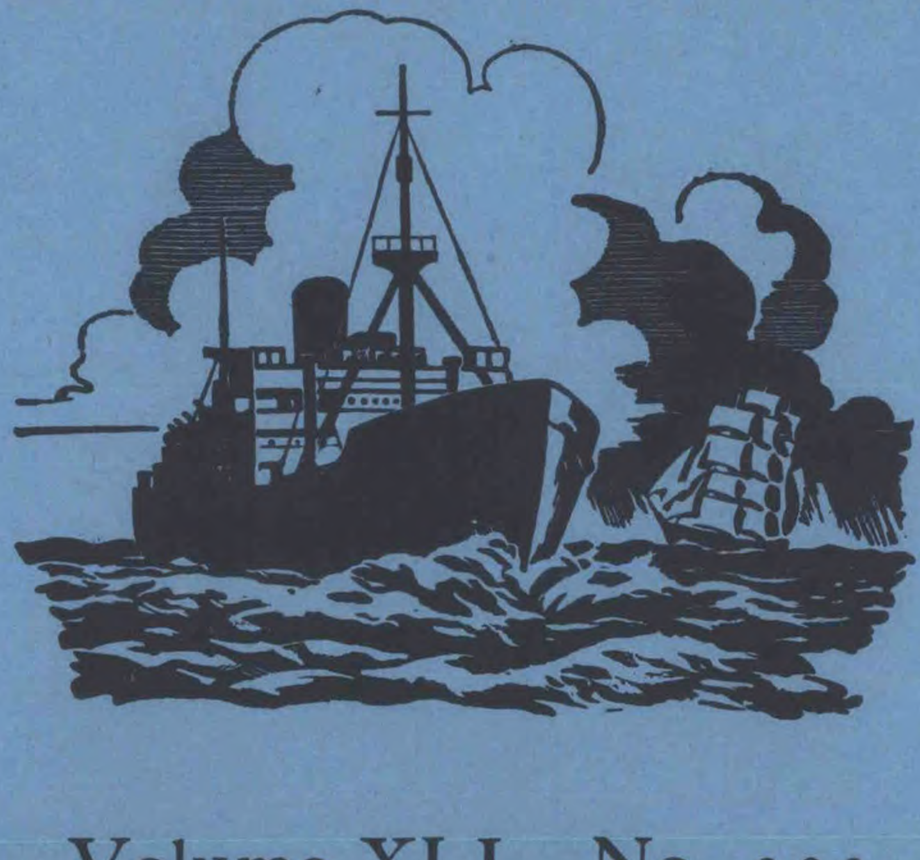
Met.O. 839

The Marine Observer

A quarterly journal of Maritime Meteorology



Volume XLI No. 232

April 1971

PRICE 42½p NET

Met.O. 839

THE MARINE OBSERVER

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

VOL. XLI **No. 232** **APRIL 1971**

CONTENTS

Letters to the Editor, and books for review, should be sent to the Editor, "The Marine Observer," Meteorological Office, Eastern Road, Bracknell, Berkshire RG12 2UR

Published for the Meteorological Office by

HER MAJESTY'S STATIONERY OFFICE

To be purchased direct from H.M. Stationery Office, at any of the following addresses: 49 High Holborn, London, WC1V 6HB; 13a Castle Street, Edinburgh, EH2 3AR; 109 St. Mary Street, Cardiff, CF1 1JW, Brazennose Street, Manchester, M60 8AS; 50 Fairfax Street, Bristol, BS1 3DE; 258 Broad Street, Birmingham, 1; 80 Chichester Street, Belfast BT1 4JY, or from booksellers

PRICE 42½p NET or £1·88 per annum (including postage)

Report of Work for 1970

(MARINE DIVISION OF THE METEOROLOGICAL OFFICE: VOLUNTARY OBSERVING FLEET AND OCEAN WEATHER SHIPS)

1. Voluntary Observing Ships

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

(*a*) 531 Selected Ships, including 2 trawlers, which are supplied with a full set of meteorological instruments on loan and which make observations in code form FM21.D every six hours and transmit them to the appropriate coastal radio station wherever their voyages take them.

(*b*) 44 Supplementary Ships, including 15 trawlers, which make less detailed observations than Selected Ships and are supplied on loan with only a barometer, air thermometer and screen. They use abbreviated code form FM22.D for their messages.

(*c*) 73 coasting ('Marid') vessels, and one lightship, which make sea-surface temperature observations in U.K. coastal waters and transmit them in a special code by W/T or R/T. When in the North Sea, the coasting ships include in their messages wind, weather and visibility observations.

(*d*) 16 lightships which make observations of wind, waves, visibility, air and sea temperatures; 14 of these send coded reports by R/T, the other two record their observations for climatological purposes only. The *Dowsing*, *Galloper* and *Royal Sovereign* lightships report barometric pressure using the precision aneroid, and their reports are included in the BBC 5-minute weather bulletins for shipping. The *Galloper* also reports barometric tendency. The time limit imposed on BBC weather bulletins does not permit the inclusion of the barometric tendencies of the other two lightships.

(*e*) 30 trawlers which make non-instrumental observations only and transmit them by W/T or R/T using the first five groups of FM21.D to radio stations in the U.K., Canada, Iceland, Norway or U.S.S.R. depending on the area in which they are fishing. In addition to these, 2 trawlers now figure in the Selected Ships' List and 15 in the Supplementary Ships' List.

(*f*) 53 Auxiliary Ships which make and transmit visual observations similar to those made by trawlers, with the addition of pressure and air temperature readings from the ships' own instruments (using the 'Shred' code). These ships do this work only when in areas where shipping is known to be sparse.

The total number of British Voluntary Observing Ships taking part in this scheme represents about 12 per cent of the world total of some 6,362 observing ships belonging to various maritime countries; the entire British merchant fleet is now about 7 per cent of the world total. Although the numerical strength of our voluntary observing fleet increased during the year it fell short of the increase of 50 instrumental ships which was our target. The building programme of the Merchant Navy is mostly directed towards larger and faster ships whilst the whole tendency of seaborne trade is towards the container ship, bulk carrier and supertanker. In shipping circles it is confidently predicted that one container ship will be able to do the work of nine conventional cargo ships and this inevitably means a considerable reduction in the number of ships at sea, already noticeable, although the overall tonnage of the British Merchant Navy is increasing. Tankers and container ships spend very little time in port and if the goodwill of the voluntary observing fleet is to be maintained a constant watch must be kept on their movements. Container ships, in particular, are likely to visit their home port much more frequently than conventional cargo ships; a container ship on the Australian trade, for instance, is expected to make five voyages a year instead of the two which has been normal for many years past.

In the first six months of the year the number of voluntary observing ships was increased by 15, a little more than half the increase hoped for. Even so, this modest increase involved 63 movements of a full set of instruments between a ship and a Port Meteorological Office when instruments had to be withdrawn from 24 ships laid up, sold to foreign buyers or broken up, and 39 ships had been recruited. The fact that 39 new ships had come on the list in six months shows that there is no lack of volunteers or enthusiasm amongst shipmasters but, proportionately, an increase of 50 ships would involve the movement of 210 sets of instruments which, added to the routine visits to ships and the inspection and exchange of their instruments where necessary, would stretch to the limit the resources of a Port Meteorological Office, as manned at present, even if it could be met.

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

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

Australasia	111	Pacific Coast of North America	9
Far East	106	Europe	29
Persian Gulf	37	Falkland Island and Antarctic	1
South Africa	41	World-wide 'tramping'	90
North Atlantic	89	Near and distant-water fishing grounds	17
West Indies	30		
South America	15		

Voluntary observing ships are supplied with the necessary instruments on loan and observations are made every six hours throughout their voyages and recorded in logbooks. During the year 1,196 meteorological logbooks were received from the regular observing ships in addition to 268 completed forms from Auxiliary ships which are not supplied with instruments. Scrutiny of the logbooks shows that the observations are, in general, carefully made and radio weather messages regularly sent to the specified stations. An encouraging feature is the number of ships which, in spite of carrying only one radio officer, are sending four radio weather messages each day and it seems to be more generally realized now amongst radio officers that a late radio weather message is better than no radio message at all. The practice of writing letters of thanks and encouragement after each and every logbook has been received has been continued whilst shipmasters and observing and radio officers have been encouraged to visit the Office when on leave. There can be no doubt that these courtesies have contributed largely to the goodwill on which the voluntary observing fleet depends.

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

Early in 1970 our part-time Agent in Southampton resigned for health reasons. From 1948 a full-time Port Meteorological Officer had been maintained in Southampton but in 1964, with the decline of Southampton as a major port and the desirability of interesting the distant-water fishing fleets in observing, it was decided to 'promote' Hull from an Agency to a full-time Port Meteorological Office while Southampton reverted to a part-time Agency which it had been before the war. In recent years, however, there has been considerable growth in Southampton as a port with a big increase in both passenger and cargo traffic. It is expected that in 1971 we shall again have a Port Meteorological Officer at Southampton.

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

	JUNE	DECEMBER
Direct reception from		
British ships in eastern North Atlantic	92	75
Foreign ships in eastern North Atlantic	14	49
British trawlers in North Sea	15	11
British merchant ships in North Sea	38	21
	159	156
Via other European countries		
Ships in eastern North Atlantic	398	260
Ships in Mediterranean	42	60
Ships in North Sea	30	102
Ships off North Russia	12	23
Ships in other European waters	17	16
Ships in Pacific	45	22
	544	483
Via North America		
Ships in North Atlantic	478	376
Ships in North Pacific	663	578
Ships in other waters	0	19
	1141	973

2. Ocean Weather Ships

The British Weather Ships completed 23 years' service in the North Atlantic during the year. The present four ships, formerly 'Castle' class frigates, have now been operating for 10–12 years and, considering their age, they continue to give satisfactory service. They co-operate with French, Norwegian and Dutch vessels in maintaining four ocean weather stations in the eastern North Atlantic. Four stations in the western North Atlantic are manned by weather ships operated by the U.S. Coast Guard. A number of other countries make financial contributions towards the cost of operating these vessels. The rules and regulations governing the equipment and the operation of the weather ships are made by the International Civil Aviation Organization supported by the World Meteorological Organization. All the North Atlantic weather stations are normally manned constantly but since July, when the Dutch ship *Cirrus* had to be withdrawn from service because of serious engine defects beyond repair, station 'Mike' has been unmanned for short periods. All ships make hourly surface and six-hourly upper-air observations. The following additional observations are regularly made by British ships: global solar radiation and radiation balance, sea temperatures and salinity at various depths down to the sea bed, magnetic variation and some marine biological work including plankton sampling, squid fishing and the collection of surface sea-water samples. Communication and navigational facilities were provided for transatlantic aircraft by all the British ships, and air/sea rescue equipment kept in a constant state of preparedness. Comprehensive search and rescue exercises were frequently carried out in which RAF aircraft sometimes participated.

3. General

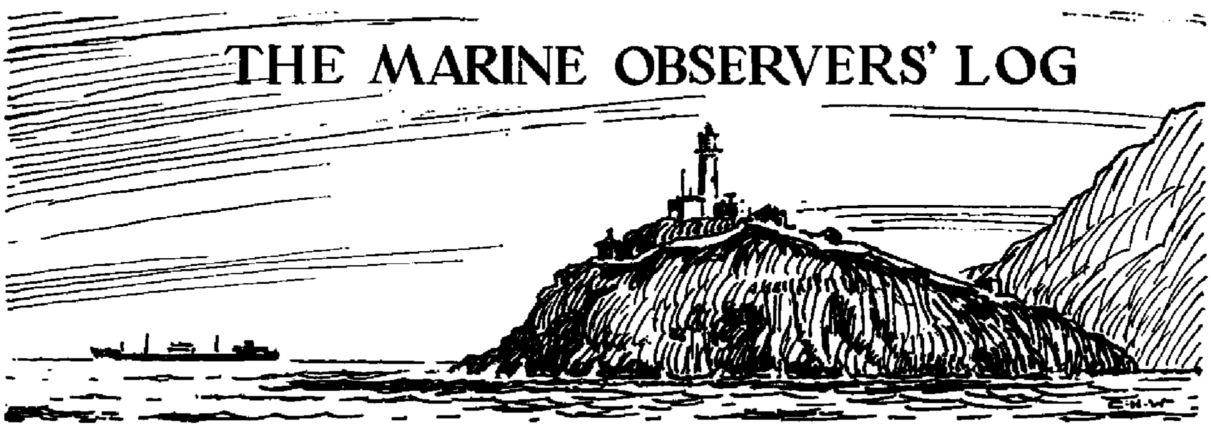
We continue to be indebted to the Sugar Line for their co-operation during the year in helping us to fulfil our obligation to recruit a small number of merchant ships to make radiosonde soundings during their normal voyages as part of the World Weather Watch programme; for which purpose a meteorologist is carried.

The Marine Division has continued to work closely with the Central Forecasting Office in the weather routeing of ships in the North Atlantic and is still involved, to a very limited extent, with data on sea-ice and surface ocean currents although, under the reorganization of some Branches in the Meteorological Office on 1st January 1970, the sections dealing with these subjects were transferred to the Climatology Branch. This has not interfered with the production of the 10-day ice charts nor reduced the need for the data on ocean currents which navigating officers have kindly provided in the pages at the back of meteorological logbooks for a great many years.

4. Awards to Voluntary Observing Ships

Annual awards of books were made to the masters, principal observing officers and senior radio officers of the 91 ships and to the skippers and radio officers on the 9 trawlers who sent in the most carefully kept meteorological logbooks during the year. Similar awards were made to the masters and officers of four vessels in the short sea trades for their contribution in making sea-temperature observations and to another nine trawler skippers and nine radio operators who had the best records in making and sending non-instrumental observations from the Arctic. Barographs were presented to the four shipmasters whose long records and consistently good service were considered as deserving special recognition.

The books selected for awards were *Cassell's English Dictionary*, *John Harrison: the Man who found Longitude*, by Humphrey Quill and *The University Atlas*.



April, May, June

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

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

FALL OF TEMPERATURE IN FOG BANK

North Sea

s.s. *Nevasa*. Captain F. A. J. Downer, D.S.C., R.D. Copenhagen to Bergen. Observers, the Master, Mr. C. J. Sample, 1st Officer and Mr. J. A. H. Cartlidge, 3rd Officer.

14th May 1970. A solid, low fog bank was observed ahead of the vessel at 1500 GMT. The top of the fog looked like the heat haze seen above a road surface on a hot day. At 1535 the vessel entered the fog which was very sharply defined, visibility was reduced to ¼ mile and the air temperature fell from 12·5°C to 6·3°. There was no marked change in the wind (NNW, force 3) or barograph reading. The vessel remained in the fog intil 1950 when the visibility gradually improved to 1 mile. By 2200 it was about 7 miles. Readings taken in the fog were:

TIME (GMT)	DRY (°C)	WET (°C)	SEA (°C)
1200	13·0	10·2	8·9
1520	12·6	9·9	8·6
1540	6·8	6·8	7·8
1900	6·3	6·2	6·7

Position of ship at 1500: 58° 20′N, 5° 15′E.

Note. Sea temperature charts for mid-May 1970 show an area of cold water (1 degC below normal) off south-west Norway. The airstream off Norway was warm and was quickly cooled from below as it passed over the cold sea. During this cooling, fog developed in the area and a steep inversion of temperature occurred on top of the fog. Refraction due to density changes in the layers just above the fog top would produce 'shimmering'. It is difficult to account for the fact that the air temperature in the fog was lower than the sea temperature recorded. This may be due to inaccuracies in the sea-temperature recordings since they were obtained from condenser intake.

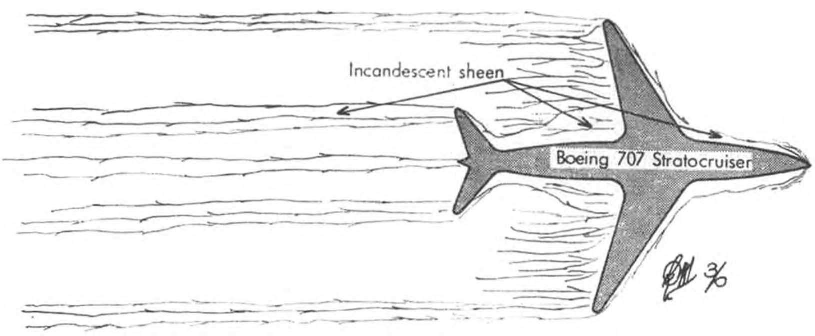
VAPOUR TRAILS

Western North Atlantic

m.v. *Crystal Gem*. Captain B. E. Evans. Dagenham to West Indies. Observers, Mr. R. D. Mearns, 3rd Officer and Mr. B. D. Jones, 2nd Officer.

14th June 1970. At 1500 GMT a Boeing 707 Stratocruiser was seen flying at a high altitude, in approx. direction 180° and making a vapour trail. This trail was making and breaking irregularly while around the fuselage and wings there was continuous vapour coverage. The vapour had an incandescent, halo-like sheen around the body of the plane and was most noticeable around the centre fuselage where the vapour was thickest. Around the rest of the body, wings and tail this same phenomenon was seen although the vapour coverage was much thinner. Total cloud 5/8, including 2/8 well-developed Cb with anvil, 4/8 well-developed Cb and towering Cu with spreading Sc up to 10,000 ft and slight traces of Cc and Ci. Distant rain showers. Air temp. 26·7°C, wet bulb 24·5°, sea 27·5°. Wind E'ly, force 1.

Position of ship: 23° 42'N, 67° 44'W.



