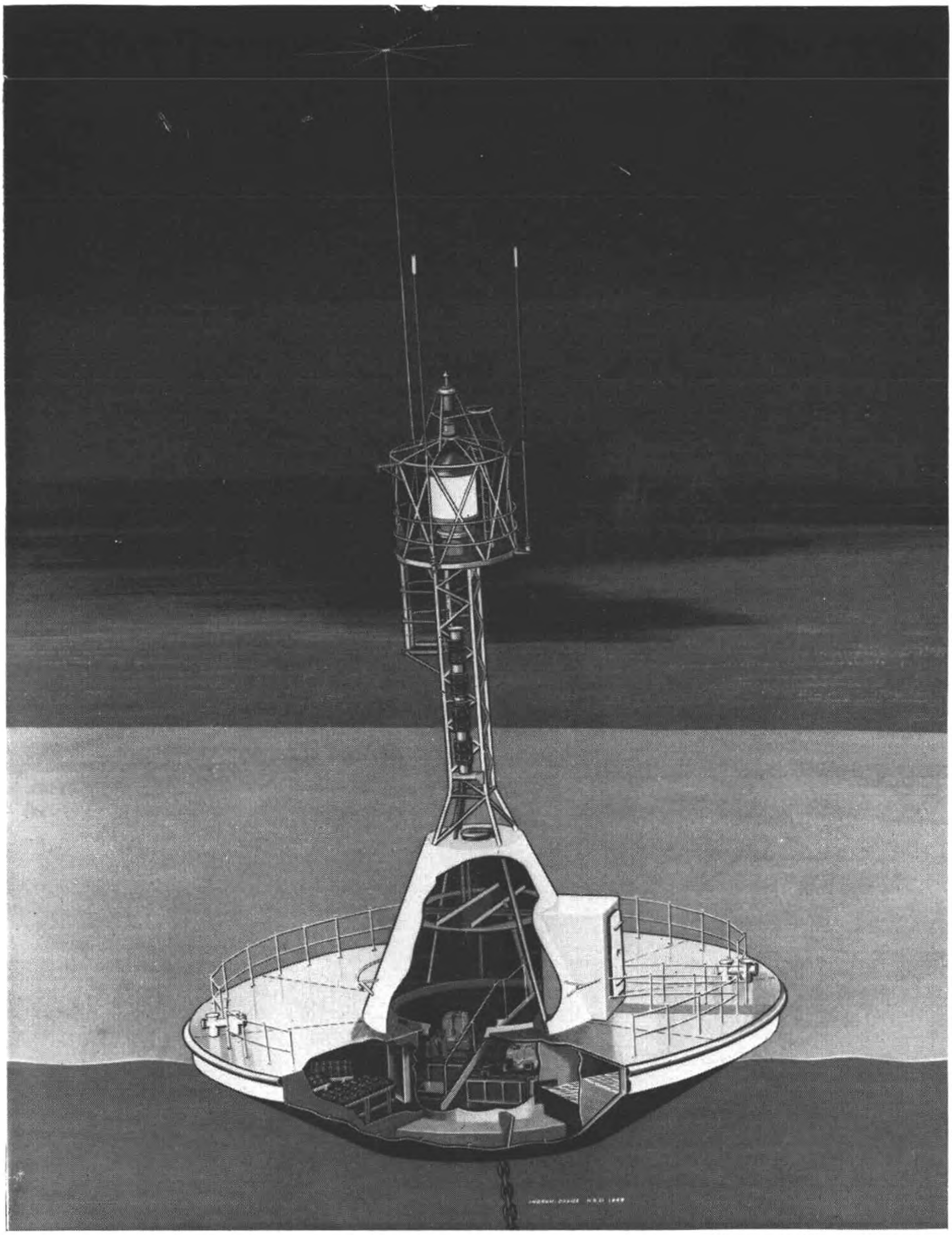
REFERENCE

1. MOTTERN, R. E., E. F. CORWIN and A. F. PYLE. The meteorological buoy programme of the U.S. Navy. *Mar. Obsr. London*, 37, No. 218, 1967, p. 182.

(*Opposite page* 68)

Hawker Siddeley Photo News

The prototype of the LANBY (Large Automatic Navigational Buoy) at the Royal Albert Dock, London (*see* page 66).
(The m.v. *Nottingham*, a Selected Ship, can be seen in the background.)



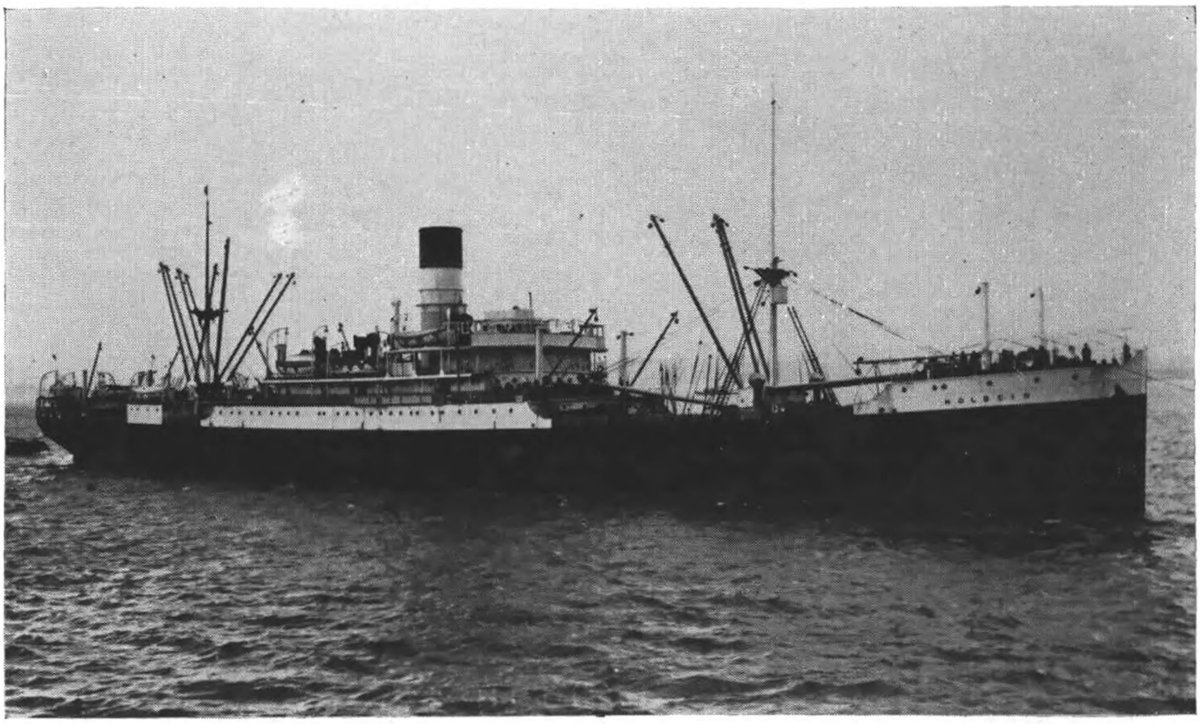
Hawker Siddeley Photo News

An artist's impression of the LANBY buoy, showing the engine and battery compartments (*see* page 66).

