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prepared by the Marine Division of the
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M.O. 638 AIR MINISTRY

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VOL. XXVIII **No. 182** **OCTOBER, 1958**

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Editorial

The Ministry of Transport recently issued a notice to shipowners and masters drawing attention to the dangers that arise from stowing cargoes of iron and steel insecurely, and quotes seven mishaps to vessels which have occurred in heavy weather due to faulty stowage of such cargoes. The notice rightly says, ' The quantity . . . in tween decks . . . should be the smallest necessary to prevent the ship from being unduly stiff since if cargo shifts a ship will be safer if she has a reasonably large metacentric height ".

Obviously if there were no heavy weather and no waves there would be no danger, apart from insufficient stability, of such cargo shifting.

From time to time in this journal, reference has been made to the fact that no matter how much the improvement in the design, machinery and navigational equipment of ships, the weather continues to play a large part in their safety, as well as in their economical operation, and almost inevitably there comes some time in the career of the master mariner when he is called upon to use his seamanship because of some meteorological phenomenon.

Lloyd's List of 29th March provides a good illustration of this fact when it quotes 16 relatively serious marine casualties directly due to bad weather in various parts of the world, out of a total of 57 casualties quoted from all causes. Many of the other casualties were due to vessels striking against the quay, so it seems probable that some of these were partly due to the wind.

Fortunately, the total loss of a modern ship directly due to weather conditions is rare; the most spectacular case of recent years is probably that of the *Princess Victoria* in the Irish Sea on 31st January, 1953. Another more recent case concerned the disappearance with all hands of the 7,000 ton cargo ship *Nordicstar* in heavy weather in the North Atlantic between 27th December, 1956 and 3rd January, 1957. There remain, however, the indirect weather effects, as when a total loss occurs due to a collision in fog. Another example where very heavy damage and possibly a total loss may still occur nowadays is when navigating in ice, and this danger, which used to predominate in Arctic or Greenland waters (see Captain Judge's article on page 206) and in the Baltic, has now extended in a rather spectacular manner to the Antarctic. The film concerning the loss of the *Titanic* recalls the iceberg danger that existed in the Atlantic prior to the introduction of the North Atlantic Ice Patrol in 1912. Even if the weather casualties these days do not often comprise the loss of the ship, they inevitably involve large sums of money for repairs, and there is often the damage to cargo directly due to the bad weather, or the indirect expense to the underwriter or perhaps to the shipowner due to the cargo being delayed. Whether such costs are covered by insurance or not, somebody has to pay.

In many cases there is little that a shipmaster can do to prevent his ship getting involved in heavy weather, and there is nothing the meteorologist can do to the weather—as yet! Attempts have been made to control the weather, e.g. by the " seeding " of clouds to induce rain, but so far with little success. The various weather services of the world, however, do their best to assist the shipmaster by the issue of special bulletins and forecasts by radio (usually in English). These are often supplemented by information sufficient for a simple weather map to be made aboard the ship. On page 228 reference is made to a new forecast code which has been introduced for international use by those meteorological services which cannot issue forecasts in English as well as in their national language. In some cases it is possible for the master of a ship, on receipt of an unfavourable weather bulletin, to perform a little " meterological navigation " and alter course or speed to avoid the worst of the approaching weather. Alternatively, he will take seamanlike precautions aboard his ship so that when the bad weather is encountered the ship is fully prepared to weather the storm. Experiments are being made by certain government-owned United States ships to adopt " meteorological navigation " in quite a big way. Some interesting trials have been carried out whereby one ship sailed across the North Atlantic on a conventional great circle, while at the same time a sister ship followed a different route the choice of which was governed by meteorological considerations, the results being compared and carefully analysed at the end of the voyage. Papers on this subject were read at the Conference of the Commission for Maritime Meteorology in 1956; the final text of these has not yet been made available, but when they are it is hoped to publish at least some extracts from them in this journal.