Note. An aircraft travelling at high speed disturbs the air through which it is passing to such an extent that sharp reductions of pressure occur in the vicinity of obstacles (nose, cockpit, etc.) and off trailing edges. The immediate adiabatic cooling which results from this pressure drop in turn results in condensation into visible 'cloud' if the air is already fairly moist. The cloud thus formed appears to outline part of and sometimes the whole aircraft, giving the appearance described in the above report. It is often seen to pulsate or flash as the pressure reductions are rapidly created and destroyed in quick succession. Powerful binoculars would be required to observe this about an aircraft in tropical latitudes forming exhaust condensation trails as, under these conditions, its height must have exceeded 30,000 ft. Although only a little Ci cloud is reported by the *Crystal Gem* the presence of Cb clouds with anvils indicates that the air at high level near these anvils may well have been sufficiently moist to produce the effect observed.

BIRDS

Western North Atlantic

m.v. *Crystal Crown*. Captain G. H. Griffiths. Salt River to London. Observers, the Master and Mrs. G. H. Griffiths, Mr. and Mrs. Thomas, passengers, Mr. W. M. Cowan, Chief Officer and Mr. E. McEwen, 2nd Officer.

14th April 1970. At 2300 GMT, 325 miles from Bermuda, two small land-birds were found on board, believed to be of the insectivorous type. As the weather was wet and blustery they were finding it hard to seek shelter. The 2nd Officer succeeded in catching one and brought it to the bridge. It showed no fear and he had it perched on one finger. It appeared to be very tired and on consulting the October 1969 number of *The Marine Observer*, the article on feeding birds, we settled on hard-boiled egg, cheese and soft breadcrumbs. These along with a plentiful supply of water were placed in a cardboard box, well ventilated and left in the ship's office.

To all appearances the bird was completely exhausted and, being mindful of the importance placed on providing fresh water, the bird was placed close to this but it seemed either unable to drink or too tired to make the attempt and I found that by dipping my finger in the water and holding it slightly above the bird's head, it would take the small drop formed on the end. I continued this until it appeared that the bird had had enough. Before going on watch some 4½ hours later the bird had pulled up considerably and seemed quite fresh although it did not look as if any of the food had been touched. Unfortunately the next morning it was dead and there was evidence that it had eaten some of the food but this had obviously been rejected from the bird's stomach.

The bird was 4 inches in length with thin fragile legs. It was mainly fawn/grey with sharply-defined black and yellow stripes running from its beak backwards across the head. The eyes were each encompassed with a black stripe running from the beak. Feathers on underside were downy.

Position of ship at 2300: 26° 56′N, 67° 12′W.

Note. Captain N. B. J. Stapleton of the Royal Naval Birdwatching Society comments:

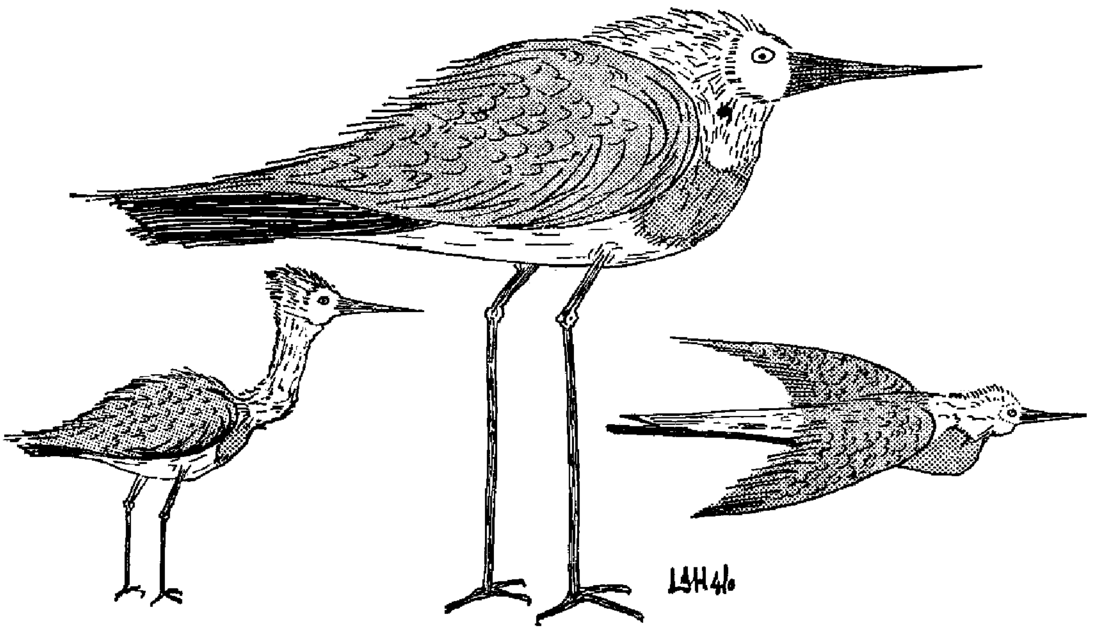
"On consulting Peterson's *Field Guide to Birds: Eastern Land and Water Birds* (*North America*) the small birds seem to be one of the migratory wood warblers which summer in eastern U.S.A. and migrate southwards in winter. The one described is one of the 'worm-eating warblers' (*Helmitheros vermivorus*) which breeds from Connecticut to north Georgia and Missouri and winters in the West Indies and Central America. It was on a northward migration in April and perhaps blown seawards. It is interesting to wonder how many actually cover these long reaches of ocean. Mr. McEwen made a good attempt to save the bird's life."

South Pacific Ocean

m.v. *Rakaia*. Captain P. Lay. Gisborne, N.Z. to Balboa. Observers, the Master, Mr. E. B. Daubeny, Chief Officer and Mr. L. J. Hicks, 4th Officer.

25th April 1970. At 1730 GMT a bird was seen to alight on No. 3 samson post (port) and rest with its neck withdrawn (as in the second sketch). In the resting position it was about 1 ft high and 1 ft long. It had white flecks on the outside of the wings and back, which were grey, and was presumed to be a land-bird due to the shape of its feet and beak. At 1850 the bird took off and flew in a positive northerly direction.

Position of ship: 36° 06′S, 155° 57′W.



Note. Captain G. S. Tuck, R.N., Chairman of the Royal Naval Birdwatching Society, comments:

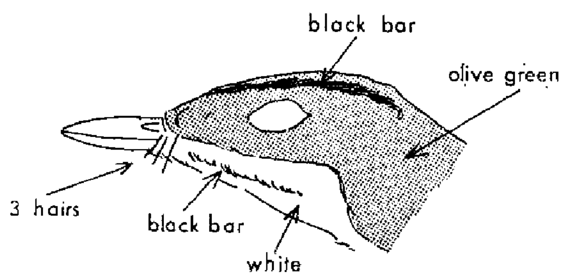
"This is an unusual land-bird and had it not been for the detailed observation, and the carefully-painted sketches undertaken by Mr. Hicks, the bird would have passed by unrecorded. It has been identified as a Hudsonian Godwit (*Limosa haemastica*), better known, perhaps, as the American Black-tailed Godwit, a large, slender-legged wader with grey upper parts, pale underparts, already in the sketch showing a chestnut flush on its breast. These birds breed in Arctic North America and undertake an immense trans-global migration to winter in South America, a few indeed reaching New Zealand. By April the urge to return has already begun and by this date, as in the above report, birds have started to assume breeding plumage, their upper parts finally darkening and the underparts assuming a rich chestnut colour. It would seem that their migration routes may be widely separated, and this is where bird observation in the oceans can give valuable information."

Caribbean Sea

s.s. *Hemifusus*. Captain N. M. Hogg. Genoa to Curaçao.

15th May 1970. At 1440 GMT a small bird, from the direction of Martinique, flew into the wheelhouse window, breaking its neck. It was 13½ cm long with a wingspan of 19 cm. The back and upper wings were olive-green, the front was white and there were black speckles on the chest. The colouring of the head is indicated in the sketch. Course 255° at 15 kt.

Position of ship: 14°N, 62°W.



Note. Captain G. S. Tuck comments:

"This was a Black-whiskered Vireo (*Vireo altiloquis*), a bird which is common in the West Indies and normally inhabits woodlands and mangrove swamps."

BATS

Arafura Sea

m.v. *Eastern Rover*. Captain J. R. Denney. Newcastle, N.S.W. to Sebu, Philippine Is. Observers, the Master, all deck officers and most of ship's company.

12th–13th May 1970. Soon after sunrise on the 12th, at about 0630 SMT, a bat was seen flying around the vessel. It landed in various parts of the ship and was most agile in climbing mast ladders, topping lift wires and rope guys. It eventually came to rest on one of the life-lines of the starboard lifeboat. The bat was 12 inches long (the distance between the rungs on the foremast ladder) when fully stretched out and had a wing span of about 3 ft. It spent most of the day asleep (warily) on the lifeboat life-line. At about 1730 the same day a second bat was noticed roosting on one of the TV aerials above the monkey island. The vessel had passed through the Torres Strait the previous night, dropping the pilot at 2300, and it was presumed that the bats came aboard about that time. On the morning of the 13th the bats had gone, presumably having flown away during the night though the nearest land (at 2100 on the 12th) was False Cape, West Irian, at a distance of 35 miles. At 0545 on 12th: Air temp. 27·5°C, sea 30·6°. Wind ESE, force 3–5. Cloudy to overcast.

Position of ship at 0545 on 12th: 10° 22′S, 140° 29′E.

Note. The *Eastern Rover* is a Hong Kong Selected Ship.

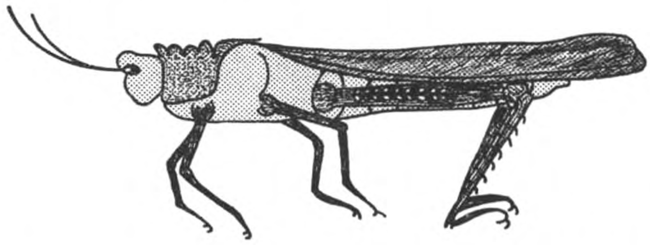
INSECT

at Curaçao

m.v. *Huntingdon*. Captain D. E. Moran. At anchor. Observer, Mr. S. A. Mieszkowski, 2nd Officer.

29th April 1970. While the vessel was in port this insect was found on deck, slightly damaged. It was 3½ inches long and had double wings with 'armour' covering on top of its body. Its colour was mainly a dull red/brown with white markings on the very long, heavy, back legs and on top of the body. The wings were a dark grey/brown. A specimen was preserved in formalin. [Mr. Mieszkowski's sketch of his "swing-wing Curaçao thing" is reproduced half life-size.]

Position of ship: 12° 10'N, 69° 00'W.



Note. Dr. N. D. Jago, Head of the Taxonomic Division, Anti-Locust Research Centre, comments:

"The insect captured on the *Huntingdon* was a large Romaleine grasshopper of the genus *Tropidacris*. It is not of economic importance but its recorded point of capture on a seabound ship is of great interest. Further records of this nature would be most welcome."

FISH

South Pacific Ocean

m.v. *Donegal*. Captain E. J. Ridout. Balboa to Papeete. Observer, Mr. M. L. Doyle, 2nd Officer.

29th April 1970. At 2230 GMT I observed a large flying fish, approx. 18 inches long, 4 inches in depth, breadth 1½ inches, fin span 15 inches. It was red and black, with a grey stomach. It was, without doubt, the largest I have ever seen.

Position of ship: 12° 30'S, 140° 30'W.

Note. Mr. G. Palmer of the Fish Section, Department of Zoology, Natural History Museum, comments:

"It is possible, from the length quoted, that the specimen may have been a species of the four-winged group of flying fishes of the genus *Cypselurus*."

Indian Ocean

m.v. *Canterbury Star*. Captain N. Johnson. Bunbury, Western Australia to Port Elizabeth. Observers, Mr. M. T. Barwell, 3rd Officer and Mr. James, A.B.

20th June 1970. Whilst taking the 0001 GMT observation a strong smell of fish prevailed throughout the bridge and 15 min later the ship passed through a very large shoal of fish. The moon was in full phase and so made the limits of the shoal very indistinct but a conservative estimate would put the extent of the radius at 1½–2 miles from the ship. The water was literally alive with fish which were leaping and splashing about, the whole of which sounded like a torrential downpour. The fishes' average size was approx. 12 inches but, because of the diffused moonlight, the colour was indistinguishable and appeared to be of a silvery hue. At 0255 the vessel had cleared the shoal and the sea temp. dropped from 24·4°C to 22·8°; the pungent smell of fish remained for a further 15 min.

Position of ship at 0015: 31° 56'S, 35° 40'E.

Note. Mr. G. Palmer comments:

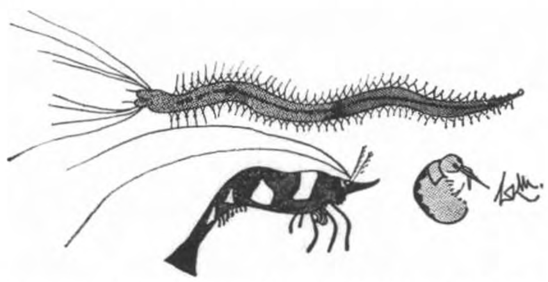
"The large shoal of fishes may well have been clupeoid or herring-like fishes of the genus *Sardinops*, enormous numbers of which are known to occur at times in this area."

MARINE LIFE

Western North Atlantic

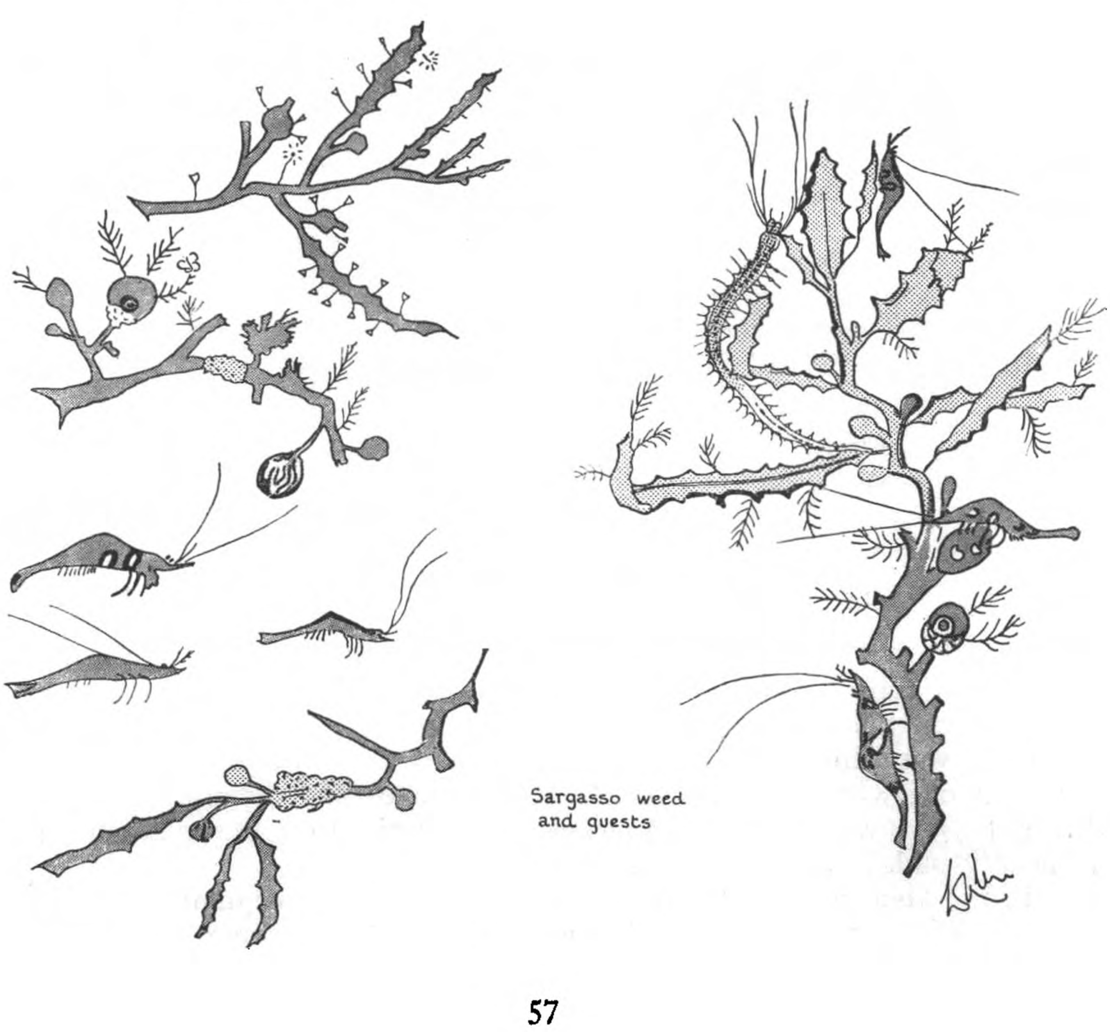
m.v. *Icenic*. Captain W. A. Murison. Curaçao to Liverpool. Observers, the Master, Mr. P. Simmons, 2nd Officer and Dr. H. Bodle, Ship's Surgeon.

5th May 1970. Whilst stopped at sea a bucketful of Sargasso weed was taken aboard. The drawings show some of the interesting life found on the weed. The worm was 1½ inches long when fully extended, pink in colour with pale extremities.



On the prawns there were various colourings which could be seen through a strong magnifying glass; some were brown with brilliant white and blue markings, ½ inch long. The water flea was only ⅛ inch long, ginger-coloured with red eyes and a diamond pattern along its back. [Captain Murison's drawings of the weed, originally in colour, are reproduced life-size.] Sea temp. 24·4°C.