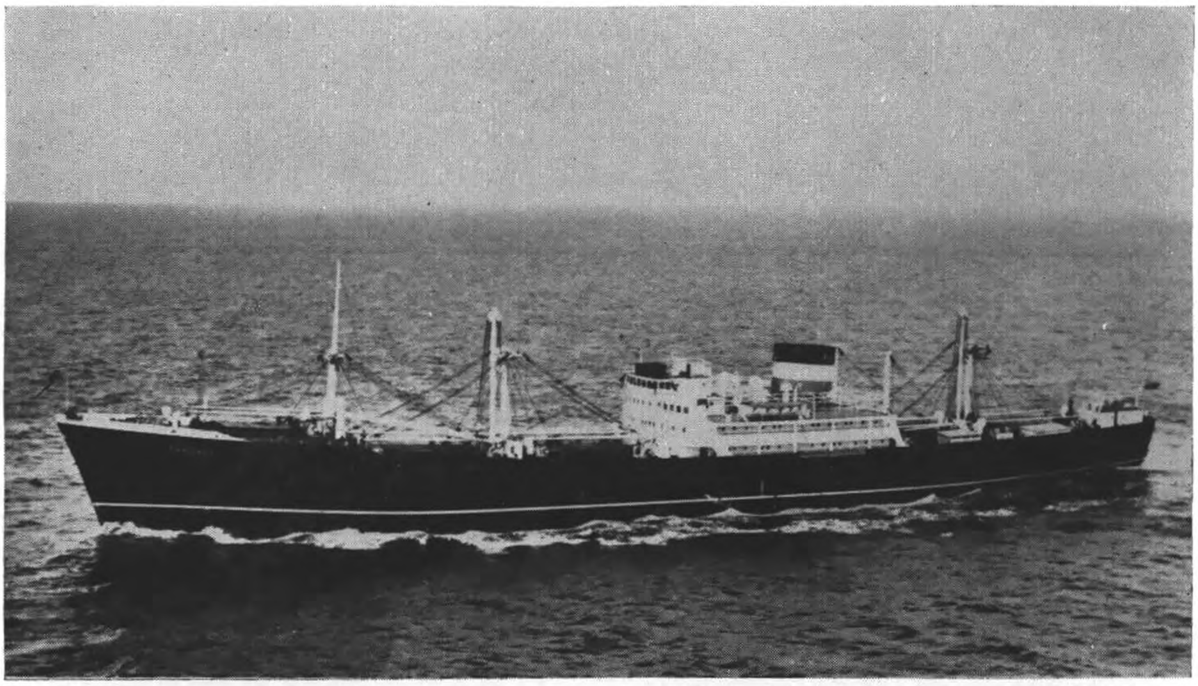
Photo by courtesy of Trinity House

The Shambles light-vessel which will be replaced by the LANBY buoy if operational trials are successful (*see* page 66).

(*Opposite page* 69)



Holbein



Photos by courtesy of Lamport & Holt Line Ltd.

Raphael

TWO SHIPS OWNED BY LAMPORT & HOLT LINE LTD. (*see* page 71).

Hints for Collectors of Small Marine Animals

(Extracts from *Instructions for Collectors, No. 9A: Invertebrate Animals other than Insects* are included by kind permission of the Trustees of the British Museum (Natural History).)

Many a ship's officer, when faced with the problem of preserving some creature for later identification, has probably wondered how it could best be done with the materials to hand. The 'additional remarks' pages of meteorological logbooks report a wide variety of animal life and many observers become collectors either by intention when something peculiar arouses their curiosity, or merely by chance when a particular specimen comes on board unwillingly, perhaps drawn into the sea-temperature bucket. So what can be done with these creatures if they are to be preserved in a fit state for identification? The Museum booklet gives detailed advice on the collecting, preserving, packing and labelling of specimens but only selected instructions are repeated here because many of the most suitable materials and chemicals are not available on board ship. Also, some of the most effective preservatives are extremely poisonous or liable to explode!

This article is confined to the preservation of those invertebrates* (animals without a skeleton of bone or cartilage) which are found in salt water and are most likely to be encountered by ships' officers. They are divided into groups, differing radically in structure, and may be summarized as follows.

Some main groups

PROTOZOA. These are minute animals, some parasitic, present in water and in almost all moist situations. Many of the free-living forms build hard shells, usually microscopic, and among these are the Radiolaria and Foraminifera. Many species of Radiolaria live at or near the surface of the sea, where they sometimes occur in great numbers. Living Foraminifera may be found on seaweeds and also near the surface, most abundantly in warm temperate and tropical waters. Large areas of the floor of the ocean are rich in the shells of long-dead animals.

COELENTERATA. Jellyfish, sea-anemones and corals are typical members of this group, but it includes many other diverse creatures of similar fundamental structure, some solitary, others forming colonies. Jellyfishes and other soft-bodied pelagic coelenterates are more abundant at the surface at night.

ROTIFERS or WHEEL-ANIMALCULES. Most of these microscopic animals live in fresh water but a few are marine. They are solitary and either sessile (i.e., attached to rocks) or free-swimming. They possess vibrating hairs at the front end, which give them the appearance of a rotating wheel.

ARROW-WORMS. These are small, transparent, torpedo-shaped animals having horizontal fins and bearing bristles on either side of the head. They are pelagic (i.e., living in the open water, not on the ocean floor), extremely delicate and liable to damage when captured. The commonest size is about three-quarters of an inch.

ARTHROPODA. This group includes crabs, shrimps, barnacles, etc. (Crustacea) and other classes of jointed animals. All these have more or less distinctly segmented bodies and jointed limbs and generally a hard external shell. Crustacea have the head not distinct from the thorax and carrying two pairs of feelers. The legs may be few or numerous, but are rarely all alike.

MOLLUSCA. Snails, slugs, limpets, oysters and cuttlefish are typical members of this group. Some of the marine forms of slugs, snails and their allies are pelagic. Cuttlefish and squids live at various depths, either lying at the bottom or swimming about.

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* Insects are not included here. It is hoped to publish a further article dealing with this subject later this year.

TUNICATES. The salps are pelagic and usually transparent. They look like little barrels, 1–6 inches long. There is an opening at each end through which water flows from front to back, and eight colourless or bluish bands of muscle fibre encircle the salps like hoops. Salps keep to warm waters and their capture in the Atlantic Ocean indicate the presence of the Gulf Stream. The sea-squirts are sessile and may either be solitary or form spreading colonies on rocks, etc., where they cling like inert lumps of grey-black or brownish clay.

Preservation

Invertebrates may be preserved by dropping them into strong alcohol, or a solution of formalin not weaker than 3 per cent, but this method will not produce the best results. If animals are plunged straight into alcohol for preservation it must be remembered that this substance extracts water from specimens placed therein. The bodies of animals are composed largely of water and if the bulk of the alcohol does not greatly exceed that of the specimens the alcohol will be diluted by about one half. This will render it useless for the purpose of preservation. Animals must therefore, in the first instance, be placed in a volume of alcohol (70–90 per cent) more than twice their own bulk, or the alcohol must be changed after 12–24 hours.