In order to provide weather bulletins for shipping, all the meteorological services concerned need a constant supply of radio weather messages from shipping distributed as widely as possible. As explained in the article on page 204, this is necessarily a continuous process and the same procedure applies in all oceans. It is no exaggeration to say that the ships' officers who consistently and conscientiously record meterological observations, and send them by radio throughout their voyages, do a very useful service to shipping as well as to the general community of all countries. The Selected and Supplementary ships form the backbone of this service from the oceans. Auxiliary observing ships also perform an extremely valuable service by filling in the blanks, particularly in areas where shipping is sparse; in such an area it may well be that reports from Auxiliary ships are the only ones available. Observing officers aboard British ships are justly proud of their voluntary international work, the value of which is recognized by the long-service award of barographs referred to on page 218 of this number, and by the Excellent Awards which are issued to a proportion of our voluntary observers each year (see the July 1958 number).

MARINE SUPERINTENDENT.

THE MARINE OBSERVERS' LOG

October, November, December

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.

CONFUSED SWELLS

South African Waters

S.S. *Tasmania Star*. Captain G. C. Goudie. Cape Town to Adelaide. Observer, Mr. P. G. Entwistle, 3rd Officer.

10th October, 1957. About 0800 S.M.T. in position 35° 23′S., 23° 15′E., a short, steep NE'ly swell became gradually superimposed upon the existing long, heavy SW'ly swell, causing a confused sea. The sea appeared to heap up and although there was little wind (force 2 to 3), wave tops would occasionally break and the crests fly off as spray. Between 1530 and 1610, between positions 35° 27′S., 25° 39′E. and 35° 27′S., 25° 53′E. the sea became even more confused and many crests were seen breaking. From 1634 to 1824, between positions 35° 27′S., 25° 59′E. and 35° 26′S., 26° 36′E., the sea was exceptionally confused, with breaking crests everywhere. It resembled a violent tide-rip or breakers on a shoal (no soundings obtained on echo sounder) and the vessel acquired a short jerky motion. The division between the confused and very confused water was clearly defined. By 2100, in position 35° 25′S., 27° 20′E., a NE'ly swell only was noticed and the confused seas had disappeared.

FALL OF SEA TEMPERATURE

Off Cape Verde

M.V. *Barrister*. Captain D. Wolstenholme. Walvis Bay to Liverpool. Observer, Mr. J. L. Beaton, 3rd Officer.

18th October, 1957. At 1045 G.M.T., with Cape Verde bearing 090° at 6 miles, discoloration was noticed in the sea surface, together with extensive tide slicks. The sea temperature by condenser intake, which had previously been 80°F, fell suddenly to 68°. At this time, the sea was dark olive green in colour, with streaks of frothing scum, and there was no evidence of any marine life. At 1145 the sea temperature had risen to 80° again by condenser intake, and to 79° by surface bucket. Normal coloration of the sea returned and all signs of the slicks had disappeared. Air temp. 79°F. Wind NE'N., force 3. Rippled sea, no swell.

Position of ship at 1045: 14° 47′N., 17° 40′W.

Note. There was probably some local upwelling of subsurface water which produced the temporary fall of sea temperature. Upwelling of cooler water occurs along part of the north-western coast of Africa throughout the year, as a result of the removal of surface water produced by the blowing of the NE. trade wind over the coastline. This occurs mainly farther north than Cape Verde and in October is most marked in approximately 20°N. to 22°N.

DISCOLOURED WATER

South Atlantic Ocean

M.V. *Dartmoor*, Captain F. Bradfield. Bremerhaven to Port Elizabeth. Observers, Mr. D. Nicholas, 2nd Officer and Mr. E. D. Somes, 3rd Officer.

20th and 21st November, 1957. At 1000 S.M.T. on each day the vessel passed through seven long, rust-coloured streaks, about 1 ft below the surface. Each streak was about 4 ft wide and seemed to be of no great depth. They lay at an angle of 15° to the wind and extended for about a mile: the width was ¼ mile approximately. Some of the substance was brought to the surface by the vessel's bow wave, but the only result noticed was that the foam became faintly tinted. No solid particles were seen.