Position of ship: 19° 33'N, 62° 12'W.



Note. The original coloured drawings were forwarded to the Department of Zoology, Natural History Museum.

North Atlantic Ocean

s.s. *Glenaffric.* Captain J. O. Jones. Durban to Las Palmas. Observers, the Master and Mr. G. Thompson, Senior 2nd Officer.

12th May 1970. At approx. 1220 GMT a very large area of bright pink 'dye' was sighted ahead. When the vessel passed this 'dye' it was found to be hundreds of thousands of Portuguese men-of-war, all packed close together, lasting for over a mile. The Master managed to obtain a 16-mm colour slide of one of the larger patches. Air temp. 26·1°C, sea 26·5°. Wind NW, force 3.

Position of ship at 1220: 11° 07'N, 17° 10'W.

Note. Dr. P. F. S. Cornelius, Head of the Coelenterate Section, Department of Zoology, Natural History Museum comments:

"Thank you for the observation and colour slide of the Portuguese men-of-war. It is not unusual for this species (*Physalia physalis*) to float in line astern though why they do it is, I believe, unknown. I think the density of *Physalia* seen on 12th May must be unusually high."

m.v. *Mabel Warwick.* Captain D. S. Craven. Immingham to Monrovia. Observers, the Master, Mr. J. Exley, Chief Officer and Mr. L. Collins, 3rd Officer.

1st June 1970. At daybreak it was observed that the vessel was sailing through a large shoal of Portuguese men-of-war. By observing distant specimens it was determined that their sails were set in an NNE/SSW line and that their tentacles dragged in a NW'ly direction. All specimens appeared to be sailing in the same direction. Their size varied between 9 and 18 inches although the majority appeared to be about 12 inches in length. The ship continued to sail through the shoal until approx. 0900. Wind N'ly, force 3. Course SSW at 11·5 kt.

Position of ship: 18° 08'N, 17° 43'W.

m.v. *Priam.* Captain R. Webb. Singapore to Liverpool via Cape of Good Hope. Observers, Mr. M. E. Peake, 2nd Officer and Mr. P. G. Smith, Cadet.

9th June 1970. At 1540 GMT and for approx. 5 miles we steamed through a shoal of Portuguese men-of-war. They were tightly packed together and numbered many thousands. Their sails, all pointing into the wind, were 6–8 inches long, pink-edged and semi-transparent with 7 or 8 vertical 'ribs' in each. The shoal thinned out gradually about ½ hour after entering the main area.

Position of ship: 18° 00'N, 17° 40'W.

m.v. *City of Guildford.* Captain T. Mallory. Durban to Las Palmas. Observers, the Master, Mr. B. K. Keith, 1st Officer and Mr. C. K. Nelson, 2nd Officer.

28th June 1970. At 1500 GMT, when in position 17° 24'N, 17° 48'W, large quantities of Portuguese men-of-war were seen; numbers must have been in the thousands. We were in the thick of the shoal at about 1645 in 17° 50'N, 17° 47'W and they began to peter out at 1800 in 18° 08'N, 17° 47'W. No more were seen after about 1900 in 18° 23'N, 17° 46'W. With reference to the article in *The Marine Observer*, April 1970, all appeared to be on the port tack and heading due north, parallel with our ship. As the wind was 340° at 7 kt this meant that they were only about 20° off the wind. It was a little difficult to estimate float and crest size but would say that the whole above-water area varied from 8 to 16 inches long, possibly a little longer, and height above water about 4–8 inches; the majority were of the larger sizes. All were purply-pink in colour as usual.

Within the area there was another animal, amounting in quantity to about 10–15 per cent of the number of the Portuguese men-of-war, these being just on the surface and extending below but not above and looking for all the world like lumps of waste floating on the water, or sponges. Their colour was dirty yellow/white and, although mainly floating singly, there were occasional groups of two or three and sometimes more bunched together. Several had Portuguese men-of-war attached to them and, indeed, unattached ones seemed to be making towards these creatures. About six contacts were seen to take place. Their sizes were similar to the Portuguese men-of-war or slightly longer. Other fauna around were a few porpoise and quite a lot of large flying fish; no birds and no weed noticed. A few unsuccessful attempts were made to get specimens. Is there any good way without stopping the ship? The Portuguese men-of-war took about 7–10 seconds to right themselves after capsizing.

Note. Dr. P. F. S. Cornelius comments:

"It is interesting to note this observation but it is not possible to identify the pale-brown objects. There is no great value in specimens of Portuguese men-of-war but, if an attempt is made to catch them, it should be remembered that they *can* sting, causing severe irritation to the skin."

PHOSPHORESCENT WHEELS

South China Sea

s.s. *Hadra.* Captain E. M. Brown. Singapore to Manila. Observer, Mr. M. C. Battrick, 2nd Officer.

13th April 1970. At 0045 SMT numerous circular patches of phosphorescence, approx. 4 ft in diameter, appeared round the ship. Within 10 min these patches appeared to cover the whole of our visible horizon in a close, uniform pattern. They alternated from very dim to fairly bright in unison, approx. once every second. At 0105 they faded slightly and another form appeared: several wheeling effects of phosphorescence appearing to pivot around six or seven points on the horizon and with many curved spokes of light, all turning in a clockwise direction and all at exactly the same speed. At the same time the original discs of light continued to flash. The wind died completely and visibility was so low that we could not see another ship 3 miles away. At 0120 the wheeling effect disappeared and the discs slowly faded during the following 10 min. The visibility increased once more to very good. The wind came up again and had shifted from NE to E.

Position of ship: 05° 00′N, 107° 15′E.

ABNORMAL REFRACTION

North Atlantic Ocean

m.v. *Welsh Herald.* Captain J. G. Tunnicliff. Mossamedes to South Shields. Observers, the Master, Mr. T. M. Cox, 3rd Officer, Mr. H. Foster, Radio Officer and others.

11th June 1970. At 2030 GMT a chain of up to 14 islands was observed over an arc of the horizon of 2½ points of the compass, from 290° to approx. 320°, and was visible from sunset until dark. It was at first assumed that they were the islands of Madeira but, as was later realized, they were lying abaft the beam whereas the observed islands were all forward of the port beam. We could only assume, therefore, that we were seeing refracted images of the Azores, the only islands in that direction, which were then between 600 and 800 miles away. At 2000: Air temp. 19·5°C, sea 19·4°. Course 018° at 13·4 kt.

Position of ship: 32° 47′N, 14° 19′W.

Note. An abnormal amount of magnification as well as refraction would be required to see islands at 600 miles. The most probable explanation is that the upper portions of several distant large Cu clouds were observed 'hull down' on the horizon. These clouds, silhouetted by the setting sun (bearing 297° at sunset), would be dark and would assume the appearance of a group of islands.

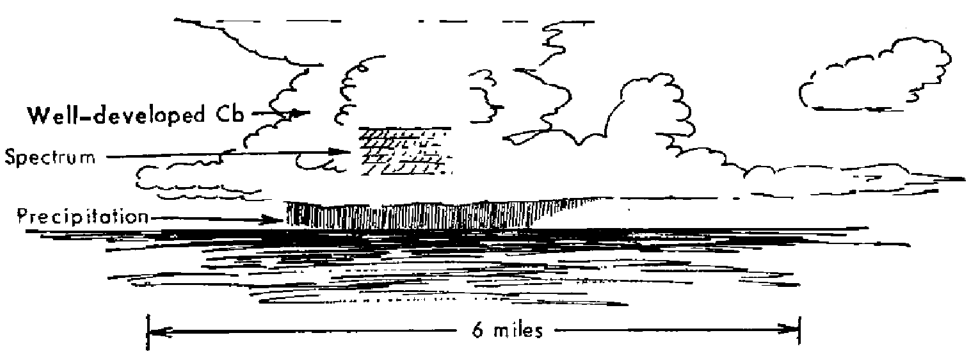
RAINBOW

North Atlantic Ocean

m.v. *British Splendour*. Captain A. R. Stewart. Isle of Grain to Montreal. Observers, Mr. J. B. Hood, 2nd Officer and Mr. R. S. Lane, Radio Officer.

13th April 1970. At an elevation of 10° above the NW horizon a rainbow-coloured horizontal streak was seen about 1/3 of the cloud height above the horizon. The cloud was a large Cb with well-formed anvil. Precipitation was seen beneath the cloud while the iridescence was visible. The phenomenon lasted for about 5 min and disappeared before the rain had stopped. The coloured streak contained all the colours of the spectrum with violet at the bottom. Dew-point 8°C, sea 14·4°. Wind SW, force 3.

Position of ship: 43° 00'N, 44° 30'W.



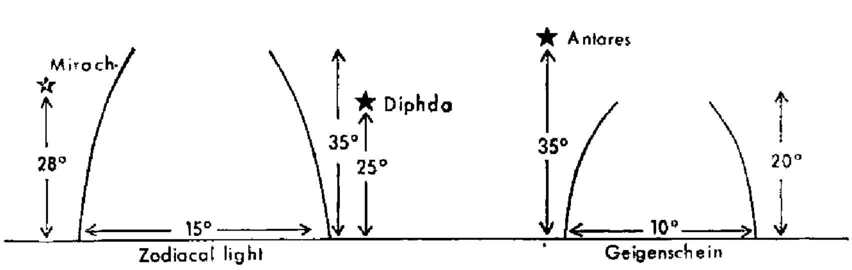
Note. The most probable explanation is that the coloration is a segment of a rainbow formed in rain falling from a shelf of cloud on the facing side of the Cb. It is a pity that no time was given with this report; from the weather observations from this ship we can only say that it occurred some time between 0600 and 1800 GMT since no observation was made at 1200 and the ship was stopped or almost stationary for most of the period. However, if the explanation given is correct (and no other can be offered), the phenomenon occurred at about 1000 SMT (1300 GMT) when the sun's altitude would have been about 30° and the bearing about SE—the position required to give the upper part of the rainbow arc at 10° above the NW horizon.

ZODIACAL LIGHT AND GEGENSCHEIN

South Pacific Ocean

m.v. *Port Caroline*. Captain R. A. Holmes. Port Chalmers to Panama Canal. Observer, Mr. R. A. Harvey, 2nd Officer.

13th May 1970. Between 1140 (1 hr 41 min before sunrise) and 1200 GMT the zodiacal light was observed, the altitude of the cone being about 35° and the diameter at the base approx. 15°. It lay between Mirach (altitude 25°) in the north and



Diphda (altitude 25°) in the south. The colour of the light was similar to that of the Milky Way and equal in brightness to the Milky Way in Scorpio. At the same time the Gegenschein was visible 180° from the zodiacal light, of a similar colour but only half as bright. The altitude of the cone head was about 20°, diameter at base 10°, bounded on the south by Antares (altitude about 35°). Both phenomena were clearly visible until they merged with the approaching twilight. The sun rose on a bearing of 070°. Air temp 21·8°C.

Position of ship: 22° 37′S, 104° 32′W.

Note. Reports from ships of zodiacal light are fairly rare though the occurrence of this phenomenon is by no means uncommon. An account of zodiacal light and Gegenschein is given in the *Marine Observer's Handbook.*

FIREBALL

Indian Ocean

s.s. *Benlomond.* Captain C. Donnelly. Durban to Hong Kong. Observers, Mr. P. A. Smith, 2nd Officer and Mr. T. T. Veitch, Cadet.

27th May 1970. At 1910 GMT a brilliant white (rather than yellow) fireball was seen to fall nearly vertically but in a snake-like or spiral fashion from a position of R.A. 65°, dec. 09°S to a position of R.A. 77°, dec. 10°S which was immediately above and just to the left of centre of the moon which was bearing 100½°, altitude 12°. The brilliance of the fireball, which increased as it fell, was difficult to estimate, being so close to the moon, but was considered to be far superior to that of Jupiter (Mag. −2·0). The duration of flight was less than one second and seemed to end abruptly rather than burn out, giving the appearance of actually striking the moon! The sky was exceptionally clear with only a few scattered Fc. Air temp. 27·7°C.

Position of ship: 00° 20′S, 86° 25′E.

EARTHQUAKE

at Callao, Peru

s.s. *Pacific Envoy.* Captain P. D. O'Driscoll. At anchor. Observer, the Master.

31st May 1970. At 2023 GMT, whilst alongside the wharf in Callao, the vessel was felt to vibrate as though a powerful motor had been started below in the engine room. This increased in intensity and it was noticed that the pier to which the vessel was moored was shaking and the metal doors of the cargo shed were rattling violently. After approximately 3 min no further movement was felt and no damage was noted on board. It was later reported on the radio that north Peru had experienced an earthquake in the Chimbote area.

Position of ship: 12° 00′S, 77° 00′W.

Note. Mr. G. Neilson of the Institute of Geological Sciences, Edinburgh, comments:

"The event referred to was the very large Peruvian earthquake which caused 70,000 casualties and about a million people were left homeless. Damage was assessed at 250,000,000 dollars. It originated in 9·2°S, 78·8°W, i.e. approximately 200 miles from where the *Pacific Envoy* was anchored. In the epicentral area the shock was reported as lasting about 40 seconds. The time of origin was 20h 23m 27·3s GMT which agrees with the time of the above report. This event was of magnitude 7·5 on the Richter scale, depth 43 km Richter (body wave). The energy released was equivalent to a 15-megaton bomb! The casualties and damage caused by this earthquake were the greatest since the great Indian earthquakes earlier this century. The town of Yungay was buried by an ice fall which triggered landslides. The towns of Caras, Kuaras and Casma were almost totally destroyed and at the port of Casma sandbanks were left after the sea had withdrawn 500 m.

"This part of the world is very prone to earthquakes and this event lies in a highly active belt of seismic activity which runs parallel to the coast."

off Chimbote

s.s. *Potosi*. Captain D. J. Houghton. Guayaquil to Callao. Observer, Mr. C. G. G. Hawken, 3rd Officer.

8th June 1970. At 1730 GMT a slight tremor was felt throughout the vessel when passing in the vicinity of Chimbote, the area which had been devastated in northern Peru a week before. Daily tremors were being felt in this area and this particular tremor was very weak, lasting for about 4 sec with a slight shuddering going through the vessel.

Position of ship: 8° 30′S, 79° 48′W.

Note. Mr. G. Neilson comments:

"We have no specific information relating to this event but it was probably a small aftershock of the large Peruvian earthquake of 31st May."

SATELLITE RE-ENTRY

S.W. Pacific Ocean

m.v. *Tofua*. Captain P. Bennett. New Zealand to Fiji. Observer, the Master.

18th April 1970. At 0553 SMT three cherry-red lights were seen low in the western sky, bearing 260° approx., passing the background of stars at great speed. The lights were in the form of an elongated triangle, base to eastwards, and were thought to mark the extremities of the shock wave surrounding the Apollo 13 command module. Maintaining this formation, the lights passed directly over the vessel, increasing in brilliance to incandescent white and starting to emit contrails. On passing to the eastern sky each light appeared to give off showers of small meteorites and the lines in the sky from contrails had a wavy path, not straight as left by high-flying aircraft, but still preserving a direction of 080°. Before disappearing behind low cloud on the eastern horizon the brilliancy appeared to be diminishing. Air temp. 21·7°C, sea 23·9°. Fine weather with 2/8 cloud. Course 009° at 15 kt.

Position of ship: 27° 27′S, 176° 25′E.

Note 1. Mr. A. J. G. Moorat, Radio and Space Research Station, Ditton Park, Slough, Bucks., comments:

"We do not think that the three red lights marked the extremities of the shock wave surrounding the command module. We think that what Captain Bennett saw were the three objects which re-entered the earth's atmosphere—the command module, the service module and the lunar module."

Note 2. The *Tofua* is a New Zealand Selected Ship.

New Zealand Waters

m.v. *Kohinur*. Captain J. H. B. Armstrong. Auckland to New Plymouth. Observers, Mr. K. W. Fulker, Chief Officer and Mr. Navandra Okhal, Seacunny.

18th April 1970. At 0555 SMT, while the vessel was off Cape Reinga (north coast, North Island, New Zealand), a watch was kept on the northern horizon for the re-entry of Apollo 13 into the earth's atmosphere. Precisely on time and bearing 030° approx., elevation 5° approx., the re-entry was observed as two orange-coloured 'fire-balls' joined together by what looked like an aircraft's condensation trail but also orange in colour. The whole episode was over in about 6–7 sec but it is interesting to note that, although visible from northern New Zealand, the re-entry was not seen in Samoa which was the approximate area of the splash-down. Air temp. 17·5°C. Wind SE, force 2. Fine weather with few clouds.

Position of ship: 34° 24′S, 172° 40′E.

Note. The Apollo 13 spacecraft had a crew of three: James A. Lovell, Jr., Commander, Fred W. Haise, Jr., lunar module pilot and John L. Swigert, Jr., command module pilot. They were unable to accomplish their mission of landing on the moon because of an explosion of oxygen tanks in the service module. However, the spacecraft had passed 130 km beyond the moon before its return to Earth and the successful recovery in the Pacific.

UNIDENTIFIED PHENOMENON

Caribbean Sea

m.v. *Port Phillip.* Captain D. M. Kissane. Panama to Curaçao. Observers, the Master, Mr. J. Brennan, 4th Officer and Mr. R. Phillips, Chief Engineer.

30th June 1970. At 0140 GMT a small semicircle of light appeared on the horizon, bearing 360°. It rapidly expanded upwards and outwards until it reached an approx. altitude of 75°, blotting out all stars. The whole incident lasted about 9 min whereupon it slowly faded.

Position of ship: 11° 36′N, 74° 19′W.