Ideally, the process of preserving invertebrates would be in four stages: anaesthetization, so that, when killed, the animals are not damaged by excessive contraction; killing; fixation, or the 'fixing' of tissues in a condition as near as possible to that of life; storing, or the preservation of the animals in some fluid in which they can remain indefinitely. However, preservation of marine animals often has to be carried out in haste and if no anaesthetization is to be attempted the simplest procedure is to place as few specimens as possible in a bottle of sea-water, pour away one ninth of the total volume and fill up, whilst stirring if possible, with formalin. This is the method advocated by the National Institute of Oceanography for the preservation of 'discoloured water'. Many of the microscopic animals mentioned above might be included with such samples and can therefore be treated in the same way because the detailed processes for treating planktonic animals mainly refer to specimens removed from sea-water by a net or filtered through a sieve.

Chemicals

ALCOHOL. Ordinary 'methylated spirit', or denatured alcohol, is not suitable for preserving marine specimens. Alcohol in the form of spirituous liquors may be used undiluted as a preservative although, for obvious practical reasons, are generally used only in emergencies. The use of rectified spirits or spirits of wine is unnecessarily extravagant.

FORMALIN. The commercial formalin is a saturated solution of the gas formaldehyde. To obtain various strengths of formalin it should be diluted as follows. To 1 volume of it add: for 10 per cent formalin, 9 volumes of water; for 5 per cent formalin, 19 volumes of water; for 3 per cent formalin, 32 volumes of water. As a general rule, the 10 per cent strength is used when formalin is added to salt water but, when other water is used in the solution, the 3–5 per cent formalin seems sufficient.

Labelling

A specimen whose origin is unknown is seldom of any value. It is therefore of the utmost importance that all specimens should be carefully labelled, as soon as possible after their collection. When forwarding specimens to the appropriate authority the Port Meteorological Officers enclose a copy of the relevant extract from the logbooks but labels are still necessary, especially if more than one bottled sample is forwarded. Labels should be placed inside the receptacles, rather than on the outside. Ordinary pulp paper is useless and it is advisable to employ a rag paper, such as writing-paper of good quality, and a rather soft lead pencil. Details should include latitude and longitude, date, method of preservation and where found, e.g. on deck, anchor chain, etc.

A CENTURY OF VOLUNTARY OBSERVING—THE LAMPORT & HOLT LINE LTD.

Our annual illustrated feature concerning ships of one ownership covering a century of voluntary observing is continued opposite page 69 with ships of the Lamport & Holt Line.

Our association with this company goes back to 14th February 1868 when instruments were put aboard their *Cassini* in Liverpool and aboard the *Uruguay* in Waterford. The company, then known as the Liverpool, Brazil & River Plate S.N. Co., had chartered the *Uruguay* from Malcolmson Bros. & Co. of Waterford. The first meteorological logbook from the *Cassini* came in on 16th May 1868 and covered the period 21st February 1868 to 12th May 1868, a voyage to and from Rio de Janeiro, and that from the *Uruguay*, covering the period 24th February 1868 to 21st May 1868, a voyage to and from Montevideo, came in on 3rd June 1868.

The *Cassini* was an iron-screw steamer of 685 tons, built by Leslie's on the Tyne in 1866, originally with one deck and schooner-rigged, but subsequently converted to three decks, brigantine-rig and a tonnage of 817. She was sold out of the company in 1872 and eventually passed to the brothers William and Edmund Johnston who founded the Johnston Warren Lines of today. In 1881 she passed into Italian ownership and was broken up at Palermo in 1909.

Beyond the fact that she was a steamer of 1,103 tons, we have no information of the career of the *Uruguay* but her entry into the Voluntary Observing Fleet is significant because she was commanded by Captain Squire Thornton Stratford Lecky, no doubt the company's most famous captain. Subsequently, until he left the company late in 1870, Lecky commanded their *Halley* and became quite outstanding in his voluntary meteorological work at sea, as well as in many other ways which need no publicizing here.

Unhappily no pictures are available of either the *Cassini* or *Uruguay*, or even of a third Lamport and Holt ship, the *Newton*, which was observing for us a century ago, and this period of our association has therefore to pass without illustration.

Our first picture is of the 'middle period' represented by the *Holbein*, a steamer of 6,278 gross tons built for the company in 1914 by Messrs. D. W. Henderson & Co. at Partick. In 1935 she was sold to Italy for scrap for £10,500. During the general strike in 1926 this vessel was laid up in Liverpool and used as a hostel to accommodate the company's office staff. She was in the Voluntary Observing Fleet for many years, her last meteorological logbook being received in May 1926.

Lamport & Holt's present-day observing ships are represented by the *Raphael*, one of the few ships in the company which have never suffered a change of name. Of 9,791 gross tons, she was built by Bartram & Sons of Sunderland in 1953 and joined the Voluntary Observing Fleet in 1962.

We take this opportunity of recording our thanks to the many masters and officers in the Lamport & Holt Line who, for over a hundred years, have voluntarily given us so much help in amassing meteorological data from the South America run. Today, three of their fleet of ten ships are observing for us.

L. B. P.

NOTES ON ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM OCTOBER TO DECEMBER 1969

October

Depressions to the south of Spitsbergen and to the south-west of Iceland, together with an anticyclone over central Canada, dominated the pressure pattern over the region. As a result relatively warm southerly winds persisted over the Barents Sea where a long-standing excessive ice anomaly became reversed, whilst cold northerly winds prevailed over the Greenland Sea where ice conditions became excessive.

Canadian Arctic Archipelago. Despite a change to winds from a northerly point, temperatures remained up to 5 degC above normal, except in the far north, and an ice deficit persisted in the southern half of the area where the onset of winter was delayed by about a month. Thin coastal ice was forming in the south-west late in the period; nevertheless open water remained off shore from Amundsen Gulf to Queen Maud Gulf.

Foxe Basin, Hudson Bay and Strait. Northerly winds soon became established and, with the consequent cooling, new ice formed in the northern and north-western parts of these areas. In Foxe Basin the process was rapid and by the end of the month the northern half was covered by close pack-ice. In the north of Hudson Bay and in the west of Hudson Strait the formation of new ice occurred a little earlier than normal.

Baffin Bay and Davis Strait. In the western parts of these areas temperatures fell to around 2 degC below normal as a result of northerly winds and ice conditions here remained excessive. In the north, close pack-ice advanced to around 70°N on the Greenland coast. To the south of this point the Greenland coast was ice-free.

Greenland Sea and Spitsbergen. In the north, strong northerly winds drove the pack-ice about 50 miles south-east beyond the normal position. North-easterly winds in the Denmark Strait, parallel to the ice edge, maintained near-normal conditions in that area. The ice excess off the south-east coast of Greenland decreased, leaving a little very open pack-ice. Ice conditions remained near normal around Spitsbergen.

Barents Sea. The most striking changes in sea-ice conditions occurred in this area. After almost two years of excessive ice conditions a deficit became established over this region by the end of the month. This was almost entirely due to relatively warm, persistent south-easterly winds. The ice edge retreated to around 79½°N between Svalbard and Zemlya Frantsa Iosifa, about 50 miles beyond the normal. The east and south-east of this area remained ice-free.