Positions of ship at 1000 S.M.T.: 17° 24′S., 03° 25′E. and 21° 21′S., 06° 34′E.

Note. Dr. T. J. Hart, of the National Institute of Oceanography, comments:

"Both these observations sound like *trichodesmium* blooms from the South Atlantic. The positions given are too far off the African coast to be directly influenced by the Benguela coastal current. Farther inshore *dinoflagellate* blooms would also have been a possibility."

M.V. *Deseado*. Captain G. S. Grant, R.D. Esbjerg to River Plate. Observer, Mr. P. V. Hunter, 3rd Officer.

15th December, 1957. At 1500 G.M.T., a discoloration of the sea surface was observed, taking the form of long reddish-brown streaks, in an otherwise clear sea. The streaks lay in the direction of the wind and extended for about 3 miles. The charted depth was 2,319 fm.

Position of ship: 16° 12′S., 37° 14′W.

16th December. At 1300 G.M.T. a marked discoloration of the sea surface was seen today also. It took the form of elongated brown and green bands giving off an unpleasant odour. The green streaks resembled a thick scum lying on the sea, while the brown streaks seemed to be below the surface. The area of discoloration was about 2 miles long by ½ mile in width.

Position of ship: 20° 48′S., 39° 31′W.

Note. Dr. T. J. Hart of the National Institute of Oceanography comments as follows:

" Both of these observations sound like *trichodesmium* blooms to me; the second, more southerly one, almost certainly so. Different overall colour effect by organisms of the same kind, but massed at different levels in the water, is a frequent feature of these phenomena. Of the many different algae that may give rise to them, *trichodesmium* is by far the most likely to form scum at the surface, away from the coast. Of course, one can never be quite sure without samples."

South Pacific Ocean

M.V. *Rangitane*. Captain R. G. Rees. Balboa to Wellington. Observers, Mr. J. Withington, 3rd Officer and Mr. J. Thomson, Supplementary 3rd Officer.

1st November, 1957. At 0015 G.M.T. the vessel entered patches of discoloured water, which looked as if it had large quantities of blood suspended in it. A noticeable feature was the great number of small birds which were present. At 0040 the vessel left the area. Air temp. 58°F, sea 57·5°.

Position of ship: 41° 28½′S., 179° 48′W.

Note. Dr. T. J. Hart, of the National Institute of Oceanography, comments:

" *Rangitane's* areas of red water east of North Island, New Zealand sound like *ciliates* or small *dinoflagellates* in bloom forming concentration, unusually far from land. The small birds in quantity suggest that it could even have been due to shoals of the so-called New Zealand whale feed. These rather large shrimp-like lobster krill do cause the visual effect of a red patch when shoaling some distance below the surface, as I have seen for myself in Cockburn Channel."

RADIO FADE-OUT

North Atlantic Ocean

M.V. *Fresno City*. Captain J. M. Cox. Sunderland to Baton Rouge (U.S.A.). Observer, Mr. G. T. Walker, Radio Officer.

20th October, 1957. Between 1630 and 1730 G.M.T. a complete fade-out of radio signals was experienced on all frequencies between 8 mc/s and 22 mc/s. About 1715, reception returned to normal on the 17–22 mc/s range—but on the 8–12 mc/s range, signals having a normal QSA of 5 were being received at QSA of ½, this being most noticeable on the two American coastal stations WCC and WSL. It was found at 2000 that conditions had returned to normal in all ranges. Sunspots were seen that day on the right hand lower limb of the sun's disc.

Position of ship: 29° 12′N., 61° 06′W.

Note. Mr. G. O. Evans, of the Post Office Engineering Department, comments as follows:

"A radio fade-out similar to that experienced by the *Fresno City* between 1630 and 1730 G.M.T. on 20th October, 1957, was also reported by receiving stations in the U.K. on circuits incoming from North America. This fade-out was caused by the solar flare associated with a large sunspot which was visible between 10th and 23rd October with an area of 2,200 millionths. This sunspot is one of the largest observed during the present sunspot cycle.