N.W. Providence Channel

m.v. *Orita.* Captain T. F. J. Leddra. Bermuda to Nassau. Observers, Mr. R. G. Pym, 3rd Officer, Mr. C. Gamwell, Radio Officer and others.

30th June 1970. (Time not stated.) An expanding halo was observed in the sky, altitude approx. 90°, white in colour, expanding rapidly from nothing. It vanished after about 5 min. There appeared to be a comet or similar object at the centre. This also vanished. Sky otherwise completely clear. (On arrival in Nassau a local resident said that this could possibly be a rocket from Cape Kennedy burning up.)

Position of ship: 25° 44′N, 77° 39′W.

North Atlantic Ocean

m.v. *City of Wellington.* Captain G. H. Salter. Mombasa to Montreal. Observers, Mr. J. T. Bennett, 3rd Officer and Mr. W. J. Pyle, A.B.

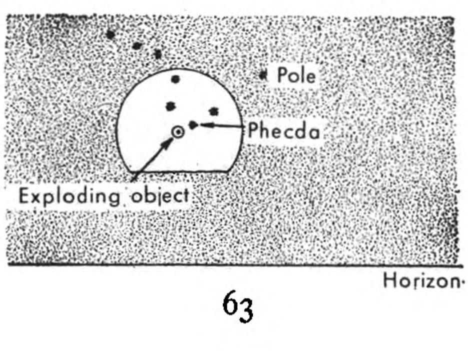
30th June 1970. At 0140–0155 GMT the most unusual and inexplicable phenomenon was observed. A semi-circular arc of milky-white light, or possibly haze, was seen in the distance, due west. Over the 15 min period it increased in size and came nearer and nearer until it was so big that it filled the whole of the horizon to the west and eventually faded into nothingness. I looked in the *Marine Observer's Handbook* and the nearest resemblance it had to any of the phenomena described in there was a cross between the Glow of an auroral display and a Counterglow, but it could not have been either of these because the latitude was only 30°N and sunset was at 2200 on the 29th. The only conclusion I can draw is that it was a freak Glow auroral display. If not, the whole thing remains a mystery to me!

Position of ship: 30° 05′N, 44° 58′W.

Western North Atlantic

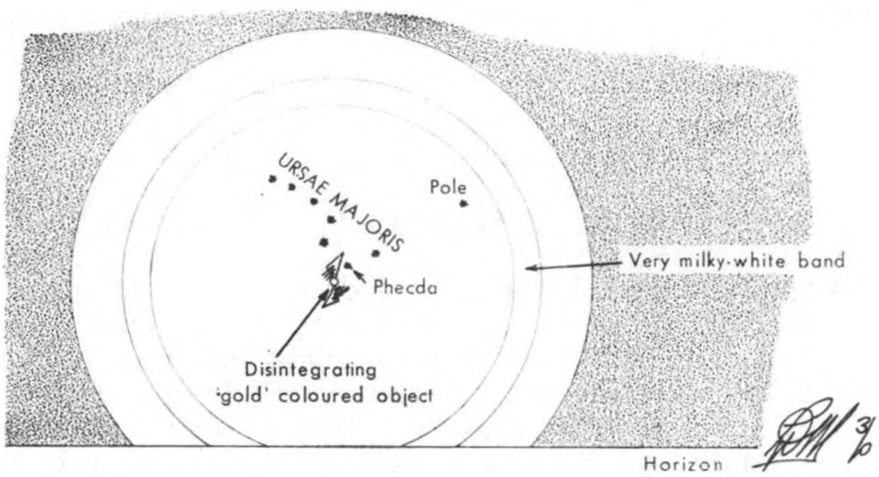
m.v. *Crystal Gem.* Captain B. E. Evans. Salt River, Jamaica to London. Observers, the Master, Mr. R. D. Mearns, 3rd Officer and all other officers.

30th June 1970. At 0135 GMT the look-out reported an unusual occurrence. This turned out to be a football-sized (relatively), mushroom-shaped, halo-like object



which was rapidly expanding. It had, during its life, a milky-white, slightly incandescent and gaseous appearance.

This object continued expanding to a maximum of about 60°, the lower edge being on or slightly below the horizon. The centre of the object was in line with Phecda, a star in the constellation Ursæ Majoris, bearing 320° approx. at the time. In this centre spot was seen a gold-coloured object which was shooting erratically over the sky within a circle radius approx. 15′. It seemed to be disintegrating.



The halo stopped expanding at about 0140 and then dissipated very quickly, completely vanishing at 0142. This happened uniformly to the whole halo and without any noticeable diminishing in radius. Although extremely large and bright it had shed no light on the vessel. Air temp. 27·1°C, wet bulb 24·7°, sea 27·9°. Cloud, small amounts of Cs and Fs. Wind E'ly, force 2–3. Slight sea, low swell. Course 053° at 11·6 kt.

Position of ship: 22° 45′N, 71°33′W.

m.v. *Beaverpine*. Captain T. Parker. San Juan, Puerto Rico to Chandler. Observers, the Master and Mrs. T. Parker, Mr. I. C. Samples, Extra 2nd Officer and Mr. M. J. Corry, Radio Officer.

30th June 1970. At 0140 GMT a brilliant pearly-white light was observed on a bearing of approx. 290°, expanding rapidly from near the horizon near the constellation of Leo. The light was very intense when first sighted, like a brilliantly floodlit cloud, and was almost perfectly circular in shape, the bottom segment of the circle being below the horizon. The edges of the part above the horizon were very sharply defined and the whole phenomenon seemed to be brighter at the edges. It was a dark night with no moon and virtually no cloud. The impression the observers got was that of watching a vast, expanding bubble or explosion, the centre of which appeared to remain in about the same position just above the horizon with an astronomical position of very approx. S.H.A. 220° and dec. 30°N (taken from star charts in *The Nautical Almanac*). It faded as it got larger and the rate of expansion appeared to decrease. However, it was discernible until it almost reached our zenith but finally disappeared some 2 min after first sighting it. A message was sent to AMVER New York.

Position of ship: 24° 15′N, 64° 50′W.

m.v. *Trefusis*. Captain W. J. Perkins. Wilmington to North Charleston. Observers, the Master, Mr. A. J. Bettles, Chief Officer and Mr. A. Murray, 3rd Officer.

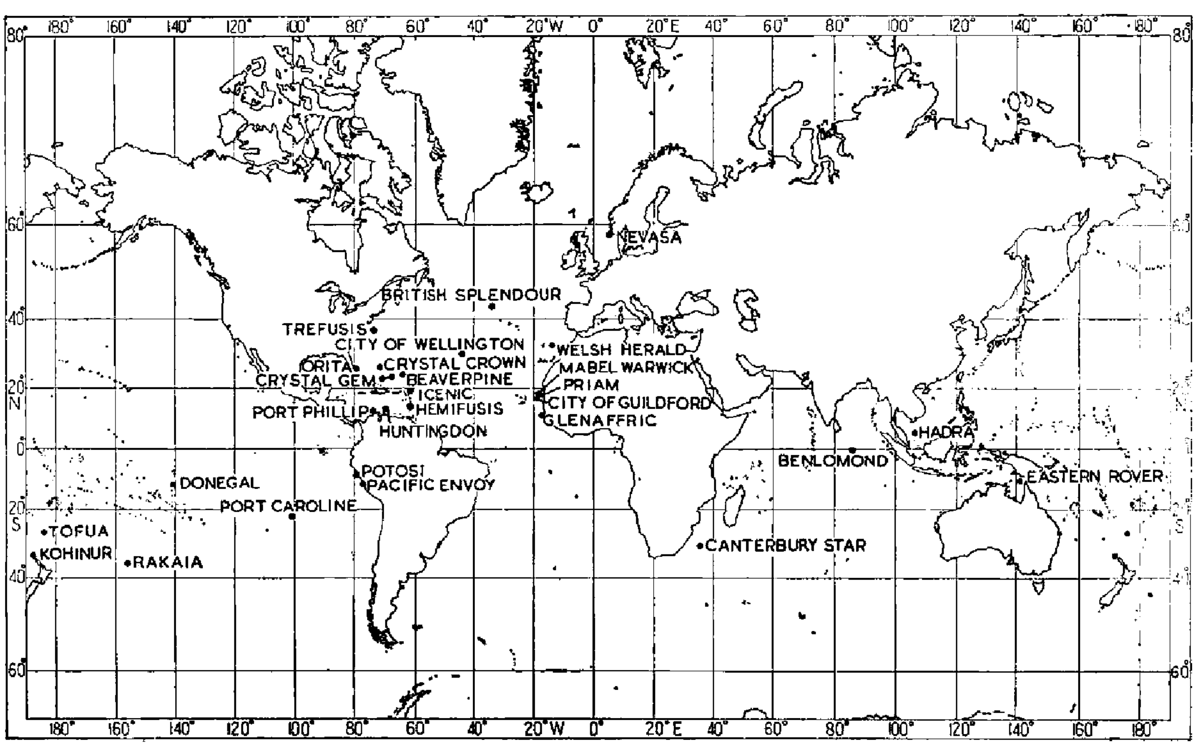
30th June 1970. At about 0140 GMT something was observed in the sky bearing south at an altitude of approx. 33°, mid-way between Spica and Antares. It had the appearance of a circular cloud about the same size of a full moon and very light in colour. It appeared to be travelling towards the vessel at a great speed, and, as it approached, it got larger and took the form of a halo. The centre looked like a comet but with two tails opposite one another. The 'comet' appeared to burst into three separate pieces and disappeared very quickly and the halo gradually disintegrated. Nothing more was seen. I would be interested to hear any explanation. My own theory is that it was probably a large meteor which, on entering the Earth's atmosphere, became so heated that it virtually exploded. The circular cloud and halo effect was probably caused by the heat affecting the upper atmosphere and causing a type of cirrocumulus cloud.

Position of ship: 37°N, 74°W (approx.).

Note. These six reports are of the same phenomenon. It would appear that a fault occurred in a recently-launched American space rocket and that it was deliberately (and spectacularly) blown up several hundreds of miles out in space above a point about 400 miles ESE of Cape Kennedy. Similar sightings have occurred in the past few years. At times the apparent approach of the illuminated area (indicated in the reports from the *Trefusis* and the *City of Wellington*) has been so dramatic that it has alarmed the observers.

AURORA

Auroral observations from British ships for April–June 1970 will be published in July.



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

SYMPOSIUM ON WEATHER ROUTEING OF SHIPS

In the January 1971 number of *The Marine Observer* were published the first three papers read at the symposium on Weather Routeing of Ships which was held at the Ships' Gear International '70 Exhibition, Olympia, London, on 16th July 1970. The final two papers are given below.

551.5:629.12

Weather Routeing Procedures in the United States

By George W. Francis

(Supervisor, OTSR Division, Fleet Weather Central Norfolk, Virginia)

Introduction

American weather routeing started about 200 years ago. In 1769 Dr. Benjamin Franklin, the Deputy Postmaster-General of His Majesty's colonies in North America, wrote to Anthony Todd of the British Post Office suggesting routes for the masters of the sailing packets to use to speed the mail service between England and America. These route recommendations were based on observations of the Gulf Stream supplied by Franklin's Massachusetts whaling-master kinsman.

This paper will show briefly the development of weather routeing in the United States and experience in the Atlantic area. It will expand somewhat the material on weather routeing activity in the United States which was presented to an informal meeting of the Honourable Company of Master Mariners in London in 1966. That paper, which appeared in *The Marine Observer* in 1967 entitled "Practical Results of Weather Routeing", was prepared by Captain W. E. Cummins, U.S.N., Commanding Officer, Military Sea Transportation Service Office, London, from material supplied by U.S. Fleet Weather Central Norfolk, Virginia.

The term 'weather routeing' is not limited to weather as such, but is understood to mean the total oceanic environment as it affects the safety and efficiency of merchant and naval shipping.

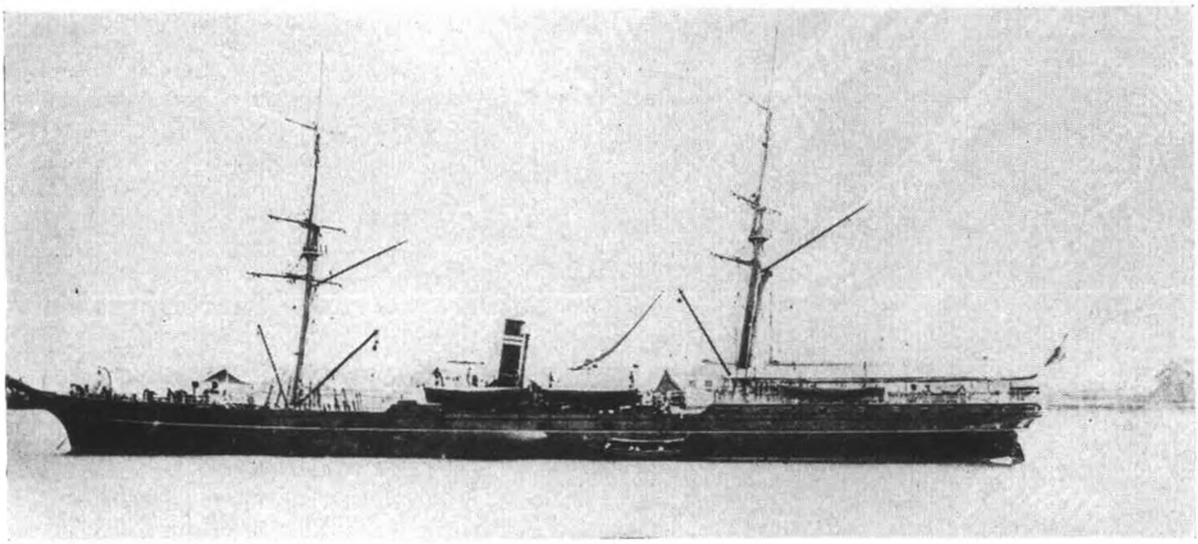
Weather services organization

It is important to emphasize that weather services in the United States are a function of both government and private enterprise. The Environmental Science Services Administration, Weather Bureau, U.S. Department of Commerce has the responsibility for collecting and analysing the basic meteorological data and making it available to all who wish to use it for whatever useful purpose. The Weather Bureau is also responsible for issuing general storm warnings and forecasts for the United States as a whole. Specialized meteorological service for individuals and corporations is provided by private meteorological organizations where available, and the Air Weather Service and the Naval Weather Service Command provide a weather service tailored to the special needs of the military services. Thus, any specialized weather service is dependent on the National Weather Service for much of its working data.

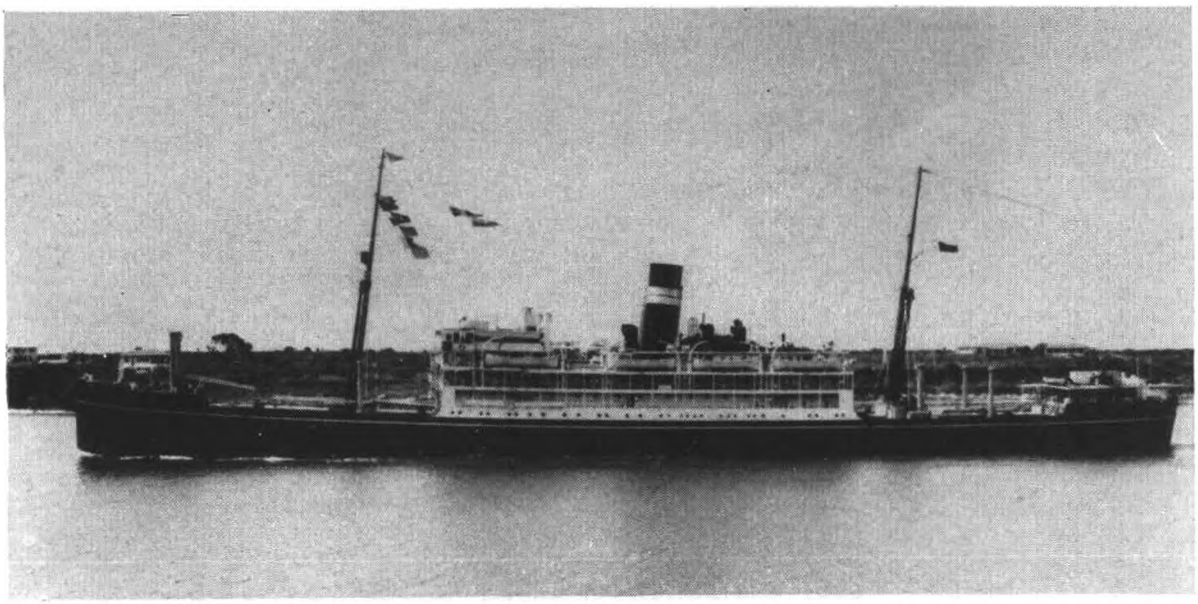
Development of weather routeing

Commercial weather routeing in the United States was initiated by Louis Allen on the east coast and Howard Kastner on the west coast in the early 1950s. It was developed to serve individual shipping lines and/or marine associations on a ship-by-ship basis. This operation has grown so that there are now some seven private weather service corporations and weather consultants engaged in providing specialized forecasts to the merchant marine, both domestic and foreign, in the Atlantic area.

