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THE MARINE OBSERVER

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COVER PHOTOGRAPH: Snowline at 2000 m on Crete, with northern Paximadhia in the foreground. Photographed from the *Liverpool Star* by Mr P.W. Jackson on 31 December 1990.

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Letters to the Editor, and books for review should be addressed to the Editor, *The Marine Observer*, Met. Office (OM), Scott Building, Eastern Road, Bracknell, Berks RG12 2PW.

LONDON: HMSO

Editorial

World Meteorological Day, a celebration with the theme 'Observing the Weather and Climate' on the 44th anniversary of the World Meteorological Organization, came and went, with the work of voluntary observers the world over being acknowledged. The theme was proposed by our own Met. Office Chief Executive, Professor Julian Hunt, who was out and about on the day, which fortunately fell within the National Week of Science, Engineering and Technology. Professor Hunt is very keen for the public to become aware of the vital importance of observations, and in particular he wishes children to be involved.

At such places as the Science Museum in London, children of all ages were able to obtain hands-on experience of the ways and means of measuring some of the many elements which make up the meteorologist's trade. Under the guidance of Met. Office scientists, a large party of children took weather measurements, including the release of cloud-base balloons. Viewers' and listeners' questions were answered on TV and radio and special presentations were given by Met. Office TV Presenters and by staff of the Education Services branch. Several national newspapers also reported on this event.

Many other activities took place around the United Kingdom at Weather Centres and observing sites, whilst Port Met. Officers on their liaison ship visits made a special point of acknowledging the vital work of the voluntary observers at sea.

To mark this special day, a new Met. Office flag was unfurled beside the WMO banner at Bracknell Headquarters. Also, during the Ocean Weather Ship's Greenock call just prior to the event, the flag was presented by the Marine Superintendent to the Master of the *Cumulus*, Captain Peter Hunter, to hoist as a 'house flag', complementing the OWS Blue Ensign which the ship flies.



Photo. by A.D. Reid

Captain P. Hunter and Marine Superintendent Captain Gordon Mackie displaying the new Met. Office 'house flag' in the ward room of OWS *Cumulus*.

The future of the Weather Ship has recently been the subject of much speculation, following a Treasury financial review. Press reports of the possible demise of the *Cumulus* are premature. Thanks in no small part to marine industry

support in the form of letters to the Chief Executive, expressing dismay at the possibility of the loss of the Weather Ship's vital North Atlantic observations, the ship's operation has been reprieved and a decision on withdrawing the ship from station has been postponed, at least for the time being. It must always dismay the devotee when a centre of excellence is threatened with the axe, and it was encouraging that support for the Weather Ship came from many quarters, including the Nautical Institute and the Master of the Honourable Company of Master Mariners.

Following the 1991 drydocking and extensive refurbishment of the Honourable Company's Headquarters ship *Wellington* in 1991, the Company is celebrating the ship's 60th anniversary in style. The ship has never looked finer since her arrival at her Victoria Embankment berth by Temple Stairs in December 1948, despite arduous service in World War II, which included convoy escort duties in the North Atlantic and Mediterranean, and rescuing passengers and crews from torpedoed merchant ships. The *Wellington* in her new livery can also be numbered amongst the United Kingdom's marine centres of excellence, and can certainly be recommended for private functions, having five different rooms in which guests can be royally entertained.

Another centre of world class is the expanding Southampton Oceanography Centre for research on oceanography, marine and earth sciences. When completed on 13 acres adjoining the Empress Docks in 1995, the centre is set to play a pivotal role in marine sciences, earth sciences and marine technology throughout the next century.

The Met. Office will have close links with the new centre, which brings together the Natural Environment Research Council's Institute of Oceanographic Sciences Deacon Laboratory at Wormley, Surrey; the James Rennel Centre, already at the University of Southampton Science Park; the NERC's Research Vessel Services at Barry, South Wales; and the University of Southampton's Departments of Geology and Oceanography, together with its underwater acoustics group.

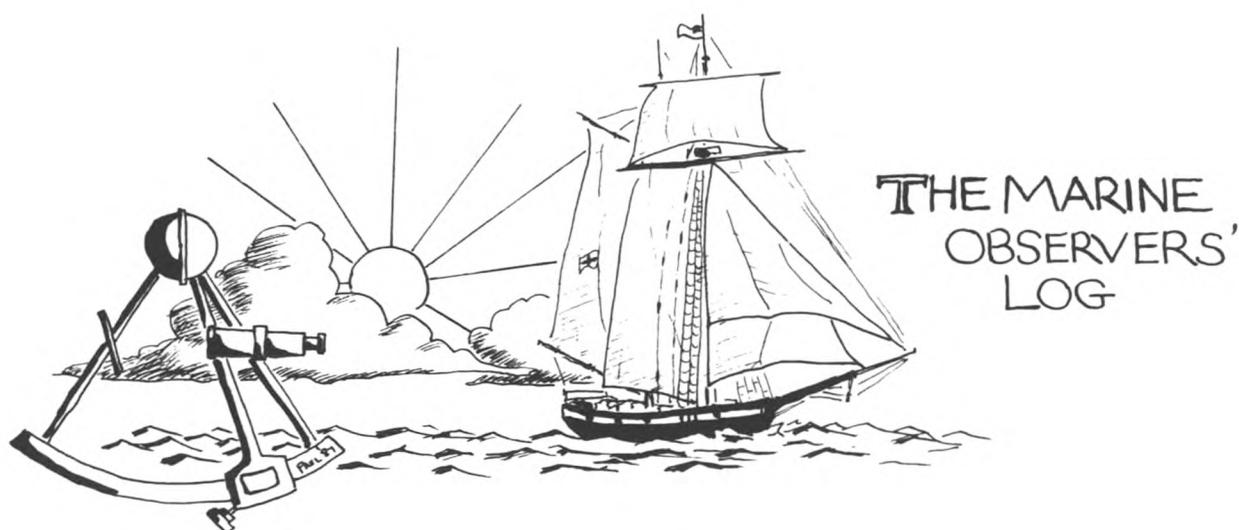
With such a wealth of skills, including NERC's observing ships, the development of the centre will create a community with such a breadth of expertise that the centre will rightly be considered the zenith in research and teaching of the marine sciences in the U.K.

Another milestone recently celebrated within the confines of the Met. Office was the Silver Jubilee of METROUTE. The world-wide ship-routing section marked this anniversary with the announcement that not one vessel has been lost at sea out of the 10,000 weather-routed passages handled with METROUTE advice. This is ascribed to the skilled teamwork established between the team of Master Mariners and the meteorologists of the Central Forecasting Office, using contemporary computer and communications technology.

Returning to the admirable work of our voluntary observers afloat, Excellent Awards for meteorological logbooks presented in 1993 are even now being finalised. However, the complete list of recipients will not be available for publication in this July edition as is usual. Nevertheless, those to be presented with the special book awards will be notified as soon as the list is finalised, and the results published in October.

Also in the next edition, we plan to include our first Readers' Survey which we hope will be completed and returned by many readers so that we can assess the wishes and requirements of our readership.

J.F.T.Houghton



July, August, September

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. All temperatures are Celsius unless otherwise stated. The standard international unit for barometric pressure is the hectopascal (hPa) which is numerically equivalent to the millibar (mb).

HURRICANE 'CALVIN'

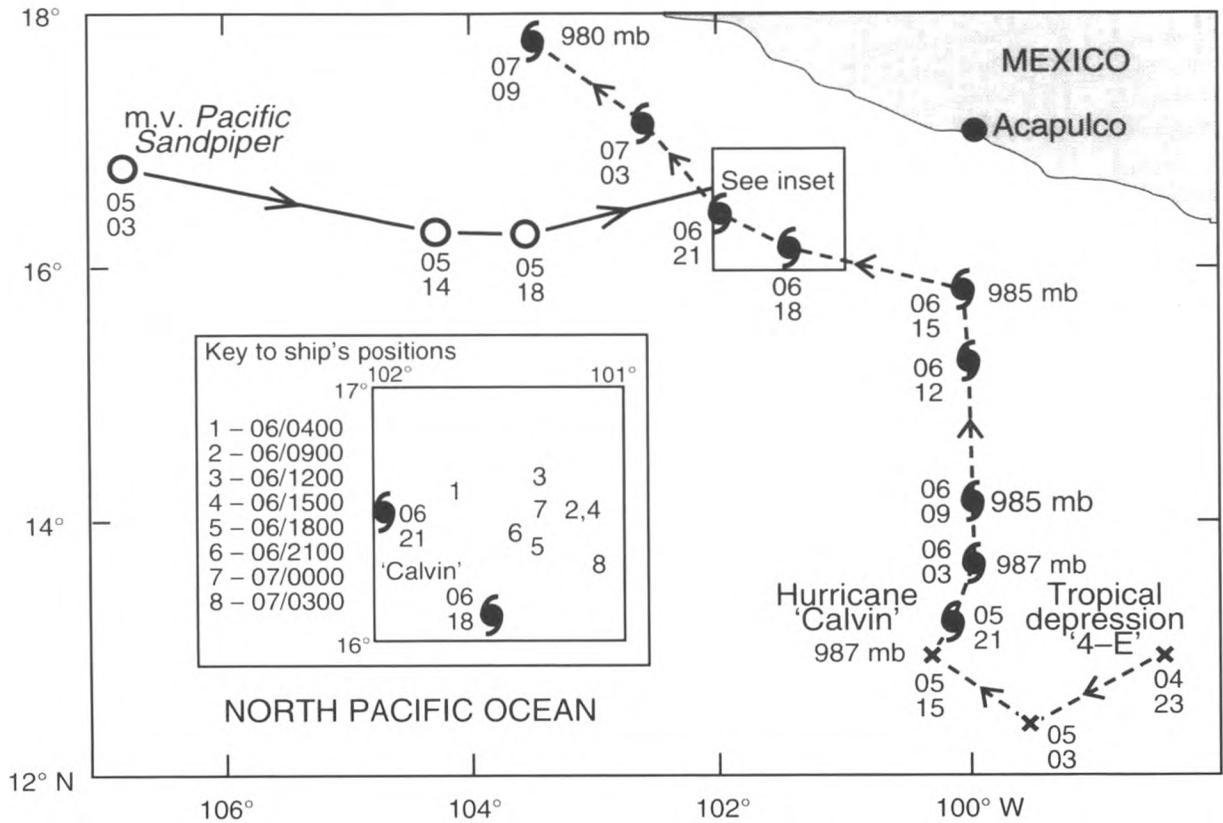
Eastern North Pacific

m.v. *Pacific Sandpiper*. Captain J.M. Miller. Tokai Mura to Balboa. Observers: the Master and ship's company.

3–7 July 1993. During the period the vessel suffered the effects of a tropical depression which later developed into hurricane Calvin. The following observations illustrate the conditions experienced whilst the chartlet [derived from the observations after receipt at Bracknell] shows the tracks of the vessel and the storm.

Date and time (UTC)	Remarks
3rd 1000:	Tropical weather outlook received from NWS Miami, stated, 'A large but disorganised area of cloudiness and thunderstorms persists a few hundred miles SW of Nicaragua. This system has the potential for some development during the next day or two.'
4th 2300:	NWS Washington DC issued a warning of tropical depression '4-E', in position 12.9°N, 98.7°W at 2100, moving west at 6 knots. Maximum sustained winds 30 knots, gusts to 40 knots. A forecast for a tropical storm was made for 0600 on the 5th, in position 13.0°N, 99.6°W.

- 5th 0300: Ship altered course to 102°, towards Acapulco, to increase the distance from 4-E which was still indicated as progressing west at 6 knots. Light and variable winds at the ship, becoming calm; confused swell of 1.5 m. At 0500 Miami warned that the depression was now upgraded to tropical storm, and named Calvin. Storm force winds and seas greater than 3.5 m were expected out to 50 n.mile from the centre.
- 1400: Ship altered course again in another (vain!) attempt to by-pass the storm. Weather conditions at the ship: dry-bulb 24.4°, pressure 1008.6 mb, wind NW'ly, force 3. Slight sea, low confused swell. At 1500 NWS Miami gave the position of Calvin as being near 13.1°N, 100.3°W while forecasting a hurricane at 13.2°N, 101.2°W by 0000 on the 6th.



- 6th 0000: Weather at ship was wind NW'ly, force 4-5, seas very confused. Cumulus of large vertical extent present in a chaotic sky as sunset approached. Horizon to the south-east was very dark with sheet lightning.
- 0300: Hurricane centre within 30 n.mile of 13.3°N, 100.5°W heading 295° at 4 knots; estimated central pressure 987 mb. Weather at ship was wind N×W'ly, force 3, thundersorm in the last hour with very heavy rain, pressure 1006.6 mb. Wind veered to E'ly, and increased to force 5-6 very suddenly. Continuous heavy rain. At 0400 the ship was at 16° 34.7'N, 101° 35.9'W. Wind E×S'ly, force 7, pressure 1005.6 mb, continuous heavy rain. Wind increased to force 9 by 0530. Ship gradually hove to about 90 n.mile west-by-south of Acapulco.
- 0900: Hurricane centre within 45 n.mile of 14.2°N, 100.0°W heading 355° at 5 knots; estimated central pressure 985 mb. Mexican government issued a Hurricane Watch and Tropical Storm Warning for the coast between Zihuantanejo and Pinotepa Nacional.
- 1200: Weather conditions at the ship: dry bulb 24.7°, pressure 998.2 mb, wind ENE'ly, force 10. Continuous heavy rain; swell predominantly from the east-south-east, seas increasing to more than 12 m.
- 1500: Weather conditions at the ship: dry bulb 25.2°, pressure 988.4 mb, wind E×N'ly, force 12 (estimated as sustained at 85 knots). Continuous heavy rain, visibility generally less than 3 cables owing to flying spray and rain. The barograph trace reached its lowest point. The largest waves, height estimated at about 16 m (i.e. bridge height) were pure white while the rest were marbled in appearance.
- 1800: Calvin near 16.1°N, 101.5°W heading north-west at 11 knots. Position of ship 16° 20.8'N, 101° 20.1'W. Wind SE×E'ly, estimated as sustained at 62 knots. Heavy intermittent rain, seas subsiding to about 9 m.

By 2100 the hurricane was to the west of the ship and was on a heading of 305° at 11 knots. Weather conditions at the ship began to improve and by 0300 on the 7th the heavy rain had become showery. Later in the day the wind veered to SSW'ly and then to N'ly, force 1–2. Calvin continued to intensify as it moved north-west and inflicted considerable damage ashore before finally dissipating at 0300 on the 9th.

Position of ship at 0300 on the 5th: 16° 48.1'N, 106° 40.1'W.

Position of ship at 1500 on the 6th: 16° 30'N, 101° 12'W.

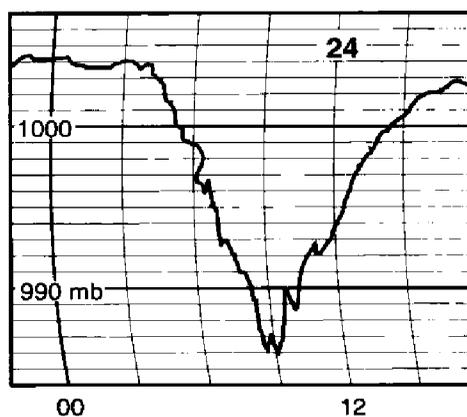
TROPICAL STORM 'WINONA'

South China Sea

m.v. *Zidona*. Captain D.C.J. Still. Singapore to Chiba. Observers: the Master, Mr D. Linfoot, Chief Officer, Mr C. Renton, 2nd Officer, Mr G. Watts, 3rd Officer and ship's company.

24–25 August 1993. During this time the vessel passed through tropical storm Winona. The track of the storm had been plotted over the previous few days from fax charts and weather forecasts received from both the Japanese meteorological service and the Hong Kong Observatory but its forecast course was found to be not as accurate as first assumed. Whilst the vessel did not actually pass through the eye, it was very close, as the following deck logbook entries and barograph trace [out of phase] show.

Date and time (UTC)	Wind Dir'n	Wind Force	Pressure (mb)	Cloud (Oktas)	Remarks
24th 1500	270°	7	1010.0	8	Overcast skies. Moderate rain showers.
1800	045°	10	993.0	6	Heavy seas. Gale force winds. Lightning. Heavy rain showers.
1900	060°	12	990.7	6	Heavy seas. Gale force winds. Lightning.
[Position of storm at 1900: 15.0°N, 116.4°E.]					
2000	075°	10	992.2	8	
2100	115°	10	995.9	8	Overcast skies. Heavy rain showers. Squalls.
2200	135°	9	998.3	8	
2300	135°	8	1001.1	8	Overcast skies. Moderate rain showers. Squalls.



25th 0000	160°	9	1003.7	8	
[Position of storm at 0000: 16.2°N, 115.9°E.]					
0100	160°	8	1004.9	6	Cloudy skies. Moderate rain showers. Squalls.
0300	160°	6	1006.6	5	Cloudy skies. Light rain showers.

The dry-bulb temperature remained at an average of 27.0° throughout the period.

The vessel steered a north-easterly course throughout, making an average speed of 10.5 knots. The Master was up all night, for obvious reasons, and it was with great delight that he adjourned for an afternoon siesta, having had a much deserved lunch.

Position of ship at 1900 UTC on the 24th: 15° 33'N, 116° 47'E.

Position of ship at 0300 UTC on the 25th: 16° 37'N, 117° 47'E.

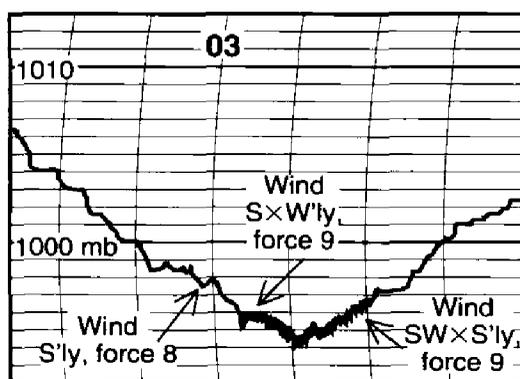
TYPHOON 'YANCY'

Eastern North Pacific

m.v. *BP Admiral*. Captain J.M. Ronald. Yokohama to Mutsure. Observers: the Master, Mr J.M. Cleugh, Chief Officer, Mr P.N.W. Collings, 2nd Officer, Mr P.M. Belcher, 3rd Officer and ship's company.

1-4 September 1993. Having sailed at 1800 UTC on the 1st, the vessel received warning of the approach of Yancy via fax charts, satellite, meteorological reports, NAVTEX and coast radio stations. The vessel's intended track was along the south coasts of Honshu and Shikoku and then up through the Inland Sea to Mutsure. However, the estimated time of arrival at the Inland Sea (Seki Saki Pilot station) was the same as Yancy's. Therefore, at 2300 on the 2nd, with the wind increasing to SE'ly, force 5, the vessel altered course to 180° in order to clear the shore and the projected track of the storm.

At 0400 on the 3rd the wind veered to S'ly and increased to force 8 as the pressure began to fall rapidly, see barograph trace. From this time the vessel reduced speed to about 3 knots and began to follow the wind around so that the wind was always on the bow, or very fine.



12

At 1200 on the 3rd, the pressure was 996.3 mb and Yancy was 142 n.nile away bearing 279° with a central pressure of 945 mb, having started to weaken since 1800 the previous day when its pressure was 925 mb. Mountainous seas were experienced throughout from 1200 until 0000 on the 4th but in the darkness no accurate wave heights or periods could be ascertained; however, violent movement of the vessel testified to quite a sizeable sea. Heavy precipitation occurred throughout the night.

By 0130 on the 4th the wind had abated to force 7 and the vessel's original course and speed were resumed to enter the Inland Sea at 1430.

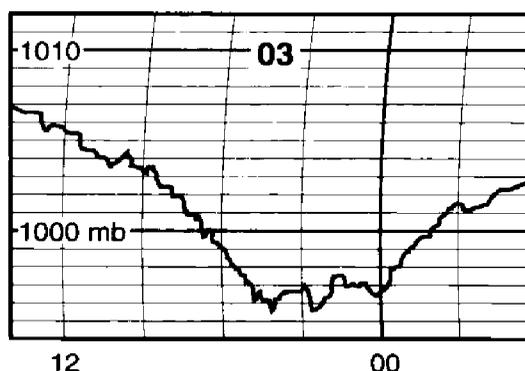
Position of ship at 1200 UTC on the 3rd: 32° 25'N, 134° 34'E.

Eastern Pacific

m.v. *Tokyo Bay*. Captain D.S. Hughan. At anchor off Nagoya. Observers: the Master and ship's company.

3–4 September 1993. At 0330 UTC on the 3rd, advice was received that the port would close owing to the expected arrival of Yancy. The following observations were taken from the vessel's safe anchorage as the storm eventually passed 140 n.mile to the west.

Date and time	Remarks
3rd 1100:	Wind E×S'y, force 7. Dry-bulb temperature 23.2°. Pressure 1005.1 mb. Intermittent moderate/heavy rain; pressure falling unsteadily.
1300:	Wind E'y, force 8. Dry bulb 22.2°. Pressure 1003.3. Continuous rain, frequently heavy; gusts of wind to force 9; visibility about 3 n.mile in heavy rain.
1400:	Wind ESE'y, force 8. Pressure 1003.0 mb. Wind veers and increases to force 9 between 1345 and 1415.
1600:	Wind SE'y, force 8. Pressure 1001.2 mb. Rain ceases; ragged stratus breaks to show moon.
1700:	Wind SE'y, force 9. Dry bulb 23.7°. Pressure 998.7 mb. Continuous rain giving way to frequent heavy rain showers; gusts of wind to force 10. Wind eases to force 6–7 at 1730. Shore lights visible at 7–8 n.mile. Lightning to south-west at 1750.



1800:	Wind SE'y, force 9. Dry bulb 26.2°. Pressure 996.1 mb. Pressure falling steadily; wind increasing; showers more scattered.
2100:	SSE'y, force 9. Dry bulb 26.0°. Pressure 995.4. Wind increases to force 10. Heavy rain with visibility down to about 2 n.mile giving way to moderate rain showers.
4th 0000:	Wind S×W'y, force 7. Dry bulb 27.1°. Pressure 998.4 mb. Large cumulus and strato-cumulus to west, dense cirrus overhead. Wind decreasing; good visibility.
0300:	Wind ENE'y, force 6. Dry bulb 27.5°. Pressure 1000.9 mb, rising. Wind veers rapidly to NNE'y, force 6.

During the next eight hours the pressure continued to rise and the wind veered to NW'y, force 4 eventually giving way to light airs and a corrected pressure of 1011.6 mb at 1900. The port of Nagoya was re-opened at 0600 on the 4th.

Position of ship: 34° 39'N, 136° 46'E.

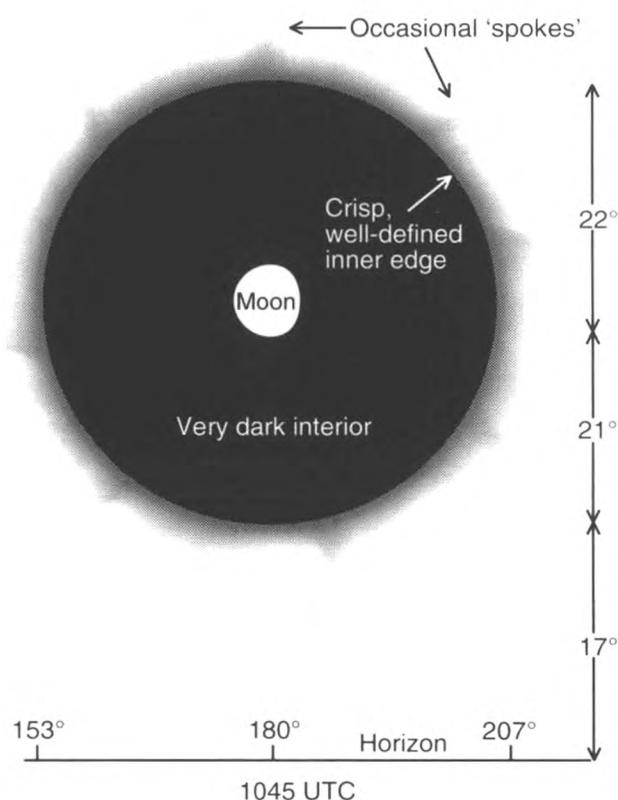
Editor's note. Yancy was the most severe of the six storms which either crossed or skirted Japan during the 1993 cyclone season. It made landfall on 3 September, bringing strong winds and heavy rain which damaged rice, sugar cane and citrus crops. Sustained winds of 120–130 mph were produced as Yancy passed across south-east Kyushu, and were still 109 mph as the then extratropical storm passed between Shikoku and Honshu.

HALO North Pacific Ocean

m.v. *BP Admiral*. Captain J.M. Ronald. Huang Pu to San Francisco. Observers: Mr P.M. Belcher, 3rd Officer and Mr R. Acma, OS.

29 July 1993. At 1045 UTC a large, very well defined and complete halo was seen around the 10-day old moon. Vertical angles were taken by sextant while horizontal angles were found by gyro repeater.

As shown in the sketch, the area inside the halo was inky black with the inner edge of the halo being very clear cut and well defined; a 'spoked' effect was seen on the outer edge.



The cloud cover was 8 oktas of high thin cirrus which allowed only Jupiter to be visible through it, and shortly afterwards low cumulus obscured the area.

Position of ship: 28° 33.5'N, 152° 36.5'E.

Note. Dr R. White, Director of Theoretical Research, Institute for Research in Meteorological Optics, comments:

'Most features, such as the sharp inner edge with hardly any illumination nearer the moon (this is the position of "minimum deviation") are standard. The main interest attaches to the "spokes" which, since they seem to have been randomly distributed round the circumference of the halo, cannot have been paraselenae or the paraselenic circle etc. It would seem that they must be, in effect "crepuscular rays" corresponding to areas of greater transparency in some layer above, or at any rate in the upper part of the cirrus layer. Nonetheless, I find it surprising that the observers apparently noticed no trace of the layer of variable transparency.'

TIDE RIPS

Eastern North Atlantic

m.v. *Dallington*. Captain P.M. Frost. Safi to Caronte. Observers: the Master, Mr S.J. Heggie, Chief Officer and Mr B. Standerline, 2nd Officer.