THUNDERSTORM

Persian Gulf

S.S. *Velletia*. Captain A. G. E. Short, O.B.E. La Spezia to Mena-Al-Ahmadi. Observers, the Master, Mr. J. Russell, Chief Officer, Mr. I. Ross, 2nd Officer and Mr. E. Lowth, 3rd Officer.

28th November, 1957. At 2100 G.M.T. vessel in position 28° 12′N., 50° 07′E., steaming at 15 kt on a course of 306°. The wind was from 140°, 25 kt, sea moderate and sky overcast, with continuous lightning in a 300° direction. The barometer was falling rapidly. At 2200, vessel in position 28° 20′N., 49° 54′E., very heavy rain was seen approaching from about 270° and a few minutes later the storm struck. The wind shifted to 270° and reached an estimated speed of 80–90 kt, accompanied by torrential rain which reduced visibility to nil. Thunder and lightning were now continuous and violent. The barograph trace showed a sudden fall of 14 mb, followed by an equally sudden rise of 15 mb as the storm passed over. When the wind struck, the vessel, steering on automatic pilot, was blown 6° off course. The violent wind and rain lasted about 20 min, but by 2240 the rain had become drizzle and the wind had fallen completely.

During the storm, a permanent awning on the port side of the after boat-deck, made of aluminium and securely bolted to steel and wooden spars, was ripped off, one section being blown over the side and the other rolled back. The steel spars to which it had been bolted were badly bent and the wooden spars ($4\frac{1}{2} \times 2\frac{1}{2}$ in.) were snapped off. The area of awning damaged was approximately 50 ft. × 30 ft.

Note. This is an interesting observation. The intensity of the storm, particularly as regards the fall of pressure and the very high wind force, appears to be unusual for this region. According to the Persian Gulf Pilot, the frequency of thunderstorms is small during November to April. Severall squalls, sometimes accompanied by lightning, are referred to in the Pilot, the highest wind forces quoted being Beaufort 10 and 11 (48 to 63 kt).

VESSEL STRUCK BY LIGHTNING

Caribbean Sea

S.S. *Tekoa.* Captain F. C. Taylor. Curaçao to Panama. Observer, Mr. R. G. Williams, 3rd Officer.

17th October, 1957. Continuous sheet and forked lightning had been occurring since midnight, and at 0400 G.M.T. a flash struck the fore topmast stay, causing blue St. Elmo's Fire to appear on the fo'c'sle rails and foredeck derricks. Two minutes later, the port shoulder of the fo'c'sle was struck and a large fireball was seen. Yet again, after a further 2 min the same thing happened. At 0415, lightning struck the deck amidships causing a large girder (deck cargo) to be enveloped in blue St. Elmo's Fire which made a distinct buzzing noise. At this time forked lightning was appearing in seven different directions and sheet lightning was continuous over the whole sky. Thunder was violent in every direction. When the vessel was struck at 0400 the wind suddenly backed from NE'E., force 4, to SW'W., force 4, a swing of 180° in less than 2 min. At 0420 violent rain commenced, but the centre of the thunderstorm was by then about 2 miles away towards the NE. No sudden barometric changes were recorded during the storm, but the temperature fell 5°F. The magnetic compasses did not vary.

Position of ship at 0400: 11° 48′N., 74° 45′W.

Note. This seems to have been a particularly violent storm and it adds another instance to reports previously received of ships being struck on the foremast, and also, in this case, on the fore part of the vessel.

In looking over some old logbooks recently a similar observation, over 50 years old, was found. S.S. *Britannia* (P. and O. Line), Captain S. Barcham, London to Sydney, reported as follows " 30th December, 1907. Noon position 34° 22′N., 25° 09′E., 1.30, heavy thunderstorm with hailstones, a deluge of rain and lightning all round the horizon. Continued until 5.30. During the night the foremast lightning conductor was struck and the last 10 ft of the strands were all opened up and fused in places."