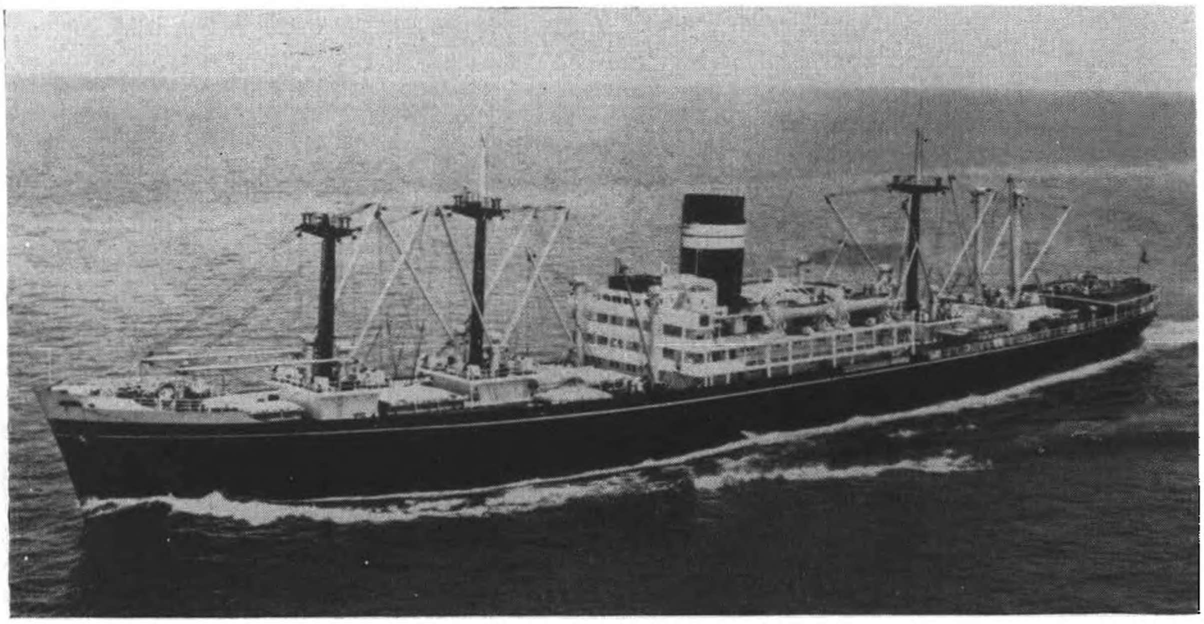
(*Opposite page* 66)



Himalaya



Mulbera



Nardana

Photos by courtesy of British India S.N. Co. Ltd.

THREE SHIPS OWNED BY THE BRITISH INDIA S.N. CO. LTD.

(*see* page 78)

(Opposite page 67

The presentation of barographs at Bracknell; left to right: Captain R. G. Hollingdale, Captain A. N. Williamson, Dr. B. J. Mason, Captain J. S. Laidlaw, Captain L. W. Cady (*see* page 78).

Weather routeing for the ships under the operational control of the U.S. Navy was developed by Dr. R. W. James of the Naval Hydrographic Office, beginning in about 1954, and became operational in the Naval Weather Service in 1958. Optimum Track Ship Routeing (OTSR) service for all types of United States fleet shipping and for the Military Sea Transportation Service (MSTS) is now provided in the Atlantic by U.S. Fleet Weather Central Norfolk, and in the Pacific by U.S. Fleet Weather Centrals Alameda and Guam. This Naval weather-routeing service is also provided to about 20 per cent of U.S. merchant marine ships while under time charter to MSTS.

General procedures

All weather routeing in the United States, whether provided by private enterprise or the Naval Weather Service Command, appears to operate on essentially the same principles and uses similar methods. All organizations consider that weather routeing is primarily meteorological in their approach to the environmental problems of safe and efficient navigation. Route recommendations for the entire passage are sent prior to departure, in response to a specific request from an individual master or commanding officer or from an operating agency. This request spells out the transit problem in detail, including speed available, draught fore and aft, deck loading and any unusual stability problems. The routeing agencies encourage the user to set priorities and state the problem as completely as possible. Some make a point of frequent personal liaison with the user to learn his point of view and desires.

Once the original route recommendation has been sent, all weather routeing organizations maintain a continuing watch on the progress of the ship during the passage and send route-change recommendations as necessary to give the environmental conditions desired. Allen Weather Corporation sends a confirmation of the original route or a change recommendation at three to four-day intervals but, at least in the Atlantic area, daily routeing messages are not sent by any of the routeing organizations. About 65 per cent of all the routeings supplied by U.S. Fleet Weather Central Norfolk are steamed without further recommendations. The other 35 per cent receive one or more route-change recommendations for a number of reasons, including such non-environmental ones as change in destination.

Route selection

The selection of the original recommended route is essentially a subjective process based on modern meteorological and oceanographic knowledge and much ship-routeing experience.

Basic to route selection is a detailed statement of operational requirements and priorities. These can be stated in the route request, in general operation policy directives, or through personal liaison with either afloat or shore-side operating department personnel. The users' priority decisions concerning least-time versus damage risk, environmental requirements for under-way replenishment, air operations, under-way training and maintenance, or need to protect sea-sensitive deck cargo, must all be known by the ship-router. The standard practices of good seamanship, good positional navigation and techniques to avoid icebergs must be applied to route selection. American ship-routers feel that while ocean currents are significant to some passages, the primary environmental element affecting ship speed is the wave field. Towing-tank experiments with model ships in model waves show that effective wave resistance should result in a speed reduction of only about 14 per cent in high head seas. However, ship log data show that ships regularly slow to bare steerage way in these conditions. This slowing is really the result of a subjective estimate by the mariner of what speed the ship can do without unacceptable damage risk. The familiar James ship-performance curves are thus the average thinking of the whole group of mariners about how their ships perform in various, not too well-defined, wave fields. American weather routeing offices rely on the wave spectrum methods of Pearson, Neuman and James and the earlier work of Sverdrup, Munk and Bretschneider, in understanding wind waves.

Automated solutions to the weather-routeing problem are under active development at this time. Some organizations are using computers as book-keeping tools in the route-following portion of the total operation. Computer programmes have been written and successfully tested which will compute a least-time track given the necessary environmental fields. However, skilful eight to ten-day forecasts of the wave field are not yet available.

American ship-routers do show skill in the selection of the general path of the low centres. This path is called the 'storm track'. They can estimate the position in the storm track where the surface lows are most likely to intensify. They can model the maximum wave-height areas associated with the lows. Then, knowing the general areas of higher waves, they can select routes to minimize time in these areas. These routes will, in general, be the best available routes.

Storm-track estimate

A number of ideas are used in the storm-track estimate. The original American weather-routeing scheme used the five-day extended forecast charts of the Weather Bureau to estimate storm tracks and build waves. These were based on mean 700-mb height anomalies and analogues. Recently the extended forecast charts have been issued daily. They are now based in part on an extended run of the primitive equation multilevel numerical forecast programme at the National Meteorological Center, Environmental Science Services Administration, Weather Bureau. This is a useful tool but still does not extend far enough. At U.S. Fleet Weather Central Norfolk we use this tool and a mixture of other concepts. Basic to our practice is the concept that there is an identifiable 'witterung' or weather régime to the 500-mb flow pattern and that surface systems are steered and governed by this 500-mb flow pattern. We recognize that major surface developments occurring near or east of continental break points, such as the Rocky Mountains and the Greenland peninsula, and those areas of strong surface temperature contrast, such as the continental coast lines in winter and the north wall of the Gulf Stream, may strongly influence the 500-mb flow pattern.

The 72-hour 500-mb forecast, skilfully forecast by the digital computer, shows the conservative major steering elements of this pattern. C. G. Rossby's long-wave concepts are a powerful tool for evaluating the 500-mb flow and extending this forecast. The pattern-separation techniques of U.S. Fleet Numerical Weather Central, Monterey, California, are used to find the long waves. This computer system uses a 500-mb space mean combined with a climatological monthly mean to find the long-wave disturbance pattern. When this is compared with the preceding series of 500-mb space mean charts, the position and motion of the long waves may be found. A gross zonal wind computation, using a nomogram by C. V. Smith of the British Meteorological Office, gives the stable long-wave length. This is compared with the actual long-wave length to anticipate a change in wave number. CAVT trajectories are used at likely points to further evaluate areas of suspected pattern change. The group velocity concept is used to extrapolate the energy of rapidly-developing large-scale disturbances from the Pacific into the Atlantic area as an aid in timing pattern changes.

The storm-track estimate follows the long-wave estimate. A study of five-day storm positions plotted on a 500-mb space mean chart for the middle day of the series during several months of the past winter shows a strong qualitative correlation between the storm track and the 500-mb mean flow. The correlation is strongest in blocking situations but is also moderately strong in more zonal situations. Using the well-known principle that surface lows intensify between the long-wave trough and the next down-stream ridge, and weaken from ridge to trough, a good subjective estimate of strong wind areas and hence likely very rough to high sea areas may be made. These estimates are combined with a knowledge of storm-track, wind and wave climatology and an understanding of the needs of the routed unit to select and recommend an optimum track.

Satellite pictures transmitted by facsimile from the National Environmental Satellite Center via the National Meteorological Center are used by most weather routeing offices to aid analysis in sparse data areas such as the South Atlantic and high latitudes in the North Atlantic. These satellite pictures play an important part in the shorter-range daily-route evaluation process.

Communications

Original route recommendations are sent via the most practical means, frequently to the operating headquarters for further delivery to the ship. Route-change recommendations to improve the route after the ship is under way go direct from the weather-routeing office to the ship by the fastest means and not through the operating headquarters. This is usually commercial radio for merchant ships and naval radio for MSTS dry-cargo shipping and fleet units.

Service evaluation

How successful has the operation been? The best testimony on that question is the continued steady growth of the acceptance of the services available and the growth in number of organizations from two to seven which provide service. U.S. Fleet Weather Central Norfolk has provided over 8,000 route recommendations to MSTS and fleet ships and units operating in the Atlantic since 1958, and provided 855 route recommendations in the year ending 30th June 1970.

Quantitative evaluation of the service rendered is difficult. The basic question is, "Are routes recommended by shore specialists better than routes selected in the ship and are they significantly better to pay for the service?"

Private ship-routeing organizations have applied two different concepts to route evaluation. Weather Routing Incorporated has used the concept of time used on a recommended route compared with computed time required in flat water on an arbitrarily defined standard route. Standard route is defined as the average time *en route* for all non-routed ships in the same class, in the same trade, between two longitudes serving as junction points, in the approaches to frequently used terminals. These non-routed ships may be those electing to ignore route recommendations, or the recorded data for ships in the trade operating before the routeing service began. Comparing the experience of routed ships with this standard clearly indicates an average saving of six to twelve hours for Atlantic crossings between the mid-Atlantic coast of the United States and north-west Europe. The larger savings are likely on the westbound crossings. Bendix Commercial Service Corporation has considered the shortest, safe, navigable distance between ports divided by the ship's rated speed in her loaded condition as the time for 100 per cent efficiency. This time is compared with the actual steaming time to compute actual efficiency. When routed-ship efficiency is compared with that of non-routed ships of the same class and trade, their study shows that routed units average 6–12 per cent more efficient than non-routed units.

In the development of the Navy weather-routeing programme the Naval Hydrographic Office and MSTS carried out several classic experiments comparing the performance of two similarly loaded victory ships departing from the same point at the same time for the same destination. The opportunity for similar comparisons has occurred only by chance and rather infrequently since then. In the relatively few cases on record, the ship steaming on the weather-routed track has usually arrived days ahead of the ship using some other track. In those isolated cases when the two ships have arrived together, the routed ship has never been more than four hours behind the non-routed ship.

The most sophisticated route-selection evaluation tried in the United States used the digital computer least-time track programme and wave fields analysed from daily ship reports to compute after-the-fact least-time tracks. These tracks were compared with those selected subjectively before-the-fact and steamed by the real ship. It was expected that the computer tracks based on history rather than forecasts would be the best available least-time track. Results showed that the computer did give a least-time track, assuming that the ship-performance curves were valid. However, these tracks were not necessarily optimum from a damage-risk consideration nor would they have always been acceptable by a prudent master. These comparisons also showed that the trained ship-router could subjectively do nearly as well selecting tracks to minimize time and, simultaneously, minimize damage risk.

Damage experience indicates that it is possible to reduce damage to a minimum using weather routeing. U.S. Fleet Weather Central Norfolk has had a damage experience which is inversely proportional to the experience of the ship-routeing staff. The percentage number of routed ships reporting damage has fallen from 2·9 per cent in fiscal year 1963 with mostly new personnel to 0·6 per cent in fiscal year 1970 with a very experienced staff.

Finally, let us assume the average ship-router issues 180 route recommendations a year. Assume the average master works 10 months a year and that he makes an Atlantic crossing every 15 days, or 20 times a year. It would then take 9 years for this fictitious master to accumulate the route selection and evaluation experience achieved by the ship-router in just one year.

Weather routeing works—because the Master, the weather-router and the National Weather Service co-operate, each in his particular area of special competence. They combine their talents and resources to use effectively modern meteorology and oceanography to solve the age-old problem of safe and efficient open-ocean navigation.

551.5:629.12

Weather Routeing Procedures in the United Kingdom

By A. G. Maule

(Central Forecasting Office, Meteorological Office, Bracknell)

The United Kingdom ship-routeing organization is located as a unit within the Central Forecasting Office (CFO) at Meteorological Office Headquarters, Bracknell, thereby having ready access to the vast stream of meteorological data received from all over the world. The staff of this ship-routeing section consists of a team of three senior meteorologists and two nautical officers, the latter being Master Mariners with sea experience, both commercially and as Master of our Weather Ships. This combination results in a team qualified to deal with both the meteorological and technical aspects of strategic ship routeing.

The whole basis of a successful routeing exercise depends, of course, on accurate weather forecasting throughout the voyage and we feel that recent advances in forecasting methods have made the concept of ship routeing a practical proposition. In particular, the general introduction of numerical forecasting techniques which require the use of a high-speed electronic computer to perform the complex calculations has resulted in more accurate forecasts of surface wind and sea conditions for longer periods ahead. To cater for the requirements of ship routeing the computer at Bracknell (English Electric KDF 9) has been programmed to produce specialized forecasts for the routeing section in addition to the normal forecasts used in the general working of CFO. These additional forecasts consist of a set of wave charts, twice daily, covering the whole of our operational area up to 48 hours ahead in periods of 12-hour intervals, together with surface charts covering a period of 72 hours ahead. These forecasts, subjectively adjusted to allow for the latest information being received, are used as the basis for our initial advice to masters but, of course, it is necessary to look even further ahead to provide the best possible advice and, for this extended view, use is made of the longer-range forecasts prepared at CFO giving general synoptic trends over the following two to three days.

All this information is combined and an optimum course is graphically calculated using the 'least-time track curves' method; this shows the estimated progress of the vessel on various headings during successive 12-hour periods. These curves are constructed by using the forecast wave charts already mentioned, in conjunction with each ship's performance curve which shows how the vessel's speed is affected in different sea states. Data supplied from the ship's log, obtained by one of the nautical officers during his initial visit to the ship or from the fair copy of the deck log, are used when drawing the ship's performance curve.

We are now in a position to advise the master of the best course to take to meet his special requirements. This routeing information can be passed to him in several ways. Before sailing either the master or one of his officers telephones our office and the general weather situation is discussed, together with expected developments, and he, in turn, informs us of any preferences he may have for this particular passage. He is then given preliminary advice as to the best course to take to meet these requirements. In some cases, however, for example a departure from a non-U.K. port, it is necessary to pass this information by Telex to the local agents or by radio-telephone soon after sailing. Subsequently, advice messages are sent to the master at least every 48 hours through Portishead Radio, either confirming his current course or advising a change of course to accommodate later developments in the meteorological situation. This procedure continues throughout the voyage. In addition to this advice as to the best course, a forecast is given for the next 48 hours of wind and sea state, together with any relevant information on fog, ice, tropical storms, etc.

Before sailing, each routed ship is requested to send us regular weather reports, again through Portishead if possible, and we are therefore able to maintain a close and continuous watch on each vessel's progress throughout the voyage. These weather messages from the vessel are, of course, free of charge. In addition to general meteorological considerations we are in a position to pass on the latest ice situation, if applicable, as the section of CFO specializing in ice reporting and forecasting is part of our ship-routeing complex and the latest information issued by the Canadian and American ice services is readily available. This general procedure is adopted for all westbound passages but a similar method is used for eastbound vessels except that the initial advice is passed to the master by W/T on receipt of a departure signal from him sent to us through Portishead Radio or commercial telegraph channels.

On completion of each voyage one of the nautical officers, accompanied on occasion by one of the routeing meteorologists, visits the ship whenever possible to discuss the routeing service with the master. Copies of a hind-cast chart are supplied to both the master and the owners showing the advised course and weather conditions experienced on each passage and also a comparison route with estimated weather conditions on that route. This comparison route is generally taken as the shortest route, or the route the master would normally have taken or was proposing to take, as discussed before sailing. From this chart it can readily be seen whether or not a particular passage has been a success from the weather-routeing point of view.

I mentioned earlier the phrase 'special requirements' and I feel this is worth enlarging upon. When we first started this service it was assumed that the main consideration would be that of a saving of time on a passage but our experience to date shows that only in a minority of cases is this true. We have found that the majority of owners are more interested in minimizing damage to either cargo or vessel resulting from long periods in unfavourable seas and are quite prepared to sacrifice some time and to increase the total distance to achieve this object. Of course in many cases extra distance does not necessarily result in loss of time. Therefore each passage is taken as 'individual' and routeing advice is given accordingly. Some may want a quick passage and some may want a quiet passage so we do our best to accommodate them.

The cost to the owners for this routeing service is basically £50 per crossing but a scheme is in operation for a reduction resulting from an increased number of crossings over a set period. This can result in a reduction to £35 per crossing. In addition to the basic charge the owners pay the cost of the routeing messages sent; this, of course, varies on a seasonal basis but is, on average, about £6 each crossing.