25 July 1993. At 1500 UTC whilst about 20 n.mile west-by-north of Pt Nador (Morocco) on a course of 041°, the vessel was noted to yaw wildly and fall off course to port. The vessel was about 15° off course as set before she would answer helm. Initially, a gyro problem was suspected but as the ship was able to correct her heading (with a little help) this was soon discounted. Closer inspection revealed a tidal rip which was almost invisible to casual observation, no broken water or wave crests usually associated with such a disturbance being seen.

Roughly 15 minutes later, further tide rips were encountered and, as traffic was light, it was decided to see exactly what the effects would be. This time, it was possible to see a series of evenly-spaced tide rips about 100 m wide and stretching across the visible plane on a bearing of 015° to 195°. In this area the sea surface was completely calm, or very slightly rippled and there was slight agitation on the perimeter of each rip but no broken water. The wind at this time was NW'ly, force 3–4.

On meeting the first of these rips, at 1515, the vessel's heading was forced to 045° then rapidly to 025° before gradually settling back on course, as set. At the next one, crossed at 1519, the vessel was forced to 043° then to 030° before reverting to 041°. At 1522 the next rip forced the vessel to a heading of 045° then very quickly to 034° before settling. The smooth sea area in this rip contained distinct and well-defined eddies and whirlpools about 2 m and 7–8 m across, respectively. The last of the well-defined rips was met at 1534 when the heading changed to 043° then rapidly to 028° before settling. In the smooth area of water the sea temperature was 22.4° but was 21.5° immediately to the north of it.

Further tidal activity was encountered until 1600 but no major problems occurred with steerage. It was interesting to note that several fishing vessels were engaged in trawling directly along the calm areas.

Position of ship: 35° 17'N, 06° 33'W.

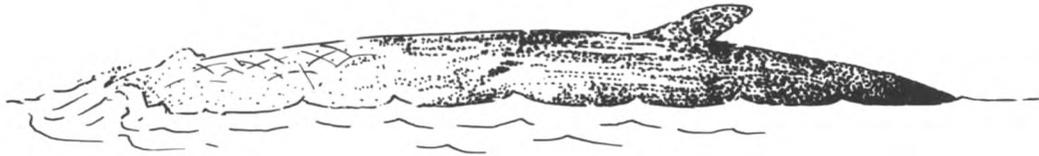
CETACEA

Equatorial Atlantic

m.v. *Appleby*. Captain C. Barclay. Immingham to Saldanha Bay. Observer: Mr B.H. Birch, Chief Officer.

19 August 1993. At about 1610 UTC whilst the vessel was on a heading of 180° at a speed of 13.5 knots, five whales were spotted heading north. They were breaking the water very gently just forward of the blowhole (no beaks were seen), and were submerging again before any sign of the tail came.

As shown in the sketch, the rear part of the body was a solid dark-grey colour but the fore part had a mottled appearance composed of criss-cross lines rather than patches, and was less coloured, becoming paler towards the head as far as could be seen. The mottled area seemed to have a brownish tinge which could also have been present on the rear of the body but was not obvious there. All the whales appeared to be of a similar size, roughly 5–6 m long and all passed at a distance of about 200 m.



Ten minutes later a school of approximately 200 dolphins was sighted as it passed about 300 m from the vessel, the dolphins always seeming to be moving away from the ship. They appeared to be a small species roughly 1.5–2 m long, and were slim bodied with a long snout which made up perhaps 20 per cent of the body length. A tall and slender dorsal fin was also seen. The upper half of the body was darker than the underside, and within the school, the colour of the upper half varied from a very dark grey through to light-grey whilst the lower half was very pale. Roughly 15–20 per cent of the dolphins were thought to be juveniles.

They were all breaking the surface, some leaping clear and spinning up to 2½ revolutions along their fore-and-aft axes.

Weather conditions were: air temperature 24.2°, wet bulb 22.0°, sea 23.8°, wind S'y, force 3, there was sunshine and a clear sky.

Position of ship: 00° 31'S, 09° 31'W.

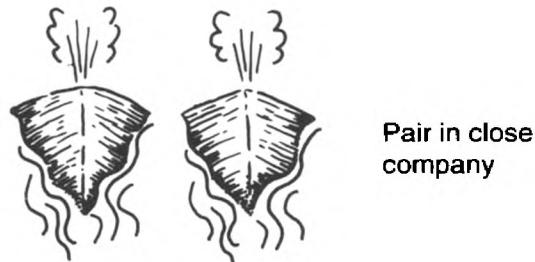
Editor's note. Through reference to publications held in our offices, we suggest that the first observation was a Cuvier's Whale (*Ziphius cavirostris*), while the dolphins were probably Spinner Dolphins.

Western South Atlantic

m.v. *Barbara E.* Captain D.A. Peden. Rio de Janeiro to Belem. Observer: the Master and Mr J. Dennis, Chief Engineer Officer.

22 August 1993. Whilst in the vicinity of the Arquipélago dos Abrolhos on a course of 019° at a speed of 12 knots, several groups of whales were sighted during the course of the morning. All were sighted east and south-east of the area of reefs in depths of water generally 28–30 m (charted) with occasional depths of 53 m.

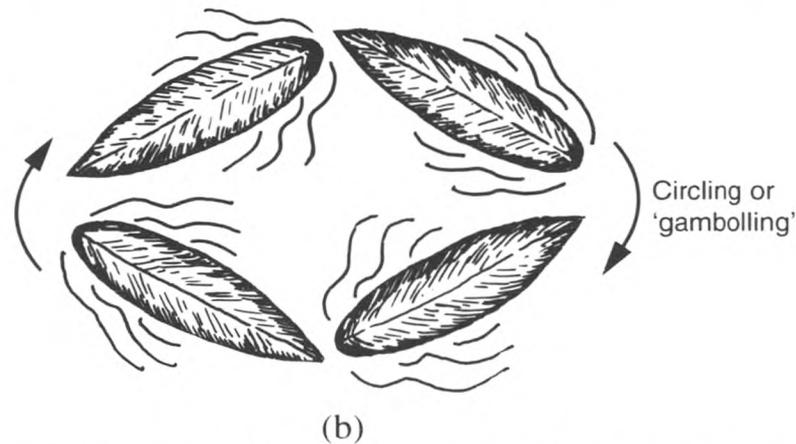
At 1245 UTC a group of three or four whales was seen and, though not especially active, their behaviour was noted as blowing regularly with flukes not shown at all. At this time two whales were spotted moving slowly away from the vessel and were observed more closely. Almost certainly Humpback Whales, they were keeping close company, blowing almost simultaneously at intervals of about 30 seconds, as shown in sketch (a) while steadily rising and falling to and below the surface together.



(a)

More whales were then sighted very close ahead of the vessel and split into two groups numbering three or four on one side and one or two on the other. Passing alongside at a distance of less than 1 cable the larger group appeared to be circling

or 'gambolling' almost continuously on the surface, blowing at intervals of 15–20 seconds, see sketch (b). Their dorsal fins were clearly of the profile illustrated for the Humpback Whale and their behaviour was vigorous but not unduly disturbed by the relatively close passing of the vessel. Although some 'bunching' of the hindquarters may have occurred, the whales did not appear to be diving, but flukes were raised or visible. The overall profile was more clearly observed than previously, the nose appearing just clear of the water at times.



A single whale was subsequently seen at about 1345, the vessel passing at 1–2 cables. This specimen appeared to be moving approximately eastward; blowing several times, it eventually 'bunched' up and dived quite dramatically with its flukes and entire tail raised clear of the water in a mass of spray. The edges of the flukes were closely observed but it could not be seen whether they were serrated or 'V-shaped'. All of the individuals seen during the morning were about 15 m long and dark-grey or black in colour.

Assuming the whales were all of the same species, the observers' collective opinion was that they were Humpback Whales. The 'mirror' behaviour of one pair and the circling movement of another group were quite distinctive and the possibility that these behaviours were connected with courtship/mating rituals was considered.

Position of ship at 1245 UTC: 18° 08'S, 38° 18'W.

Eastern North Pacific

m.v. *Chiquita Schweiz*. Captain M.L. Kinnear. Puerto Madero, Mexico to Wilmington, California. Observers: the Master, Mr P.J. Gallie, Chief Officer and Mr T. Karake, Cadet.

13 August 1993. At 1345 UTC, whilst passing Cabo San Lucas a whale was sighted 2 points off the port bow at an approximate distance of 5 cables. It was swimming parallel to the ship's course of 322° but as the ship overtook it, the whale suddenly dived away; at this point, it was 1 cable on the beam. The whale was identified as a California Grey Whale through reference to *The Seafarer's Guide to Marine Life*, by P.V. Horsman. It was thought that the whale dived having detected the noise of the ship's engine and propellor.

Although no further whale sightings were made, shortly afterwards a school of approximately 50 Common Dolphins (*Delphinus delphis*) was seen off the port bow.

Position of ship: 22° 41'N, 112° 25'W.

m.v. *Chiquita Schweiz*. Captain M.L. Kinnear. Los Angeles to Panama. Observers: the Master, Mr P.J. Gallie, Chief Officer, Mr I.O. Bagalay, AB, Mrs Kinnear, Supernumerary and members of ship's company.

16 September 1993. Whilst the vessel was approaching the Pilot station at Puerto Armuelles, two Bryde's Whales (*Balaenoptera edeni*) were observed swimming together in a southerly direction approximately 30 m from the port side of the ship. They appeared to be mother and calf staying very close to each other, side by side. The adult was about 20 m long whilst the calf was about 7 m long. They were watched for about 15 minutes during which time they surfaced eight times.

The Pilot and local mooring gang informed the observers that whilst whales were not uncommon in Charco Azul Bay, it was rare to see them so close inshore (the vessel was 1.5 n.mile from land at the time) and that they were sighted more frequently during the 'summer' dry season (December to April) than in the 'winter' wet season (May to November).

The whales were identified through reference to *The Seafarer's Guide to Marine Life* by P.V. Horsman and the observers also learned from it that the species takes its name from J. Bryde, a Norwegian consul to South Africa, who built the first whaling factory at Durban in 1909.

Position of ship: approximately 08° 17'N, 82° 52'W.

MANATEES

Panama Canal

m.v. *Andes*. Captain T.R. Barton. Cristobal to Balboa. Observers: Mr W.A. Heffernan, 3rd Officer and Mr J. Nonato, AB.

12 August 1993. At 1510 UTC whilst the vessel was in northbound transit of the Panama Canal and approaching No. 75 buoy along the Mamei Reach at full ahead manoeuvring speed (about 13 knots), the Third Officer noticed a disturbance in the water ahead.

On closer inspection, the disturbance turned out to be a pair of manatees which were playing around the buoy. Both were 3–4 m long and seemed to be in good health, judging by the speed of their activity while playing. The vessel slowed down upon approach but neither mammal appeared to be concerned by it, even though passing them at only 8 m.

In conversation with the Pilot, it was revealed that these were the first manatees to be seen in Gatun Lake for approximately 10 years. A report of the sighting was sent to canal biologists who were working in the area.

Position of ship: 09° 07'N, 79° 46'W.

Editor's note. Photographs (taken on board the *Lincolnshire*) of this rarely reported mammal appear in *The Marine Observer*, January 1992, p.29.

SEAL

North Pacific Ocean

m.v. *BP Adventure*. Captain D.R. Lewis. Chiba to San Francisco. Observers: Mr T.T. Latto, 2nd Officer and Mr W.O. Pardyak, Cadet.

17 August 1993. At 0115 UTC a small, black object was sighted ahead, close to the vessel's starboard side. On closer inspection it was found to be a seal

swimming along the surface and, as it drew level with the ship's bow, it dived briefly to reappear abeam of the vessel at about the same distance of 50–60 m.

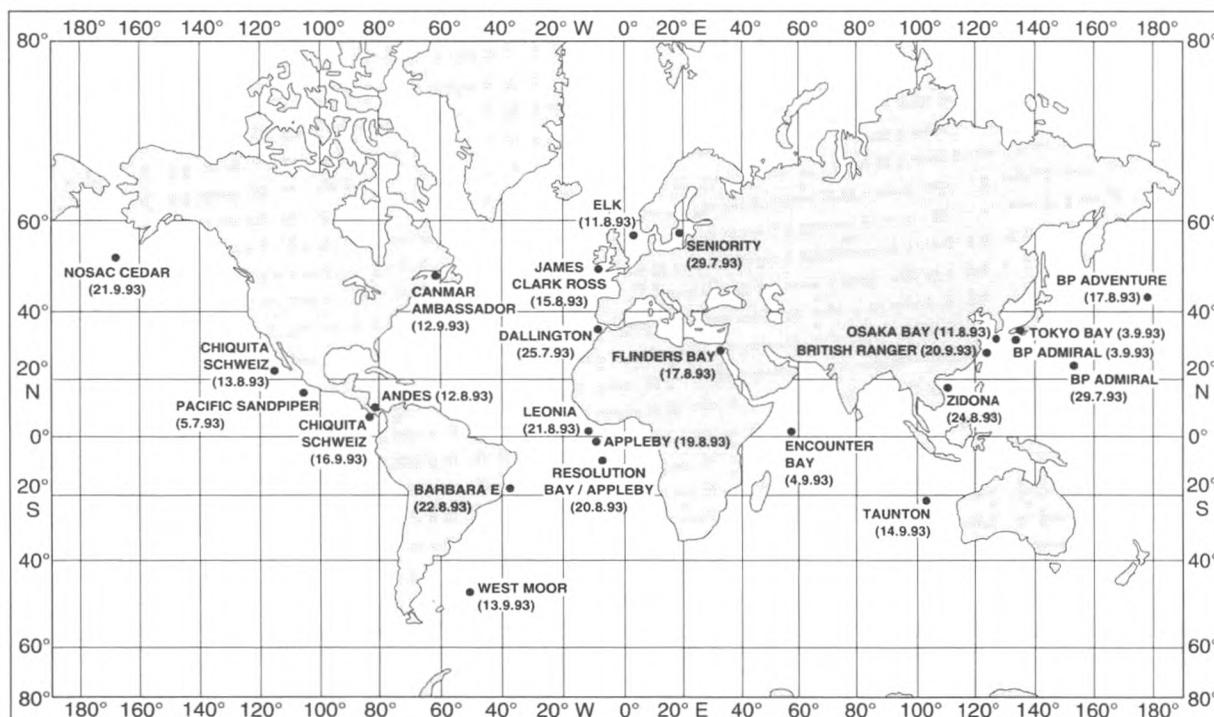
Unfortunately, it stayed at the surface for only 10 seconds or so before diving and being lost to sight in the wake and driving rain which made visibility bad. However, the specimen was estimated to be 1–1.5 m long with quite a slender body compared to Common and Grey Seals found around the United Kingdom, it had relatively large flippers compared to the body size and the head was well-rounded with whiskers clearly visible. The seal was a brownish black with dark, almost jet-black flippers and there were deep red/brown patches on its back just below the head and on its chest.

After consulting *The Seafarer's Guide to Marine Life*, by P.V. Horsman, the observers decided that it was most probably an Alaskan or Northern Fur Seal. The vessel's position some 355 n.mile from land and over a charted depth of some 4500 m seemed to rule out it being a sea otter or sealion. At this distance from the Aleutian Islands chain, it was thought the seal was lost!

At the time of observation the sea temperature was 13.0° and the sea was rough with a moderate swell.

Position of ship: 43° 23.5'N, 179° 59.7'E.

Editor's note. The *Nosac Cedar* whilst *en route* from Osaka to Nanaimo, also observed a seal, on 21 September. It had a dark head, grey breast and brown back, as noted by Captain E.D. Somes, Master. The seal took an interest in watching the vessel pass before resuming its business. The vessel was in position 49° 56.4'N, 165° 33'W about 230 n.mile from the Aleutians (the nearest land).



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

BIRDS

Gulf of Suez

m.v. *Flinders Bay*. Captain D.K. MacCorquodale. Suez to Fremantle. Observers: the Master, Mr N.A. Voss, 3rd Officer and members of ship's company.

17 August 1993. At 0800 UTC the vessel had just altered course at the southern end of the Gulf of Suez and was steering a course of 147° at a speed of about 20 knots, when a long column of large, white birds was seen flying across the stern at a distance of roughly 4 n.mile. A short while later, a similar column was seen flying across the bow, from port to starboard.

This column stretched across the horizon, making it several miles in length, and the birds were flying quite low, about 2–3 m above sea level. As the vessel passed through the column, the birds made no attempt to alter course but simply flew higher, although those that had to fly over the funnel must have had quite a shock. They were flying on a course of about 230°, and would have made landfall around the Gifatin Islands.

On the close inspection available, the birds were noted to have white bodies, long necks, long beaks which were orange in colour, black-and-white wings and black feet; comments from the bridge observers included 'type of heron' and 'must be a crane'. Reference was made to the only bird book available on board, *A Guide to Seabirds on Ocean Routes* by Gerald Tuck, where the following passage was found:

'If the voyager is fortunate enough to be passing through the Gulf of Suez during the first week of April or the last ten days of August, he may be a witness to the mass migration of White Storks passing in thousands across the Gulf during their northerly and southerly seasonal migrations.'

These storks must have been the early birds!

Position of ship: 28° 18'N, 34° 12'E.

Editor's note. A photograph of a White Stork appears on page 128 of the July 1993 issue of *The Marine Observer*.

Indian Ocean

m.v. *Encounter Bay*. Captain A.W. Ellis. Fremantle to Jeddah. Observers: Mr J.G. Swindlehurst, Chief Officer and members of ship's company.

4–6 September 1993. At 0245 UTC a single bird was noted 'playing' in the turbulence around the bow, frequently diving towards the surface of the sea but always just skimming the waves until 0310, when it clipped the top of one, fluttered on briefly and then landed. Whilst on the surface it lost some 400 m on the ship but on taking off again it gradually caught up and returned to the bow, settling on the foremast. Once there, it held its wings aloft whilst perched as if to dry its feathers. At this point, it was possible to see that the visitor had red legs and, on closer inspection from the fo'c'sle deck, the bill was noted as being not hooked. Identification was uncertain but the bird was thought a possible member of the tern family. At 1330 the bird was still roosting on the foremast.

The following day, at 1440, the bird was perched on the mast and reference to Tuck's *A Guide to Seabirds on Ocean Routes* gave thought that it may be a booby. After further consultation, a tentative identification of a Red-footed Booby was made. The observers' reference stated that boobies alight so as to watch for fish,

ready to launch themselves, but this hitch-hiker did not seem to be taking any notice of its surroundings, possibly indicating that it had injured itself to some degree when it hit the sea.

On the 6th at 0240 the booby tried a short test flight and then returned to the foremast for 10 minutes before taking flight again and riding the turbulence around the bow for a similar time, again diving toward the sea. This time, however, the reason was easy to see — flying-fish being chased to provide an early breakfast.

At 0300 the hitch-hiker presumably decided that there was insufficient action around the ship and flew off towards the south, soon being lost to sight.

Position of ship at 0245 UTC on the 4th: 01° 53'N, 58° 42'E.

Note. Captain P.W. Chilman, of the Royal Naval Birdwatching Society, comments:

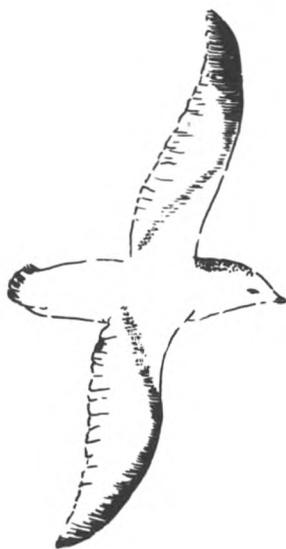
'The identification sounds correct, the red feet are the feature which identifies this species in all its different stages of plumage. It breeds on islands all round the tropics and wanders far out to sea, frequently roosting on ships. This and other boobies are known to chase and catch flying-fish.'

South Atlantic Ocean

m.v. *West Moor*. Captain E. Sierks. Falkland Islands to Ascension Island.
Observer: Mr N.C. Horner, Chief Officer.

13 September 1993. At 0900 UTC unusually large numbers of birds — several hundred at least, were in attendance and flying all around the vessel. A number of Pintado Petrels and at least one Wandering Albatross were easily identified but the largest group or flock consisted of what were thought to be Antarctic Prions, see sketch.

They were noticeably smaller than the Pintado Petrel and flew in a much more erratic manner, making them difficult to observe in any detail despite their close



proximity. From the top, their appearance coincided closely with the photograph in *Seabirds of the World* by Peter Harrison but the light areas under the wings and body were almost pure white and the colour of their bills was impossible to discern. They remained in company all day and some were still present on the following day.

Position of ship: 47° 12'S, 49° 00'W.

Note. Captain P.W. Chilman, of the Royal Naval Birdwatching Society, comments:

'Pintado Petrels and Wandering Albatross can always be expected in the Southern Ocean. Prions (sp. *Pachyptila*) are very difficult to tell apart unless you are well acquainted with them. The observer could well be right in identifying them as Antarctic Prions (*Pachyptila vittata*); however, the underwings and body are described as being almost pure white which makes me wonder if they were Fairy Prions (*Pachyptila turtur*). I honestly cannot say, and I am certain that I would not be sure unless I had a very good view of them. The prions breed all round the Antarctic and often occur in enormous numbers out to sea.'

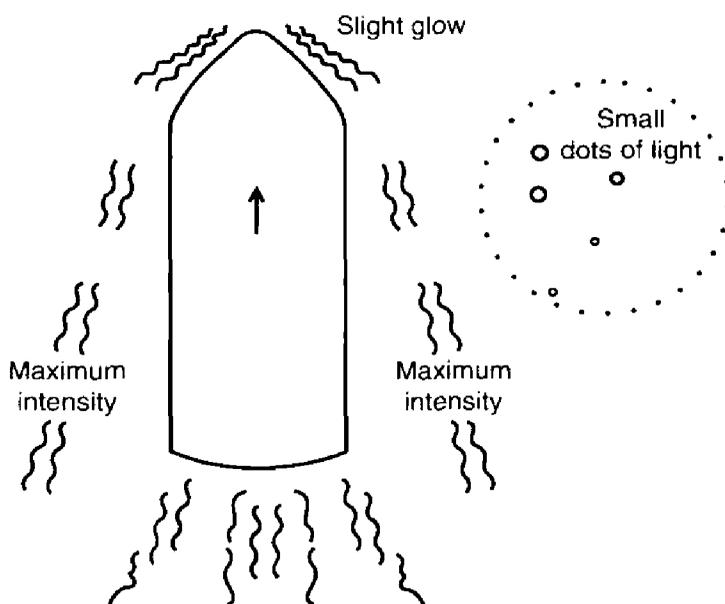
BIOLUMINESCENCE

Korea Strait

m.v. *Osaka Bay*. Captain D.J. Robertson. Busan to Kobe. Observers: the Master, Mr G.H. Smith, 3rd Officer and ship's company.

11 August 1993. At 1145 UTC very distinct bioluminescence was observed, the effects being so bright that the bridge front and also the interior of the wheel-house were lit periodically, as with close lightning. The 'lights' were observed to 'come on' when breaking waves were caused by the vessel's progress and, with reference to the *Mariners' Handbook*, this was described as 'disturbed water luminescence'; the lights were marine blue/turquoise in colour.

As shown in the sketch, the effect started at the bow and spread outwards, following the line of the wake. Near the vessel's side, lanes of light were seen, still being visible astern for a distance of 2 n.mile whilst further out from the bow and wake numerous small dots of light were seen.



The display lasted for nearly 3½ hours and, according to the salty sea-dogs on board, it was one of the best examples of the phenomenon they had ever seen. A sample of the water was taken in the sea-water bucket and vigorously shaken, minute particles in it then began to glow. A further sample was taken for landing in the United Kingdom but as there was no formalin, the Third Officer (at great personal expense) provided a measure of Bacardi for the purpose.

The area through which the vessel passed was being extensively fished at the time of the display and the observers wondered if this could have had any effect on

the intensity of the light. The weather at the time was calm with clear skies and a low bow swell; the sea temperature was 25.2°.

Position of ship: 33° 23'N, 128° 38'E.

Note. Dr P.J. Herring, of the Institute of Oceanographic Sciences Deacon Laboratory, comments:

'I have examined the sample (much encouraged by its strong aroma of Bacardi) and found it to contain several specimens of the brightly luminescent organism *Noctiluca*. This is a single-celled organism, known as a dinoflagellate, and is widespread in the world's oceans, particularly in coastal regions. Although dinoflagellates are technically plants, because most are photosynthetic and contain chlorophyll, *Noctiluca* is not photosynthetic but carnivorous, feeding on fish eggs and other tiny organisms. It is very large for a dinoflagellate and may reach 1 mm in diameter. In sea-water samples, it looks like a tiny transparent sphere. It does contain some orange pigment and when present in very dense concentrations, it can be visible as a red scum on the surface. Its luminescence is very bright and when, as here, large numbers are present, it can produce very spectacular effects, as described.

'The Bacardi worked well — I hope it is as successful in preserving the Third Officer.'

Celtic Sea

R.R.S. *James Clark Ross*. Captain N. Beer. Vessel on scientific cruise. Observers: Mr S. Wallace, 3rd Officer and members of ship's company.

15 August 1993. About one hour after sunset, at 2100 UTC, when the ship was about 28 n.mile south of Ireland, bright-green bioluminescence was observed where the ship's wake was breaking. After referring to the *Marine Observer's Handbook* the following action was taken.

Although the echo sounders remained on, the radars were switched off, resulting in no appreciable difference in the effects; the Aldis lamp was flashed onto the wake and the bioluminescence was no longer visible in the beam of light; finally, several samples of water were taken in the sea-temperature bucket. When the bucket was shaken luminescence was seen in it, and also on deck where water was spilt. The phenomenon appeared to form from small 'particles' approximately 0.5 mm across and continued until 2230. Throughout the night bioluminescence was observed from time to time but did not have the same intensity.

As no preservatives were available, the water sample was stored in the refrigerator on board, while the observers wondered what preservatives would be suitable.

Weather conditions at 2100 were: dry bulb 13.4°, sea 14.7°, wind WSW'ly, force 2–3. The sea was calm with a long, low westerly swell.

Position of ship at 2100 UTC: 51° 02.7'N, 08° 58.9'W.