ST. ELMO'S FIRE

North Atlantic Ocean

S.S. *Manchester Progress.* Captain M. E. Bewley. Newport News to Liverpool. Observer, Mr. E. W. Weekes, 3rd Officer.

16th November, 1957. St. Elmo's Fire was observed at 0300 G.M.T. on the truck of the foremast and for about 30 ft along the main aerial. It took the form of a pale bluish light radiating streamers of varying intensity, which persisted for several minutes. At the time, the vessel was passing through a heavy rain squall and lightning was seen around the horizon. The wind was sw's., force 6.

Position of ship: 39° 35′N., 55° 30′W.

WATERSPOUT

North Atlantic Ocean

S.S. *Martita.* Capt. H. Bunn. Rotterdam to W. Africa.

19th November, 1957. Between 1020 and 1040 G.M.T. a waterspout was seen at distance of 5 miles to the sw. The unusual feature of the phenomenon was that the base of the spout appeared first of all, with almost explosive intensity, and only afterwards did the funnel begin to form. The cloud consisted of heavy towering Cb with an unusual degree of uplift. It was at a height of about 800–1,000 ft and presented a rapidly changing, chaotic appearance. Air temp. 84°F, wet 80°, sea 84·5°.

Position of ship: 08° 39′N., 13° 52′W.

South Pacific Ocean

M.V. *City of Khartoum.* Captain H. E. Roberts. Panama to Wellington. Observers, Mr. L. R. Jones, Chief Officer and Mr. P. G. Weldon, 4th Officer.

18th October, 1957. At 1445 G.M.T. a waterspout was observed 3 miles away on the starboard bow, hanging from a dark grey sheet of cloud. It was moving in an E'ly direction at a speed of about 10 kt and passed the ship 300 ft to starboard. The surface of the sea was greatly agitated, with spray rising to about 50 ft. The spout was rotating in a clockwise direction and at the base it was about 50–60 ft wide. The height of the cloud base above the waterspout was about 600 ft. There was heavy rain, accompanied by wind gusting to force 5, with a 3° fall of temperature in 20 min.

Position of ship at 1445: 30° 24′S., 141° 36′W.

M.V. *Condesa.* Captain E. Lougheed. Napier to Panama. Observer, Mr. D. R. Williams, 2nd Officer.

4th December, 1957. At 2335 G.M.T. during a heavy rain shower the wind suddenly increased from force 7, to what was estimated to be force 9 or 10, and at the same time a large waterspout was seen about a ¼ mile away, travelling at right angles to the ship's course. The water in the track of the spout was thrashed into a whirling foam, while a dense cloud of spray at the base of the column rose to about 25–30 ft, accompanied by a cone of water drawn up to an estimated height of 150 ft (see drawing opposite page 205). In the centre, the column was very thin but it widened to an estimated diameter of about 450 ft at the sea surface. It hung from a large balloon-shaped cloud which appeared to be suspended in mid-air. The spout was rotating in an anticlockwise direction and was in sight for 5 min. Visibility was just under 3 miles. The radar set was switched on but no echo was obtained from the spout. A sudden sharp fall in pressure was recorded on the barograph as the spout passed.

Position of ship at 2400 G.M.T.: 31° 18′S., 133° 24′W.

SEA SMOKE

North Atlantic Ocean

S.S. *Media.* Captain J. T. Jones, R.D. New York to Liverpool. Observer, Mr. R. G. Southern, Junior 3rd Officer.

27th November, 1957. At approximately 1145 G.M.T. a fierce line squall accompanied by snow flurries overtook the ship from the port quarter to the starboard bow. A vast amount of " sea smoke " suddenly formed, rising from the surface in great clouds which gave the sea the appearance of boiling. This " smoke " became a dense cloud layer at a height of about 50–100 ft above the sea. Snow was falling at the ship while this was occurring. The whole phenomenon lasted for about 15 min. Air temp. 38°F, wet 38°, sea 58°. Wind W., force 7.