With more and more vessels having facsimile equipment on board these days, it is sometimes asked, "Why do weather routeing from ashore when the master can receive weather charts direct and therefore do his own routeing?" This is true up to a point, but there are one or two drawbacks to this system which I would like to mention. Firstly, due to facsimile schedules, broadcast timings and the volume of traffic which has to go out on FAX, the chart which the master receives can be quite out of date, meteorologically speaking, by several hours and the data on which it was based will possibly have been up-dated in the light of later information received in CFO after the chart has been transmitted. The ship which is weather routed from ashore, on the other hand, can receive the latest information by W/T message—the delay here being reduced to the normal 'between traffic list' times.

The second point in regard to facsimile routeing is that no matter how good a particular shipmaster may be at weather forecasting (and here I must say that we recognize that many shipmasters are proficient in this field) he cannot be as competent as the professional meteorologist who has specialized solely in this work for a considerable number of years, unlike the shipmaster who, of necessity, has had to divide his skills amongst the varied aspects of his profession.

Our opinion is that the use of facsimile equipment in conjunction with routeing advice from a shore base gives the master an 'all-round picture', both literally and metaphorically, in that he can see the slightly out-of-date FAX chart while also receiving details by radio of interim weather developments.

I would also like to emphasize that in ship routeing the meteorologist is acting solely as adviser to the master. There is no question of his authority in any sense being diminished by the use of the service and we feel that, with the much greater volume of weather information we have at our disposal (satellite information and a vast coverage of both surface and upper-air data), we are in a good position to advise him on a course to minimize the worst of the Atlantic weather. With the advent of a bigger computer and with further research into methods of numerical forecasting an even more efficient service will result from more accurate forecasts for longer periods ahead.

Though the United Kingdom ship-routeing service has been in operation for a much shorter period than those of some other countries we feel that even in this comparatively short period—just over 2 years—results have been achieved to justify a continuation of this aid to ships' navigation with its resultant economic advantages.

1970—The Year of the Comets

By DR. K. B. HINDLEY, F.R.A.S.

(Meteor Section Director, British Astronomical Association)

Comets that become visible to the naked eye are not frequent. About fifteen comets are observed every year but only about one a year becomes bright enough to be faintly visible to the naked eye, whilst perhaps one every ten years or so becomes a prominent naked-eye object. The year 1970 will go down in the record books with no less than five comets visible to the naked eye, three of these being quite prominent and one being one of the brightest comets of this century. Two of these objects have been widely reported by ships' personnel—Comet Tago-Sato-Kosaka 1969g which was a prominent object in southern skies during December 1969–January 1970 and Comet Bennett 1969i which was a splendid object in the morning sky during February–April 1970. Over one hundred reports have been received and so only a few can be quoted in full below. The magnitudes used for the comets are the mean of several observers in all cases.

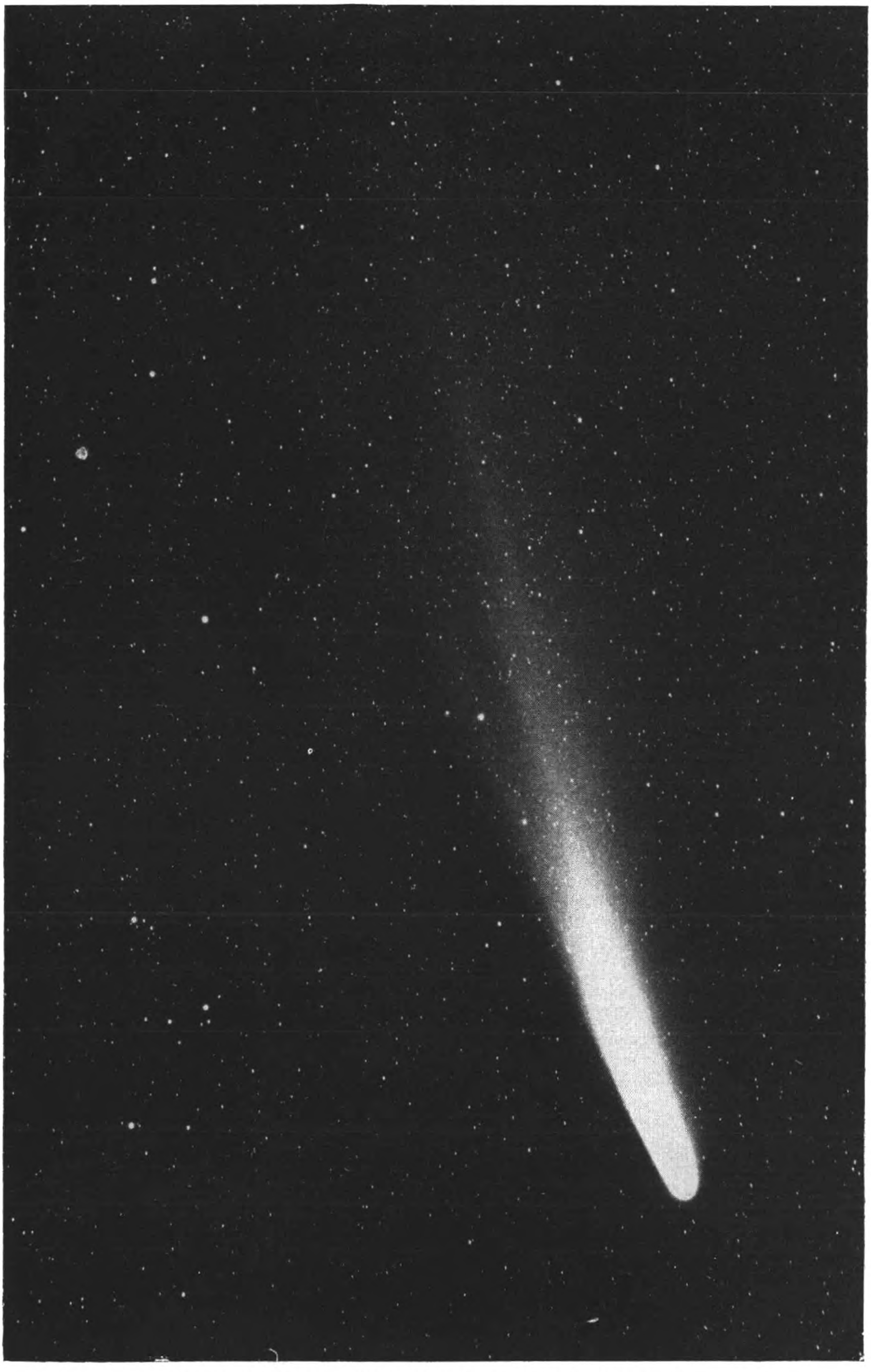
Modern research has shown that comets consist of a collection of dust and rocks fused together with frozen gases to form a fairly solid body perhaps 20–50 miles in diameter. These objects spend most of their time at the outer edge of the solar system where temperatures are very low and they are quite stable. However, comets move in very elongated orbits which pass into the inner solar system and close to the sun. Every thousand years or so the frozen comet 'nucleus' moves sunwards and the heat encountered causes the frozen gases to vaporize to form a large gas cloud—the fuzzy comet 'head'. This head can be hundreds of thousands of miles across, many times larger in size than the planets, yet it is simply a cloud of gas and dust surrounding the tiny nucleus. Further, in the vacuum of space, the 'light pressure' caused by the heat and light from the sun forces the dust and gas in the head to stream away into space to form a comet tail. The comet tail therefore points away from the sun at all times, hence the tail streams behind the head as the comet approaches the sun and the comet actually moves tail first as it recedes. The comet appears bright by reflecting sunlight and by the sun's ultra-violet light causing the gas in the comet to fluoresce in much the same way as the gas in domestic strip-lighting. At each return, comets lose a significant portion of their mass as gas and dust and, eventually, after many returns which may take millions of years, they fade and disintegrate completely. But the dusty material continues in orbit around the sun and is believed to be the main source of the particles which cause meteors or shooting stars, burning up in a brief flash as they enter the Earth's atmosphere at very high speed.

Comet Tago-Sato-Kosaka 1969g was first reported in late December by many ships in middle and southern latitudes. For instance, Mr. I. T. Whale, 2nd Officer, m.v. *Glenorchy* (Captain T. W. Willows), Trincomalee towards Las Palmas, sighted the comet with the naked eye on 21st December 1969 as a bright magnitude 2·8 hazy object 10° above the western horizon. A straight tail 8° long stretched upwards from the head. The photograph opposite this page shows the comet as recorded by M. P. Candy on 1st January 1970, using a 13-inch camera at the Perth Observatory, Western Australia. The brightest part of the head is perhaps $\frac{1}{3}$° across and is over-exposed to show the faint part of the tail. On the same evening, a report from the m.v. *Sugar Crystal* (Captain J. E. Leaver), Queensland towards Cape Town, indicates that the comet was then at about its brightest, magnitude 2·4, with a tail 10° long. The progress of the comet as it moved slowly across the sky and steadily faded was followed by many observers. By early February the object was just a diffuse patch of light at magnitude +6, just visible to the naked eye, with no tail. On 4th

(*Opposite page* 74)

Comet Tago-Sato-Kosaka 1969g on 1st January 1970 (*see* page 74)

(*Opposite page* 75)



Comet Bennett 1969i on 7th April 1970 (*see* page 74)

February, however, the comet suffered a fourfold increase in brightness, reaching magnitude 4·8 in less than three days. Such explosive increases in comet brightness are not uncommon in comets close to the sun and are probably caused by a solar flare or explosion on the sun's surface. The increased heat released by this flare strikes the frozen comet nucleus and causes large amounts of gas and dust to be released. After this outburst the comet faded steadily and was soon lost to naked-eye observers. It remained visible in small telescopes for several months more as it continued to move away from the sun and to fade. When you read this, the comet will have moved out beyond the orbit of the planet Jupiter and have just become invisible even on long-exposure photographs with the world's largest telescopes. Comet Tago-Sato-Kosaka turned out to be fainter than expected and never possessed a prominent tail. It was only seen to advantage from southern latitudes, having faded considerably by the time it became visible from the British Isles.

It was a different story, however, with the next bright comet of 1970, Comet Bennett 1969i. This comet was discovered as a faint diffuse patch of light, visible only using telescopes, in late December 1969. It, too, moved across southern skies at the beginning of 1970 and became visible to the naked eye as a faint patch at the beginning of February. On 15th February the comet was a magnitude +4 object with a short tail 1° long. Mr. G. E. Shearer and Mr. G. M. Railson (2nd Officers), m.v. *City of Eastbourne*, Mombasa towards Montreal, first sighted the comet on the morning of 12th March at 0200 GMT. The hazy comet head was about magnitude +2·5 and it had a straight tail 3° long stretching upwards. By now the comet was moving rapidly northwards in the sky, brightening and moving towards a fairly close approach to Earth. On 20th March the comet reached its full splendour. Mr. E. A. Owen (Chief Officer) and Mr. D. W. D. Small (3rd Officer) m.v. *Cyclops*, Cape Town, reported that on that date the comet was a brilliant magnitude −0·5 diffuse head about ½° across, with a beautifully curved tail nearly 16° long. In the next few days the comet became visible from the British Isles and the comet was photographed by Dr. H. R. Soper from his observatory in the Isle of Man on 7th April with a 6-inch camera (*see* photograph opposite this page). The comet was now a magnitude +1·3 object with a tail 9° long seen with the naked eye, although the tail could be traced for 14° on the photograph. In binoculars, the head had a brilliant star-like nucleus and the tail had two distinct branches—both visible on the photograph. The fainter left-hand one was caused by gas molecules, the brighter right-hand one by dust particles. The tail at this time was 5,000,000 miles long, and the head was 200,000 miles across. Despite this, estimates of the size of the comet nucleus—the only solid part of any comet—indicate a body perhaps 80 miles across. As April progressed the comet moved away from both the Earth and sun and faded steadily, but still remained a prominent naked-eye object. At the beginning of May the show was over, the comet being a diffuse magnitude +5 object with a short tail 1° long seen with the naked eye. Small telescopes were sufficient to follow the object into the summer as it continued to fade and, as you read this, the comet will be moving away from the sun between the orbits of Mars and Jupiter, but still visible as a faint patch on photographs taken with large telescopes.

Comet Bennett presented one of the finest and most easily observed cometary spectacles of this century, in many ways more impressive than Comet Arend-Roland in 1957, Comet Seki-Lines in 1962 and Comet Ikeya-Seki in 1966. The comet became brighter than expected and sported a fine curved tail reminiscent of those shown in engravings and woodcuts of great comets of the past. Accurate computations of the orbits of these two comets show them to be ellipses with periods of several centuries. They will return, but not for a long time.

With the western land masses becoming increasingly veiled in polluted air and bathed in artificial lights at night, the observer at sea, with dark unobscured skies, now has a decided advantage. Your observations of these two comets have been very valuable, not least being the fact that observations have come in from ships in varied latitudes. Observations from southern latitudes were particularly valuable—there are few observatories 'down under'. If other bright comets appear I hope that you will continue to make notes about them. Observations of the total brightness of the comet head compared with nearby stars and descriptions of any tail visible are particularly valuable.

Editor's Note. At the time of going to press, reports of the Bennett Comet had been received from the following 118 ships, either in their meteorological logbooks or in manuscript:

Amoria, Anadara, Anshun, Athelcrest, Baltistan, Bankura, Benarmin, Benarty, Bencleuch, Benlomond, Benmacdhui, Benvorlich, Border Castle, Border Shepherd, Brandon Priory, Bristol City, British Robin, Buccleuch;

Caledonia Star, Cape Howe, Cape Nelson, Cape York, Carmania, Ceramic, City of Chester, City of Eastbourne, Clan Macgregor, Clan Mactavish, Clytoneus, Colorado Star, Cotopaxi, Cotswold, Crystal Crown, Crystal Sapphire, Cyclops;

Devon City, Diomed, Discovery, Donegal, Dorcasia, Dorset, Dunadd, Eastern Ranger, Eastern Rover, Eastern Trader, Edenmore, English Star, Eucadia, Flintshire, Fremantle Star, Glenalmond, Glengarry;

Haparangi, Helenus, Hemifusus, Hobart Star, Huntingdon, Hupeh, Hurunui, Hyria, Imperial Star, Iron Barque, Jamaica Producer, Jason, John Biscoe, Juwara, Kohinur, Kohistan, Laurentic, Machaon, Manapouri, Manchester Concorde, Manchester Port, Mangla, Mataura, Melbourne Star, Moreton Bay, Nova Scotia;

Orcades, Orita, Otaki, Pando Cove, Pando Sound, Pando Strait, Pegu, Pembrokeshire, Perseus, Pipiriki, Port Adelaide, Port Brisbane, Port Burnie, Port Caroline, Port Launceston, Priam, Pyrrhus, Rakaia, Redcar, Regent Falcon, Rothesay Castle, Rievaulx, Ripon, Runswick;

St. Jasper, Sagamore, Saxonia, Shahristan, Silversand, Silvershore, Sugar Producer, Sunek, Sussex, Theseus, Tongariro, Trefusis, Tremeadow, Welsh City, Yochow, Zaphon.

Reports of the Tago-Sato-Kosaka Comet were received from the following ships:

Benattow, Clan Macleod, Dorcasia, English Star, Flintshire, Glengarry, Glenogle, Glenorchy, Kweichow, Orsova, Sugar Crystal, Theseus.

Waves on the South African East Coast

By J. M. A. J. W. Smit

(Port Meteorological Officer, Cape Town)

In *The Marine Observer* of October 1970 are further reports of unusual waves on the east coast of South Africa. It is wrong to think that these waves occur only on the 100-fathom line as some reports are from well on the continental shelf. Two factors appear to be common to all reports: the wind was moderate to strong south-westerly and the ship was travelling in the opposite direction. No report has been made of freak waves with a north-easterly wind from ships on a north-easterly course.

The author, a Master Mariner and Port Meteorological Officer, has asked several ships to keep their echo-sounders going along this coast and has received some support. However, owing to the lack of good fixes and not being in possession of the scale of the echo-sounder, it has not yet been possible to establish the cause of these waves. The oceanographic section of Cape Town University, with which the author works in conjunction, has drawn large-scale charts for the purpose; but ships which (according to their positions) were following the same track did not give the same information.

The m.v. *Tugela* on two occasions reported 85 fathoms well off the continental shelf in a position 31° 34·3′S, 29° 58·3′E. Both times this was recorded on the echo-sounder trace; but a research ship could not find the spot. The position must have been wrong.

The author's theory is that some obstacle must be causing this wave, such as a sea-mount or a canyon. Assume that the counter-current of the Mozambique drift is forced up a canyon; if the wind is north-easterly, or calm, this water would merge with the current. If, however, there is a strong south-westerly wind the sea will build up and a ship on a south-westerly course may well find a freak wave here (see Fig. 1). The same effect would occur with a sea-mount.

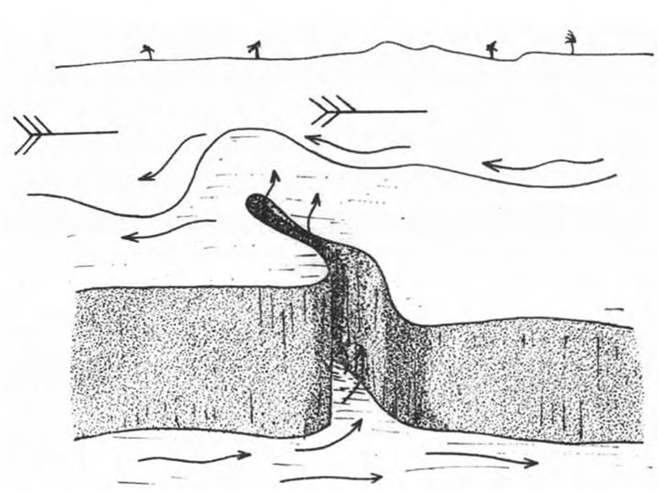


Fig. 1. Possible explanation of unusual waves above a submarine canyon.