Note. Dr P.J. Herring comments:

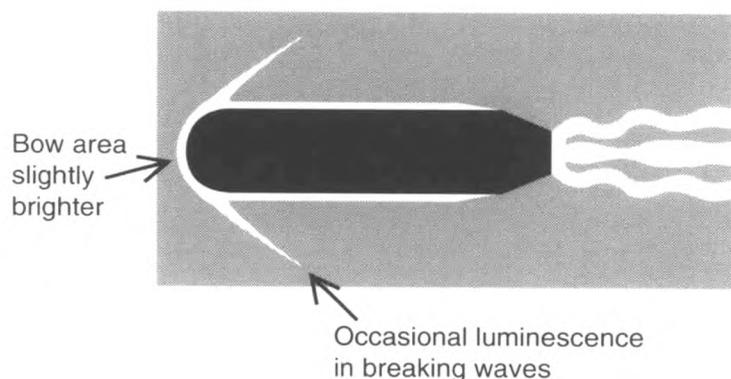
'This is a typical description of dinoflagellate bioluminescence, probably dominated by a species of *Noctiluca* in this instance. This looks like a large (0.5–1.00 mm) translucent sphere, very similar to a fish egg.

'Ideal preservatives are 10 per cent formaldehyde (formalin) in seawater; any concentration at which the formaldehyde can still be smelled is satisfactory. Alcohol is also suitable, any proprietary spirit will do if industrial alcohol is not available, add at least 10 per cent to the sample. In the absence of anything else a little bleaching fluid might work but I have not tried this.'

Equatorial Atlantic

s.s. *Leonia*. Captain A.F. Devanney. Cape Town to Las Palmas. Observers: Mr C.M. Scott, Chief Officer, Mr M.A.J. Thomson, 3rd Officer and Mr E.H. Boke, SG1.

21–22 August 1993. During the morning 12–4 watch on the 21st, marine bioluminescence was especially noticeable along the ship's sides to a width of 60–70 cm and in the wake which was visible as three white lines going astern for 100–150 m, see sketch.



It was not particularly bright, being a dull, milky colour although it seemed a little brighter around the bow and there was occasional luminescence from the breaking waves in that area. When the sea-water temperature was taken, the water sample was agitated but showed no signs of light; shining a light on the sea had no effect either. The display continued until 0300 on the 22nd.

At the time of the observation the sea temperature was 23.4° and the wind was WSW'y, force 3.

Position of ship at 2300 UTC on the 21st: 00° 51'N, 10° 07'W,

Note. Dr P.J. Herring comments:

'Bow wave and wake luminescence is most commonly caused by dinoflagellates, visible only as a general glow.'

Indian Ocean

m.v. *Taunton*. Captain C.J. Davies. Ponta Do Ubu to Kakogawa. Observer: Mr H. Narvekar, 2nd Officer.

14 September 1993. Between 1400 and 1630 UTC bioluminescence was observed in the disturbed waters of the bow wave although only that part of the wave which broke was lit. The colour was bright white with a violet tinge, and most of the lit waves stayed that way until they reached the bridge wing, with very few being visible past the stern. Surprisingly, there were no effects noticeable in the disturbed water close to the hull or for 15–20 m away from it.

The air a few feet above the sea had a diffused, white appearance which reduced the visibility to about 6 n.mile. Switching the radar on and off repeatedly had no effect on the phenomenon nor did flashing the Aldis lamp on it. A water sample

was taken and an attempt made to reproduce the light by shaking the sample in a bottle but this had no effect either.

At the time of the observation the sea water temperature was 23.5° and the wind was SSW'ly, force 2.

Position of ship: 20° 05'S, 103° 15'E.

Note. Dr P.J. Herring comments:

'I cannot identify the cause of this luminescence. If it had been dinoflagellates (the source most likely) I would have expected luminescence down the hull and in the wake. It is more as if it was something very close to the surface, small crustaceans or jellies are both possibilities.'

DISCOLOURED WATER

Baltic Sea

m.v. *Seniority*. Captain L.C. Pink. Halmstad to Riga. Observers: the Master, Mr P. Branagam, Chief Officer and Mr W.M. Dopheide, 2nd Officer.

29 July 1993. Between 0900 and 1700 UTC the vessel passed through an area of discoloured water in the form of long streaks of what looked like yellow sand. At first, it was thought to be tank washings but as it became thicker, it was quite obviously not. At one stage, the sea appeared almost yellow for as far as the eye could see.

Using a magnifying-glass, a bucketful of water was examined and showed what appeared to be a brown weed, formed from hairy elements similar to the white seeds blown from dandelion heads. Each individual element was very small and delicate. The area covered by the discolouration began from a point directly south of the southern end of Öland and extended to the southern end of Gotland, a total distance of nearly 100 n.mile.

The wind never exceeded force 2 during the period, and the only change in general conditions was an increase in the sea temperature from 15.1° to 16.5°.

Position of ship: 56° 12'N, 17° 18'E.

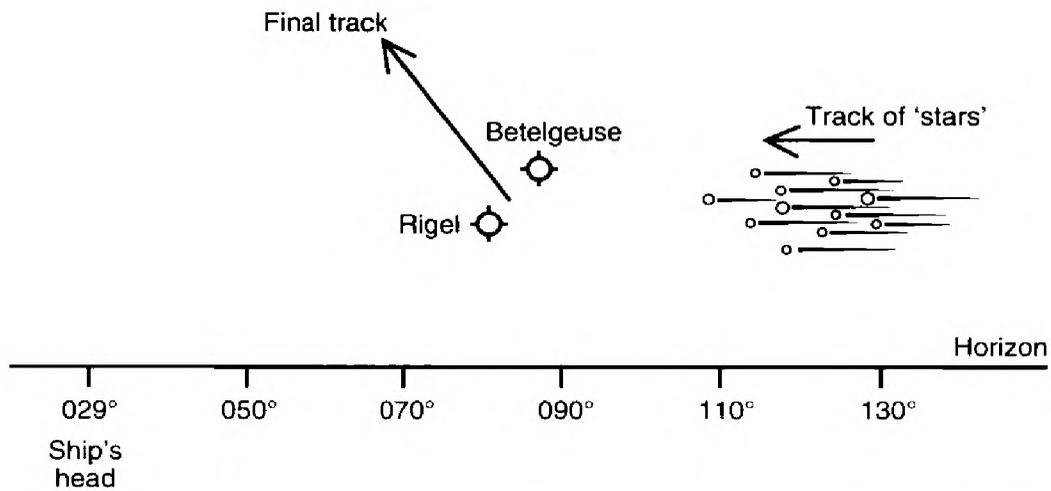
METEORS

East China Sea

m.v. *British Ranger*. Captain S. Barker. Forcados to Ulsan. Observers: Mr E. Tiller, 3rd Officer, Mr N. Marshall, Radio Officer, Mr C. Etherington, Cadet and members of ship's company.

20 September 1993. At 1700 UTC a single 'shooting star' was seen approaching Betelgeuse at an incredible speed; it was brighter than the star and there was a fair-sized trail remaining in its wake, so to speak. Just before the object reached Betelgeuse, about 10–15 other 'stars' were noted following in its track. These were of various sizes but moved faster than the initial object seen although travelling at the same altitude of roughly 20° above the horizon.

On reaching the star Alnilam, in Orion's belt, all of the stars were observed to change direction and to pass over the observers' heads, see sketch, where they were then lost to sight owing to cloud cover. Although none of the observers were



totally sure whether they had seen shooting stars, or rather, a meteor storm, it was decided that this was more likley than UFOs, as suggested by one member.

At the time of the observation the wind was NE'ly, force 2 and the cloud cover was 3 oktas.

Position of ship: 28° 07.9'N, 124° 43.9'E.

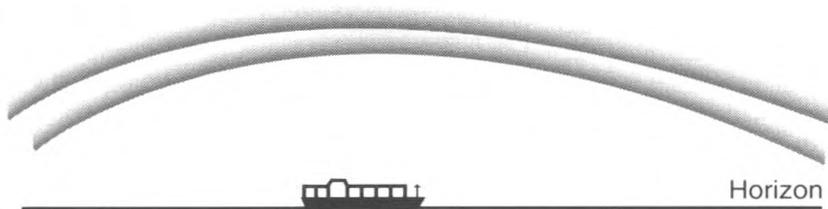
AURORA BOREALIS

North Atlantic Ocean

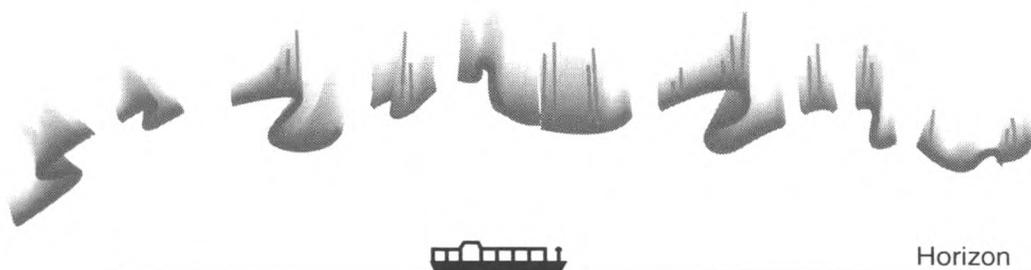
m.v. *CanMar Ambassador*. Captain P. Moore. Montreal to Felixstowe. Observers: the Master, Mr P. Bland, Chief Officer, Mr E.M. Remolado, 2nd Officer, and Mr N.C. Acot, 3rd Officer.

12/13 September 1993. Between 2345 UTC on the 12th and 0730 on the 13th an auroral display was observed developing from a quiet homogeneous arc through to flaming coronal rays. The following notes and sketches describe the development.

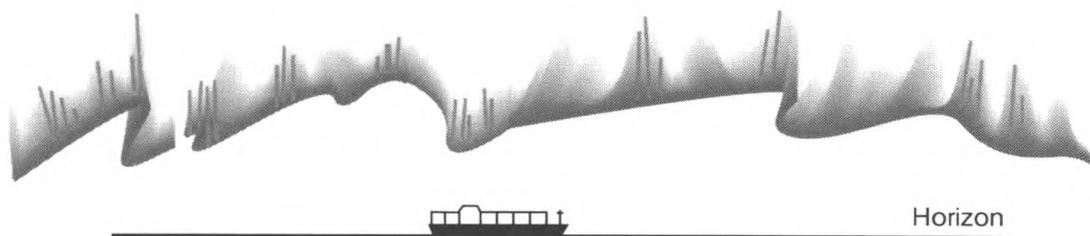
Sketch 1: 12th at 2345. Homogeneous arc with lower edges at elevation 15°, maximum elevation of 45°; orientation 070°/270°. Pale, quiet; moderate brightness.



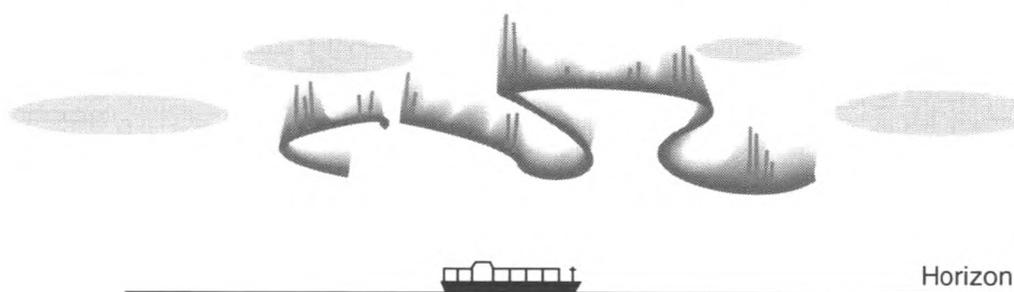
Sketch 2: 13th at 0112. Rayed arc with lower edges at elevation 5°, maximum elevation 30°; orientation 070°/270°. Yellow-green and white; active/pulsating and brilliant.



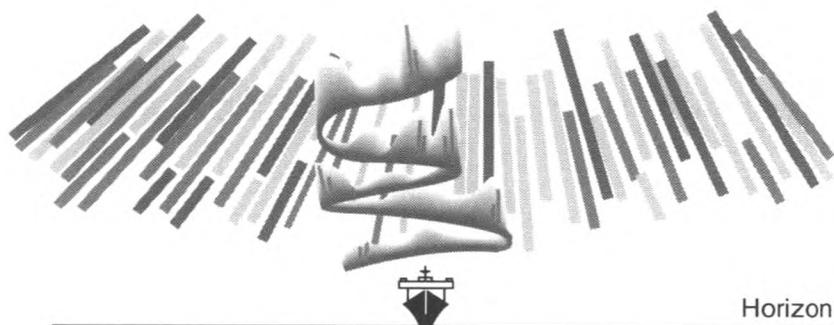
Sketch 3: 0143. Rayed arc with elevation 5° on bearing 075° , also 15° on bearing 270° . Maximum elevation 30° to approximately 40° ; orientation $075^\circ/270^\circ$. Yellow-green, rainbow colours; pulsating and brilliant.



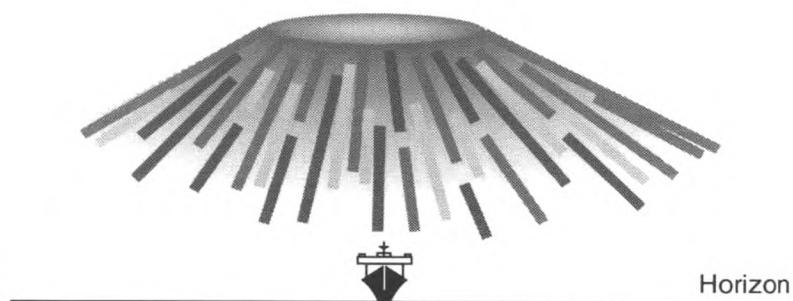
Sketch 4: 0240. Patches and rayed band with elevations of 5° and 10° on edges, maximum elevation 20° to approximately 30° ; orientation $075^\circ/260^\circ$. Yellow-green and whitish; quiet, moderate brightness.



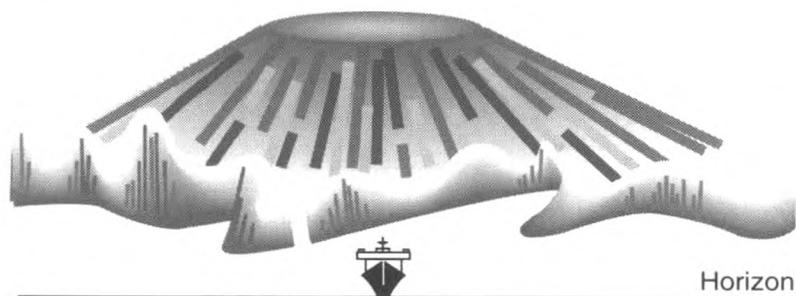
Sketch 5: 0430. Rayed band and coronal rays with elevations of 5° – 80° . Overhead. Light yellow; pulsating, bright.



Sketch 6: 0615. Coronal rays with elevation of 5° to zenith. Overhead. Yellow-green; flaming, brilliant.



Sketch 7: 0730. Coronal rays and rayed band with elevations of 10° to zenith on northern horizon, 15° to zenith on southern horizon. Overhead. Yellow-green; flaming, bright/brilliant.



Position of ship at 2345 UTC on the 12th: 49° 53'N, 61° 03.4'W.

UNIDENTIFIED LIGHT

South Atlantic Ocean

m.v. *Resolution Bay*. Captain R.T. Wood. Rotterdam to Adelaide. Observers: the Master, Mr Shakeel Azim, 3rd Officer and members of ship's company.

20 August 1993. At 1900 UTC whilst on a heading of 142° at 20 knots a sudden, red flare was observed bearing 170° to the starboard side. It was very brief, seeming to last less than 2 seconds but its altitude was about 10°.

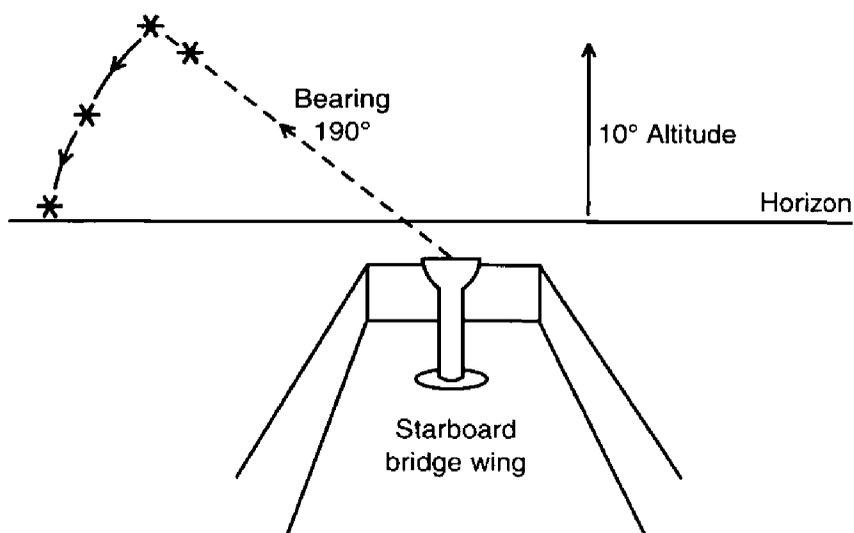
The Master was informed and the vessel's course was altered to 170° in order to carry out a surface search in case the flare was a distress signal. Nothing was heard on VHF or by any other means. After approximately 30 minutes on the new course, the *Appleby*, which was about 10 n.mile to port, was able to confirm the observation and was also engaged in a surface search. Nothing was found by either vessel in a two-hour search and it was agreed that the flare may have been a bright meteor.

Position of ship: 05° 04.4'S, 06° 04.8'W.

m.v. *Appleby*. Captain K. Milburn. Immingham to Saldanha Bay Observers: the Master, Mr K.S. Dowden, 3rd Officer, Mr D. Bridgeman, Cadet and Mr M.V. Desilva, AB.

20 August 1993. At 1905 UTC whilst on a course of 142° at a speed of 13 knots, a red flare was sighted bearing 190° at a maximum altitude of 10°. The flare was glowing red and lit up the surrounding area, it was extremely distinct owing to the dark backdrop (nautical twilight ended at 1911) and took 3 seconds to descend towards the horizon which was at a range of 18 n.mile, see sketch. On first sighting, the flare was thought to be at a range of about 8 n.mile although it was difficult to make a more accurate decision with vision not fully adjusted to the darkness.

The Master was called immediately and the vessel brought round to a heading of 190° while an extra watchman was posted to the bridge. At 1935 the Master made contact with the *Resolution Bay* 20 n.mile to the north-west; they also



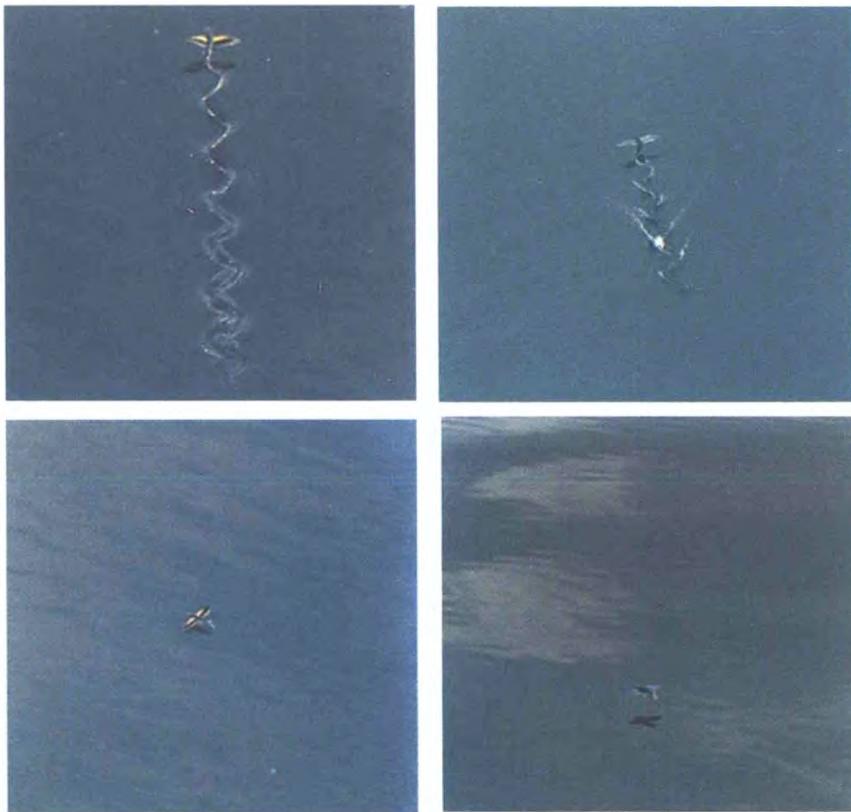
reported seeing the same flare and described similar characteristics. Both vessels commenced a search; after 90 minutes (total steaming distance of 20 n.mile) it was considered unlikely that the flare was a distress signal owing to the fact the *Resolution Bay's* account of the sighting was identical, even though they were 20 n.mile astern at the time. By cross bearings the approximate position of the flare was found to be $06^{\circ} 16' S$, $06^{\circ} 00' W$. No other sightings were made and the search was called off at 2035.

Position of ship at 1905 UTC: $05^{\circ} 14.0' S$, $05^{\circ} 49.7' W$.



Crown Copyright

The C-130 Hercules aircraft of the Met. Research Flight. (See page 127.)



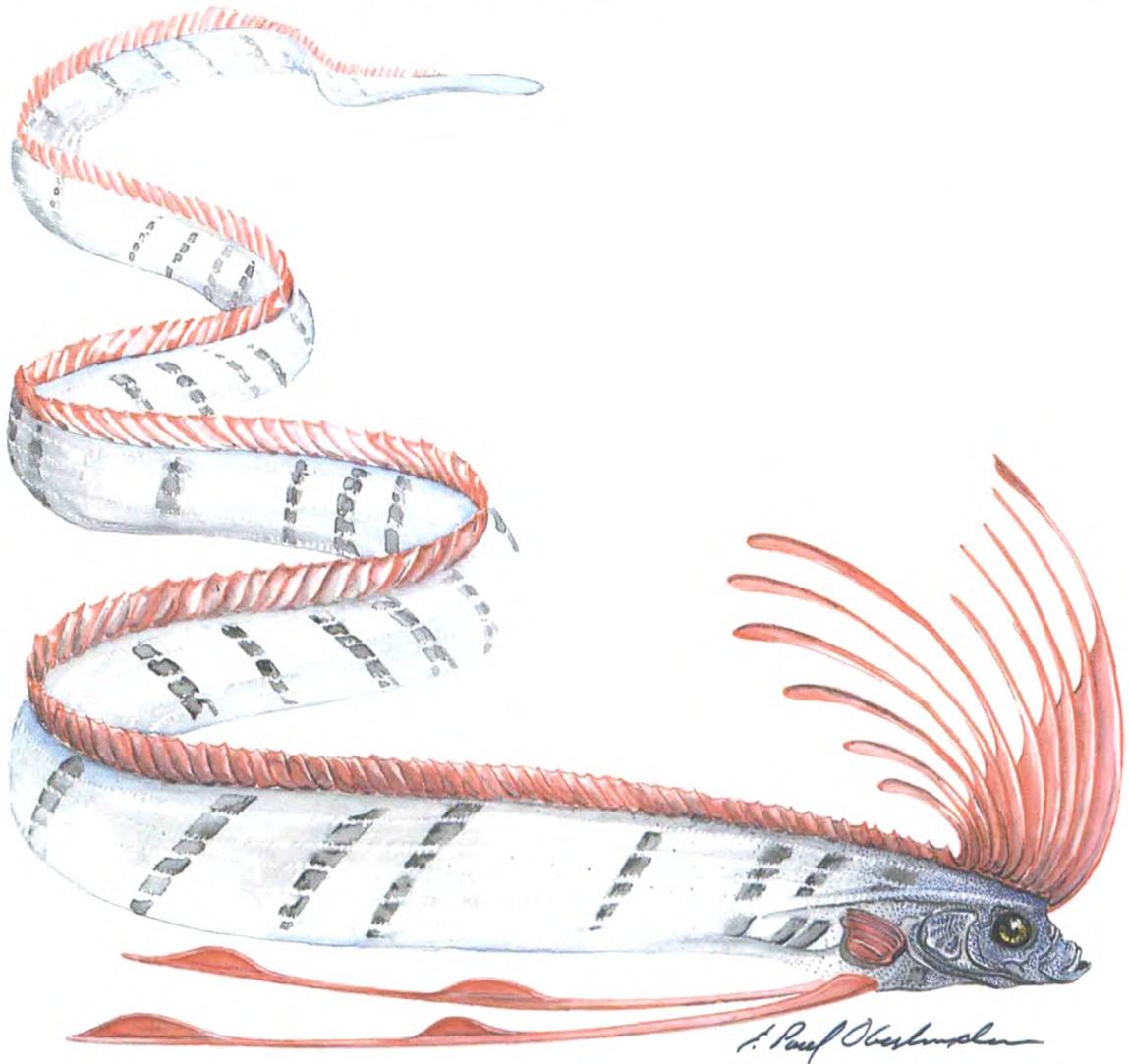
Photos. by Captain A.D.G. Bell

Flying-fish showing varying 'wing' colours. (See Letters to the Editor, page 136.)

The Oarfish: 'Sea Serpent' remains mystery of science*

BY C.L. DYBAS

Some time after nightfall on September 24, 1963, a 5.5-metre long sea creature was washed ashore near Malibu, California. Around midnight Malibu resident Carole Richards took her poodle for a walk along the beach, happened upon the creature's huge body, and screamed in terror. Phyllis Huggins, a neighbour, heard her cry, and within minutes lights flashed on in houses throughout Malibu as word spread that a 'sea serpent' lay dead just outside.



E. Paul Oberlander/WHOI Graphics

The Oarfish

According to a police report of the incident, a passer-by named North Young bravely dragged the monster off the beach and laid it across the top of his car, intending to take it to local authorities. Young had driven less than a mile from the beach when two police deputies spotted his vehicle, did a double-take, turned their car around, and directed its headlights at 'a gigantic creature draped across a car roof.' The officers quickly decided they'd better 'call in the experts on this one'.

* Reproduced from *Oceanus*, Spring 1993, by kind permission of the Editor.

‘And that’s how I came to be at the scene’, remembers Boyd Walker, now Emeritus Professor of Zoology at the University of California, Los Angeles. Vlad Walters, another zoologist at the university, and I jumped into a truck, roared out to Malibu, and brought the dead ‘sea serpent’ back to the lab for analysis. Far from being a fearsome monster of the deeps, however, it turned out to be one of the rarest and most beautiful fish in the sea — an oarfish, *Regalecus glesne*. The oarfish specimen is now on display at the Los Angeles County Museum of Natural History. According to fish curator Robert Lavenberg, it is an almost complete animal — a rare find — except for a metre or so of its tail, which was probably bitten off by sharks.