Position of ship: 50° 03′N., 43° 39′W.

UNUSUAL VISIBILITY

Gulf of Aden

S.S. *Ixion.* Captain G. Edge. Liverpool to Australia. Observers, the Master, Mr. G. I. Wright, Chief Officer, Mr. M. J. Steele, 3rd Officer and Mr. R. J. Atkinson, 4th Officer.

21st October, 1957. At 1400 G.M.T. the Jebel Warsangeleh mountains, heights up to 6,800 ft, were seen quite clearly at a distance of 87 miles. The Master could not recall seeing this before in 36 years' experience. Air. temp. 82°F, wet 75°, sea 85°. Cloudless with light SE. breeze.

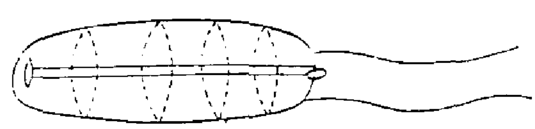
Position of ship: 12° 22′N., 47° 51′E.

SALPA

South Atlantic Ocean

S.S. *British Sailor.* Captain H. G. Jeary. Isle of Grain to Durban. Observers, Mr. P. Edmondson, Chief Officer and Mr. G. W. McCathie, Extra 2nd Officer.

12th December, 1957. Streaks of discoloured water were seen, lying in a line 110°–290°, and a sample was taken at 0800 G.M.T. It was thick with small living



organisms, each about 5–8 mm in length and consisting of a jelly-like substance with what appeared to be a central tube running from end to end.

At one end, an orifice moved as if gulping, the central tube expanded and contracted and the creature moved through the water. It was able to move in either direction. At the end remote from the mouth, there were two fine antennae which were almost as long as the body. Between the antennae there was a small brown spot on the body, which appeared to be some kind of organ, and was the only part not transparent. Finely marked parallel lines circled the body. On dying, the jelly-like substance became a mass of minute bubbles and shrunk to about half its normal size.

Position of ship: 16° 40′S., 2° 15′E.

Note. Dr. T. J. Hart, of the National Institute of Oceanography, comments:

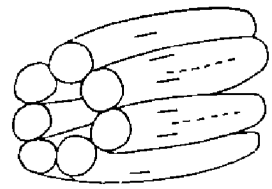
" This sounded like salps, so I handed it to Mr. P. Foxton a specialist on the group, and he concurred, saying that it was most probably *Salpa democratica*, an oceanic species very common and widespread in the South Atlantic. The peculiar feature is that it should be present in such great concentrations so far from land, far beyond the normal influence of the coastal current off SW. Africa where we captured it in large numbers ourselves from the *William Scoresby*.

CYCLOSALPA

South Atlantic Ocean

M.V. *Dartmoor.* Captain F. Bradfield. Durban to Avonmouth. Observers, Mr. I. Gault, Chief Officer, Mr. D. Nicholas, 2nd Officer and Mr. E. D. Somes, 3rd Officer.

21st December, 1957. At 0900 G.M.T. while the vessel was stopped, a large number of transparent objects with orange-coloured stripes were seen floating just below the surface. One was brought on board in a bucket and examined. It was found to be 2 in. long and 1½ in. in diameter and consisted of seven tubes attached to each other at the " head " of the object. Each tube was about ½ in. in diameter and had an orange stripe 1 in. long just below the place where it was attached to the other tubes. There were two purple ¼ in. stripes on the " outboard " side. *See* sketch.



When two of the tubes were separated from the others, they continued to live and propel themselves, quite independently, by passing water through the tubes. The other set of five tubes behaved similarly.

Position of ship: 15° 06′S., 01° 35′E.

Note. Miss A. Clark, of the Natural History Museum, comments:

" These objects must be *cyclosalpa,* which is a rather gelatinous organism of a group of animals known to zoologists as *tunicates.* The genus *cyclosalpa* is the only one in which the aggregated form makes rings instead of chains. The stripes were probably part of the internal organs and luminous organs."