November

Low pressure again dominated over the area with centres located over Norway and near Hudson Bay. Once more cold northerly winds resulted over the Greenland Sea and warm southerly winds over the Barents Sea. These areas showed the greatest anomalies in sea-ice conditions.

Canadian Arctic Archipelago. This area cooled off quickly as northerly winds persisted and temperatures fell to around 3 degC below normal. At the end of the month close pack-ice or fast ice covered the whole area, a return to normal conditions.

Foxe Basin, Hudson Bay and Strait. North to north-west winds persisted over Foxe Basin and Hudson Bay and temperatures fell to around 4 degC below normal. Foxe Basin soon became covered by close pack-ice but the increase in ice cover over Hudson Bay was slow despite seemingly favourable conditions. At the end of the month the southern limit, here, lay in about 61°N, a few miles north of its normal position. To the south small amounts of new ice were forming on coasts. In Hudson Strait winds were mainly south-south-west and temperatures remained above average for most of the month. During this time there was only a slight increase in new-ice formation in the west of the Strait and on north and south coasts.

Baffin Bay and Davis Strait. Ice conditions were near normal in these areas. At the end of the month the ice edge lay from near Upernavik in the north-east to Resolution Island in the south-west. In the east some new ice and broken young ice had formed in the Disko Bay area.

Labrador Sea. South to south-west winds maintained a positive air-temperature anomaly, in places by as much as 3 degC, and there was less ice than normal in this area. At the end of the month a little new ice had formed in inlets northward of Hopedale.

Greenland Sea and Spitsbergen. Ice conditions remained excessive over most of the Greenland Sea and, in the north, the ice edge advanced beyond any known extreme limit for this month. As a result of persistent, strong northerly winds and predominantly east-going current the edge of close pack-ice was located at 73½°N, 6°E, about 300 miles east of normal. This ice

Table 1. Icebergs sighted by aircraft and merchant ships within latitudes 40°N–65°N and longitudes 40°W–65°W

(This does not include growlers or radar targets)

Limits of Latitude and Longitude		Degrees North and West												
		66	64	62	60	58	56	54	52	50	48	46	44	42
Number of bergs reported south of limit	Oct.	> 69	> 58	> 31	> 21	> 13	> 8	> 8	> 5	0	0	0	0	0
	Nov.	> 6	> 6	> 6	> 6	> 6	> 6	> 6	> 4	2	0	0	0	0
	Dec.	1	1	1	1	1	0	0	0	0	0	0	0	0
	Total	> 76	> 65	> 38	> 28	> 20	> 14	> 14	> 9	2	0	0	0	0
Number of bergs reported east of limit.	Oct.	> 69	> 69	> 69	> 67	> 61	> 57	> 51	> 20	> 17	> 16	> 12	7	2
	Nov.	> 6	> 6	> 6	> 6	> 6	4	4	1	0	0	0	0	0
	Dec.	1	1	1	1	1	1	1	1	1	1	1	1	1
	Total	> 76	> 76	> 76	> 74	> 68	> 62	> 56	> 22	> 18	> 17	> 13	8	3
Extreme southern limit	Oct.	51° 17′N, 56° 23′W on 26.10.69												
	Nov.	48° 50′N, 52° 41′W on 23.11.69												
	Dec.	56° 30′N, 40° 42′W on 25.12.69												
Extreme eastern limit	Oct.	62° 42′N, 40° 48′W on 9.10.69												
	Nov.	52° 45′N, 51° 47′W on 19.11.69												
	Dec.	56° 30′N, 40° 42′W on 25.12.69												

> ('greater than') has been inserted where there is some doubt as to the actual number of icebergs at some of the sightings, but the true value is probably greater than the value given.
Extreme limits during the 3-month period are underlined.

edge was also located about 100 miles south-east of Jan Mayen. Further south, in the Denmark Strait, ice conditions became excessive and in fact were extreme near north-west Iceland, where the edge was 100 miles south-east of normal. The excess in this area was due to north-westerly winds. A belt of very open pack-ice persisted near the south-east coast of Greenland. Near Spitsbergen north-easterly winds prevailed and temperatures fell to around 2 degC below normal. In the south, ice conditions increased to become normal though there was a light deficit of ice on the western side of the archipelago.

Barents Sea. The ice deficit in this area increased as strong south-south-east winds persisted and temperatures remained several degrees above normal (in places by as much as 8 degC). The outward edge of open pack lay from 76°N, 20°E to 78½°N, 50°E and thence to Mys Zhelaniya, in most places about 100 miles north of normal. In the east a thin belt of fast ice was becoming established on the west coast of Novaya Zemlya north of Mys Sukhoy Nos and in the south-east some new ice was forming on coasts to the east of the Pechora estuary.

White Sea. Once again, in this area, strong south to south-west winds delayed the advance of winter. Temperatures rose to around 2 degC above normal and consequently there was an ice deficit. At the end of the month some new ice had formed in the west and south but most of the White Sea and The Gorlo were ice-free.

Baltic. In contrast, light north-westerly winds early in the month in the north of this area caused temperatures to fall to around 4 degC below normal and a little new ice formed, earlier than usual, on coasts at the head of the Gulf of Bothnia. By the end of the month temperatures recovered to near average and, though there was a slight increase in new ice, the situation recovered to normal.

December

The pressure pattern of October was repeated this month. Thus warm south-westerly winds prevailed over the Barents Sea, maintaining the large ice deficit in this area, and cold northerly winds prevailed over the northern part of the Greenland Sea where ice conditions remained beyond the known extreme limit.

Canadian Arctic Archipelago, Foxe Basin, Baffin Bay, Hudson Bay and Strait. These areas, as normal, were covered by fast ice or close pack-ice at the end of the month.

Davis Strait and Labrador Sea. In the north and west, ice conditions became excessive as pack-ice from Baffin Bay advanced into the area under the influence of northerly winds. At the end of the month the edge of close pack-ice lay from Okkak in Labrador, north-east to 64½°N, 54°W then northwards to the entrance to Sondre Strømfjord. There was a little open pack-ice just to the west of Cape Farewell. On the Labrador coast there was a broad belt of new ice extending southward from Okkak to Battle Harbour, extending seaward for about 70 miles. On this part of the Labrador region, due largely to relatively warm south-easterly

Table 2. Baltic Ice Summary: October–December 1969

No ice was reported at the following stations during the period: Tallin, Mariehamn, W. Norrskar, Göteborg, Visby, Kiel, Flensburg, Aarhus, Copenhagen, Oslo, Kristiansandfjord.