With its eerie, sinuous silhouette, it is little wonder that the oarfish has long been mistaken for a sea serpent. Indeed, those who study the fish say that a person who reports seeing a creature with all the characteristics of an oarfish might well be suspected of having hallucinations. It is now thought that the sea-monster tales of Aristotle, Pliny, and other classical observers were likely accounts of oarfish sightings. ‘Even the famous Sea Serpent, measuring 17 metres in length, cast up on the shore of Orkney in 1808 was almost certainly this fish,’ maintains J.R. Norman of the British Museum of Natural History in *A History of Fishes*.

Called ‘king of the palace under the sea’ by Japanese fishermen, the oarfish is the longest teleost (that is, bony, rather than cartilaginous, fish) in the ocean. A member of the family Regalecidae, it may reach lengths of more than 17 metres and weigh up to 300 kilograms. The serpentine fish is found in warm, temperate waters worldwide, at depths of from 20 to 200 metres. Its life span is unknown.

An oarfish sports a long, red dorsal fin that rises to a mane-like crest atop its head. A ‘sea monster with fiery red hair’, glimpsed undulating through the deep waters of California’s Monterey Bay, was reported in a 1925 edition of the *Monterey Peninsula Herald*. This ‘freak of Father Neptune’s’ flaming hair was thought to be seaweed that the monster became entangled in while surfacing from the bay’s depths. The oarfish also has brilliant-red pelvic rays that rotate like the oars of a rowboat when it swims — hence its common name. Scientists think the appendages may be used in taste perception, though, not as swimming aids, according to ichthyologist John Olney at the Virginia Institute of Marine Science in Gloucester Point. Olney is one of the few marine biologists who currently study oarfish and their evolutionary history.

Oarfish and their relatives — which have common names as fanciful as unicorn fish, inkfish, and tube-eyes — make up the order Lampridiformes. The oarfish’s closest relative, known as the streamerfish, or *Agrostichthys*, is not as large and spectacular, but is also very secretive: less than five specimens have ever been found. All lampridiformes have evolved a novel mechanism for capturing their prey (usually small invertebrates and fish): The animals move their upper jaws far forward when feeding, making their open mouths some 40 times larger than their closed mouths.

Oarfish begin their lives as brightly-coloured (amber, pink or red) floating, planktonic eggs some 2 to 4 millimetres in diameter. These eggs incubate for up to three weeks at the sea surface, so their vivid colours may be a specialization to protect developing embryos from harmful solar rays. Ichthyologists understand little more about the oarfish’s habits now than they did in 1771, when the first specimen was described in the scientific literature by Morton Brunnich, a Danish naturalist. He found the fish washed up on a beach near a coastal farm in Norway. Fewer than 25 sightings of the creature have been recorded since then, most of

them similar to the Malibu stranding. What little we know about the oarfish results from study of these bodies and research on the fish's larvae, which have been found in the Mediterranean Sea, East Pacific Ocean, and west and South Atlantic Ocean. The oarfish's scarcity makes it almost a marine illusion.

A few encounters with this rare creature have occurred at sea, but despite attempts to lure it close enough to a ship to be caught, none has succeeded. A 1906 encounter may be the closest scientists have come to capturing a live adult *Regalecus*. Marine biologist F. Wood Jones published an account of the sighting in *The Fishes of the Indo-Australian Archipelago*. On October 28, some 30 miles south of the island of Sumbawa, a 'long and very beautiful fish came to the surface at the ship's bow. Baited rigs were thrown to it, but it took no notice of them'. Although the vessel's crew was not able to entice the oarfish onto a hook, Jones says that in the water, the fish was a wonderful sight: 'With its vivid red crest and dorsal fin, scarlet streamers on its sides, and blue of its head and intense shine of silver on its body, it was probably the most beautiful creature I've ever seen'.

Naturalist C.F. Holder is one of the few other scientists to have seen an adult oarfish alive. In 1925, Holder chanced upon a small oarfish swimming in shallow waters along the beach of Avalon Bay on Santa Catalina Island, off southern California. 'The opportunity to observe this radiant creature was one I'll never forget', he wrote in *Fishes*. 'The fish was a fragile and delicate creature, a very ghost of a fish, which swam along just beyond where the water gently lapped the sands. It was a striking creature, showing naught but a vivid red mass of seeming plumes and a silver sheen where it undulated through the water'.

Oarfish from more recent 'sea serpent encounters' along the coast of California — five in fact — can be found in the fish collection of the Scripps Institution of Oceanography in La Jolla, California, according to Richard Rosenblatt, curator of fishes. The most recent specimen (1986) died when it became trapped in a fisherman's driftnet near the San Juan seamount in the eastern Pacific; a warning, perhaps of more such 'catches' to come.

'The oarfish has but blundered into the hands of man in the past', said the late Romeo Mansueti, a biologist at the University of Maryland Chesapeake Biological Laboratory at Solomons Island. 'As he plies the ocean in ever greater numbers, man's encounters with the oarfish may — or may not increase. In any case, may it be remembered that the fish has no commercial value, nor any potential as a game fish'. In spite of increasing exploration and exploitation of the oceans, John Olney believes that because of the oarfish's rarity, the secrets of its life may never be fully revealed. But if such a fish can exist, there may be all sorts of creatures in the sea's depths that we know nothing about.

Cheryl Lyn Dybas specializes in writing about 'underappreciated' creatures of the deep. Her articles on marine life have also appeared in *National Wildlife*, *International Wildlife*, *Wildlife Conservation*, and the National Science Foundation's *Directions* magazines.

Results of the monitoring of Marine Meteorological Services

The Commission for Marine Meteorology (CMM) of the World Meteorological Organization initiated the monitoring of Marine Meteorological Services (MMS) in 1981, and an outline monitoring program was distributed to WMO members in 1985.

Responsibility for the task of setting up a global survey and then evaluating the results of the monitoring of MMS was assumed by Mr George Kassimidis of the Hellenic National Met. Service and Mr B. Cuello of the Uruguay National Met. Office.

A global survey of MMS was carried out by means of a questionnaire prepared by the authors and distributed through PMOs to Voluntary Observing Ships between June 1991 and early 1992. The survey generated an excellent response, with 1625 questionnaires completed and returned by ships' Masters from 21 CMM Member countries. Three members of WMO not operating VOS programmes also responded.

The questionnaire was designed to gain the opinions of mariners on the reliability, timeliness and accuracy of gale and storm warnings, weather bulletins, radiofacsimile and telecommunications services.

The response from Masters of ships observing for the United Kingdom VOF was encouraging in all aspects. Weather services provided for shipping by the United Kingdom were generally given a clean bill of health. With respect to facsimile transmissions for the Northeast Atlantic, some Masters commented that there was too much detail for the small scale of printers generally carried, particularly on near-continent and coasting ships.

Many U.K. ships commented very favourably on the NAVTEX services and praised its extension world wide. NAVTEX is seen as especially useful to ships which do not carry radio officers, becoming more frequently the norm as a result of the introduction of GMDSS. However, in some areas of the world the times of NAVTEX transmissions are sometimes reported as being sent too late for practical purposes.

The individual written comments of Masters who took the time to identify specific problems or shortcomings in weather services for shipping were most helpful. The following is a summary of some of the 190 suggested improvements proposed by ships' Masters, though they apply to individual countries' services and areas of responsibility:

- (a) Improve weather forecasts and gale and storm warnings by use of correct schedules, more frequent updating, terminology and available information to the forecasters. Include or improve forecasting of wind and sea state, reduced visibility conditions and of tropical cyclones.
- (b) Provide more extended forecasts, e.g. to two, three and four days ahead.
- (c) Provide additional information for ice edge locations, local forecasts and wind reports for some areas.
- (d) Improve facsimile services by more attention to frequency of transmission, adherence to schedules, clarity, clear graphics, adequate coverage, world-wide coverage and transmission frequencies.
- (e) Improve services from Coastal Radio Stations by better diction and reading of weather bulletins at dictation speeds. Increase number of broadcasts in daylight hours and in summer.

- (f) Increase the number of NAVTEX stations and broadcasts of meteorological information, as NAVTEX is seen as most useful to ships not equipped with radio officers.
- (g) Port Meteorological Officer visits are viewed as essential to maintaining standards and quality of observations and any diminution in their presence would have an adverse effect.

The excellent overall response to the survey highlights the importance which the marine-user community places on the availability of high quality MMS, and places the onus on members to take action to correct identified weaknesses in these services.

Even though marine meteorological services are, clearly, highly valued by mariners for what they provide, there is evident room for improvement. The Secretary General of WMO recommended CMM to consider carefully the recommendations from the marine-user community and take appropriate measures to establish a suitable ongoing MMS monitoring programme which involves the marine community.

The following responses have been provided by the Head of the United Kingdom Central Forecasting Office.

Improvement of forecasts

In the U.K. considerable efforts are made to improve the forecasts provided to the mariner. A new numerical model of the atmosphere was introduced in 1991 and this is being improved all the time. The model produces forecasts out to six days ahead. These forecasts include those of the atmosphere pressure distribution, sea and swell, upper winds, precipitation and many other atmospheric quantities, all essential to the forecaster's trade. All the forecasts for shipping provided by the Met. Office are based on the output from this atmospheric model.

Provision of extended forecasts

In the U.K. worded forecasts are available for the following 24 hours for coastal waters and for those areas of the High Seas for which Bracknell has an international responsibility. Forecast charts of the expected mean sea level pressure together with the frontal systems are available out to 72 hours ahead, and sea and swell charts to 48 hours ahead, by radio facsimile. Forecasts for longer periods ahead can be had by taking a service from METROUTE, the commercial service operated from the Central Forecasting Office and backed up by a team of Master Mariners and highly skilled forecasters interpreting the sophisticated model output.

Ice information

The U.K. produces ice information and contains detailed information on the ice situation.

Radio-facsimile broadcasts

The radio-facsimile service from the U.K. has been improved. A survey of frequencies has resulted in the optimum use by the Met. Office. The Telecommunication Centre at Bracknell is always pleased to receive any information on the reception conditions encountered. Great care is taken at Bracknell to ensure that schedules are met. Problems with the start signal from

Bracknell were cleared following reports from ships indicating that the signal was not switching their equipment from an IOC (Index of Co-operation) of 576 to 288 and *vice versa*.

The quality of the output for shipping on the radio-facsimile service is being kept under review. At present the output is that provided to other recipients in the U.K. by land line and the use of the IOC of 288 (alternate line scanning) is quite adequate for the land-based user. Over radio circuits propagation conditions sometimes result in poor quality charts. To assist in the interpretation of the charts the labelling of pressure centres has been improved and only the isobars in multiples of 16 mb (hPa) are labelled: thus the 984, 1000, 1016 and 1032 mb isobars are given labels so that even if the clarity of the labelling is not that good on the chart received the recipient can usually deduce the value.

Radio-telephone service from Coast Stations

In the U.K. all forecasts broadcast by British Telecom are read at normal speed and then repeated at slow dictation speed. The number of broadcasts is determined by the main issues of the forecast products based on data times of 0000 and 1200 UTC. Any significant change to the forecasts in the intervening periods is covered by the gale and storm warning service.

NAVTEX services

U.K. waters are fully covered by NAVTEX but there are gaps in other areas around Europe. These gaps should be gradually filled as the final implementation date for the GMDSS (February 1999) approaches.

The Meteorological Research Flight

Introduction

In the first of a series of articles about the activities of various branches of the Met. Office, we highlight the operations of the Meteorological Research Flight (MRF) based at the Defence Research Agency, Farnborough, Hampshire. The Flight consists of a modified C-130 Hercules aircraft (see photograph on page 121) owned and crewed by the Royal Air Force and maintained by the Met. Office.

The Hercules carries a considerable number of instruments which can be used to measure a wide range of atmospheric variables on size scales from small droplets to a cold front up to 200 km in extent.

As well as providing data for the Met. Office, the MRF works in conjunction with several United Kingdom and overseas Universities and other scientific establishments. The Hercules has also taken part in a number of international experiments.

The present role of the MRF

MRF's main task is to make observations of the atmosphere to aid in research into atmospheric processes. These observations lead to improved understanding of, and therefore improved description of, the physical processes in the atmosphere

which can be used in the Met. Office's large computer. This in turn improves both the weather forecasts and the predictions of the Earth's climate produced by the Office. MRF also makes measurements in support of the development of remote sensing instruments and measurements of atmospheric pollution.

MRF Organization

Of the 50 people based at the MRF, six are the RAF crew and about 20 are responsible for the instrumentation on the aircraft and its operation. This includes repairing and developing instruments, preliminary analysis of the data the aircraft accumulates during its flights, and administration and organization of the flights. The remaining staff are research personnel and are divided into four groups.

The **atmospheric radiation group** is responsible for measuring short- and long-wave radiation in the clear and cloudy atmosphere, and for developing descriptions of the way in which the radiation is treated in the computer models of the atmosphere.

The **cloud physics group** studies the microphysical properties of clouds to improve presentation in the computer models. Of particular interest are the properties of stratocumulus clouds and the mechanisms which cause them to form and dissipate. Also, in conjunction with the radiation group, the microphysical and radiative properties of cirrus clouds are being studied.

The **mesoscale research group**, which operates in conjunction with the Department of Meteorology at the University of Reading, examines the data produced during special experiments, such as a recent project named FRONTS92, in which up to 70 sondes were dropped from the aircraft during flights lasting up to 12 hours, to investigate the development of depressions and fronts.

Finally, the **atmospheric chemistry group** make basic measurements of the trace gases in the atmosphere. This group completed studies of the ozone 'holes' above the Antarctic and are now concentrating their efforts on the photochemistry of the troposphere, particularly that of ozone.

MRF Resources

The Hercules aircraft carries a very wide range of instruments to support the research described above. It is capable of measuring the following parameters:

1. **Aircraft position, speed and attitude (pitch, yaw and roll).** The aircraft carries OMEGA, Inertial Navigation Systems and most recently, Global Positioning System from satellites: it can also be fitted with LORAN when required.
2. **Basic atmospheric variables.** Pressure, temperature, humidity and wind speeds.
3. **Atmospheric radiation.** Visible and infra-red radiation can be measured both with broad-band and with several narrow-band instruments. Microwave measurements can also be made.
4. **Cloud physics.** Droplet or crystal sizes, densities and shapes can be measured, and also total water content of clouds. The aircraft carries a unique holographic system which can produce three-dimensional pictures of cloud particles.
5. **Aerosols.** Both particle size and optical properties can be measured.

6. **Atmospheric chemistry.** The aircraft is capable of taking multiple samples of the atmosphere and storing them for later analysis by gas chromatography. Ozone, oxides of nitrogen and other trace species can be measured in real time.
7. **Dropsondes.** The aircraft is capable of releasing and tracking up to five radiosondes at a time. This allows very detailed cross-sections of the atmosphere to be measured.
8. **Photography.** The aircraft is equipped with a number of video cameras.

The collection of data from these instruments is automated and the scientists on board can see the measurements in real time and in graphical form. This allows good planning to be made of the flights and ensures that a maximum amount of useful data are produced.

An initial analysis of test results can be produced within a few hours of landing and a sophisticated suite of computer programs is available for post-flight analysis. The computer system also supports the requirements of the research scientists, being equipped with a wide range of terminals, printers and plotters.

Notes for Observing Officers

From time to time, we have published helpful hints for observers, based on the more common problems which appear in ships' meteorological logbooks. Since the computerisation of records began, a number of changes have taken place in the way your data are transferred to the Marine Data Bank, and it is hoped that the notes which follow will be of help to observers.

1. GMT/UTC

The time of the midnight observation should always be entered as 0000 and never as 2400. The observer is asked to enter the GMT/UTC a second time in the first column of the right-hand page, regardless of the note contained in older editions of the log that this column is for Met. Office use only.

2. Wind Indicator

Unless otherwise instructed, figure 3, wind speed estimated in knots, should always be entered here, even when an anemometer is available. Only specialist ships and fixed structures, as agreed with Port Met. Officers or the Marine Division, may sometimes find it preferable to use anemometers, where estimation of the wind force by sea state is impracticable.

3. Position

Care should be taken to enter the correct quadrant under Qc, particularly when changing latitude between North and South or longitude between East and West.

4. Clouds

Great care should be taken to ensure that coded heights, amounts and types of cloud are fully compatible. It sometimes happens that the amount of low, or medium if no low, cloud recorded in group 13 appears to be more than the total cloud amount already entered in group 5, but as this is not possible, the two amounts must be reconciled. Night observations of clouds should always be attempted, when possible.

5. Visibility

Only the figures 90–99 should be used by observers on ships. The full table is for land station use. In conditions of fog or mist, care should be taken to ensure the code figure for visibility agrees with the figure reported under present weather. For instance, if fog is reported by present weather code figures 41–49, this indicates visibility of less than 0.5 n.mile which can therefore only be reported as 90–93.

6. Wind and Swell

As mentioned earlier, wind speed should always be estimated from the appearance of the sea: anemometers should not be used. The code figure for a northerly wind or swell is 36, never 00, which is reserved for a calm, or no swell waves. Observers sometimes accidentally enter wind directions as, for instance, 40 or 50 for 040° or 050°, whereas these should be 04, 05. It should not be forgotten that there is an optional extra group available, (00fff) for estimated wind speeds of 99 knots or more.

7. Air Temperatures

Reading the dry- and wet-bulb temperatures to the nearest tenth of a degree Celsius does not normally present a problem. This degree of accuracy is necessary to gain the maximum benefit from temperature observations. On the introduction of the new group 23, wet-bulb temperature, as from the 0000 hours observation on 2 November 1994 (see page 143), the wet-bulb reading should still be entered initially between groups 6 and 7. After reading the air temperatures, due care should be taken in the interpolation of dew-points from tables, as the dew-point appears to be the element most often in error of all the groups in the weather message.

Regular attention to the cleanliness of the Stevenson screens, wicks, muslins and water reservoirs is essential. Renewal of the muslins, wicks and water, and cleaning of the thermometers, are vital for the maintenance of accurate temperatures. The frequency of this renewal will depend on the degree of fouling, but weekly is considered the norm under seagoing conditions. A water reservoir that is showing signs of green algae within, usually after a few months or even weeks, can be sterilised in a mild solution of disinfectant and then washed out (see Squatters in the muslin, *The Marine Observer*, January 1994, pp. 27–29). The action of renewing the muslins, wicks and water should be clearly recorded in the remarks section of the log.

8. Sea Temperature

Sea temperature should also be read to the nearest tenth of a degree, using the rubber bucket and thermometer supplied for the purpose whenever practicable. In coding the method of taking sea temperatures, it should be remembered that method (c), hull sensor, refers only to a purpose-fitted Met. Office installation with special distant reading equipment, and not a ship's own sensor; for the purposes of the log, the latter should be entered as method (b) when used. The amended group 16 to be introduced in November, with its indicator for sign and type of measurement of sea temperature (s_s), will, in future reprints, obviate the need to enter the method at the top of the page.

9. Waves

If there is a swell with no wind (or sea) waves present, the wind wave group 18 should be entered as 20000 in the logbook but omitted from the radio message. Solidi (//) should be entered for elements in a wave or swell group partially coded, except in the case of being unable to estimate the period of a confused sea, when $P_w P_w$ is reported as 99. No entries should be made in complete groups which are not observed (see paragraph 11). Observations of wind and swell waves should always be attempted at night when possible, using any residual light from the ship or the heavens which usually allows acceptable estimations to be made. However, when it really is too dark to estimate these elements, it is unnecessary to make an explanatory entry in the log as it is usually understood.

10. New code groups

On the introduction of the minor code changes on 2 November 1994, (see Notices to Marine Observers, page 143) WMO has ruled that the groups for weather, clouds, wind waves and swell waves should always be reported by Selected and Supplementary Ships, and the continuing co-operation of observers is requested.

The following modifications to code groups will be made:

- (i) Replace $0s_n T_w T_w T_w$ by $0s_s T_w T_w T_w$.
- (ii) Add a new group 23 ($8s_w T_b T_b T_b$) in the *Ship's Meteorological Logbook*, inserted between group 22 and existing group 23, ICE etc., which is renumbered group 24.

s_s = Indicator for sign and type of measurement of sea surface temperature.
 s_w = Indicator for the sign and type of wet-bulb temperature reported.
 $T_b T_b T_b$ = Wet-bulb temperature, in tenths of a degree.

11. General

To assist in the computer-keying process of your valuable observations, please do not make unwanted entries in any section of the logbook to be sent to the Office, whether it be the original or fair copy, as these entries may lead to confusion and must therefore be deleted. It is appreciated that the practice of entering known groups in the log in advance of the time of observation may be helpful to the observer, but if the remaining data are not then entered in for transmission or climatological purposes, the rest of the figures are of no use and confusing.

It is helpful to enter the observations in the log in the blocks of the standard daily observation times in order, 0000, 0600, 1200, 1800, or three-hourly when appropriate, but it is not necessary to leave long sections of empty pages representing the passage of time when no observations are possible, e.g. when the ship is in port. As much of the log as practicable should be used for actual observations, entered as legibly as possible, before despatch to the Office. When the Principal Observer wishes to make a fair copy, there is an opportunity to correct obvious errors in the original observations.

Brief reports of sightings of marine life and astronomical phenomena may be entered in the general remarks column of the log if desired. However, to ensure

that your reports are not overlooked and are extracted for scientific and publication purposes, it is preferable to make an entry in the additional remarks pages, always including brief details of date and UTC, position, course and speed, name of observers and Master, and photographer's name where appropriate. It is also better to make these records in the log than to send a report with a separate letter, as the facts can be more carefully analyzed and used with the records in a ship's log to supplement the report.

It cannot be stressed too often how much we value your reports of all marine sightings of interest, no matter how minor they may appear, and especially if such reports are complemented by suitable photographs or drawings. Scientific experts often remark on the value of ships' reports to their records.

AURORA NOTES JULY TO SEPTEMBER 1993

BY R.J. LIVESEY

(Director of the Aurora Section of the British Astronomical Association)

The observations submitted by mariners during the period under review are listed in Table 1. The nights in which auroral activity was most widely reported are listed in Table 2.

Table 1 — Marine aurora observations July to September 1993

DATE	SHIP	GEOGRAPHIC POSITION	TIME (UTC)	FORMS IN SEQUENCE
12/13 Sept.	<i>Cumulus</i>	55° 26'N, 21° 20'W	2330–0500	qV.G.qP.V. Max. alt. 60°.
12/13	<i>Canmar</i> <i>Ambassador</i>	49° 53'N, 59° 47'W	2345–0730	G.ap ₁ .RA.p ₁ RA. qRB+qmP.p ₂ RB. p ₂ CRR.p ₂ RR+RB. All sky 180°.
23/24	<i>Cumulus</i>	58° 20'N, 11° 35'W	2235–2320	qHB. Max. alt. 100°.
24/25	<i>Cumulus</i>	61° 09'N, 17° 12'W	2340–0015	qHB.RR. Max. alt. 60°.

KEY: a = active, m = multiple, p₁ = pulsating, p₂ = flaming, q = quiet, C = coronal, G = glow, HB = homogeneous band, P = patch, RA = rayed arc, RB = rayed band, RR = ray bundle, V = veil.

As the Earth rotates under the auroral oval, so long as it remains active and has expanded towards the equator, the mid-latitude aurora is seen at progressively more westerly sea areas and countries as each in turn enters its dark, night period. As the aurora borealis and aurora australis react together at the same geomagnetic longitude and geomagnetic latitude north and south, the Southern Hemisphere observations augment those obtained in the Northern Hemisphere. Australasian observers thus may report aurora at around 1200 UTC to be followed by reports at progressively later times from European, Atlantic and American observers. The aurora can of course begin at any longitude and at any time, even in daylight, thus determining which of the above observer groups sees the start or finish of the

auroral activity. In big auroral storms, activity can continue for more than one revolution of the Earth, and each region will experience more than one night of activity.

Table 2 — Nights during which auroral activity was most widely reported.

DATE	LOCATION
15/16 Aug.	Northern Scotland, Fair Isle, U.S.A., New Zealand (South Island).
16/17	Scotland, northern England, northern Wales, Canada, U.S.A.
12/13 Sept.	Northern Scotland, Iceland, Newfoundland, U.S.A., New Zealand (South Island).
13/14	Northern Scotland, Iceland, Canada, U.S.A., New Zealand (South Island).
20/21	Scotland, Iceland, Canada.
21/22	Fair Isle, Iceland, Canada, U.S.A.
23/24	Scotland, northern England, Iceland, Canada.
24/25	Scotland, Canada, U.S.A.

The sunspot cycle is rapidly declining and with it the transient type of storm activity, although any such storm could appear anywhere in the solar cycle (remember the big storm of 8/9 February, 1986, which was at sunspot minimum). The quiet, more northerly aurora consisting of glows, arcs, bands or the occasional ray, associated with 27-day recurrence periods, has been in evidence. A cycle of recurrent storms, particularly shown up by magnetic records, has been traced from 15 August 1993 through to 30 December, and time-wise these are closely related to a persistent solar equatorial hole that has an extension connecting with the northern polar cap hole in the sun's atmosphere.

In Figure 1 are compared auroral, magnetic and sunspot zone activities for the present cycle, so far. The peak of auroral activity and the solar shock-wave activity indicated by magnetic storm sudden commencements took place in association with sunspot 1989 maximum. It will be noted, however, that the total magnetic disturbance generally peaked as sunspots declined, in 1991. Note too, how the sun's northern hemisphere was more active in sunspots during the declining years. In the late years of the sunspot cycle, the sun's magnetic field modifies itself so that the southern solar hemisphere is better orientated towards the Earth in the first half of the year, and the northern hemisphere in the latter half. In Figure 1 there is an apparent affinity between southern hemisphere sunspots and springtime magnetic storm commencements peaking in 1991. On the other hand, visual aurorae appeared to be more evident in the autumnal half of the year.

Excluding transient storms, and analysing quiet aurorae exhibiting only glows, arcs or bands without rays or activity, seen from British waters, the period 1989 to 1993 saw more activity in the autumnal period. This is consistent with more coronal hole activity in the sun's northern hemisphere, very evident in the latter half of 1993.