Mariners wishing to help in unveiling the mystery of these freak waves could do so by taking regular soundings in the neighbourhood, accompanied by very accurate fixes, times and, if possible, sea-water temperatures. The trace on the echo-sounder must, on the first occasion, be accompanied by the scale and full particulars of the echo-sounder, i.e. make, type and Mark number. Fixes should be at intervals of no longer than 15 to 20 minutes and it would be helpful if methods of fixing could be described. Information should be sent to the Port Meteorological Officer, P.O. Box

4251, Cape Town. [If more convenient, the information can be entered in meteorological logbooks and will be forwarded from Bracknell.] It will then be forwarded to the oceanographic section of the University where it will be plotted.

A CENTURY OF VOLUNTARY OBSERVING—THE BRITISH INDIA LINE

Our annual illustrated feature concerning ships of one ownership covering a century of voluntary observing is continued opposite page 66 with three ships of the British India Line.

Our association with this company goes back to 7th August 1857 when we put our instruments aboard the s.s. *Australian*, Captain J. H. Wright, for a voyage to Calcutta. She appeared on our registers for a number of years after that, latterly as "trading in British India". In those early days, a century ago, we also had on our voluntary observing list the s.s. *Cashmere*, Captain J. F. Lewis, which was recruited for observing in 'East Indian Seas' in 1870 and the *Himalaya*, the subject of our first photograph. She was an iron-screw steamer, brig-rigged, of 912 tons, built by Pile's of West Hartlepool in 1867. The opening of the Suez Canal two years later saw many ships which had been employed on the Indian and Far Eastern runs going back to the builders for modernization, but the *Himalaya* was sufficiently up to date already to make this step unnecessary and it was not until 1876 that her turn came. She was then re-boilered, re-engined and refitted by Denny's of Dumbarton which brought her gross tonnage up to 1,427 and thereafter she served mostly on the Indian coast, being broken up in 1891. We first put our instruments aboard her on 31st May 1870.

The middle period, i.e. about 50 years ago, is represented by the *Mulbera*. She was a twin-screw turbine ship built in 1922 by Alexander Stephens & Son of Linthouse, of 9,100 gross tons and a service speed of 13 knots. She was originally built to carry 114 first-class passengers and 44 second-class passengers but was later converted to a one-class ship to carry 158 passengers. With the exception of the years of World War II she was on our voluntary observing list for the whole of her life until she went to the breakers in April 1954.

The present-day observing ships of the British India Line are represented by our third picture, the s.s. *Nardana*. She was built in 1956 by Barclay, Curle & Co. Ltd. of Glasgow and spent some years on the Australian Voluntary Observing List during part of which period she was running under the name *Baradine*. In 1968 she reverted to her original name and came over to the U.K. Voluntary Observing Fleet.

We take this opportunity of recording our thanks to the hundreds of Masters and Officers in the British India Line who have voluntarily given us so much valuable data over the years. Since we recruited the *Australian* back in 1857 we have seldom, if ever, been without at least one of their ships on our voluntary observing list; today there are ten B.I. ships on the U.K. Voluntary Observing List and eight on the Australian list, whilst a further six are observing for the India Meteorological Department.

L. B. P.

PRESENTATION OF BAROGRAPHS

The annual awards of barographs to four shipmasters in recognition of their long and zealous voluntary observing at sea were made at Bracknell on 2nd December 1970 by Dr. B. J. Mason, Director-General of the Meteorological Office.

The 1970 awards, to Captain R. G. Hollingdale and Captain J. S. Laidlaw of the New Zealand Shipping Co., Captain A. N. Williamson of the Bibby Line and

Captain L. W. Cady of the Port Line, were announced last October in *The Marine Observer*. Also present at the ceremony were Captain Paton, Marine Superintendent of the Port Line, and two representatives of the New Zealand Shipping Co., their Assistant Marine Superintendent, Captain Davies, and Mr. Halliday of the Management. We were also pleased to welcome Mrs. Hollingdale, Mrs. Williamson and Mrs. Wright, sister of Captain Cady.

In making the presentations Dr. Mason mentioned that it was a red-letter day as far as this ceremony was concerned because it was only the second time in the 23 years that barographs had been awarded that we had been able to get all four recipients together in one place at the one time. Moreover, the three shipping companies represented there had all been observing for us for well over a century.

Captain Cady, who had 19 years of voluntary observing behind him, came from the Port Line whose observing record went right back to 1854; Captain Hollingdale and Captain Laidlaw, both with 19 years' voluntary observing, came from the New Zealand Shipping Co. whose ships first came into the Voluntary Observing Fleet in 1855; Captain Williamson, with 22 years' service, came from the Bibby Line whose first observing ship also joined us in 1855.

Dr. Mason touched briefly on the present achievements of the Meteorological Office and its future hopes but emphasized that in spite of the help given by meteorological satellites and bigger and faster computers, the basic requirement of the Meteorological Office was still a surface observation and, over three-quarters of the world's surface, that could only be provided by a ship. There was at present no substitute, nor in the foreseeable future.

After lunch with the Director-General and senior officers of the Meteorological Office the visitors were shown some of the work of the Office.

A photograph taken at the presentation is opposite page 67.

L. B. P.

NOTES ON ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM OCTOBER TO DECEMBER 1970

October

High pressure prevailed over and to the west of Greenland, resulting in light and variable winds over these areas, while low pressure occurred over the Norwegian Sea, maintaining cold northerly winds over the Greenland Sea where excessive ice conditions persisted. Late in the month the low pressure area moved east into the Kara Sea and, as a consequence, cold north-easterly winds established excessive ice conditions over the Barents Sea for the first time since February 1970. The ice limits at the end of the month are shown on the map on page 82.

Canadian Arctic Archipelago. Further freezing in the south resulted in the whole area being covered by close pack-ice, as normal, at the end of the month.

Foxe Basin, Hudson Bay and Strait. Light winds, mainly from the south-west quadrant, prevailed over these areas and air temperatures were up to 6 degc above normal at the end of the month. The formation of new ice in these areas was thus considerably delayed.

Baffin Bay and Davis Strait. Though air temperatures were above average in Baffin Bay the ice situation there was near normal, largely due to the area of pack-ice which had survived through the summer melting season. In the Davis Strait, as a result of the north-westerly winds, air temperatures fell to around 1 degc below normal and the edge of open pack-ice was a little further south than normal.

Greenland Sea. Moderate to strong northerly winds prevailed, especially in the north where air temperatures fell to around 2 degc below normal. At the end of the month the edge of close pack-ice was about 50 miles south-east of normal between 75°N and 80°N, but between 70°N and 75°N the edge was close to its normal position.

On the eastern side of the Denmark Strait strong northerly winds became established late in the month and the edge of close pack-ice advanced to within 50 miles of Straumnes, almost 50 miles south-east of its normal position.

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

(This does not include growlers or radar echoes)

Limits of Latitude and Longitude		Degrees North and West												
		66	64	62	60	58	56	54	52	50	48	46	44	42
Number of bergs reported south of limit	Oct.	12	12	12	12	12	11	8	5	0	0	0	0	0
	Nov.	5	5	5	3	3	1	1	1	1	0	0	0	0
	Dec.	>4	>2	1	0	0	0	0	0	0	0	0	0	0
	Total	>21	>19	18	15	15	12	9	6	1	0	0	0	0
Number of bergs reported east of limit	Oct.	12	12	12	12	12	12	7	3	1	1	1	1	0
	Nov.	5	5	5	5	5	5	5	4	4	2	2	2	1
	Dec.	>4	>4	>4	>4	>4	>4	>4	1	1	1	1	0	0
	Total	>21	>21	>21	>21	>21	>21	>16	8	6	4	4	3	1
Extreme southern limit	Oct.	51° 48′N, 55° 18′W on 21.10.70												
	Nov.	49° 48′N, 53° 50′W on 1.11.70												
	Dec.	60° 12′N, 45° 06′W on 24.12.70												
Extreme eastern limit	Oct.	56° 20′N, 43° 15′W on 29.10.70												
	Nov.	56° 20′N, 40° 30′W on 22.11.70												
	Dec.	60° 12′N, 45° 06′W on 24.12.70												

> ('greater than') has been inserted where there is some doubt as to the actual number of icebergs at some of the sightings, but the true value is probably greater than the value given.

Extreme limits during the 3-month period are underlined.

Barents Sea. A marked change occurred in this area during the month. Relatively warm southerly winds were replaced by cold winds from the north-east and air temperatures fell from around 2 degC above to around 3 degC below normal. Under the influence of the north-easterly winds the edge of close pack-ice advanced to about 50 miles south of its normal position thus terminating a period of ice deficit which had persisted for over seven months. In the south-eastern corner of the Barents Sea a little new ice had formed as normal.

White Sea and Baltic. New freezing began in both areas during the month. In the White Sea near-normal amounts of new ice formed in the western part, but the formation of new ice at the head of the Gulf of Bothnia occurred about two weeks ahead of normal.

November

Low pressure occurred over Baffin Island and in a belt from south of Iceland to the Kara Sea, while pressure remained unusually high over Greenland. The resultant winds were strong north-easterly over the Greenland and north Barents Seas where excessive ice conditions persisted for most of the month.

Canadian Arctic Archipelago and Foxe Basin. These areas remained covered by ice, as normal.

Hudson Bay and Strait. The ice situation here was near normal, with the northern half of the Bay and almost all of the Strait covered by close pack-ice.

Baffin Bay, Davis Strait and Labrador Sea. At the end of the month the edge of close pack-ice lay from Upernavik north-west to 58°W, thence south to 65°N and later south-west to Cape Chidley. Some new ice formed on the Labrador coast from this Cape to Hamilton Inlet. On the eastern side of Baffin Bay new ice had formed along the coast between Upernavik and Disko Bay. In the Davis Strait and Labrador Sea, where air and sea temperatures were close to average, the ice situation was near normal but in the north air temperatures were around 3 degC above average and there was less ice than normal. The areas to the south of the Labrador Sea remained ice-free as normal.

Greenland Sea and South-east Greenland. Moderate to strong, mainly north-easterly winds prevailed over these areas resulting in air temperatures around 3 degC below normal except around Jan Mayen where a positive anomaly of 1 degC occurred; sea temperatures in the Denmark Strait were around 2 degC below normal. The edge of close pack-ice lay from the north-west corner of Vestspitsbergen south-west to 69°N, 18°W, then rippled west-south-west to 65°N, 38°W, restricting the navigable width of the Denmark Strait to 40 miles, before turning south-south-west to join the coast near Tingmiarmiut Fjord. In the far north ice conditions were slightly excessive; to the north of Iceland the edge was about 120 miles south-east of normal and off south-east Greenland there was also an excess.

Barents Sea. Cold north-easterly winds prevailed for most of the month but were replaced latterly by winds from a southerly point. Air temperatures fell to around 3 degC below normal in the north but recovered to around 2 degC above normal in the south where sea temperatures remained about 1 degC above normal. At the end of the month the edge of close pack-ice plunged southward to 75°N between Sørkapp in Vestspitsbergen and 25°E before recovering to 76½°N at 28°E. From this point it continued east along 76½°N, plunging southward to 75½°N at about 50°E, where it turned east-north-east to round the northern extremity of Novaya Zemlya and finally closed the coast near Mys Sporyy Navalok. Some fast ice had formed in fjords on the west coast of Novaya Zemlya, northward of Proliv Matochkin; new ice and very open pack-ice were reported on coasts southward and later westward of these straits to Cheshkaya Guba. In the north the edge was close to normal at the end of the month, though it had been well south of normal for the greater part of the month. In the south the situation was near normal.

White Sea and Baltic. Once again cold northerly winds were replaced by strong southerly winds late in the month and air temperatures recovered from as much as 6 degC below normal to around 2 degC above. Close pack-ice covered the south-western half of the White Sea and new ice was forming over the remainder, a slightly excessive condition. In the Gulf of Bothnia a thin belt of fast-ice enclosed coasts north of 65°N, with new ice forming on coasts north of 62°N. Ice conditions in the Gulf were slightly excessive. Further south some new ice was forming in the waterways around Stockholm, otherwise the Baltic Sea, as normal, was ice-free.

DECEMBER

High pressure persisted over Greenland while the main low pressure activity was confined to the extreme north-west Atlantic and the Barents Sea. As a result of this pattern strong northerly winds prevailed over the Greenland Sea where the main ice excess was further increased.

Canadian Arctic Archipelago, Foxe Basin, Baffin Bay, Hudson Bay, and Strait. All areas were covered by close pack-ice or fast-ice as usual.

Davis Strait and Labrador Sea. At the end of the month the edge of close pack-ice lay from Disko southwards to Holsteinsborg (new ice covered Disko Bay) then south-westwards to 61°N, 62°W where it recurved to run parallel with the coast and finally closed it near Battle Harbour. Open or very open pack-ice and, in the south, some new ice formed a 50-mile-wide belt on the seaward side of this edge. On the eastern side of the Strait a belt of very open pack-ice had rounded Cape Farewell and extended to 47°W. In all these areas the ice situation was near normal.

South Newfoundland, River and Gulf of St. Lawrence. Northerly winds prevailed for most of the month, resulting in air temperatures about 3 degC below normal though sea temperatures remained about 2 degC above average. New ice extending from the Labrador Sea ice area, covered the Strait of Belle Isle. Some sheltered locations on the Quebec coast were also affected by new ice. The Northumberland Strait was covered by close pack-ice and new ice while the river was covered by close pack-ice and new ice down to Baie Comeau. Ice, of unspecified type, was reported in White Bear Bay on the south coast of Newfoundland. There was more ice than normal over the whole area.

Greenland Sea and South-east Greenland. Due to strong northerly winds over the area north of 70°N, air temperatures remained several degrees below normal. Further south winds were more variable and air temperatures were near or a little above normal, though sea temperatures remained 1 or 2 degC below average. The edge of close pack-ice lay from north-west Spitsbergen south-west and later south-south-westwards to the head of the 'North Bay' at 75°N, 4°W where it temporarily recurved to run eastwards before again recurving through 74°N, 1°W to run south-westwards through the Denmark Strait, passing within 40 miles of Straumnes. On clearing the Strait the edge ran west-south-west and later south-south-westwards to meet the coast a few miles north of Cape Farewell. An area of mainly very open pack-ice continued south-westward to round the cape (see *Davis Strait*). The main ice excess occurred north of 70°N where the edge was as much as 150 miles south-east of normal; in the Denmark Strait it was 50 miles south-east of normal while off south-east Greenland ice conditions were near normal.

Barents Sea. Cyclonic activity, mainly in the south of the area, resulted in cold winds from an easterly point and air temperatures fell to around 5 degC below average in the north where the ice edge was generally 30 miles south of normal. In the west the winds were more northerly and the ice edge advanced to about 120 miles south of normal near Bear Island. In the south