No ice was reported at any of the stations during October

Station	November									December								
	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Leningrad ..	0	0	0	0	0	0	0	0	14	8	31	24	15	2	15	7	0	244
Riga ..	0	0	0	0	0	0	0	0	11	15	31	16	9	0	13	0	0	250
Pyarnu ..	0	0	0	0	0	0	0	0	10	11	31	20	20	0	13	7	0	203
Viborg ..	0	0	0	0	0	0	0	0	—	8	31	24	24	0	15	9	0	—
Klaipeda ..	0	0	0	0	0	0	0	0	5	9	31	22	0	5	19	0	0	235
Ventspils ..	0	0	0	0	0	0	0	0	—	21	31	6	0	0	2	0	0	—
Helsinki ..	0	0	0	0	0	0	0	0	25	17	31	15	11	0	12	0	0	245
Turku ..	0	0	0	0	0	0	0	0	36	17	31	15	8	0	8	0	0	265
Mantyluoto	0	0	0	0	0	0	0	0	—	17	31	9	2	0	5	0	0	—
Vaasa ..	29	30	2	0	0	0	0	0	66	1	31	28	25	0	8	18	0	288
Oulu ..	24	30	7	4	0	5	2	0	96	1	31	31	31	0	0	31	0	386
Roytaa ..	30	30	1	0	0	0	0	0	—	1	31	21	6	8	11	15	0	—
Lulea ..	6	30	10	8	0	8	0	0	186	1	31	31	31	0	8	13	10	506
Bredskar ..	0	0	0	0	0	0	0	0	—	6	25	16	0	0	14	0	0	—
Alnosund ..	0	0	0	0	0	0	0	0	91	1	31	31	31	0	31	0	0	310
Stockholm ..	0	0	0	0	0	0	0	0	45	10	31	3	0	0	3	0	0	175
Kalmar ..	0	0	0	0	0	0	0	0	26	21	31	11	0	0	2	0	0	144
Skellefteå ..	30	30	1	0	0	1	0	0	—	1	31	31	25	0	29	2	0	—
Tönning ..	0	0	0	0	0	0	0	0	—	12	31	18	0	5	12	0	1	—
Husum ..	0	0	0	0	0	0	0	0	—	22	31	10	10	0	10	0	0	—
Emden ..	0	0	0	0	0	0	0	0	—	22	31	10	0	0	10	0	0	—
Lübeck ..	0	0	0	0	0	0	0	0	—	22	31	10	7	2	10	0	0	—
Gluckstadt ..	0	0	0	0	0	0	0	0	—	17	31	15	0	0	10	0	0	—
Bremerhaven	0	0	0	0	0	0	0	0	—	22	31	10	2	0	4	0	0	—
Stettin ..	0	0	0	0	0	0	0	0	2	10	31	22	6	0	22	0	0	192
Gdansk ..	0	0	0	0	0	0	0	0	—	28	31	2	0	0	0	0	0	177

CODE:

A First day ice reported.
B Last day ice reported.
C No. of days that ice was reported.
D No. of days continuous land-fast ice.
E No. of days of pack-ice.
F No. of days dangerous to navigation, but assistance not required.
G No. of days assistance required.
H No. of days closed to navigation.
I Accumulated degree-days of air temperature (°C) where known.*

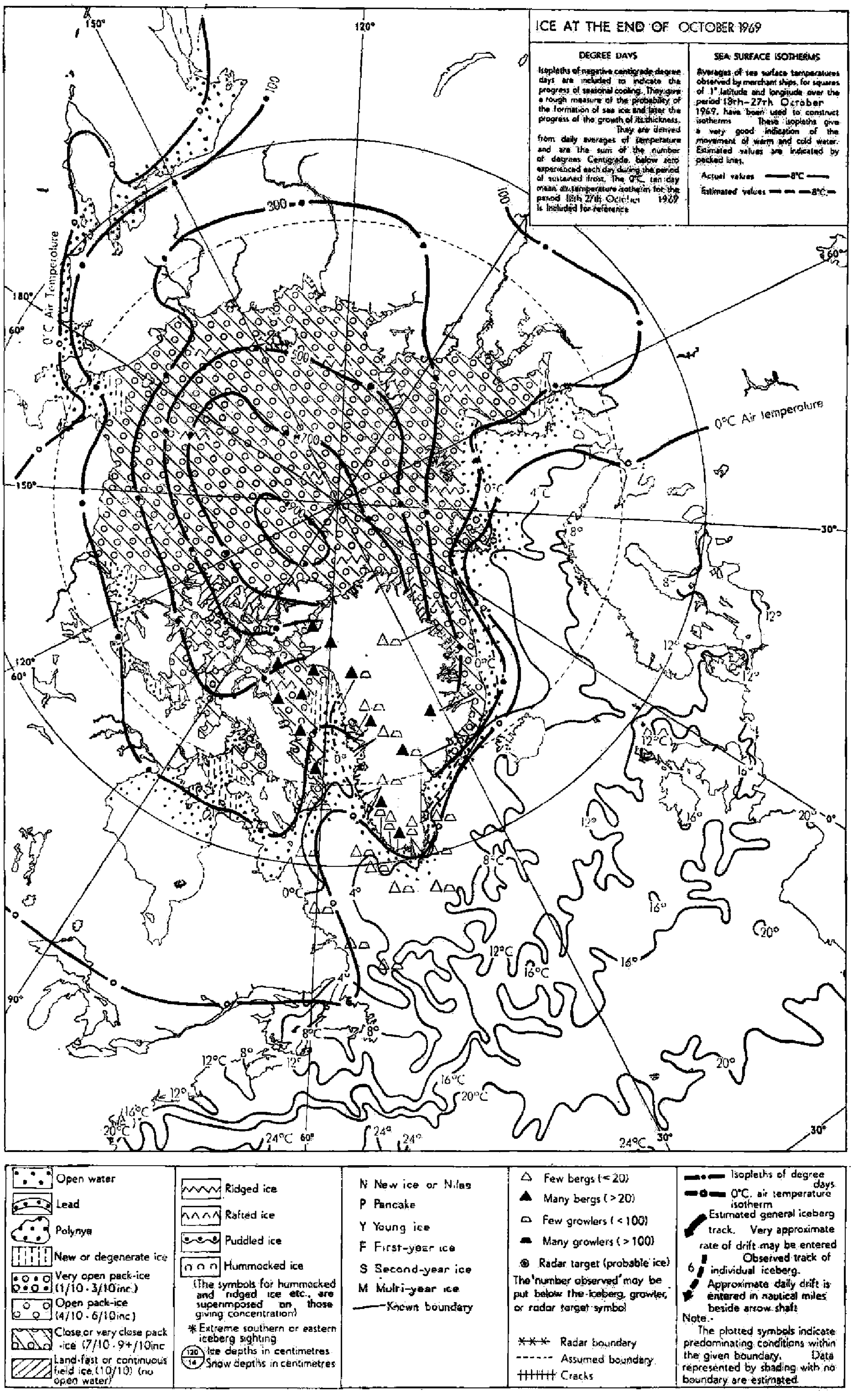
* These figures give a rough measure of the first probability of the formation of sea ice, and later the progress of the growth and its thickness. They are derived from daily averages of temperature (00 + 06 + 12 + 18 GMT) and are the sum of the number of the degrees Celsius below zero experienced each day during the period of sustained frost.

winds raising air and sea temperatures well above average, there was much less ice than normal.

River and Gulf of St. Lawrence. In the river, pack-ice advanced downstream to about Île Verte. By the end of the month some new ice had formed on the northern and western coasts of the Gulf. Over the whole area winds were mainly light easterly and, as a consequence, particularly over the Gulf, air and sea temperatures were well above average. There was thus less ice than normal in these areas.