Although the mariner is normally concerned with tropospheric weather, the sun's weather, if one might call it such, plays an important part in shaping the weather in the Earth's high atmosphere, particularly the ionosphere and the magnetic field, and will have some bearing on marine affairs especially with effects on radio communications. The particles that cause radio aurora effects are not those that cause the visible aurora so that the two phenomena are not necessarily observed on the same day, or at the same time, and the two may appear alternately, the radio aurora fading as the visible aurora develops.

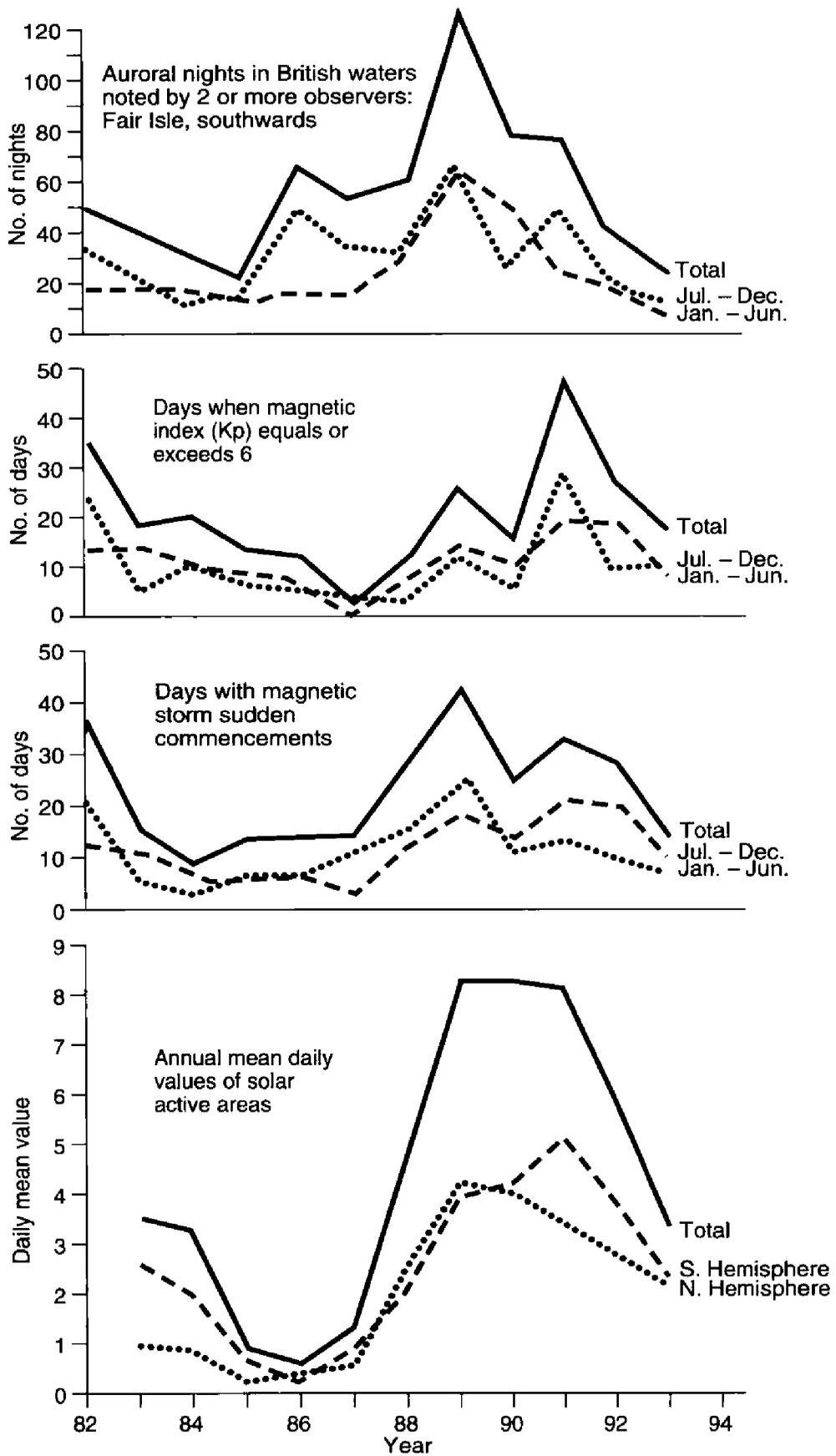


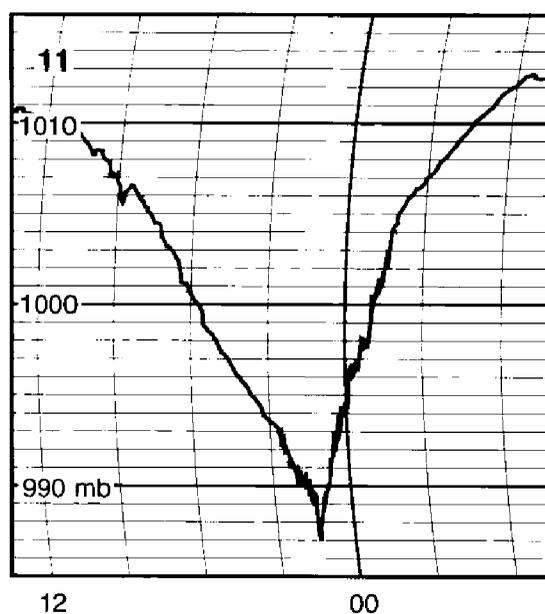
Figure 1. Comparison of auroral, magnetic and sunspot zone activity.

LETTERS TO THE EDITOR

Feedback to forecasters

I feel you would be interested to receive the following weather log abstracts and barograph trace for severe weather experienced by the vessel on the 11th and 12th of September last [1993], in the vicinity of the remains of tropical storm 'Floyd'.

Date and time (UTC)	Wind		Pressure (mb)	Temperature		State of sea
	Dir'n	Force		Air	Wet-bulb	
11th 1900	SSW	7	998.2	17.9	16.9	Rough. Heavy SW swell.
2100	SSW	8	998.0	18.0	17.7	Very rough. Heavy SW swell.
2300	NW	10	987.0	18.5	16.5	Very rough. Heavy confused swell.
12th 0100	NW	10/11	993.4	17.0	15.0	Violent NW sea and swell.
0300	NW	10/11	1001.0	16.8	14.9	Violent sea, mountainous NW swell.
0500	NW	9/10	1011.6	16.5	14.8	Very rough sea. Very heavy NW swell.



This storm was forecast to track into the Western Approaches, and even in the afternoon of the 11th, warnings were still being given that it was approaching the top north-east corner of the Bay of Biscay. The barometer on board was falling so fast that it was apparent that the storm had altered course to a more south-easterly direction and, by 0000 on the 12th the vessel was hove to in storm force 11–12 winds. By 0300 it was obvious that the vessel could remain hove to for several more hours, so course was altered to the south-east and speed increased to get away from the storm field.

Apart from the heavy rolling, little damage was done and by late afternoon on the 12th a course towards the Azores was resumed.

The incident itself only goes to show that even with all the aids available today, the final prediction cannot be assumed to be correct. In fact, at 2100 on the 11th we passed a vessel proceeding towards Ushant, and they were assuming the storm was passing ahead of them, when actually that ship must have passed close to the centre.

Captain J.R. de L. Inniss, Master of the *Avalona Star* (Cardiff Concordia Marine Co. Ltd).

Editor's note. We were pleased to receive the above comments from Captain Inniss, so too was the Head of the Central Forecasting Office at Bracknell, who replies:

The report from the Master of the *Avalona Star* in relation to bad weather encountered in September 1993, and his comments in connection with the forecasts received are most welcome. This feedback to the forecasters is very useful since there are lessons to be learned from every meteorological situation.

As the report indicates, the depression that caused the problem had previously been tropical storm Floyd. These features carry with them an area of very moist and warm air, and although they appear to weaken in mid-Atlantic, they often develop into very vicious extra-tropical depressions as they advance over the colder water, with a great deal of ascent in the warm, unstable air. This is a different mechanism to the usual type of Atlantic depression that develops on the polar-front. Such factors are always very difficult to predict even with the sophisticated numerical models of the atmosphere that are run on the large computers at centres such as the National Meteorological Centre at Bracknell. The main reason for this difficulty is that the true structure of the system is not fully known, so unless the numerical forecast models start with a good analysis of the system (that is, its structure, including the humidity and temperature structure right up through the atmosphere) the numerical forecasts are handicapped from the beginning. This is where the human forecaster can adjust the numerical forecasts using skill and acquired experience.

Overall, the handling of this depression on the large scale was reasonably good. However, some of the detail so important to the *Avalona Star* was not well predicted. In particular, the timing of the deepening was some six to nine hours earlier than predicted and the intense centre was rather further south than had been analysed early on 11 September. This resulted in the position of the centre being further south than forecast later that day and early on the 12th, giving the apparent movement as being towards the south-east whereas in reality, the intense centre was beginning to curve towards the left by the early hours of the 12th. Consequently, the *Avalona Star* experienced stronger winds than were forecast. There was the additional complication of the occluded front to the north of the depression being swept around the western quadrant of the depression which caused a significant increase of wind in the south-west quadrant. This increase during the evening of the 11th had been signalled in a Storm Warning issued on the morning of that day indicating winds increasing to violent storm force 11. Although the plain language forecasts are as complete as possible, the additional facility of having access to the analyses and forecast charts issued by radio facsimile provides the complimentary pictorial guidance, and the reception of both the plain language forecasts and the charts broadcast by radio facsimile can be a very powerful combination in the understanding of a developing situation.

... and whether fish have wings.

I came across these photographs [see page 121] of some flying-fish which I took whilst in command of the *Gandara* when we were transitting the the Coral Sea back in 1987, approximately.

Apart from the ones which quite graphically show the lift-off from the water, the other thing that interested me was the wing colouring of brown and yellow, and turquoise. I have noticed during passages around the world how the colours do apparently change, varying from almost translucent purple to a deep navy colour, and wonder how many other colourings of flying-fish wings have been reported.

I think that flying-fish are just taken for granted but perhaps if we looked at them more closely, then we may see some really weird and wonderful colours, especially in island areas. What does baffle me, is why, when the wings are only extended during flight, they should be of differing colours. I could understand it if they were a coral-swimming fish where the colours are designed to help them blend into the coral colours and so evade capture, but why the need in flight over crystal clear waters like the Coral Sea?

Captain A.D.G. Bell.

SCENE AT SEA



Photo. by T. Collins

Stratus partially obscuring the islands of the St Kilda group pictured from f.p.v. *Norna* in early July 1993.

Editors's note. Stratus is the cloud which has the lowest base of all, seldom being higher than 1500 feet, and is generally grey in a fairly uniform layer which shows little or no detailed structure. It is most commonly formed when moist air blows across a cold surface whose temperature is below the dew-point of the air (advection). Since advection stratus is formed by cooling from below, the atmosphere near the surface is stable and there is often an inversion between about 600 feet and 3000 feet near which the cloud's top is well defined, and high ground may extend above it into clear air. A wind speed of 5–10 knots favours stratus formation, but higher speeds spread the cooling through too deep a layer of the atmosphere and the sky remains clear. However, if the air-sea temperature difference is large then the cloud can form even in strong winds. In the United Kingdom two favourable areas for advection stratus formation are:

1. The west and south-west coasts when warm, moist SW'ly winds blow. The air approaches land over a progressively cooler sea surface causing shallow stratus to form which then drifts onto exposed coasts and often well inland too.
2. The east coast when moist E'ly winds blow. Here, the air is cooled by the cold surface of the North Sea and stratus formation is more common in early summer when warm air from the continent crosses a sea surface which has warmed very little since the previous winter. In Orkney, this persistent stratus is termed 'haar' and the name is now used for all such occurrences on the east coasts of the United Kingdom.

Stratus can also form orographically when moist air is forced to rise over high ground, and from dispersing fog which may do so through a temporary stage of low cloud.

At the time of the photograph a depression was tracking to the north of Scotland allowing warm moist air from the south-west to be drawn across the increasingly cooler sea surface thus causing stratus to form, even though observed wind speeds from the *Norna* were between force 3 and force 7 for the period. Drizzle, frequently associated with this cloud, was also recorded on several occasions by the shipboard observers.

Book Reviews

The Sea — Our Heritage by Jean Cantlie Stewart. 145 mm × 225 mm, viii + 304 pp. Rowan Books, Davieburn House, Drummuir, Keith, Banffshire AB55 3QB. Price: £14.95.

Much has been written about the parlous state of Britain's Merchant Navy in the shipping press, but this must be the first full-length book which has squarely addressed the issue from a detailed historical and objective viewpoint.

Mrs Stewart has managed to encapsulate 800 years of British maritime history in one volume, from the monarchs' establishment of Royal and Merchant Navies to the Repeal of the Navigation Laws and the disastrous, though delayed, effect this has had on the British carrying trade in the twentieth century.

In seventeen chapters of closely printed text, the author has provided a comprehensive record of all the important aspects of British maritime affairs which have a bearing on today's problems confronting the seafaring establishment. The first two chapters deal with the formation of the navies by the Kings and Queens of England and the resulting benefits to trade, and by careful and selective reasoning shows how the different policies on navigation laws affected trade and cabotage operations. Chapters three and four deal with the ending of the traditional maritime policy in Britain in the nineteenth century, leading to a shortage of ships in the Royal Navy, and goes on to highlight the losses suffered by the Merchant Navy in World War I.

The next chapter deals at length with the courage and the role of the Merchant Navy crews during World War II, emphasising the great casualties and losses of ships suffered, though reminding us of their courage and generosity in action and the great pride in themselves, and the morale that existed amongst these beleaguered men. Details of many incidents from the War are included as specific examples in several other chapters, providing the reader with much interesting material from many sources, gathered under this one title. Chapters seven and eight consist of an expert analysis of the factors which affected our country's development, or lack of it, after the War, including the effect of rationing, the dollar drain and strikes by shipyard workers and seamen.

Then follow chapters explaining the role of the Royal Navy, convoy escorts, aircraft and amphibious operations and a reprise on the shipbuilding industry before World War I, the neglected story of 'hearts of oak'. Jean Stewart ends with a plea for the British to learn from history, and with the opinion that a change of attitude is required on the part of the British people towards their maritime interests. She also calls for a revival of will by all concerned and a determination not to be hampered by EC restrictions or to have us cut off from the open sea, which is Britain's lifeline. Throughout the book the author has included an interesting and varied collection of black-and-white drawings and prints of ships, Royal Navy and Merchant, sailing and powered, and of shipbuilding, to further enhance her first class narrative.

With the large number of ships of both Navies mentioned by name throughout the book, the only suggestion that can be made is that such names would have better been highlighted, by appearing in italics, or at least in quotes, as no doubt many readers will find old friends with which they could identify more readily if they could easily pick them out of the unchanging text layout.

After seven years of painstaking research, sifting and collation, Jean Stewart has clearly produced a monumental record, which stands on its own as a unique

history of many features of our maritime heritage, for instance in the case of shipbuilding, for which no comparable record exists. It is also eminently worthy of study by all who have a desire to understand how the parlous state of our merchant service came about through historical events, and who have an interest in preserving our merchant fleet.

The Oceans: — A Celebration, compiled by the Living Earth Foundation, Editor Lisa Silcock. 240 mm × 297 mm, 224 pp., *illus.* Ebury Press Ltd, Random House, 20 Vauxhall Bridge Road, London SW1V 2SA. Price: £19.99.

The Living Earth Foundation is one of a number of organizations devoted to bringing about change in attitudes to preserving the fragile environment, by working internationally to persuade governments to accept responsibility for the future of the surface of the Planet. All royalties from sales of this superb book of coloured plates, and text contributed by eminent marine scientists and oceanographers, will go to support projects in Cameroon, Venezuela and Brazil, aiming to empower local communities to conserve and maintain their environment and manage their natural resources for the future. Following the first in this series, *The Rainforests: A Celebration*, Living Earth intends that many such projects will eventually extend to all corners of the world.

Eighty percent of the pages of this book are filled with the most colourful and stunning photographs of life upon and under the sea that one could ever hope to encounter. To have compiled such a gallery from only about two dozen sources is a remarkable achievement in itself, and the results are certainly worth the effort. It would be difficult for the average reader to verify the colour accuracy of the many photographs of the multitude of sea and littoral creatures pictured, but to be able to view the artwork is pleasure enough without needing to know how accurate the colour printing is. It should suffice that most types of sea and coastal creatures are given a place in this excellent record, each with an extensive caption which includes zoological appellations as well as common names.

The texts written by experts from many sections of the marine biological scientific community are succinctly introduced by Professor David Bellamy, who sums up the feelings that could well come to the mind of anyone who cares to study this beautiful book: 'Time is running out for the oceans. Please read this book, because the extraordinary life that it celebrates is exactly what is at stake. Then join the campaigners and help us to fight for the ocean's survival: for their own sake, for yourselves and for your children's future.'

Bulk Carrier Practice by Captain J. Isbester. 220 mm x 300 mm, 400 pp. *illus.* The Nautical Institute, 202 Lambeth Road, London SE1 7LQ. Prices: Nautical Institute Members — £75.00. Non-members — £107.14. Bulk orders over 5 — £50.00 per copy. Airmail extra — £15.00 per copy.

This bulky hardback volume is another authoritative work which follows in the footsteps of a number of respected books commissioned and published by the Nautical Institute. A study of the Institute's 1994 publications list reveals that one of the major benefits of membership could be the large savings that can be made by taking advantage of the favourable prices charged to members' for the Institute's comprehensive range of technical guides and books. Receipt of its monthly journal *Seaways* is almost reason enough on its own to become a member.

The Nautical Institute Bulk Carrier Working Group, comprising shipowners, masters, architects and commercial managers, assisted Captain Jack Isbester, himself an Extra Master and Fellow of the Institute, to write this definitive work on bulk carrier practice. Consultation has also been widespread throughout classification societies and the fleets of different nations, and the Met. Office Marine Division is pleased to have been able to make a small contribution to the chapter on the loaded voyage with respect to routing and rough weather.

Whilst readers, whether practical mariner, company official, college lecturer or consultant, are assumed to have no previous experience of bulk carriers, an adequate knowledge of ships and shipping is a prerequisite to understanding of the 26 chapters and several appendices: there is also a comprehensive index. However, in providing explanations in the book, the author has tried not to assume too much knowledge and experience in the reader, who is as likely to come from a Third World country where traditions of training may be recent and diverse, compared to the officers drawn from countries with an established maritime tradition.

This lengthy book appears to cover all conceivable aspects of bulk carrier operation, from evolution of the ship-type through records, stability, loading, the voyage, and discharging to equipment, safety, and maintenance. On brief inspection only, it seems an exceptionally practical guide, with examples, forms and tables mainly taken from actual practice, which gives the whole book a very lively style. The examples include a most comprehensive selection of charter-parties and many other forms and records, which should remove much of the apprehension experienced by newcomers to the bewildering array of unfamiliar documents associated with chartering and the consequent carriage of bulk cargoes.

The author conceived a good idea by using drawings, records and actual plans from one ship, *Regina Oldendorff*, throughout as examples to every chapter or appendix. Other ships are also used, but the reader will surely benefit from being able to follow the details of one ship right through the book.

In a book of such length and complexity it is perhaps inevitable that some typographic errors will occur, but some of the captions to diagrams are difficult to understand. The layout of diagrams and graphs has not been perfectly planned, many of the captions, to graphs in particular, appearing upside down, mainly because they are un-edited examples of forms in practical use.

These are but minor irritations which do not detract in the least from the general feeling that this is a guide which will be of continuous lifelong use to seafarers and administrators operating bulk carriers. It is certain that readers can gain much benefit from this practical book, the contents of which it would be hard to find elsewhere under one title.

J.F.T.H.

Personalities

OBITUARY — CAPTAIN J.C. COX died on 3 December 1993 on losing his battle against lung cancer from which he had suffered for about one and a half years.

John Cushnaghan Cox (Ian to all his friends) was born in January 1935 and joined Paddy Henderson and Co. as a Cadet in 1951: he was serving as Chief Officer with that company when it was taken over by Elder Dempster which in turn merged with Alfred Holt and Co. to form Ocean Fleets. He was promoted to

Master in 1978 and five years later transferred to OCL, now P&O Containers Ltd. The various companies changed around him whilst he stayed put as he saw the contraction and decline of the shipping industry taking place during his time at sea.

In 1988, after ten years in command of large container ships, he was appointed as Nautical Adviser with P&O Containers Ltd. In the following year he was made Fleet Manager (Marine Services), a position he held until his untimely death, only a year before he was expecting to retire.

Captain Cox's first meteorological logbook came from Blue Funnel ship *Achilles* in October 1971, one of 23 to receive an assessment of 'excellent' out of a total of 30 meteorological logbooks he helped to compile. He received Excellent Awards in 1984, 1986 and 1987 on his last command before coming ashore, m.v. *Tolaga Bay*.

Ian Cox obtained his Extra Master's Certificate whilst he was still at sea, and this complemented his seamanlike approach to both his work and his life, inspiring those who worked under him to emulate his high standards. He remained active in his work to within two weeks of his death, attending the Remembrance Day ceremony at the Merchant Navy Memorial in London in mid-November as Chairman of the London Branch of the Nautical Institute. He had been elected a Fellow of the Nautical Institute in 1989 and was a member of their Council. He was admitted as a Younger Brother of Trinity House in 1988 and was a Member of the Honourable Company of Master Mariners.

We offer our sincere condolences to his wife Geraldine and her son who attends Merchant Taylors School.

RETIREMENT — CAPTAIN R.J.A. COPELAND retired from the sea on his 57th birthday, 21 January 1994.

Robert Copeland was born in January 1937 at Enniscorthy, Co. Wexford, Ireland, and educated at Galway Grammar School. He went straight to sea, sailing from Belfast in the Hain Line ship *Trewidden* as a Deck Boy in August 1954. He then served with various companies as a Seaman, working his way up to Boatswain before being appointed as Third Mate on the Head Line ship *Carrigan Head* in January 1960. From that ship in November 1961 he sent in the first of a grand total of 68 meteorological logbooks that he has provided in his 27 years as marine observer and Master. Thirteen of his logs were marked 'excellent' and he received an Excellent Award in 1986.

Captain Copeland continued to serve in Head Line ships as he was promoted through the officer ranks, gaining his Master's Certificate in February 1967 and being appointed to his first command, *Fair Head*, in September of the following year. He was Master of many Head Line ships and latterly when with that company in *Cast Beaver* for the years 1973-1977. He transferred to Cast Line proper in 1978 and then to Bibby Line in 1979, where he spent one of his two years with that company in command of *Dart Atlantic*.

From 1981 up to the time of his retirement, Captain Copeland was with Ropner Shipping of Darlington, his final batch of logs coming from his last command, the bulk carrier *Ravenscraig*. He set off on his retirement voyage around the world with his wife, Jane, in March of this year, with first stop Hong Kong to be a spectator at the Rugby Sevens championship. We hope he continues to enjoy his flights around the globe and that he will find fulfilment in his endeavours to make time to do all those things that could never be accomplished when he was at sea.

RETIREMENT — CAPTAIN D.A. DORNOM retired on 29 April 1994 after serving for 43 years at sea, mainly in ships of the P&O Group.

David Dornom was educated at Whitgift School and received his pre-sea training at H.M.S *Worcester*, the 200-berth training college afloat which was, until 1969, moored on the south side of the River Thames at Greenhithe near Dartford. On leaving the training ship in 1951 he joined Ellerman and Bucknall Steamship Co. as an Apprentice. Soon after passing his Second Mate's Certificate in 1955 he transferred to the P&O S.N.Company as Fourth Officer and it was from his first P&O ship *Socotra* that we received his first meteorological logbook in March 1956.

Captain Dornom served in many P&O cargo and passenger liners in all ranks, ultimately as Chief Officer of the passenger liner *Orsova*, until transferring to the newly formed General Cargo Division on the restructuring of the P&O Group in 1971. He later served in general cargo, refrigerated, heavy-lift and gas-carrying ships of the group's Bulk Shipping Division, before moving to OCL in 1983. He was promoted to command in 1984 and from that time onwards remained Master of P&O Containers' *Flinders Bay* up to his retirement.

Captain Dornom was involved with the entries in a total of 44 meteorological logbooks in his 19 observing years, half of these logs coming from his last ship. A marking of 'excellent' was awarded for no fewer than 19 of those logs and he received five Excellent Awards between 1985 and 1991. Had he stayed at sea for one more year he may have been short-listed for a long-service barograph award, but as it is, we are most fortunate to have had his whole-hearted co-operation in excellent observing throughout his career.

Captain Dornom joined the Royal Naval Reserve in 1955 and served in frigates, minelayers and minesweepers: latterly he has specialised in the Naval Control of Shipping. He was promoted Commander in 1970 and was awarded the Royal Naval Reserve Decoration (R.D.) in the same year, with a second clasp awarded in 1990.

On leaving H.M.S. *Worcester* in 1951, Cadet Dornom was accepted as a Cadet of the Honourable Company of Master Mariners, a scheme in which a Member of the Company continuously monitors the progress of a candidate. He was elected a full member in 1966 and a Liveryman in 1977. He is currently serving as a Member of the Court of Assistants of the Honourable Company.

In addition to his seagoing pursuits, Captain Dornom has worked with his wife, Paddy, as a fund raiser for the Missions to Seamen. He is a keen supporter of the Transport Preservation movement and is a shareholder in the Bluebell Railway and the Locomotive No.35006, *Peninsular & Oriental S.N.Co.*

Our good wishes are sent for a happy, successful and lengthy retirement.

Notices to Marine Observers

CHANGES TO SHIP CODE FOR SELECTED AND SUPPLEMENTARY SHIPS

WMO's Commission for Basic Systems has approved the following modifications to code FM 13-IX Ext. SHIP, for introduction as from the 0000 hours UTC observation on Wednesday, 2 November 1994. The changes affect observers on Selected and Supplementary Ships of the Voluntary Observing Fleet.

1. The systematic reporting of:

- (i) All present and past weather, including phenomena without significance. This is a change from the present method, and means that i_x , type of station and weather indicator, will routinely be coded as 1 (manned station, weather group included). In the unlikely event that these data cannot be collected, i_x will be coded as 3 (manned station, weather group omitted).
- (ii) All cloud observations, including no cloud.
- (iii) All relevant wave groups. There are no changes in the rules for reporting various elements of the wave groups.