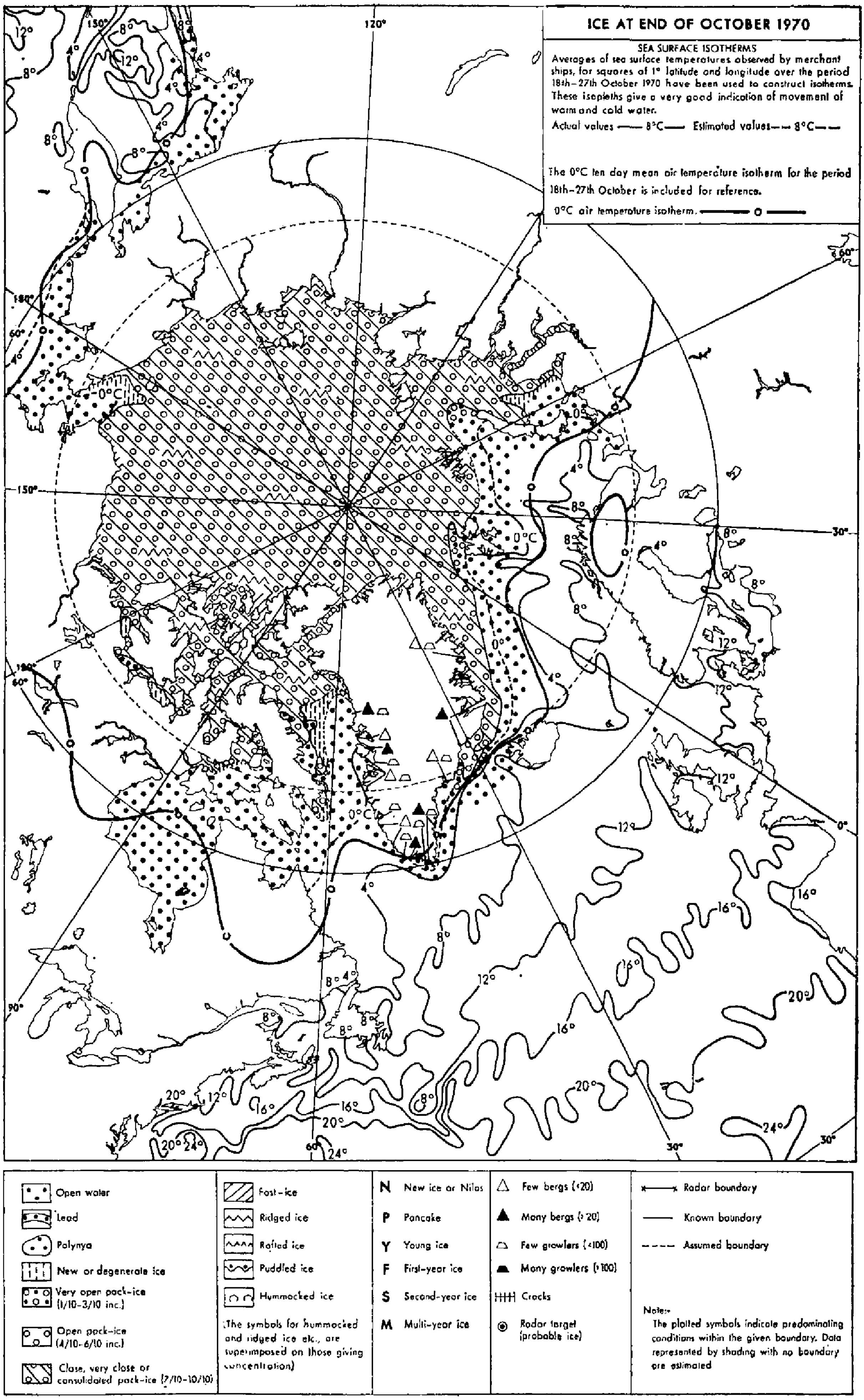

ICE AT END OF OCTOBER 1970
SEA SURFACE ISOTHERMS
Averages of sea surface temperatures observed by merchant ships, for squares of 1° latitude and longitude over the period 18th–27th October 1970 have been used to construct isotherms. These isopleths give a very good indication of movement of warm and cold water.
Actual values —— 8°C —— Estimated values — — 8°C — —
The 0°C ten day mean air temperature isotherm for the period 18th–27th October is included for reference.
0°C air temperature isotherm. —— O ——
Open water
Lead
Polynya
New or degenerate ice
Very open pack-ice (1/10–3/10 inc.)
Open pack-ice (4/10–6/10 inc.)
Close, very close or consolidated pack-ice (7/10–10/10)
Fast-ice
Ridged ice
Rafted ice
Puddled ice
Hummocked ice
(The symbols for hummocked and ridged ice etc., are superimposed on those giving concentration)
N New ice or Nilas
P Pancake
Y Young ice
F First-year ice
S Second-year ice
M Multi-year ice
Few bergs (<20)
Many bergs (>20)
Few growlers (<100)
Many growlers (>100)
Cracks
Radar target (probable ice)
Radar boundary
Known boundary
Assumed boundary
Note:-
The plotted symbols indicate predominating conditions within the given boundary. Data represented by shading with no boundary are estimated

Table 2. Baltic Ice Summary: October–December 1970

No ice was reported at the following stations during the period: Ventspils, Tallin, Mariehamn, W. Norrskar Mantyluoto, Kalmar, Göteborg, Visby, Tönning, Husum, Emden, Lübeck, Gluckstadt, Bremerhaven, Kiel, Flensburg, Stettin, Gdansk, Aarhus, Copenhagen, Oslo, Kristiansandfjord.
No ice was reported at any of the stations during October

Station	November									December								
	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Leningrad ..	9	30	11	1	1	10	0	0	34	1	31	31	25	5	25	6	0	52
Riga ..	0	0	0	0	0	0	0	0	7	24	31	7	0	0	0	0	0	91
Pyarnu ..	0	0	0	0	0	0	0	0	7	22	31	4	4	0	0	4	0	98
Viborg ..	9	30	4	4	0	3	0	0	—	1	31	31	31	0	16	14	0	—
Klaipeda ..	0	0	0	0	0	0	0	0	—	26	28	3	0	0	0	0	0	—
Helsinki ..	0	0	0	0	0	0	0	0	24	25	31	7	0	0	6	0	0	101
Turku ..	0	0	0	0	0	0	0	0	30	25	31	6	0	0	0	0	0	89
Vaasa ..	16	30	3	0	0	2	0	0	101	1	31	31	23	0	21	9	0	190
Oulu ..	10	30	21	21	0	7	14	0	169	1	31	31	31	0	0	31	0	313
Roytaa ..	16	30	8	0	0	8	0	0	—	4	31	24	5	11	4	19	0	—
Lulea ..	9	30	22	22	0	22	0	0	215	1	31	31	31	0	25	6	0	386
Bredskar ..	0	0	0	0	0	0	0	0	—	25	27	3	0	0	3	0	0	—
Alnosund ..	0	0	0	0	0	0	0	0	37	17	31	15	0	0	3	0	0	115
Stockholm ..	0	0	0	0	0	0	0	0	8	25	31	6	0	0	4	0	0	60
Skellefteå ..	20	25	0	0	0	6	0	0	—	1	31	9	0	0	10	0	0	—

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

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

milder winds from a westerly point prevailed, resulting in air temperatures about 2 degC above average; here there was rather less ice than normal. At the end of the month the edge of close pack-ice lay from 77½°N on the west coast of Spitsbergen south-south-eastwards to 74°N, 18°E where it turned and meandered eastwards to meet the coast of Novaya Zemlya near Mys Litke. In the south-east very open and open pack-ice with some fast-ice enclosed the coast eastward from Cheshskaya Guba extending across Proliv Karskiye Vorota to within a few miles of Mys Chernyy on the south coast of Novaya Zemlya. Fjords on the west coast of that island continued to be affected by fast-ice.

White Sea and Baltic. Moderate to strong winds from a westerly point prevailed over these areas, resulting in air temperatures up to 2 degC above normal north of 60°N, though temperatures fell to around 2 degC below average in the Gulf of Finland and the Baltic Sea. Close pack-ice covered the south-western half of the White Sea with new ice affecting the remainder. The Gorlo was also covered by new ice which extended eastwards and northwards along the west coast of Poluostrov Kanin. Fast-ice and new ice affected most coastal areas of the Gulf of Bothnia and a belt of close pack-ice enclosed the coast at the head of the Gulf northward of about 64°N. New ice and fast-ice were also reported along the northern shores and at the head of the Gulf of Finland, at a few places in the Gulf of Riga, around the Stockholm Skerries and southward along the coast of Sweden to Norrköping. Over the Gulf of Finland there was a slight excess but in other areas the ice situation was near normal.

R. M. S.

Note. The notes in this article are based on information plotted on ice charts similar to the map shown opposite but on a much larger scale (39 in × 27 in). These charts are published at ten-day intervals and are available at the price of reproduction on application to the Director-General, Meteorological Office (Met.O.10a, D.W.R.), London Road, Bracknell, Berks. Alternatively, they may be seen at any Port Meteorological Office or Merchant Navy Agency. Up-to-date ice charts are broadcast daily by facsimile.

Book Reviews

Seamanship, by Duncan Macrae Anderson, Master Mariner. 8½ in × 5½ in, pp. 475, *illus.* The Shipping and Trading Co. Ltd., 16 Rochester Terrace, Leeds LS6 3DF, 1970. Price: £2·75.

The title of this book is somewhat misleading as the 26 chapters contain such a variety of subjects. One reads nearly half-way through the book before eventually coming to matters that could generally be considered as seamanship. A knowledge of elementary science is invaluable to the modern sailor and the author has wisely devoted the first few chapters to this, and then progressed into ship stability, sea waves, rolling and motion in a sea-way. Information on ship design and marine engineering is also included and although a knowledge of these subjects is useful they cannot be accepted as seamanship.

The author has undertaken a vast task in including such a variety of subjects but obviously to achieve this some explanations are brief and diagrams a little too simple. In several cases facts are stated without any explanation yet when dealing with such subjects as ship and propeller design lengthy scientific descriptions have been given. Matters of historic interest, stability of submarines and African elephant poachers also appear and are rather irrelevant and occupy too much space in a book which is trying to cover practically everything apart from a galley sink.

When studying seamanship one must not believe all that is written in seamanship books and this volume is no exception though the information it contains is more reliable than that given in many other books. A more realistic approach to some of the modern problems that confront seamen in large ships and descriptions and properties of new materials found in modern vessels could have been a valuable contribution to this new and interesting seamanship book.

G. A. W.

Ceaseless Vigil, by W. J. Lewis, B.E.M. 8¾ in × 5¾ in, pp. 128, *illus.* George C. Harrap & Co. Ltd., 182–184 High Holborn, London, W.C.1, 1970. Price: £1·30.

The loom of the Bishop Rock light is a welcome landfall from the Southwest Approaches. *Ceaseless Vigil* is the story of the keeper of the Bishop's and several other lights, not only around these shores but also in the Falkland Islands. It is a tale of high adventure and routine watch-keeping, of intense drama and depressing loneliness but, most of all, it is a revealing account of devotion to the safety of shipping.

The story is built around the framework of the author's career as a lighthouse keeper. Into this structure graphic descriptions are interwoven of lighthouses and their equipment, of life 'aboard' and its routine, of his fellows and their abilities, and, perhaps most interesting of all, of the hobbies he has pursued so diligently, notably the study of marine and bird life; it is clear that Mr. Lewis has become an experienced naturalist.

The style is simple and easy and, though the several line drawings are good, a few photographs may well have been included for lighthouses are so photogenic. This book is recommended particularly to the mariner who may well wonder just what manner of man keeps the Bishop's light.

R. M. S.

Personalities

RETIREMENT.—MR. W. W. BEEBEE retired last December after 34 years as a radio officer, his last ship being the *Glenfalloch*.

Walter Willis Beebee was born on Christmas Day 1910 at Urmston in Cheshire.

He obtained the Postmaster-General's Marine Wireless Certificate in 1936 and joined the Blue Funnel Line's passenger ship *Sarpedon* on the Far East run; he remained with the same company throughout his career.

During World War II, when he was in the *Tantalus*, the ship narrowly escaped an engagement with the German raider *Atlantis* in the South Indian Ocean, the Admiralty coded warning being received just in time; but, later in the year, on 26th December 1941, whilst she was off the Bataan coast, Manila, she was sunk by Japanese bombers. Taking to the boats, Beebee and others landed near Corregidor but a few days later they were captured by the Japanese and spent the next three years as their prisoners in southern Luzon.

They were ultimately rescued in February 1945 in a daring raid behind the Japanese lines made by United States ground forces, paratroopers and Filipino guerrillas, using amphibious tanks. All were evacuated, including the raiding party, after, as Mr. Beebee says, "our Jap garrison was disposed of". They got back through the Japanese lines and then crossed Lagonoy Bay to the north shore which was in American hands. Mr. Beebee arrived back in the U.K. in July 1945 after an absence of four years.

Personal records of radio officers in the Voluntary Observing Fleet were not started until after World War II and the first note we have of Mr. Beebee's work for us was when he was in the *Ixion* in 1956. But, for some years before that, the ship had been observing more locally for the South African Weather Bureau, reporting to Pretoria from the Equator southwards to Cape Town and then eastwards on the run towards Australia. She was one of the first ships to work Amsterdam Island, a station which subsequently proved so useful to ships running their easting down to Australia.

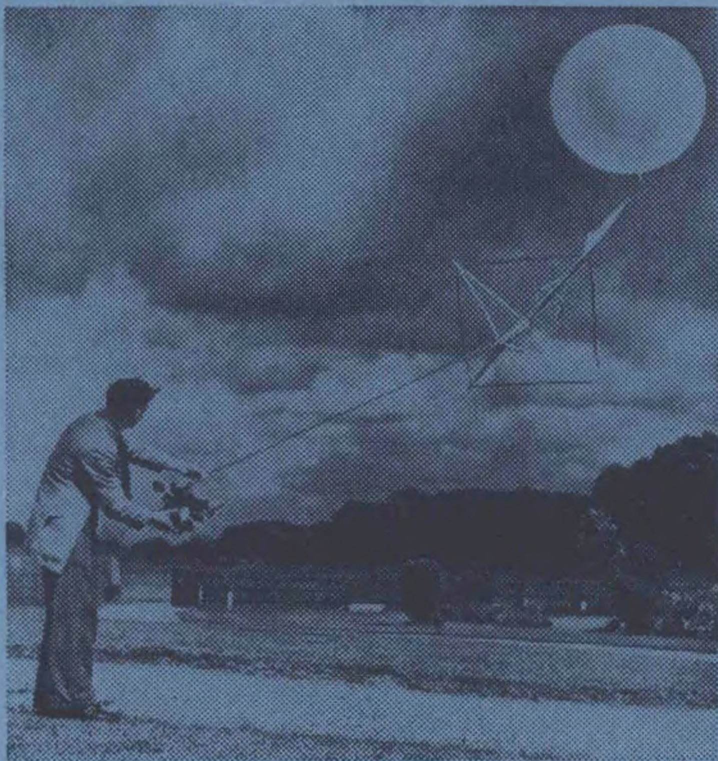
Since he came on the U.K. voluntary observing list in 1956 we have had one or more meteorological logbooks from Mr. Beebee in every year except 1964 and during his time with us he has had five Excellent Awards.

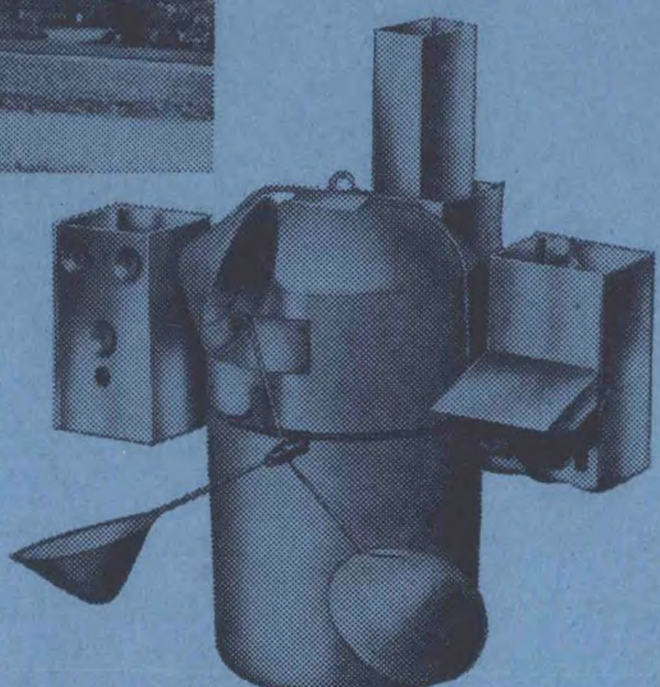
We wish him health and happiness in his retirement in the West Country.

L. B. P.

Printed in England for Her Majesty's Stationery Office by
William Clowes and Sons Ltd., London, Beccles and Colchester

Dd. 500146. K. 17. 4/71



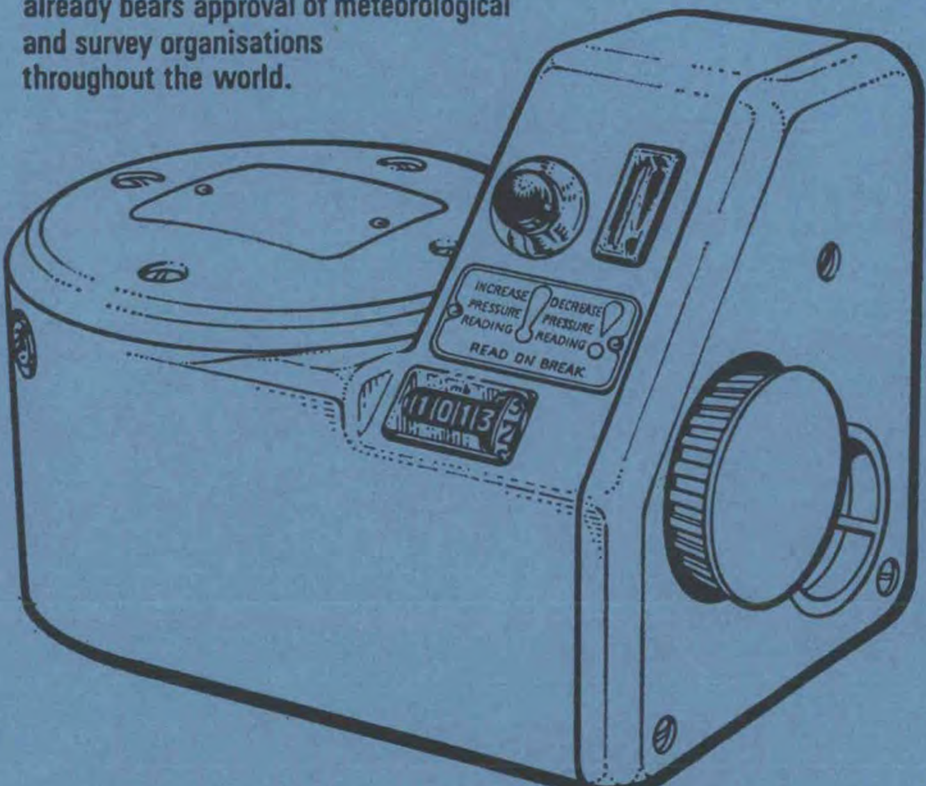


determine

BAROMETRIC PRESSURE

- **PRECISELY ± 0·3 mb at 20°C**
- **RAPIDLY digital readout**

This portable precision aneroid barometer already bears approval of meteorological and survey organisations throughout the world.



NEGRETTI & ZAMBRA ‹AVIATION› LTD.

73-77 LANSDOWNE ROAD · CROYDON · CR9 2HP · ENGLAND

Telephone Nos: 01-688-3426/9 Cable Address: NEGRETTI - Croydon Telex No: 267706

SBN 11 400156 1