Greenland Sea and Spitsbergen. A cold northerly airstream persisted over the northern part of this area and there was little change in the position of the ice edge. Ice conditions remained in excess of published extreme limits. Further south, however, the Icelandic low was now centred to the west of Iceland and thus easterly winds prevailed to the north and west of Iceland where the ice edge retreated westwards and the ice excess of the previous month was greatly reduced. Off south-east Greenland close pack-ice, less than normal, extended southwards to 61°N with a little open pack-ice to the south. The cyclonic activity near Spitsbergen raised air and sea temperatures above average and, despite an advance of the edge of very open pack-ice to 75°N, there was less ice than normal.

Barents Sea. Relatively warm winds from a southerly point persisted over this area, resulting in an air temperature anomaly of plus 3 degC and a sea temperature anomaly of plus 2 degC. The edge of close pack-ice lay at around 76°N in the west, about 100 miles north of normal, and at around 78°N in the east, about 200 miles north of normal. On the west coast of Novaya Zemlya coastal fast-ice had formed north of Zaliv Mollera. There was an increase in the formation of ice along coasts in the south-east, eastward of Cheshskaya Guba. In these south-eastern regions there was less ice than normal.


ICE AT THE END OF OCTOBER 1969
DEGREE DAYS
Isopleths of negative centigrade degree days are included to indicate the progress of seasonal cooling. They give a rough measure of the probability of the formation of sea ice and later the progress of the growth of its thickness. They are derived from daily averages of temperature and are the sum of the number of degrees Centigrade, below zero experienced each day during the period of sustained frost. The 0°C, ten day mean air temperature isotherm for the period 18th 27th October 1969 is included for reference
SEA SURFACE ISOTHERMS
Averages of sea surface temperatures observed by merchant ships, for squares of 1° latitude and longitude over the period 18th–27th October 1969, have been used to construct isotherms These isopleths give a very good indication of the movement of warm and cold water. Estimated values are indicated by pecked lines.
Actual values —8°C—
Estimated values — — —8°C—
0°C Air Temperature
0°C Air temperature
300
500
700
100
150°
120°
180°
60°
90°
30°
Open water
Lead
Polynya
New or degenerate ice
Very open pack-ice (1/10 - 3/10 inc.)
Open pack-ice (4/10 - 6/10 inc.)
Close or very close pack-ice (7/10 - 9+/10 inc
Land-fast or continuous field ice (10/10) (no open water)
Ridged ice
Rafted ice
Puddled ice
Hummocked ice
(The symbols for hummocked and ridged ice etc., are superimposed on those giving concentration)
* Extreme southern or eastern iceberg sighting
Ice depths in centimetres
Snow depths in centimetres
N New ice or Nilas
P Pancake
Y Young ice
F First-year ice
S Second-year ice
M Multi-year ice
Known boundary
Few bergs (< 20)
Many bergs (> 20)
Few growlers (< 100)
Many growlers (> 100)
Radar target (probable ice)
The 'number observed' may be put below the iceberg, growler, or radar target symbol
Radar boundary
Assumed boundary
Cracks
Isopleths of degree days
0°C. air temperature isotherm
Estimated general iceberg track. Very approximate rate of drift may be entered
Observed track of individual iceberg.
Approximate daily drift is entered in nautical miles beside arrow shaft
Note.-
The plotted symbols indicate predominating conditions within the given boundary. Data represented by shading with no boundary are estimated.

White Sea and Baltic. Air temperatures fell from several degrees above to well below average (in places by as much as 11 degC) as southerly winds of Atlantic origin were replaced by those of Siberian origin. As a result there was a rapid growth of ice in both areas. In the White Sea close pack-ice now covered the south-western half with new ice forming over most of the remainder, though The Gorlo remained ice-free. The coast of Finland was fringed with new ice which extended across the Gulf of Bothnia at about 58½°N and became close pack-ice at the head of the Gulf. Similarly, close pack-ice filled the head of the Gulf of Finland and new ice extended westward to about 26°E. New ice almost covered the Gulf of Riga. Further south, new ice and some open pack-ice was forming on most coasts from the Gulf of Riga to Denmark. In the Gulf of Gdansk this had become fast-ice. Over the White Sea the ice situation had returned to normal but over the Baltic there was more ice than normal.

North Sea. Some new ice formed on German and Danish coasts as cold south-easterly winds became established over the area.

R. M. S.

Note. The notes in this article are based on information plotted on ice charts similar to the map shown overleaf but on a much larger scale (39 in × 27 in). These charts are published at ten-day intervals and are available at the price of reproduction on application to the Director General, Meteorological Office (Met.O.1), Eastern Road, Bracknell, Berks. RG12 2UR. Alternatively, they may be seen at any Port Meteorological Office or Merchant Navy Agency. Up-to-date ice charts are broadcast daily by facsimile.

Book Reviews

Sailing Ships, by Björn Landström. 8½ in × 4¾ in, pp. 191, *illus.* George Allen & Unwin Ltd., Ruskin House, 40 Museum Street, London, W.C.1, 1969. Price: 35*s.*

In 1961 Björn Landström produced a very scholarly, albeit somewhat bulky work which he called simply *The Ship*. He seems to have received many requests for a concise edition and, as "new and important finds have been made since that time, and as I have also learned a great deal that is new, from my own researches and those of others, I decided that the best thing to do was to revise my previous book thoroughly and to add certain entirely new sections". The book under review is the result of that decision but, in order to bring it down to a reasonable size and price, its scope has been restricted to sailing ships and only those from the western world including the Mediterranean countries.

Gleaning his information from many sources such as paintings on ancient vases, rock carvings and reliefs in burial places, the author has produced some very clear and well-drawn reconstructions of the craft of ancient Egypt, Greece, Rome, Scandinavia and all western nations right up to the beginning of the seventeenth century. Until that time source material of this sort was often both inadequate and ambiguous and for this period he has included the original representations on which his reconstructions are based; they are built up with considerable skill and with a seaman's eye for a ship and, in view of the fact that these ancient artists were unlikely to have been practical seamen themselves and that they were unable to depict perspective, his bringing to pictorial life these ships is indeed remarkable.

"Sailing ships in words and pictures from papyrus boats to full-riggers" runs the full title of this book; a rather ambitious scope, one might think, in a work of its size and yet one has only to open it at random to realize how beautifully this object has been achieved.

L. B. P.

Further Offshore, by Captain J. H. Illingworth. 11¼ in × 8¾ in, pp. 336, *illus.* Adlard Coles Ltd., 3 Upper James Street, Golden Square, London W.1, 1969. Price: £6.

The author of this classic work needs no introduction to most readers of this journal. Many will be well acquainted with earlier editions of the book under the title *Offshore*, first published in 1949 and last revised in 1963.