2. The indication for sign and type of sea surface temperature.

- (i) This will obviate the need for the entries at the top of the right-hand log page.
- (ii) The modification to code group 16 is as follows:

Replace $0s_n T_w T_w T_w$ with $0s_s T_w T_w T_w$.
- (iii) s_s = Indicator for sign and type of measurement of sea surface temperature, as shown in the table.

Code	Sign	Type
0	positive or zero	intake
1	negative	intake
2	positive or zero	bucket
3	negative	bucket
4	positive or zero	hull contact sensor (i.e. Met. Office)
5	negative	hull contact sensor
6	positive or zero	other
7	negative	other

To assist observers, the present recording of the wet-bulb temperature in column 19 of the logbook, which is not coded, will continue.

3. The addition of new a group for reporting wet-bulb temperature.

(i) After group 22, add a new group 23, ($8s_w T_b T_b T_b$).

(ii) s_w = Indicator for the sign and type of wet-bulb temperature reported, as shown in the table.

Code	Sign	Type
0	positive or zero	measured
1	negative	measured
2	iced bulb	measured
5	positive or zero	computed
6	negative	computed
7	iced bulb	computed

(iii) $T_b T_b T_b$ = Wet-bulb temperature, in tenths of a degree Celsius, its sign being given by s_w , as shown in the table above.

4. Renumber ICE group 24.

5. On the message pad, allow space for the extra group(s).

Observing ships will be advised in advance of plans to ensure smooth and immediate introduction of the changes to take place at 0000 hours on 2 November 1994. Adhesive labels for sticking to front covers of logs and code books will be issued by Port Met. Officers or mailed direct to ships, and reprints of the log, message form and other publications affected will be introduced as soon as possible.

Observing ships which have not received the labels in time for the introduction of the new code groups are asked to advise the Marine Division in good time.

PORT METEOROLOGICAL OFFICER — BRISTOL CHANNEL

The facsimile receiver number for the United Kingdom PMO based in Cardiff has been changed to 0222 225295.

The address and telephone number for the Port Meteorological Office are unchanged.

FLEET LISTS

Fleet Lists

UNITED KINGDOM

As for 1 March 1994

1. The following is a list of ships recruited to the United Kingdom Voluntary Observing Fleet.
2. The names of the Masters, Observing Officers and Radio Officers are as shown in the latest meteorological logbooks to be received at the Marine Division in Bracknell, up to the date shown above. The date of the latest receipt is given in the second column. Masters and Officers are invited to notify the Editor of any errors or omissions found in the lists.
 - * Indicates a recently recruited ship from which a logbook has not yet been received.
 - † Indicates a ship from which no logbook has been received since the beginning of the previous year, and therefore for which it is impractical to show the Master's and Officers' names.
3. All logs received from ships will be acknowledged by the Marine Superintendent of the Met. Office.
4. Port Met. Officers will personally call on Masters and Observing Officers as opportunity offers, and on receipt of requests from ships.
5. Masters and operators of ships are particularly requested to advise the Marine Superintendent or a Port Met. Officer with prior notice of any changes of service or ownership which may necessitate the withdrawal from the ship of equipment on loan from the Met. Office.

Selected and Supplementary Ships

NAME OF VESSEL	LAST RETURNS RECEIVED	MASTER	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Abbey</i>	2.12.93	R. J. Cropper.....	J. Mealor, N.A. Binns, D.F. Black.....	T. C. Barry.....	Furness Withy (Shipping) Ltd
<i>Aberthaw Fisher</i>	†	—	—	—	James Fisher & Sons Plc
<i>Afric Star</i>	11.2.93	A.J. Brown.....	N.M. Casao, J.R. Gazmin, J.S. Tamayo.....	R. Bernal.....	Star Reefers
<i>Al Awdah</i>	21.2.94	D. Kent.....	A. Ahmad, S. Salem, O. Soltan.....	D. Moscoso.....	Kuwait Oil Tanker Co.
<i>Al Fuyat</i>	11.1.94	D. Carrick.....	S.B. Rushwan, A.M.H. Haider, P. Rojendra.....	R. Lao.....	Kuwait Oil Tanker Co.
<i>Al Rayyan</i>	†	—	—	—	United Arab Shipping Co. (S.A.G.)
<i>Al Samidoun</i>	1.11.93	A.R. Wilkinson.....	T.A. Yakout, A.Y. Mahfouz, K.R. Mahmood.....	M.S. Espino.....	Kuwait Oil Tanker Co.
<i>Al Shuhadaa</i>	10.2.94	K.M. Hammad.....	H. Selim.....	P. Martinez.....	Kuwait Oil Tanker Co.
<i>Al Tahreer</i>	9.2.94	P.A. Woods.....	D.A. Yorke, Y.A. Al-Bawali, O.M. Mousa.....	H. Macan.....	Kuwait Oil Tanker Co.
<i>Alicides</i>	4.3.93	A.C. Barretto.....	R.T.B. Fonseca, M.N. D'Souza, S. Sreedhara.....	P. Fernandes.....	Mobil Shipping Co. Ltd
<i>Aldringen</i>	9.2.94	P.I.E. Quance.....	P.M. Frost, P. Hilbert, H. Yasin.....	—	Stephenson Clarke Shipping Ltd
<i>Alexis</i>	†	—	—	—	Thorstone Ship Management Ltd
<i>Alliance</i>	†	—	—	—	Denholm (I.O.M.) Ltd
<i>Almeda Star</i>	21.2.94	P. Holiby.....	J.V. Sheridan, N.P. Tuvida, N.C. Marco.....	N.M. De Leon.....	Concordia Marine Co. Ltd
<i>Andes</i>	5.11.93	T.R. Barron.....	J.L. McCorquodale, J.N. Balkwill, W.J. Clear.....	P.D. Hyde.....	Furness Withy (Shipping) Ltd
<i>Antwerpen</i>	21.12.93	W. Defloor.....	I. Debach, H. Swillens, K. De Vlegelmer.....	G. Geurts.....	ABC Containerline N.V.

<i>Appleby</i>	7.1.94	K. Milburn.....	B.H. Birch, M.J. Figg, S.M. Conran.....	P. Moraes.....	Ropner Shipping Services Ltd
<i>Arctic Universal</i>	12.11.93	L.A. Crole.....	A.S. Caballana, R.C. Cubillo, A.A. Gutia.....	C.F. Unato.....	London Ship Managers Ltd
<i>Argentina Star</i>	25.10.93	P. Richards.....	A. Groom, M. Ellis, M. Samwell.....	—	Blue Star Ship Management Ltd
<i>Aspid</i>	28.9.93	F.J.M. Scott.....	C. M. Toner, T. Jupp.....	—	The Aspid Trust
<i>Atlantic Conveyor</i>	19.10.93	R.S. Bolton.....	S. A. Crow, N.R. Broomhall, D.J. Cierar.....	—	Cunard Co. Ltd
<i>Atlantic Universal</i>	18.3.93	R.M. Hutchinson.....	R.M. Hutchinson, F.S. Soriano, D.P. Kuruntillaka.....	B. Groggin.....	London Ship Managers Ltd
<i>Auckland Star</i>	23.8.93	T.C. Black.....	M. D. Ramos, E. Alvarez, R. Hussain.....	A. Sacey.....	Blue Star Ship Management Ltd
<i>Author</i>	15.7.93	G. Waller.....	G.T. Hill, T.T. Davies, K. Grant.....	J. Gellatly.....	Denholm (I.O.M.) Ltd
<i>Avelona Star</i>	7.1.94	K. Lumby.....	R.A.A. Morrison, E.B. Cussey, S.B. Ramoa.....	J.L. Romano.....	Concordia Marine Co. Ltd
<i>Avila Star</i>	13.12.93	D.F. Craddock.....	D.L. Jerusalem, S. Villacean, M.G. Bifra.....	I.E. Ballena.....	Blue Star Ship Management Ltd
<i>Aya II</i>	29.10.93	M.J. Bellamy.....	M. Pedro, A. Martinez, M.A. Lemus.....	B. Everett.....	Cardiff Ship Management Ltd
<i>Azeca I</i>	—	—	—	—	—
<i>BP Argoxy</i>	13.7.93	P.A. Darlow.....	A. M. Lacey, W. J. Wulawczyk, A. Olbronski.....	P.J.J. Gould.....	BP Shipping Ltd
<i>BT Nautilus</i>	25.8.93	G.N. Gaunt.....	R.B. Webb, J. Gilbert, E. Embolitorio.....	K.B. Irani.....	BT Shipping (London) Ltd
<i>BT Navarin</i>	16.6.93	H.G. Gray.....	B. Budhiraja, P.K. Sinha, D. Thingore.....	K.B. Irani.....	BT Shipping (London) Ltd
<i>BT Navigator</i>	19.10.93	H.G. Gray.....	B. Budhiraja, E. Villaseca, M. Thornley.....	Singh Manjit.....	BT Shipping (London) Ltd
<i>BT Neptune</i>	3.8.93	N. Shepherd.....	M. Hefter, A.S. Arrieta, I. Octavio.....	W. Sudanand.....	BT Shipping (London) Ltd
<i>BT Nestor</i>	8.10.93	C.J. Bland.....	V.K. Vijayan, R.C. Misra, S.C. Sharma.....	J.D. Rodrigues.....	BT Shipping (London) Ltd
<i>BT Nimrod</i>	†	—	—	—	—
<i>Bahia Express</i>	†	—	—	—	—
<i>Baltic Breeze</i>	5.7.93	Tev Ho Wat.....	—	San Tint.....	V. Ships (U.K.) Ltd
<i>Baltic Eagle</i>	†	—	—	—	—
<i>Baltic Eider</i>	5.7.93	—	—	—	—
<i>Baltic Tern</i>	18.11.93	D.R. Cripps.....	P.R.N. Maynard, S.N. Parvin, M. Causon.....	—	Wallenius Lines (Japan) Ltd
<i>Baltic Universal</i>	8.6.93	B. Mullenger.....	J. Gunson, M. Kearney, G.R. Armstrong.....	—	Andrew Weir Shipping Ltd
<i>Barbara E</i>	11.1.94	E.M. Colley.....	N.D. Cairo, L.M. Ladores, J.R. Ramiro.....	—	Andrew Weir Shipping Ltd
<i>Barra Head</i>	21.1.93	D.A. Peden.....	J.W. Charlton, M. De Felipe.....	—	London Ship Managers Ltd
<i>Belo Oriente</i>	*	C.E. Harvey.....	M. Horridge, D.E. Aylott, M.P.A. Stephen.....	—	Jeppesen Heaton Ltd
<i>Berlin Express</i>	10.1.94	J.H. Hutson.....	S. Braund, M. Haynes.....	—	Chelston Ship Management Ltd
<i>Blue Flame I</i>	†	—	—	—	Eurasia Ship Mgmt Co. (H.K.) Ltd
<i>Bora Universal</i>	10.2.94	B.R. Richmond.....	R.I. Hay, M.T. Lachica, R.J. Sajo.....	—	P&O Containers Ltd
<i>Botany Bay</i>	9.11.93	I.S. Grant.....	I.M. Percival, A. Murray, C.A. Spain.....	—	Boston Putford Offshore Safety Ltd
<i>Bransfield</i>	13.5.93	M.J. Cole.....	J.R. Greenspan, S.J. Howat, R. Jackson.....	—	London Ship Managers Ltd
<i>Brisbane Star</i>	*	—	—	—	P&O Containers Ltd
<i>Britannia Beaver</i>	30.9.93	J.M. Ronald.....	P.N.W. Collings, J.M. Cleugh, P.M. Belcher.....	—	British Antarctic Survey
<i>British Admiral</i>	30.9.93	D.R. Lewis.....	G.M. Hallett, M. Janik, A. Parkinson.....	—	Blue Star Ship Management Ltd
<i>British Adventure</i>	22.3.93	N. Greig.....	R. Miller, C.J. Garner, C.D. Donoso.....	—	Britannia Aggregates Ltd
<i>British Esk</i>	21.2.94	W.A.J. Cameron.....	D. Buckley, S. Ferguson, K. Kowalczyk.....	—	BP Shipping Ltd
<i>British Ranger</i>	11.2.94	C.R. Shoolbraid.....	A. Chylak, T. Olszewski, D.P. Witts.....	—	BP Shipping Ltd
<i>British Reliance</i>	13.5.93	J.A. Buchanan.....	W.A.T. Cameron, T.T. Laito, N.P. Garratt.....	—	BP Shipping Ltd
<i>British Renown</i>	21.2.94	R. Standing.....	L.A. Wood, P. Cavagan, M. Crisp.....	—	BP Shipping Ltd
<i>British Resolution</i>	21.2.94	M.R. Mansbridge.....	J. Harris, D.J. Clark, L. McEwan.....	—	BP Shipping Ltd
<i>British Resolute</i>	21.2.94	P. St Lawrence.....	E.R. Davis, T.E. Ryan, C.J. Burt.....	—	BP Shipping Ltd
<i>British Skill</i>	10.1.94	M. Etherington.....	P. Newman, J.R. Hollamby, S. Moore.....	—	BP Shipping Ltd
<i>British Spirit</i>	21.10.93	I. Middleton.....	—	—	Furness Withy (Shipping) Ltd
<i>British Steel</i>	—	—	—	—	—

Selected and Supplementary Ships (contd)

NAME OF VESSEL	LAST RETURN RECEIVED	MASTER	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>British Success</i>	12.1.94	S. Petey	N. Collins, C. Winterbottom, N.P. Garratt	W.G. Jeremiah	BP Shipping Ltd
<i>British Tamar</i>	21.12.93	F.W. Wilkinson	B.A. Jolly, J. Gutowski	J. Ferson	BP Shipping Ltd
<i>Broompark</i>	4.8.93	H.R. Mogul	R.I. Sani, P.S. Prabhu, I.S. Gill	E. Almaida	Denholm (I.O.M.) Ltd
<i>Brussel</i>	10.1.94	W. Defloor	P. Degraeve, G. Sommers, K. De Vlegelmer	R.M. Dejarlo	ABC Container Line N.V.
<i>Bubayan</i>	6.12.93	P.J. Grilfith	W. Khaatab, A.K.A. Aly	J.G. Canete	Kuwait Oil Tanker Co.
<i>Buenaventura</i>	15.1.93	S. Kocherla	J. Ilarde	E. Gravador	Jardine Ship Management (U.K.) Ltd
<i>Buffalo</i>	4.2.93	K. P. Riley	J. Murray, C. G. Collard, M. E. Ingham	—	POETS Fleet Management Ltd
<i>CAM Defender</i>	†	—	—	—	CAM Shipping Ltd
<i>CAM Retriever</i>	†	—	—	—	CAM Shipping Ltd
<i>CAM Supporter</i>	†	—	—	—	CAM Shipping Ltd
<i>CMB Ebony</i>	†	—	—	—	Aseco (Antwerp) Ltd
<i>CMB Princess</i>	9.2.94	J.R. Taylor	S. Narang, S.I. Khot, A. Dunning-Ag	S.P. Sakala	V. Ships (U.K.) Ltd
<i>C.S. Alert</i>	5.1.94	R.J. Walter	T. Rawlings, N.P. Smith, K. Hughes-Jones	W.E. Harrison	BT (Marine) Ltd
<i>C.S. Iris</i>	22.1.93	R. Waller	D. Darlington, N.P. Smith, J.D.F. Darbyshire	J. Vaughan	BT (Marine) Ltd
<i>C.S. Monarch</i>	11.5.93	A. Pereira	D. Boparrah	R. Dandona	BT (Marine) Ltd
<i>C.S. Nexus</i>	*	—	—	—	Coe Metcaif Shipping Ltd
<i>C.S. Sovereign</i>	2.12.93	C.D. Knight	R. Poole, N. Barnaby, M.R. Swaffield	P. Muir	BT (Marine) Ltd
<i>CSAV Los Angeles</i>	26.7.93	D. Moseley	T.T. George, C.A. Montedaro, P. Podest	J.N. Escalona	Jardine Ship Management (U.K.) Ltd
<i>Cableman</i>	†	—	—	—	P&O Tankships Ltd
<i>Cabo Negro</i>	*	—	—	—	—
<i>Cable Venture</i>	9.9.93	R.S. Merrill	R. Gibson, D. Robson, D.A. Wilson	D.R. Woods	Cable & Wireless (Marine) Ltd
<i>Caledonian Isles</i>	*	—	—	—	Caledonian MacBrayne Ltd
<i>Canberra</i>	21.4.93	I. Gibb	R.D.J. Kevan	V. Turner	P&O Cruises Ltd
<i>CanMar Ambassador</i>	22.12.93	J.O. Simco	J. Parker, F.L. Campus, N.C. Acot	G.L. Borbon	Canada Maritime Services Ltd
<i>CanMar Conquest</i>	†	—	—	—	Canada Maritime Services Ltd
<i>CanMar Europe</i>	26.1.94	E. Leenijes	T. Regniers, W. Kinpuato, Z.N. Lunguch	N. Mpoto	OOCL (U.K.) Ltd
<i>CanMar Triumph</i>	16.2.93	I. Donaldson	—	S. Ghose	Canada Maritime Services Ltd
<i>CanMar Victory</i>	24.3.93	F.K. Gordon	M.T.R. Buddhadasa, E.G. Bribron	L. Geroche	Canada Maritime Services Ltd
<i>Canterbury Star</i>	10.2.94	A. Tibbott	J. Carriativo, F. Octa, C.J. Alvarado	F. Gemudiano	Blue Star Ship Management Ltd
<i>Cape Horn</i>	2.12.93	M.R. Banon	D. Bonella	E. Salazar	MOL Tankship Management Ltd
<i>Cardigan Bay</i>	11.1.94	D.W. Lav	B.L. Brierley, D.L. Dodsworth, M.L. Mullins	E. MacKenzie	P&O Containers Ltd
<i>Cartagena</i>	†	—	—	—	Dole Fresh Fruit International Ltd
<i>Cast Husky</i>	29.10.93	W. Werner	D. Perusina, A. Miloslavice, L. Ljumovic	J. Sech	Cast Europe (U.K.) Ltd
<i>Cast Maskay</i>	11.1.94	D. Strazicic	—	J. Gugiv	Cast Europe (U.K.) Ltd
<i>Cast Otter</i>	†	—	—	—	Cast Europe (U.K.) Ltd
<i>Cavendish</i>	10.9.93	R.J. Cropper	J.A.B. Ashiellic, N.B. Fagan, W.J. Clear	M. Sebastian	Furness Withy (Shipping) Ltd
<i>Celtic Challenger</i>	10.2.94	V.F.R. Moorman	A. P. MacLean, W. G. Tait	—	C.M. Willie & Co. (Shipping) Ltd
<i>Cerantes</i>	24.9.93	R.H. Nightingale	S. Furness, A.D. MacPherson, G.K. McBride	—	Denholm (I.O.M.) Ltd
<i>Challenger</i>	13.4.93	P.H.P. Maw	G.M. Long, P.T. Oldfield, J.C. Holmes	—	NERC Research Vessel Services

Selected and Supplementary Ships (contd)

NAME OF VESSEL	LAST RETURN RECEIVED	MASTER	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Durrington</i>	†	—	—	—	Stephenson Clarke Shipping Ltd
<i>Eagle</i>	9.12.93	P.D. Kelly.....	D.A. Ganley.....	P. Kinchella.....	Mobil Shipping Co. Ltd
<i>Eastern Bridge</i>	9.2.94	A. Crofts.....	I.C. Gravatt, B.R. Noel, K.C. Townley.....	K.S. Woodley.....	Ropner Shipping Services Ltd
<i>Ebalina</i>	†	—	—	—	Shell Marine Personnel (I.O.M.) Ltd
<i>Eburna</i>	22.1.93	A.D. Guillaume.....	P. Tweedle, R. Keir, H. Quddus.....	A. Fielding.....	Shell Marine Personnel (I.O.M.) Ltd
<i>Echoman</i>	†	—	—	—	P&O Tankships Ltd
<i>Edinburgh Fruit</i>	†	—	—	—	Denholm Ship Management Ltd
<i>Edinburgh Maersk</i>	10.2.94	J. Hansen.....	F.A. Julsdorf, M. Simonson.....	D. Cooper.....	A.P. Moller, Copenhagen
<i>Edinburgh Satsuma</i>	11.1.94	M.G. Hancock.....	A.S. Hardy, J.F. Pereira, V.A. Varma.....	B.X. Pinto.....	Denholm Ship Management (U.K.) Ltd
<i>Elk</i>	29.11.93	B. Luke.....	M.J. Paine, K.J. Wilson, R.W. Madden.....	H.J. Bowering.....	POETS Fleet Management Ltd
<i>Ellen Hudig</i>	30.9.93	P. De Oliveira.....	D. Suls.....	— Gunarwardena.....	ABC Containerline N.V.
<i>Encounter Bay</i>	11.1.94	B.W. Nuttall.....	R.T. Wheslan, I.D. Hebborn, J.S. Russell.....	M. Hannan.....	P&O Containers Ltd
<i>Endeavor</i>	9.11.93	K.E. Greest.....	C.S. Shaw, P.S. Jobling, N.E. Blythe.....	A.P. Daff.....	Souter Shipping Ltd
<i>English Star</i>	28.9.93	G.W. Bryson.....	I.N. Cortez, E. Lavezaris, R.M. Bat-og.....	E. Pacz.....	Blue Star Ship Management Ltd
<i>Enterprise</i>	8.10.93	I. Beetham.....	M. Monk, W.J.A. Gilbert.....	J.D.P. Jones.....	Souter Shipping Ltd
<i>Equinox</i>	21.2.94	P.A. Helm.....	W. McCann, V.L. Turner, N. Sumpson.....	J.D.P. Jones.....	Souter Shipping Ltd
<i>Eredine</i>	10.1.94	P.A. Frewer.....	M. Martin, R.C. Stewart, S. Rapley.....	A.B. Crosland.....	The China Navigation Co. Ltd
<i>Eridge</i>	*	—	—	—	P&O Ship Management Ltd
<i>Ervilla</i>	†	—	—	—	Shell Marine Personnel (I.O.M.) Ltd
<i>Espanade</i>	21.2.94	R. Taylor.....	N.E. Blythe, C.M. Ashton, M.E. Sands.....	J. Shefford.....	Shell Marine Personnel (I.O.M.) Ltd
<i>Esso Aberdeen</i>	19.11.93	G.T. Rhymer.....	A. Hodson, D. McIntosh, A. Mason.....	—	Souter Shipping Ltd
<i>Esso Fife</i>	23.12.93	R. Noakes.....	R.C. Moss, M.K. Elson, K.H. Watts.....	—	Esso Petroleum Co. Ltd
<i>Esso Milford Haven</i>	*	—	—	—	Esso Petroleum Co. Ltd
<i>Esso Tyne</i>	9.9.93	M.J. Halle.....	J. Holmes, M.K. Elson, L.L. Wallace.....	—	Esso Petroleum Co. Ltd
<i>Euplecta</i>	†	—	—	—	Shell Marine Personnel (I.O.M.) Ltd
<i>Euro Merchant</i>	†	—	—	—	C.M. Willie & Co. (Shipping) Ltd
<i>Euro Trader</i>	27.9.93	M. Augustin.....	J. Alvirin, W. Nabozny.....	— Boruta.....	C.M. Willie & Co. (Shipping) Ltd
<i>European Trader</i>	7.7.93	P.I. Hillman.....	C.P. Douglas, R.M. Kenzor, C.J. Batty.....	—	P&O European Ferries Ltd
<i>Excelsior</i>	5.1.94	R. Cordon.....	P.W. Bennet, P.S. Jobling, H.A. James.....	J.P. O'Driscoll.....	Souter Shipping Ltd
<i>Exemplar</i>	25.1.94	N.D. Riley.....	S.K. Nixon, C. MacSweeney, A. Crew.....	F. Wilson.....	Souter Shipping Ltd
<i>Eye of the Wind</i>	†	—	—	—	Adventure Under Sail
<i>Falcon Arrow</i>	10.2.94	C.T. Oreda.....	R.B. Suzon, M.H. Baja.....	G. Abello.....	Jardine Ship Management (U.K.) Ltd
<i>Falklands Desire</i>	22.6.93	P. Taylor.....	G.C. Grey, D. Butterfield, B. Sydney.....	A. Gambin.....	Marr Vessel Management Ltd
<i>Famella</i>	9.12.93	J.B. Nichols.....	A.G. Hay, F.F. Kuhn, R. Hamison.....	P.J. Appleyard.....	Marr Vessel Management Ltd
<i>Flinders Bay</i>	21.2.94	D.A. Donnom.....	L.J. Fletcher, J.V. Dilley, C.B. Feierabend.....	F.A. Dunn.....	P&O Containers Ltd
<i>Forthbank</i>	4.3.93	C. Butters.....	—	A.G. Belonte.....	Andrew Weir Shipping plc
<i>Francis Drake</i>	†	—	—	—	Ocean Youth Club
<i>Fremantle Star</i>	†	—	—	—	Blue Star Ship Management Ltd
<i>Frines</i>	†	—	—	—	Jebsens International (London) Ltd

<i>Fullness</i>	26.8.93	B. C. Dalanon.....	D. Laquiao, R. R. Ramos, P. Ilao.....	A. Urbiztondo.....	Jebsens Internacional (London) Ltd
<i>Ga Chau</i>	+	—	—	—	Denholm Ship Management (U.K.) Ltd
<i>Gardline Locater</i>	+	—	—	—	Gardline Shipping Ltd
<i>Geestbay</i>	16.12.93	W.A. Boddington.....	K. Cox, R.M. Eaton, D. Buckingham.....	—	The Geest Line
<i>Geest Dominica</i>	14.10.93	G.L. Foster.....	A. Scales, J.S. Lawes, A.B. Ward.....	—	The Geest Line
<i>Geestport</i>	27.9.93	D. Roberts.....	J. Bore, S. Gallacher, D.J. Fulton.....	—	The Geest Line
<i>Geest St Lucia</i>	21.2.94	R.A. Cole.....	M.H.F. Kenny, J.S. Lawes, C.A. Murphy.....	—	The Geest Line
<i>Gem</i>	*	—	—	—	Stephenson Clarke Shipping Ltd
<i>General Delgado</i>	17.6.93	D.P. Marfil.....	O.G. Gaurana, R.M. Valdellon, S.O. Rivera.....	J.A. Tupas.....	Jebsens Ship Management (Bergen) A/S
<i>General Tirona</i>	+	—	—	—	Cory Bros Shipping Ltd
<i>General Villa</i>	+	—	—	—	Cory Bros Shipping Ltd
<i>Glen Roy</i>	*	—	—	—	MOL Tankship Management Ltd
<i>Gold Varda</i>	+	—	—	—	Haverton Shipping Ltd
<i>Golden Roy</i>	12.1.94	R.E. Baker.....	E. Malisa, B. Edo, G. Bakalar.....	D. Goran.....	Cardiff Ship Management Ltd
<i>Garbea</i>	+	—	—	—	Denholm Ship Management (U.K.) Ltd
<i>Graigwerdd</i>	9.11.93	R. Wade.....	P.C. Coles, J.V. Sedonio.....	R.G. Martinez.....	Idwal Williams & Co. Ltd
<i>Greater Manchester</i>	+	—	—	—	Ocean Youth Club
<i>Challenge</i>	+	A. Sorensen.....	D. Igguiden, G. Harper.....	T. Looney.....	Greenpeace Marine Division
<i>Greenpeace</i>	20.5.93	—	—	—	Isles of Scilly Steamship Co. Ltd
<i>Gry Maritima</i>	*	—	—	—	Atlantic Power & Gas Ltd
<i>Gryphon A</i>	*	—	—	—	Wallem Ship Management (H.K.) Ltd
<i>Gulf Speed</i>	11.11.93	P.D. Misquitta.....	K. Prabhat, R.E. D'Sa, J.T. Pereira.....	S. Bose.....	Wallem Ship Management (H.K.) Ltd
<i>Gulf Spirit</i>	19.10.93	T.A. Rodrigues.....	P. Goran, K.M. Gaad, A. Habib.....	A.G. Lobo.....	Wallem Ship Management (H.K.) Ltd
<i>Gull Arrow</i>	21.12.93	I.S.R. Bell.....	G.P. Dalida.....	D.J. Duggan.....	Jardine Ship Management (U.K.) Ltd
<i>HV Fox</i>	+	—	—	—	Marr Vessel Management Ltd
<i>Harold La Borde</i>	9.2.94	P.J. Dugg.....	J.P. Murphy, J.F. Heylen, J. Bago.....	W.R. Salandy.....	Bibby Line Ltd
<i>Harrier</i>	10.2.94	M.S. Browning.....	R.T.B. Fonseca, P.S. Dighe, A.V. Sequeira.....	—	Mobil Shipping Co. Ltd
<i>Havdratt</i>	+	—	—	—	A/S Havtor Management
<i>Havjarl</i>	27.9.93	H.G. Poillard.....	A.G.J. Gooch, L.L. Cacal, I.C. Mado.....	J.A. Genato.....	A/S Havtor Management
<i>Havkong</i>	6.9.93	K.W. Newman.....	H. Lie, R.P. Gilbert, S.A. Vertudazo.....	J.M. Manalo.....	A/S Havtor Management
<i>Havlom</i>	8.6.93	W.T. Munro.....	C. Fitton, M. Smith-Burley, F.T. Mulrooney.....	—	A/S Havtor Management
<i>Havsul</i>	+	—	—	—	A/S Havtor Management
<i>Hawk</i>	*	—	—	—	Mobil Shipping Co. Ltd
<i>Hebridean Isles</i>	2.12.93	M. Kennedy.....	K.M. MacDonald, S.D. MacDonald, R. Bell.....	—	Caledonian MacBrayne Ltd
<i>Hekabe</i>	7.1.93	D. Simpson.....	T. Ferguson, A. Cameron, D. Pitogo.....	O. Poon.....	Kvaerner Shipping A/S
<i>Helen</i>	+	—	—	—	ABC Containerline N.V.
<i>Helikon</i>	17.2.93	N. Muhsin.....	E. Johnsen, K. Ratcliffe, J. Penafiel.....	P. Yaoyao.....	Kvaerner Shipping A/S
<i>Helios</i>	19.10.93	T.H. Goldsmith.....	R.M. Deyes, F.H. Gloria, B.J. Lellis.....	—	Kvaerner Shipping A/S
<i>Hemera</i>	23.8.93	T.H. Goldsmith.....	N. Tolentino, R.I. Tan, S. White.....	M. Dumarao.....	Kvaerner Shipping A/S
<i>Hemina</i>	9.2.94	P. Vennell.....	T.N. Ferguson, G.J. Knox, M.A. Pagente.....	L. P. Lim.....	Kvaerner Shipping A/S
<i>Hermod</i>	1.7.93	A.S. Tennant.....	T.N. Ferguson, D.J.M. Gale, R.D. Sabillis.....	I. Entreliso.....	Kvaerner Shipping A/S
<i>Hesiod</i>	26.5.93	P. Beresford.....	N.J. Blacker, B. Bitasan, N. Sealimoy.....	O. Ocana.....	Kvaerner Shipping A/S
<i>Hijaz</i>	24.8.93	N.A. Siddiqui.....	—	R. Caraan.....	United Arab Shipping Co. (S.A.G.)
<i>Hoegh Duke</i>	+	—	—	—	Leif Hoegh & Co. A/S
<i>Hoo Kestrel</i>	*	—	—	—	R. Laphorn & Co. Ltd
<i>Hoo Venture</i>	+	—	—	—	R. Laphorn & Co. Ltd

Selected and Supplementary Ships (contd)

NAME OF VESSEL	LAST RETURN RECEIVED	MASTER	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Hornbreeze</i>	23.8.93	J.B. Woomble	T. Yuson, I.S. Sanchez, A.B. Lagramara	A. Solanor	London Ship Managers Ltd
<i>Horncloud</i>	2.12.93	C.E. Ramsden	M. Bartolay, B. Semic, I. Oscar	R. Mesina	London Ship Managers Ltd
<i>Husnes</i>	7.1.93	R.O.C. Smith	I.K. Oxford, M.P.A. Stephen, W. Campbell	T.H. Phillips	Chelston Ship Management Ltd
<i>Ibn Abdoun</i>	†	—	—	—	United Arab Shipping Co. (S.A.G.)
<i>Ibn Rashid</i>	†	—	—	—	United Arab Shipping Co. (S.A.G.)
<i>Iolair</i>	10.2.94	M. Buchanan	D. Wilson, J. Wood, P.B. Watson	N. Collins	BP Exploration (U.K.) Ltd
<i>Ironbridge</i>	21.2.94	D.G. Olley	D.M. Jack, D. Barclay, D. Bowman	A.V. Godse	Furness Withy (Shipping) Ltd
<i>Ile of Arran</i>	28.4.93	S.F. Findlay	C.C. Bain	—	Caledonian MacBrayne Ltd
<i>Ile of Mull</i>	5.1.94	K. MacPherson	I. Scarr, D. Watson, G. Robertson	—	Caledonian MacBrayne Ltd
<i>Isocardia</i>	16.12.93	E. Wilkinson	R.J. Collier, D.N.A. Morrice, A. Shaikat	—	Shell Marine Personnel (I.O.M.) Ltd
<i>Isomeria</i>	11.1.94	J.G. Peace	S. Zadziuk, J. Wilson, J.F. Harrison	T.A. Verling	Shell Marine Personnel (I.O.M.) Ltd
<i>Ivbank</i>	9.12.93	D.R.W. Maynard	J.P. Warren, R. Pietrzak, W. Szewczyk	A. Lomotan	Andrew Weir Shipping plc
<i>Jaitre Prospect</i>	27.9.93	S.R. Dang	R. Bahi, S. Popov, Y. Savelev	R. Kar	Wallem Ship Management (H.K.) Ltd
<i>Jahre Spirit</i>	6.10.93	M.K. Chaturvedi	—	— Sunil	Wallem Ship Management (H.K.) Ltd
<i>Jahre Spray</i>	†	—	—	—	Wallem Ship Management (H.K.) Ltd
<i>James Clark Ross</i>	7.9.93	N. Beer	M.J. Burgan, J.R. Harper, S. Wallace	S. J. Mee	British Antarctic Survey
<i>Jarikaba</i>	10.2.94	B.C. Preece	A.L. Hurrell, R.C. Mitra, W.C. Eleria	P.L. Michael	Marine Management Services Ltd
<i>Jervis Bay</i>	5.1.94	N.J. Kelleher	R.B. Gurney, J. Townsend, H.J. Davey	—	P&O Containers Ltd
<i>Jevington</i>	1.2.94	M.F. Berne	P. Dawson, B. Standerline	—	Stephenson Clarke Shipping Ltd
<i>Jostelle</i>	12.1.94	I.H. Beange	T.A. Meharry, J.M. Towler, N.G. Young	A.P. Clarke	Souter Shipping Ltd
<i>Kamina</i>	25.10.93	P.E. Underwood	E. Grocholewicz, R. Deocampo, W. Perchel	V. Fainsol	Antrak Marine Ltd
<i>Kathe Sif</i>	6.12.93	—	—	—	Jeppesen Heaton Ltd
<i>Kazimah</i>	*	—	—	—	Kuwait Oil Tanker Co.
<i>Kelvin Challenge</i>	26.3.93	J.W. Wilcock	A.S. Maramon, S.O. Timajo, E.A. De Villa	T.A. Gravador	Acomarit (U.K.) Ltd
<i>Kelvin Fortune</i>	9.2.94	T. Haxell	S. Ledesma, D. Aban, E. Cortuna	M. Yaoyao	Acomarit (U.K.) Ltd
<i>Keta Lagoon</i>	1.11.93	P.Y. Hevi	B.B. Assebi, K.K. Wutoh, B. Minnow	K. Addai	Black Star Line Ltd
<i>Kivi Arrow</i>	8.4.93	P. Moseley	S.R. Bantista, J.A. Clehista, J.I. Flores	E. Penamante	Jardine Ship Management (U.K.) Ltd
<i>Kommandor Subsea</i>	†	—	—	—	Hays Ships Ltd
<i>Kowloon Bay</i>	10.2.94	D.L. Batchelor	A.J. Bull, S. Fish	P.J. Pegg	P&O Containers Ltd
<i>Kukawa</i>	10.1.94	W.E.L. Godsell	K. Totto-Rockson, S.E. Oduro, I.K. Ackah	T. Gravador	Acomarit (U.K.) Ltd
<i>Kumasi</i>	6.12.93	G. K. Thomson	I.K. Ackah, E. Boye	I.V. Saquifyan	Acomarit (U.K.) Ltd
<i>Lackenby</i>	8.10.93	T.O.M. Armstrong	G. Mair, I.T. Davies, K. Henderson	D.K. Weerasekera	Ropner Shipping Services Ltd
<i>Lady of Mann</i>	†	—	—	—	Isle of Man Steam Packet Ltd
<i>Lampas</i>	26.8.93	B. Remnison	A. W. Batten, D.J. Pegg, J.D. Moore	R.E. Haviland	Shell Marine Personnel (I.O.M.) Ltd
<i>Lanka Amitha</i>	24.8.93	J.J. Millar	A. Ahmed	S.K. Datta	V. Ships (U.K.) Ltd
<i>Lantau Trader</i>	22.12.93	A. Nayyar	R. Kacker, A. Simoes	M.P. Corrie	T. & J. Harrison Ltd
<i>Latia</i>	5.11.93	D.W. Inverarity	D.R. Carter, G.W. Pritchard, S.K.M. Turnbull	A.D. Delaney	Shell Marine Personnel (I.O.M.) Ltd
<i>Leonia</i>	31.1.94	F.D. Hugo	D. Cotterell, J.R. Wilson, M.O. Khan	P.M. Denely	Shell Marine Personnel (I.O.M.) Ltd
<i>Lepeta</i>	*	—	—	—	Shell Marine Personnel (I.O.M.) Ltd

Selected and Supplementary Ships (contd)

NAME OF VESSEL	LAST RETURN RECEIVED	MASTER	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Northella</i>	†	—	—	—	Marr Vessel Management Ltd
<i>Northern Horizon</i>	21.2.94	J. Davies	J. Laird, P. Taylor	—	Marr Vessel Management Ltd
<i>Northia</i>	17.12.93	H.J. Tibbs	D. Reynolds, R.M. Haif, S. Turnbull	—	Shell Marine Personnel (I.O.M.) Ltd
<i>Oakby</i>	25.1.94	C.R. Bamford	M.M. Aloysius, J.V. Jayalathaer, D.A. Mendis	J. Mercer	Ropner Shipping Services Ltd
<i>Ocean Goose</i>	†	—	—	—	Captain D.A. Church
<i>Ocean Surveyor</i>	13.4.93	W.M. Allen	S.B. Beal, D.A. Wilson, G.G. Paskell	R.A.M. Lynn	Cable & Wireless (Marine) Ltd
<i>Olivebank</i>	12.1.94	D.E. Gander	W.C. Hirst, A.O. Altar, R.T. Banas	E.G. Arciaga	Andrew Weir Shipping plc
<i>Onda</i>	†	—	—	—	Wallem Ship Management (H.K.) Ltd
<i>OOCL Assurance</i>	11.11.93	C.E.W. Sturcke	D.J. Pritchard, S.J. O'Mara, E. Godolphin	M.I. McGregor	OOCL (U.K.) Ltd
<i>OOCL Bravery</i>	28.9.93	D.R.L. Llewellyn	I. Wright, F. McNulty	G. Jarra	OOCL (U.K.) Ltd
<i>OOCL Charger</i>	†	—	—	—	OOCL (U.K.) Ltd
<i>Orchid B</i>	10.1.94	R.D. Murray	R.J. Clark, D.H. Longino	G.G. Murray	Beta Maritime Services Ltd
<i>Oriental Bay</i>	10.2.94	A.P. Talbot	D.C. Thomson, F.N. Cambra	S.R. Cloutte	P&O Containers Ltd
<i>Oriental Venture</i>	11.1.94	R.A.W. Jarrett	R.P. Coghlan, C.W.M. Stewart, A.J. Glass	R.O. Ball	Dorchester Maritime Ltd
<i>Orion Reefer</i>	11.2.94	T.S. Bedi	S. Sarkar, B. Pereira, B.K. Das	A. Maqsood	Wallem Ship Management (H.K.) Ltd
<i>Ormond</i>	1.2.94	G. Hepple	J. M. Milloy, F. Pereira, N.P.F. D'Souza	A. Mamparo	P&O Ship Management Ltd
<i>Osaka Bay</i>	26.1.94	D.J. Robertson	F.H. Alrai, K.S. Hardy, R.G. Ball	C. Constantinou	P&O Containers Ltd
<i>Pacific Crane</i>	11.2.94	G. Bates	D. Farmer, T.T. Lunt, W.R. Durraans	P.G. Golson	James Fisher & Sons plc
<i>Pacific Guardian</i>	†	—	—	—	Cable & Wireless (Marine) Ltd
<i>Pacific Horizon</i>	†	—	—	—	Marr Vessel Management Ltd
<i>Pacific Pintail</i>	25.2.94	K.N. Young	T. Greig, A.J. Howlett, D.P. Hadfield	T. McMahon	James Fisher & Sons plc
<i>Pacific Princess</i>	†	—	—	—	P&O Cruises Ltd
<i>Pacific Sandpiper</i>	11.2.94	J. Lundberg	P. Ellis, J.B. Appleby, J.I.N. Marsham	G. Swainbank	James Fisher & Sons plc
<i>Pacific Swan</i>	13.12.93	A.C. Lacey	P.R.S. Cutler, P.A. Booker, T.I. Dixon	D. Courtinadge	James Fisher & Sons plc
<i>Pacific Teal</i>	11.2.94	D. Marr	D. Ilderton, J.G. Worthington, P.J. Mahoney	A.P. Austen	James Fisher & Sons plc
<i>Pacific Universal</i>	19.5.93	G.J. Smith	E.A. Isla, H.P. Tabayan, F.S. Soriano	D.P. Villaluna	London Ship Managers Ltd
<i>Pacific Venture</i>	†	—	—	—	MOL Tankship Management Ltd
<i>Pacific Wave</i>	*	—	—	—	MOL Tankship Management Ltd
<i>Palliser Bay</i>	23.12.93	D. Tracey	R. Moxon, L.S. Mahdi, J.S. Orr	G.E. Kelly	P&O Containers Ltd
<i>Pegasus</i>	†	—	—	—	Marine Management Services Ltd
<i>Pelican Arrow</i>	27.9.93	X.C. Gomez	R.K. Marngain, R.J. George, M. Naing	S.D. Pillai	United Ship Management Ltd
<i>Peninsular Bay</i>	21.2.94	K.J. Owen	R.K. Jones, I.M. Percival, J.A. Richardson	W.H. Coventry	P&O Containers Ltd
<i>Persens</i>	†	—	—	—	Marine Management Services Ltd
<i>Photas</i>	27.4.93	G.A. Davies	P.M. Crowe, D. Clavering, D. Billington	D.A.C. MacRae	Coe-Mercalf Shipping Ltd
<i>Pisces Pioneer</i>	*	—	—	—	T. & J. Harrison Ltd
<i>Pride of Bilbao</i>	*	—	—	—	P&O European Ferries (Portsmouth) Ltd
<i>Pride of Cherbourg</i>	10.5.93	C.E. Walford	J. Welch, D.H. Worrin, P.N. Racliffe	—	P&O European Ferries (Portsmouth) Ltd
<i>Pride of Hampshire</i>	1.12.93	R.A. Shopland	R. Smell, D.R. Hilton, D.C. Ray	A. Patterson	P&O European Ferries (Portsmouth) Ltd
<i>Pride of Le Havre</i>	24.11.93	M.L. Bechley	D.R. Hilton, J.J. Bowles, G.M. Starkey	S. Horne	P&O European Ferries (Portsmouth) Ltd

<i>Pride of Suffolk</i>	27.9.93	J.M. Gower.....	A. Henwood, P.G. Bowett, A. Hayward.....	R.P.R. Sibley.....	P&O European Ferries (Felixstowe) Ltd
<i>Pride of Winchester</i>	1.2.94	C.E. Banks.....	J.E. Hutchins, D.L. Pereira, J.W. Trickett.....	P. Irwin.....	P&O European Ferries (Portsmouth) Ltd
<i>Prince of Scandinavia</i>	7.1.93	M. Madsen.....	—	—	DFDS (U.K.) Ltd
<i>Puerto Cortes</i>	+	—	—	—	Pacific Ship Mgmt (Singapore) Pte Ltd
<i>Puma</i>	+	—	—	—	POETS Fleet Management Ltd
<i>Pufford Skua</i>	9.2.94	D. Spivey.....	D. Newbury, G. Smith.....	L. Poinis.....	Boston-Putford Offshore Safety Ltd
<i>Pychley</i>	7.1.94	J.A. Smeeton.....	S. Gupta, K.S. Sarkar, A. Prasad.....	D. Callcott.....	P&O Ship Management Ltd
<i>Queen Elizabeth 2</i>	5.11.93	R.A. Woodall.....	P. Jowett.....	J.C. Chavez.....	Cunard Line, Ltd
<i>Queenstand Star</i>	21.6.93	D.R. MacKillop.....	J. Saquibal, J.R. Trimanez, P.B. Lemohsits.....	R. Hughes.....	Blue Star Ship Management Ltd
<i>Rafnes</i>	26.8.93	A. Falconer.....	R.M. Collins, T. Nyunt, M.J. Gooderham.....	T. Adrian.....	Chelston Ship Management Ltd
<i>Ravensraig</i>	6.12.93	R.J.A. Copeland.....	J.P. Whiteley, K. Bryant, C. Edwards.....	R.G. Palompo.....	Ropner Shipping Services Ltd
<i>Reefar Jambu</i>	21.2.94	L.M. Ortega.....	A.B. Cortes, J. Potter, A.B. Capas-an.....	E.P. Tipu.....	Sembawang Shipping Co. (Pte) Ltd
<i>Regina Oldendorff</i>	9.11.93	V.S. Narayan.....	W. Wawrzynow, N.D. Yullaluz, A. Cheidiev.....	A.K. Pallit.....	Egon Oldendorff (H.K.) Ltd
<i>Repulse Bay</i>	19.10.93	A.K. Trevedi.....	—, Srivastava, F.M. Fernandez, D.N. Casiano.....	—	Orient Ship Management Ltd
<i>Resolution</i>	11.1.94	K.P. Byrne.....	A.N. Murray, I.G. Travis.....	—	P&O Containers Ltd
<i>Resolution Bay</i>	21.2.94	C.R. Short.....	A.J. Skingley, A. Murray, S.C. Lugg.....	J.C. Milten.....	Gardline Shipping Ltd
<i>Rhine</i>	+	—	—	—	P&O Containers Ltd
<i>Rhine</i>	*	—	—	—	Cable & Wireless (Marine) Ltd
<i>Royal Princess</i>	24.8.93	I. Tomkins.....	A. Wilkinson.....	E. O'Driscoll.....	United Ship Management Ltd
<i>S.C. Lancer</i>	+	C.J. Graham.....	I. Appleby, D. Strangeway, B. Fosyth.....	—	P&O Cruises Ltd
<i>Sachem</i>	1.2.94	J.C. Cowie.....	H. Mouat, D.J. Wheeler.....	—	Schahin Cury
<i>Sagacity</i>	+	M.L.M. Smith.....	P.C. Sellars, N. Mogg, R.C. Huxtable.....	E. Smith.....	Mobil Shipping Co. Ltd
<i>St Clair</i>	21.2.94	N. Shum.....	A. Smerkh, A. Zyanchurin.....	S. Bradshaw.....	F. T. Everard & Sons Ltd
<i>St Helena</i>	5.1.94	—	—	—	P&O Scottish Ferries Ltd
<i>Samoan Reefer</i>	+	—	—	—	Curnow Shipping Ltd
<i>Santos Express</i>	2.12.93	—	—	A. Beskrovnyy.....	Mermaid Marine Management Ltd
<i>Santos Star</i>	+	—	—	—	V.Ships (U.K.) Ltd
<i>Satucket</i>	+	—	—	—	Concordia Marine Co. Ltd
<i>Scallonian III</i>	13.5.93	C.P. Row.....	P. Crawford, M. Mitchell.....	A. Quale.....	Mobil Shipping Co. Ltd
<i>Scirocco Universal</i>	21.2.94	H.M. Jones.....	B.J. Stewart, J.P. De La Cruz, P. Shahada.....	T.J. Martel.....	Isles of Scilly Steamship Co. Ltd
<i>Scotia</i>	+	—	—	—	London Ship Managers Ltd
<i>Scottish Star</i>	17.6.93	P. Buckley.....	R. Ranara, P. Regaspi, B.B. Garing.....	D. Balita.....	Marr Vessel Management Ltd
<i>Sea Falcon</i>	11.5.93	A.C. Mathews.....	A.J. Cope, A.K. Dowds, A.J. William.....	F. Turner.....	Blue Star Ship Management Ltd
<i>Sea Profiler</i>	9.2.94	K. Scott.....	J. Hanley, I.C. Clark.....	—	Canada Maritime Services Ltd
<i>Sea Searcher</i>	26.8.93	D. Tobin.....	R. Cox, M. Pointin, A. Matheson.....	—	P&O Cruises Ltd
<i>Seaboard Invincible</i>	5.1.94	P. Lester.....	P. Branagan, B. Harman.....	—	Gardline Shipping Ltd
<i>Semac I</i>	+	A. Forrest.....	D. McIntyre, I.G.C. Ferguson, N. Sheard.....	—	Gardline Shipping Ltd
<i>Seniority</i>	27.9.93	—	—	—	Seaboard Offshore Ltd
<i>Shabonee</i>	+	—	—	—	F.T. Everard & Sons Ltd
<i>Shetland Service</i>	9.2.94	—	—	—	European Marine Contractors Ltd
<i>Shropshire</i>	*	—	—	—	F.T. Everard & Sons Ltd
<i>Siliqua</i>	+	—	—	—	Mobil Shipping Co. Ltd
<i>Singapore Bay</i>	12.1.94	P.A. Furneaux.....	M. Rossiter, N.P. Barrington, J.H. Lafferty.....	R.E. Goring.....	Tidewater Marine Service
					Bibby Line Ltd
					Shell Marine Personnel (I.O.M.) Ltd
					P&O Containers Ltd

Selected and Supplementary Ships (contd)

NAME OF VESSEL	LAST RETURN RECEIVED	MASTER	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Sir Eric Sharp</i>	†	—	—	—	Cable & Wireless (Marine) Ltd
<i>Snow Crystal</i>	25.8.93	M.J. Williams	E.C. Lyon, E.N. Palmox, M.R. Roquid	R.M. Baazon	Frigomar's Shipping GmbH
<i>Snow Drift</i>	†	—	—	—	Frigomar's Shipping GmbH
<i>Snow Flower</i>	11.2.94	M. Baker	J.H. Champ, C.L. Pilapil, R.A. Carumba	P.D. Tudzon	Frigomar's Shipping GmbH
<i>Sociality</i>	†	—	—	—	F.T. Everard & Sons Ltd
<i>Speciality</i>	30.9.93	A.J.A. Richards	R. Fearns, C. Bush, D.M. Robb	—	F.T. Everard & Sons Ltd
<i>Stability</i>	†	—	—	—	F.T. Everard & Sons Ltd
<i>Staffordshire</i>	9.2.94	F.R.F. Martin	G. Watson, D.I. MacKinnon, A. MacLellan	—	Bibby Line Ltd
<i>Star Jasmine</i>	†	—	—	—	Univan Ship Management Ltd
<i>Star Pembroke</i>	†	—	—	—	Texaco Overseas Tankship Ltd
<i>Star Westminster</i>	†	—	—	—	Texaco Overseas Tankship Ltd
<i>Star Windsor</i>	†	—	—	—	Texaco Overseas Tankship Ltd
<i>Siena Britannica</i>	6.1.93	A.R. James	P.A. Hughes, D. Slade, M.R. Bailey	C.M. Dunwoody	Texaco Overseas Tankship Ltd
<i>Siena Constructor</i>	†	—	—	—	Stena Sealink (U.K.) Ltd
<i>Siena Felicity</i>	9.2.94	T.D. Shannon	D. M. Vann, W.J.G. Mair	—	Stena Offshore Ltd
<i>Siena Felicity</i>	21.2.94	P. Evans	T. Wilson, R. Jenkins	K.W. Torr	Stena Sealink (U.K.) Ltd
<i>Siena Londoner</i>	†	—	—	—	Stena Sealink (U.K.) Ltd
<i>Siena Normandy</i>	†	—	—	—	Stena Sealink (U.K.) Ltd
<i>Siena Normanly</i>	28.6.93	T. Bailey	C.J. Coleman, J.E. Birdsell, M.K. Lee	—	Stena Sealink (U.K.) Ltd
<i>Siena Seawell</i>	†	—	—	—	Stena Offshore Ltd
<i>Stolt Birchwood</i>	†	—	—	—	Stolt-Nielsen Singapore Pte Ltd
<i>Stolt Cedarwood</i>	†	—	—	—	Stolt-Nielsen Singapore Pte Ltd
<i>Stolt Falda</i>	†	—	—	—	Stolt-Nielsen Singapore Pte Ltd
<i>Stolt Oakwood</i>	†	—	—	—	Stolt-Nielsen Singapore Pte Ltd
<i>Starrington</i>	†	—	—	—	Stolt-Nielsen Singapore Pte Ltd
<i>Stressa</i>	†	—	—	—	Stolt-Nielsen Singapore Pte Ltd
<i>Strider Isis</i>	†	—	—	—	Stolt-Nielsen Singapore Pte Ltd
<i>Strider Juno</i>	29.10.93	G.P. Mandagie	P. Limbu	—	Wallem Ship Management (H.K.) Ltd
<i>Sulthen</i>	9.11.93	A.C. Free	C. Cunpbell, M.J. Buchanan, W.A. Skivington	M. Echarath	Pacific Ship Mgmt (Singapore) Pte Ltd
<i>Sulsker</i>	5.1.94	D.W. Temple	J.J. Coyle, I. Campbell, I.A. Craig	—	Pacific Ship Mgmt (Singapore) Pte Ltd
<i>Sun Sama</i>	6.12.93	A. Dua	H. Thura, U. Thanwala	—	Caledonian MacBrayne Ltd
<i>Sunny Clipper</i>	17.2.93	J.B.A. Dourado	G.K. Murthy, Ye Naing, R. Ramlal	—	Scottish Office Agri. & Fish. Dept.
<i>Superiority</i>	†	—	—	—	United Ship Management Ltd
<i>Swan Arrow</i>	†	—	—	—	Grand Seatrade Shipping Agencies Ltd
<i>Swan Bay</i>	16.6.93	B.O. Roxell	P.L. Punay, E.B. Borres	—	F.T. Everard & Sons Ltd
<i>Swan River</i>	2.12.93	S. Eliasson	P.G.M. Welland, R.D. Degoliado, C.O. Ferraten	—	K.G. Jebsen Skipsrederi A/S
<i>Swift</i>	25.8.93	C.J. Graham	E. F. Soriano, B. Serring	P.R. Cueto	Swan Shipping A/S
<i>Table Bay</i>	17.12.93	P.J.R. Manson	M. P. Green, R.E. Smith	R. Garcia	Swan Shipping A/S
<i>Tamamonta</i>	10.2.94	R. Sydney	A. Gupta, D.A.J. Noronha, S. Abreo	R. Santos	Mobil Shipping Co. Ltd
<i>Tamapaicharee</i>	†	—	—	—	P&O Containers Ltd
<i>Tamar FI</i>	†	—	—	—	Andrew Weir Shipping plc
					Andrew Weir Shipping plc
					Falkland Island Development Co.