John Illingworth has twenty years of ocean racing experience behind him. He won his first off-shore yacht championship in 1929 and, since the war, has won one Sydney–Hobart and two Fastnet races outright and his class in two other Fastnets, three R.O.R.C. and two French ocean-racing championships. In addition to his many successes in ocean racing he is a yacht designer of distinction. With his partner and associates he designed *Gipsy Moth IV*, particulars of which are included in the chapter on single-handed off-shore racing. He also fitted out *Lively Lady* for Alec Rose's round-the-world voyage, so his credentials as an authority on his subject are well established. Every facet of ocean racing, fast cruising, modern yacht handling and equipment is included in the book, from choosing and tuning a boat to helmsmanship and strategy. The merits of various rigs are evaluated and the design and layout of headsails, mainsails, trysails and spinnakers and their R.O.R.C. rating are dealt with at some length.

The book is admirably produced, well indexed and illustrated. The 32 plates include some fine action pictures and the 105 diagrams and line-drawings are of exceptional clarity.

The 20 appendices include such useful information as the Beaufort wind scale, weights and strengths of materials, crew instruction sheet, list of yacht tools and repair equipment, off-shore cooking, vane self-steering gears and a glossary of terms in French, German, Italian and Spanish.

The chapter on wind and weather contains a lot of material of value to off-shore racing enthusiasts but also contains several loose statements which are misleading. The section on basic winds is the worst in this respect where the statement regarding temperature and pressure differences between surface and upper air confuses horizontal with vertical temperature gradients and thus conveys little to the reader. The term 'pressure grades' is presumably a misprint for 'pressure gradient', while the doldrums are not just simply 'windless areas'. Depressions in the area of the South Island of New Zealand are said to "show much the same characteristics as in the British Isles, everything being reversed of course, in sense". This comment evidently refers to the difference in the application of Buys-Ballot's law between the north and south hemispheres but conveys little meaning as it stands. It is a pity the author did not verify the statements in this chapter with a professional meteorologist before publication. Apart from this weakness and a minor editorial error in Chapter 9 referring to numbered diagrams the book has unrivalled technical merit and will appeal to all interested in sailing. There can be little doubt that it will continue to be recognized as a standard work on the subject. As prices go today it is good value for money and a sound investment for any sailing enthusiast.

A. D. W.

Cruise to a Cruel Shore, by Henri Bourdens. $8\frac{3}{4}$ in × $5\frac{3}{4}$ in, pp. 240, *illus.* Souvenir Press Ltd., 95 Mortimer Street, London, W.1. Price: 35*s*.

The second half of the twentieth century cannot surely produce many adventures akin to those of Robinson Crusoe or the Swiss Family Robinson and yet one such fell to the lot of Henri Bourdens and his wife Jose when, late in January 1967, they were cast away on a remote part of Bathurst Island, off northern Australia.

Bourdens is basically an aviator of the adventurous kind and, having flown planes in South America, Vietnam, Laos, the Middle East and the Sahara, doing all kinds of jobs most of which he confesses would have been severely frowned on by the Civil Aviation authorities, he had at last gained respectability as a senior Captain in an established airline on the run between Paris and Toulouse. But the daily 'milk run', as he terms it, became just too respectable and he seized the opportunity of exchanging it for "an ill-defined job flying a gallant but obsolete piece of airborne hardware in an intolerable place on the other side of the world", the Far East again, in fact. The book does not tell anything of his new assignment, one may simply regard it as the reason for his being out East, but it starts from the time when he and his wife met a particularly local type of craft built in and manned from Kuala Trengganu on the east coast of Malaysia, about 500 miles north of Singapore. This craft, called a Bedor, is said to have been invented by a shipwrecked Frenchman who settled down in those parts "to build boats and to sire children; and both his children and his boats were half-caste". The hulls were the shapely ones which he had learned to fashion in Provence, the sails were the bat-like, heavily battened and multi-sheeted sails of the Chinese junk, whilst a large platform and bamboo shelter jutting over the stern to accommodate the crew completed the mongrelization.

It was this unusual craft which Bourdens and his wife fell in love with as they saw her in Mersing and resolved to have one built and adapted so that she could be handled by the two of them and sailed back to France. The building and fitting out took some eight frustrating months, the vessel was named *Singa Betina*, the Malay equivalent of *The Lioness*, and she eventually sailed eastward from Singapore.

The leisurely, idyllic passages through the islands of Indonesia are well described. They provide the least adventurous part of the book although handling a Bedor, albeit specially adapted and fitted with a radio D/F and echo-sounder, with two people, one a woman ("and a pint-sized one at that", says the author), must call for no little navigational skill and seamanship. Those were halcyon days however; the author names this part of his book 'Adventure in Paradise' and indeed it must have been.

But on the last leg of the passage to Darwin the *Singa Betina* met a cyclone which battered her hull, stripped her rigging and drove her ashore.

For two months the castaways existed on a small supply of provisions salvaged from the *Singa Betina*, which was rapidly reduced to a sand-filled derelict, and on sea-snails. An attempt to reach help on foot brought them near to death and finally, with death from starvation only a matter of days away, they put to sea, taking their chance on a makeshift raft. This quickly became waterlogged but providentially, nothing less, with the raft well under water, they were picked up by the *Betty Joan*, an Australian lugger running supplies to the Mission on Bathurst Island. Her temporary skipper had decided to make the longer passage round the north coast of the island instead of the more usual one through the narrow Apsley Straits; had it been otherwise this story would probably never have been written.

Ironically, the aborigines who were sent by the missionaries to salvage the *Singa Betina* if they could, lived in comparative luxury whilst they were doing the job. Says the author, "There were clams and mud-crabs in the swamp, crocodile and turtle eggs, and edible roots. They knew what to look for and where. We didn't and starved."

A story of high and unusual adventure and a remarkable example, infrequent in peacetime, of the extent to which the human mental and physical capabilities can be taxed without cracking; it deserves to be read.

L. B. P.

Personalities

RETIREMENT.—CAPTAIN R. S. HOPPER, D.S.C. has retired after 45 years at sea.

Robert Sydney Hopper was born in 1908 in Liverpool and traces his ancestry back to a twelfth-century family of boat, barge and small-craft builders on the Medway. They developed a barge which had buoyancy chambers at the ends and a hinged bottom; these became known as Hopper barges, a term still widely used today. In the latter part of the nineteenth century the family's slipways at Chatham were sold to the Admiralty. Captain Hopper's grandfather and one of his great-uncles went out to Rangoon and there they founded a shipyard. They built the first floating dock east of Suez, entirely of teak, in which they were both subsequently killed during native troubles. The dock later sank through neglect and was abandoned. Another part of the family had gone north to the Tyne, just above Hebburn, to set up a shipyard which, however, failed. They then moved to the Clyde and founded the famous shipyard, Fairfields.

Captain Hopper's father, Captain G. E. Hopper, was one of the early shipmasters in the Blue Star Line in 1910; he was one of our pre-war voluntary observers at sea.

Young Hopper went to sea in 1924 as a cadet aboard the *Celticstar*. He passed for 2nd Mate in 1928 and was appointed 4th Officer of the *Almedastar*. He passed for Master in 1934.

Captain Hopper had joined the Royal Naval Reserve in 1931 and when, in 1938, to meet a shortage of naval officers in the face of an expanding Navy, it was decided to admit Royal Naval Reserve Officers, he was an early volunteer. With a commission as Lieutenant, Royal Navy, he was appointed to H.M.S. *Anthony*, a destroyer.