Tamathai.....	23.9.93	E.F. Stewart.....	R. Miranda, R. De Leon, W. Zdrojewski.....	Z. Cybulski.....	Andrew Weir Shipping plc P&O Tankships Ltd.
Tankerman.....	†	G.C. Hatcher.....	R.J. Augustin, R.N. Elikewela, L.L. Ubiado.....	H.K.S.S. Gunasekera.....	London Ship Managers Ltd
Tasman Universal.....	21.2.94	L.J. Hesketh.....	J. Smith, M.A. Amroliwala, S. Panwar.....	K. Sridhar.....	P&O Ship Management Ltd
Taunton.....	21.2.94	—	—	—	A/S Thor Dahl Shipping
Thorsaga.....	†	—	—	—	Chelston Ship Management Ltd
Times.....	†	—	—	—	Sealion Shipping Ltd
Toisa Conqueror.....	11.2.94	A.R. Peckler.....	J. Beale, A. Sage, R. MacLeod.....	—	Sealion Shipping Ltd
Toisa Cougar.....	26.10.93	D. Gordon.....	F. Ahmed, P.A. Yardley.....	—	Sealion Shipping Ltd
Toisa Gryphon.....	10.1.94	R.T. Blackman.....	F. Smiles, A.J. Blazey.....	—	Sealion Shipping Ltd
Toisa Puffin.....	†	—	—	—	Sealion Shipping Ltd
Toisa Puma.....	†	—	—	—	Sealion Shipping Ltd
Toisa Sentinel.....	5.1.94	R.O. Chaplin.....	J.S. Martinez, N.I. Audia, I.C. Strachan.....	M.D. Pike.....	Sealion Shipping Ltd
Toisa Widgen.....	†	—	—	—	Sealion Shipping Ltd
Tokyo Bay.....	9.2.94	D.S. Hughan.....	C.K. Urion, G.D. Mead.....	R.A. Browne.....	P&O Containers Ltd
Tonbridge.....	†	—	—	—	Kuwait Oil Tanker Co.
Toraga.....	12.1.94	J. Wrigley.....	G.G. Gelonga, M.A. Cully, M.M. De Leon.....	P.B. Bermejo.....	Acomarit (U.K.) Ltd
Trinidad and Tobago.....	19.10.93	R.J. Court.....	B. Joseph, T.K. Ramroop.....	A. Stuart.....	Bibby Line Ltd
Ullswater.....	10.1.94	M.A. Kill.....	S.J. Kemberly, M.G. Mehta, R. Sethi.....	R.M. Shah.....	P&O Ship Management Ltd
Uruguay Express.....	2.7.93	Fernando Pedera.....	Julis Rodriguez.....	Omar Silva.....	Worms Cargo Services Ltd
Valdivia.....	11.2.94	R. Prestly.....	D.N. MacNair, O.E. Dantlof, G. Shaw.....	D. Woollan.....	Harrisons (Clyde) Ltd
Veronica Viking.....	†	—	—	—	Viking Supply Ship (U.K.) Ltd
Vigilant.....	22.10.93	D.L. Beveridge.....	J.P. Laycock, R.J. Sheldon, A. MacCullum.....	—	Scottish Office Agr. & Fish. Dept.
Vine.....	30.9.93	M.J. Walker.....	S. Rogers, M.F. Captain, S. Singh.....	—	P&O Ship Management Ltd
Washington.....	†	—	—	—	Stephenson Clarke Shipping Ltd
Welsh Venture.....	†	—	—	—	BP Shipping Ltd
West Moor.....	9.2.94	D. Johnston.....	N.C. Homer, F.S. Servenjo.....	—	Jeppesen Heaton Ltd
Western Bridge.....	5.1.94	A. Crofts.....	K.P. Gibbons, B.R. Noel, K.C. Townley.....	—	Ropner Shipping Services Ltd
Westra.....	8.10.93	W.A. Brown.....	J. Ebdy, M.A. Magee, M.A. Worsnop.....	C.J. Delahunty.....	Scottish Office Agri. & Fish. Dept.
Wiltshire.....	11.1.94	A.G. Smith.....	A.P. Henry, D.F. Morton, A.S. McCarlie.....	—	Bibby Line Ltd
World Light.....	12.1.94	C.M.R. Lloyd.....	Y.Y. Shing, L.G. D'Silva, Xu Li Bin.....	C. Wade.....	World-Wide Shipping Agency Ltd
World Spear.....	7.1.93	P. Roberts.....	K.B. Ferries, P.C. Bhowmik, M. Hossain.....	R.R. Cassinath.....	Marine Navigation Co. Ltd
Zenatia.....	25.8.93	J. Hovington.....	K. Steptenson, A. Qayum, S.D. Morrison.....	R.N. Kathoke.....	Shell Marine Personnel (I.O.M.) Ltd
Zetland.....	1.2.94	G. Nicholls.....	W. Howell, E. Fernandes, M.S. Noronha.....	D. Parkes.....	P&O Ship Management Ltd
Zidona.....	23.8.93	D.C.J. Stull.....	D. Linfoot, C. Renton, G.P. Watts.....	M.F. D'Silva.....	Shell Marine Personnel (I.O.M.) Ltd
Zim Rio.....	†	—	—	D. Atkinson.....	V. Ships (U.K.) Ltd

‘Marid’ Ships

The following is a list of ships recruited for the observing and reporting of sea temperatures from coastal waters of Great Britain.
Masters are requested to point out any errors or omissions in the lists.

NAME OF VESSEL	MASTER	OWNER/MANAGER
<i>Achatina</i>	—	Shell International Shipping Ltd
<i>Ashington</i>	O. Stephenson	Stephenson Clarke Shipping Ltd
<i>Authenticity</i>	J.L. Taylor	F.T. Everard & Sons Ltd
<i>BP Joustier</i>	R. Rait	BP Oil U.K. Ltd
<i>Brentwood</i>	A.I. Rees	Crescent Shipping Ltd
<i>Briarthorn</i>	M. Robinson	Coe Metcalf Shipping Ltd
<i>City of Bristol</i>	R. Hemmings	United Marine Dredgers Ltd
<i>Eastgate</i>	M. O'Brien	P&O Tankships Ltd
<i>Emerald</i>	B.L. Reid	Stephenson Clarke Shipping Ltd
<i>Esso Avon</i>	L.R. Spalding	Esso Petroleum Co. Ltd
<i>Esso Clyde</i>	C.C. Jorgensen	Esso Petroleum Co. Ltd
<i>Esso Fawley</i>	D. Bryan	Esso Petroleum Co. Ltd
<i>Esso Mersey</i>	D.J. Wilson	Esso Petroleum Co. Ltd
<i>Frederick M</i>	G. Cattanack	Coe Metcalf Shipping Ltd
<i>Gladonia</i>	M.J. Parkin	Runwave Ltd
<i>Guidesman</i>	J. Souter	P&O Tankships Ltd
<i>Harting</i>	J. McCuaig	Stephenson Clarke Shipping Ltd
<i>Helmsman</i>	S. Floate	P&O Tankships Ltd
<i>Hernes</i>	D.C. Selley	Chelston Ship Management Ltd
<i>Irishgate</i>	P. Holdstick	P&O Tankships Ltd
<i>Jubilence</i>	D. McGowan	Crescent Shipping Ltd
<i>Norman Commodore</i>	B. Hayball	Commodore Ship Management Ltd
<i>Northgate</i>	R. Alderdice	P&O Tankships Ltd
<i>Orionman</i>	D.W. Rice	P&O Tankships Ltd
<i>Pamela Everard</i>	G. Lewis	F.T. Everard & Sons Ltd
<i>Stena Hibernia</i>	J.P. Garner	Stena Sealink Ltd
<i>Stolt Avocet</i>	J. Frisby	Stolt-Nielsen Rederi A/S
<i>Teviot</i>	J. Montgomery	Gibson Gas Tankers Ltd
<i>Tillerman</i>	A. Simson	P&O Tankships Ltd
<i>Vibrence</i>	P.D. Mills	Crescent Shipping Ltd
<i>Waverley</i>	D.L. Neill	Waverley Excursions Ltd
<i>Welsh Piper</i>	D.J. Jones	British Dredging Aggregates Ltd
<i>Westgate</i>	J. Whitfield	P&O Tankships Ltd
<i>Whitcrest</i>	H. Williams	J.H. Whitaker (Tankers) Ltd
<i>Whitsea</i>	—	J.H. Whitaker (Tankers) Ltd

Light Tower

NAME	MASTER
<i>Royal Sovereign</i>	V. Pearce, D. McGovern

Oil Rigs and Platforms

NAME OF RIG OR PLATFORM	OWNERS/OPERATORS
<i>AH001</i>	Amerada Hess Ltd
<i>Beryl A</i>	Mobil North Sea Ltd
<i>Beryl B</i>	Mobil North Sea Ltd
<i>Buchan A</i>	BP Petroleum Development Ltd
<i>Cleeton</i>	BP Petroleum Development Ltd
<i>Dan Countess</i>	Lauritzen Offshore Ltd
<i>Drill Star</i>	Sedco-Forex Drilling Services Ltd
<i>Dunlin A</i>	Shell U.K. Exploration & Production
<i>Emerald Producer</i>	Midland & Scottish Resources PLC
<i>Glomar Arctic III</i>	Global Marine Drilling Co. Ltd
<i>Gryphon A</i>	Kerr-Magee Oil (U.K.) PLC
<i>Heather A</i>	Unocal (U.K.) Ltd
<i>Henry Goodrich</i>	Sonat Offshore (U.K.) Ltd
<i>John Shaw</i>	Sonat Offshore (U.K.) Ltd
<i>Montrose A</i>	Amoco (U.K.) Exploration Co.
<i>Morecambe Bay (API)</i>	British Gas
<i>Neddrill 6</i>	Neddrill U.K. Ltd
<i>Ocean Alliance</i>	Diamond Offshore Ltd
<i>Ocean Guardian</i>	Diamond Offshore Ltd
<i>Santa Fe 135</i>	Santa Fe Drilling Co. Ltd
<i>Santa Fe 140</i>	Santa Fe Drilling Co. Ltd
<i>Sedco 706</i>	Sedco-Forex Drilling Services Ltd
<i>Sedco 707</i>	Sedco-Forex Drilling Services Ltd
<i>Sedco 712</i>	Sedco-Forex Drilling Services Ltd
<i>Sedco 714</i>	Sedco-Forex Drilling Services Ltd
<i>Sonat Arcade Frontier</i>	Sonat Offshore (U.K.) Ltd
<i>Sonat Rather</i>	Sonat Offshore (U.K.) Ltd
<i>Sovereign Explorer</i>	Sedco-Forex Drilling Services Ltd
<i>Tartan A</i>	Texaco North Sea (U.K.) Co. Ltd
<i>Thistle A</i>	BP Petroleum Development Ltd
<i>Viking B</i>	Conoco (U.K.) Ltd
<i>Western Pacesetter IV</i>	Western Oceanic (U.K.) Ltd

BRITISH COMMONWEALTH

The following lists give the names of Selected and Supplementary Ships, and the number of Auxiliary Ships where known (i.e., those which only report in 'sparse areas'), which voluntarily co-operate with meteorological services of the British Commonwealth. Information for these lists is required by 15 March each year. Information for the January corrective lists is required by 15 September each year.

AUSTRALIA (Information dated 4.2.94)

NAMES OF VESSELS

Selected Ships:

Al Khaleej
Al Kuwait
Al Qurain
Al Rayyan I
Al Yasrah
Anro Australia
Arafura
Ariake
Aurelia IV
Aurora Australis
Australia Star
Australian Achiever
Australian Advance
Australian Endeavour
Australian Spirit
Australian Trader
Australian Venture
Barbican Spirit
Bass Trader
Boral Gas
Botany Triad
Botany Trinity
Botany Triton
Botany Troubador
Brahman Express
Buffalo Express
Canopus
Cape Moreton
Coral Chief
Danny F
El Cordero
Fairstar
Fernanda F
Flinders
Frank Konency
Franklin

Selected Ships (contd)

Fua Kavenga
Glenda Lee
Gordon Reid
Hanne Bakke II
Highland Chief
Icebird
Iron Baron
Iron Carpentaria
Iron Dampier
Iron Flinders
Iron Gippsland
Iron Kembla
Iron Newcastle
Iron Pacific
Iron Prince
Iron Shortland
Iron Spencer
Iron Sturt
Iron Whyalla
Island Gas
Island Seaway
Jabiru Venture
Joana Bonita
Karina Bonita
Kelvin
Kelvin Endeavour
Klang Reefer
Kowulka
Lindsay Clark
Maersk Oceania
Maria Bonita
Mawashi Al-Gasseem
Mawashi Tabuk
Mobil Astral
Mosdeep
Nivosa

Selected Ships (contd)

Northwest Sanderling
Northwest Sandpiper
Northwest Shearwater
Northwest Snipe
Ormiston
Pacific Conquest
Pacific Gas
Papuan Chief
Pathfinder II
Portland
Primera Peak
Rig Seismic
River Boyne
River Embley
River Torrens
Roberta Jull
Sedco B.P. 47I
Sitka
Southern Surveyor
Spirit of Tasmania
Swan Reefer
TNT Altrans
TNT Capricornia
TNT Carpentaria
Tranztas Trader
Uniceb
Wyuna
Young Endeavour
Zincmaster

Supplementary Ships:

Iron Curtis
Iron Monarch
Kapala

Auxiliary Ships:

Australia has 2 Auxiliary Ships currently reporting.

HONG KONG (Information dated 2.3.94)

NAMES OF VESSELS

Selected Ships:	Selected Ships (<i>contd</i>)	Selected Ships (<i>contd</i>)
<i>Al Mariyah</i>	<i>Micronesia Pride</i>	<i>Red Sea Pioneer</i>
<i>Al Muharraq</i>	<i>Mundogas Orinoco</i>	<i>Seafalcon</i>
<i>Anna</i>	<i>Navios Bulker</i>	<i>Sishen</i>
<i>Asian Challenger</i>	<i>OOCL Advance</i>	<i>Talabot</i>
<i>Bunga Kantan</i>	<i>OOCL Alliance</i>	<i>Tampa</i>
<i>Bunga Suria</i>	<i>OOCL Applause</i>	<i>Tapiola</i>
<i>Chengtu</i>	<i>OOCL Award</i>	<i>Texas</i>
<i>Delmas Bougainville</i>	<i>OOCL Charger</i>	<i>Torrens</i>
<i>Delmas Joinville</i>	<i>OOCL Educator</i>	<i>Trade Dawn</i>
<i>Delmas Tourville</i>	<i>OOCL Envoy</i>	<i>Wawasen Setia</i>
<i>Eriskay</i>	<i>OOCL Executive</i>	
<i>Fair Bridge</i>	<i>OOCL Explorer</i>	
<i>Gallantry</i>	<i>OOCL Exporter</i>	
<i>Golfo De Chiriqui</i>	<i>OOCL Fair</i>	Supplementary Ships:
<i>Grand Glory</i>	<i>OOCL Faith</i>	<i>Andes Challenger</i>
<i>Hawk Arrow</i>	<i>OOCL Fidelity</i>	<i>Eastern Sea</i>
<i>Highlander</i>	<i>OOCL Fortune</i>	<i>Grand Fortune</i>
<i>Kamaleverett</i>	<i>OOCL Freedom</i>	<i>Green Era</i>
<i>Karabieverett</i>	<i>OOCL Friendship</i>	<i>Ivyeverett</i>
<i>Kwangtung</i>	<i>OOCL Frontier</i>	<i>Kurama</i>
<i>Maersk Asia Tertio</i>	<i>OOCL Honour</i>	<i>Maritime Faith</i>
<i>Maersk Nanhai</i>	<i>OOCL Hope</i>	<i>Maritime Triumph</i>
<i>Maersk Semakau</i>	<i>Ocean Centaurus</i>	<i>Maritime Victory</i>
<i>Marienvoy</i>	<i>Ocean Competence</i>	<i>OOCL Fame</i>
<i>Maritime Champion</i>	<i>Ocean Elite</i>	<i>Rainbow</i>
<i>Maritime Express</i>	<i>Ocean Sincerity</i>	<i>Seamaster</i>
<i>Maritime Goliath</i>	<i>Ocean Sirius</i>	<i>Seamaster I</i>
<i>Maritime Grace</i>	<i>Ocean Strength</i>	<i>Shaplaeverett</i>
<i>Maritime Joy</i>	<i>Osprey Arrow</i>	<i>Silver Clipper</i>
<i>Maritime Loyalty</i>	<i>Pacific Islander</i>	<i>Splendor River</i>
<i>Maritime Success</i>	<i>Pearl</i>	<i>Success Bulker</i>
<i>Mercury Diamond</i>	<i>Ratana Valai</i>	<i>Toba</i>

Auxiliary Ships:

Hong Kong also has 1 Auxiliary Ship currently reporting.

INDIA (Information dated 1.3.94)

NAMES OF VESSELS

Selected Ships:	Selected Ships (<i>contd</i>)	Supplementary Ships (<i>contd</i>)
<i>Akbar</i>	<i>State of Nagaland</i>	<i>Lt Arun Khetrapal PVC</i>
<i>Andamans</i>	<i>Vishnu Sagar</i>	<i>Aurobindo</i>
<i>Arunachal Pradesh</i>		<i>Bhagat Singh</i>
<i>B.R. Ambedkar</i>	Supplementary Ships:	<i>Bharat Seema</i>
<i>Bharatendu</i>	<i>A.B. Tarapore</i>	<i>Chandidas</i>
<i>Bhavabhuti</i>	<i>APJ Anand</i>	<i>Chennai Jaayam</i>
<i>Harshavardhan</i>	<i>APJ Angad</i>	<i>Chennai Oookkam</i>
<i>Jala Jyoti</i>	<i>APJ Anjali</i>	<i>Chennai Perumai</i>
<i>Jala Yamini</i>	<i>APJ Priti</i>	<i>Chennai Polivu</i>
<i>Lokmanya Tilak</i>	<i>APJ Shalin</i>	<i>Chennai Sadhanai</i>
<i>Sagar Kanya</i>	<i>APJ Sushma</i>	<i>Chennai Velarchi</i>
<i>Sagar Sampada</i>	<i>Aditya Usha</i>	<i>Chennai Veeram</i>
<i>Samudra Manthan</i>	<i>Alaknanda</i>	<i>Chatrapati Shivaji</i>
<i>State of Andhra Pradesh</i>	<i>Annapurna</i>	<i>Continental Rose</i>

India (contd)

NAMES OF VESSELS

Supplementary Ships (contd)

Dadabhai Nowroji
Dakshineswar
Diglipur
Dweep Setu
FONJ Shekhan PVC
Ganga Sagar
Guru Bachlan Singh Salaria
Hardwar
Harkishan
Har Govind
Havildar Abdul Hamid
Homi Bhabha
Indian Endurance
Indian Explorer
Indian Goodwill
Indian Progress
Indian Prosperity
Indian Resolve
Indian Valour
INS Deepak
INS Godavari
INS Gomati
INS Kripan
INS Ranvir
INS Trishul
INS Vikrant
INS Vindya giri
Jag Manek
Jag Pari
Jag Prabhat
Jag Prakash
Jag Preeti
Jag Shakti
Jag Shanti
Jag Vijay
Jag Vivek
Jagat Samrat
Jagat Swamini/Priyamvada
Jagat Vijeta
Jala Bala
Jala Gauri
Jala Godavari
Jala Mohan
Jala Mokambi
Jala Mudra
Jala Murugan
Jala Tapi
Jala Vallabh

Supplementary Ships (contd)

Jala Vijaya
Jameela
Jay Laxmi
Jay Narayan Vyas
Kabirdas
Kalidas
Kanchan Junga
Kanpur
Kolandia
Lal Bahadur Shastri
Lance Naik Albert Ekka
Lok Maheshwari
Lok Prakash
Lok Pratap
Lok Pratima
Lok Preeti
Lok Rajeshwari
Lok Vikas
MMP Wealth
M.T. Jawaharlal Nehru
M.T. Nandu
Maharshi Dayanand
Maharshi Karve
Major Dhansingh Thapa PVC
Major Hoshiar Singh
Mandakini
Maratha Melody
Maratha Prudence
Mizoram
Motilal Nehru
Murshidabad
Naik Jadunath Singh PVC
Nand Hari
Nand Kavita
Nand Nidhi
Nand Rati
Nand Smiti
Nand Srishti
Nanda Kala
Nanda Kishore
Nanga Parbat
Nankauri
Netaji Subhash Bose
Nicobar
Nitya Amar
Onge
Patliputra
Prabhu Das

Supplementary Ships (contd)

Prabhu Daya
Prabhu Gopal
Prabhu Puni
Prabhu Satram
Rafi Ahmed Kidwai
Rama Raghoba Rane PVC
Ramdas
Ratna Vandana
Ravidas
Sabarimala
Sagar Deep
Sagar Samrat
Samarat Ashok
Sarojini Naidu
Satya Murti
Skandy Surveyor
State of Gujarat
State of Haryana
State of Manipur
State of Orissa
Subhedar Joginder Singh
Tulsidas
Tirumalai
Uttar Kashi
Varanasi
Varuna Adhar
Vishva Abha
Vishva Ajay
Vishva Bandhan
Vishva Karuna
Vishva Kaumudi
Vishva Madhuri
Vishva Mohini
Vishva Nandini
Vishva Pallav
Vishva Pankaj
Vishva Parag
Vishva Parijat
Vishva Parimal
Vishva Shakti
Vishva Shobha
Vishva Vikram
Vishva Yash
Vishwesharayya
Vivekananda
Yerawa

NEW ZEALAND (Information dated 1.2.94)

NAMES OF VESSELS		
Selected Ships: <i>America Star</i> <i>Auckland Express</i> <i>California Star</i> <i>Canterbury Express</i> <i>Capitaine Tasman</i> <i>Challenger</i> <i>Chitral</i> <i>Crusader</i> <i>Direct Kea</i> <i>Fishguard Bay</i> <i>Forum Papua New Guinea</i> <i>Forum Samoa</i> <i>Golden Bay</i> <i>Hunte</i> <i>Kotuku</i> <i>Kuaka</i> <i>Melbourne Star</i>	Selected Ships (contd) <i>New Zealand Pacific</i> <i>New Zealand Star</i> <i>Pacific Ariki</i> <i>Rangikura</i> <i>Rangitane</i> <i>Rangitata</i> <i>Rangitikei</i> <i>Rangitoto</i> <i>Socoft Stream</i> <i>Søren Larsen</i> <i>Spirit of Competition</i> <i>Spirit of Freedom</i> <i>Swan Tide</i> <i>Sydney Star</i> <i>T.A. Navigator</i> <i>Taiko</i> <i>Tainui</i>	Selected Ships (contd) <i>Tangaroa</i> <i>Tarihiko</i> <i>Tasman Enterprise</i> <i>Tasman Venture</i> <i>Tui Cakau III</i> <i>United Peace</i> <i>Union Auckland</i> <i>Union Rotoiti</i> <i>Union Rotoma</i> <i>Union Rotorua</i> Supplementary Ships: <i>Arahanga</i> <i>Arahura</i> <i>Aratika</i>

Auxiliary Ships:

New Zealand has a fleet of 13 Auxiliary Ships currently reporting.



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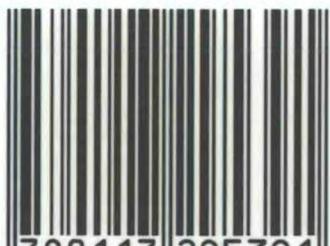
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