Captain Hopper started the war in the aircraft carrier *Glorious* in the Indian Ocean but was soon called home to work on loop mining for harbour defences. He then went to the fast minelayer *Manxman*. For his work in her in home waters he was mentioned in despatches. Later the ship was sent to the Mediterranean to mine the Italian port of Spezia. This was successfully done; the ship returned to Gibraltar, a distance of 880 miles, at an average speed of 43½ knots and Captain Hopper was awarded the D.S.C. The ship's great speed also came in useful when, although singularly unfitted for carrying cargo, she got supplies through to Malta which was near starvation.

After *Manxman* was torpedoed in supporting the landings in North Africa, Captain Hopper came home to command H.M.S. *Wallace*, a destroyer on convoy escort work off the east coast of England.

On reaching the retiring age for officers of his rank in the Royal Navy at the end of 1953, Captain Hopper came back to sea in the Blue Star Line and was appointed to his first command, the *Portland Star*, in 1955. He wound up his career in command of the *Scottish Star*, a voluntary observing ship which was trapped in the Great Bitter Lake, Suez Canal by the 1967 Egypto-Israeli war, one of fourteen ships of which four were British, two German, two Swedish, two Polish, one French, one American, one Czechoslovak and one Bulgarian. Captain Hopper describes this as a job which kept him far busier than would a fully-manned sea-going ship and in which the fraternity of the different nationalities had to be seen to be believed and was probably unique in maritime history. One could see a German, aboard a Bulgarian ship, entertaining with a French song sung in English accompanied by a Pole on a guitar.

Captain Hopper's association with the Meteorological Office goes back to 1933 when he sent us his first meteorological logbook from *Arandora Star*. In eleven years of observing he sent us sixteen meteorological logbooks.

We wish him health, serenity and happiness in his retirement.

L. B. P.

RETIREMENT.—CAPTAIN F. H. TURTON completed his last voyage in command of the *Argyllshire* and retired from the sea at the end of September 1969.

Frank Harvey Turton was born in Edinburgh in 1909 when his father was serving with the Clan Line. Captain Turton served all his sea-going career with the Clan Line, commencing as an apprentice in 1923 and obtaining his first command, the *Halesius*, in 1950. He was unfortunately torpedoed off Finisterre when serving in *Clan Alpine* during World War II.

Captain Turton's record with the Meteorological Office goes back to 1928 when we received his first logbook from the *Clan Kenneth*. Subsequently in 12 years of voluntary observing he has sent us 21 logbooks of which 7 were classed Excellent and he received an Excellent Award in 1959.

We wish him health and happiness in his retirement.

J. C. M.

RETIREMENT.—CAPTAIN A. N. WILLIAMSON has retired from the sea after 45 years' service.

Alexander Newton Williamson was born in Leith and first went to sea as a cadet with the Bibby Line in 1924, being appointed to their *Dorsetshire*. He passed for 2nd Mate in 1929 and joined the Ben Line as a junior officer in their *Bencruachan*. Later he went to the New Zealand Shipping Company in their *Ruapehu* and, after passing for Master in 1935, he returned to the Bibby Line. His first command was in 1950 in the *Empire Pride* which was being managed by the Bibby Line for the Ministry of Transport. Captain Williamson was, in fact, the first Bibby Line cadet to attain a command in the Company.

During World War II Captain Williamson held a temporary commission in the Royal Naval Reserve; his first ship H.M.S. *Cheshire*, which had been requisitioned by the Admiralty from the Bibby Line, was torpedoed in the Atlantic in October 1940. Subsequently he spent three years in H.M.S. *Folkestone* on convoy-escort duties in the North Atlantic and later was mentioned in despatches for mine-laying operations from H.M.S. *Plover* during 1944.

In the February 1932 number of *The Marine Observer* we published extracts from the meteorological logbooks of three ships, all of the New Zealand Shipping Company, which had been involved in the Napier earthquake of February 1931. One of these ships was the *Ruapehu* which had been diverted to the port in order to take the survivors of the earthquake to Wellington. In her, the young Mr. Williamson was serving and was compiling his first meteorological logbook.

Altogether, in 22 years of voluntary observing he sent us 49 meteorological logbooks of which 21 were classed Excellent. He received Excellent Awards in 1939, 1954, 1955, 1956, 1958 and 1961.

We wish him health and happiness in his retirement.

L. B. P.

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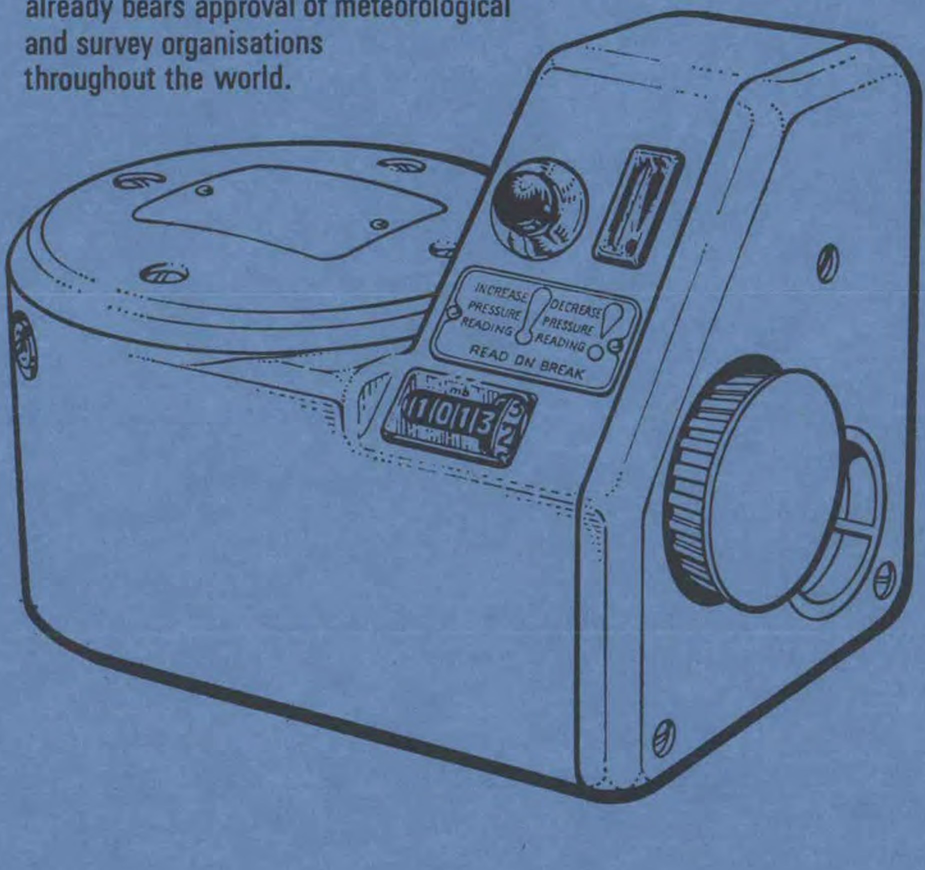

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