CUTTLEFISH

West African waters

M.V. *Tantallon Castle.* Captain J. B. James. Cape Town to Dakar. Observers, the Master, Mr. D. Mitton, Chief Officer and Mr. T. Ball, 3rd Officer.

19th December, 1957. At 1200 G.M.T. a large number of cuttlefish were seen floating on the sea surface, in a band parallel to the ship's course (320°). The band was about 1 to 1½ miles long and around 30 yd wide, and it also contained what appeared to be leaves and sticks, such as might have come from a river. Wind ENE, force 3.

Position of ship: 09° 04′N., 16° 00′W.

Note 1. A similar observation in almost the same position, by S.S. *Umtali,* on 9th November, 1956, was published on page 202 of the October 1957 number of this journal.

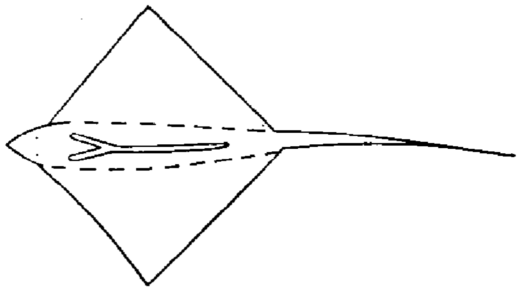
Note 2. Dr. W. J. Rees, of the Natural History Museum, says that this new observation, in approximately the same area and time of year, suggests that it is a time when cuttlefish have spawned and are at their weakest and may die due to sudden changes in temperature. In aquaria in Britain, a change in temperature of 2°C has been found sufficient to cause mortality among *sepia officinalis.*

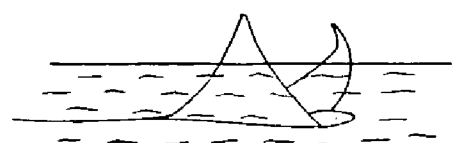
EAGLE RAYS

Off West African Coast

M.V. *Dartmoor.* Captain F. Bradfield. Bremerhaven to Port Elizabeth. Observers, the Master, Mr. I. Gault, Chief Officer, Mr. D. Nicholas, 2nd Officer and Mr. E. D. Somes, 3rd Officer.

13th November, 1957. At 1715 G.M.T. passed through huge numbers of rays, first





seen as twin " fins ", gliding slowly through the water side by side—a dull colour on the inboard side and glossy on the other side. All the pairs of "fins" seemed about the same size and distance apart—i.e. about 12 in high and 12 in apart.

The " fins " were seen later by the Master and Chief Officer to be the wings of rays which were dark brown on the upper side and white underneath. All the rays seemed to be about the same size, around 2½ ft to 3 ft across. They had a white mark like a two pronged spear on their backs and were all swimming with the tips of their wings out of the water (*see* sketch). The vessel passed through the rays, which extended as far as the eye could see, from 1715 to 1800.

Wind E., force 2–3. Sea rippled with long swell. Speed of vessel 13½ kt. The vessel was within the 100 fm. line during this time.

Position of ship: 9° 52′N., 16° 32′W.

Note. Mr. N. B. Marshall, of the Natural History Museum, comments:
"The drawing and description of the rays, particularly of their method of swimming, show that they belong to the family of eagle rays. This record is a very interesting one.

PHOSPHORESCENCE

North Atlantic Ocean

M.V. *Barrister*. Captain D. Wolstenholme. Walvis Bay to Liverpool. Observer, Mr. J. L. Beaton, 3rd Officer.

15th October, 1957. At 2200 G.M.T., the visibility having improved after a heavy rain squall, the ship was seen to be cutting through parallel bands of phosphorescence lying in a SW′W–NE′E direction. The bands were 600 ft apart and estimated to vary from 4 ft to 25 ft in width. Due to darkness, the length of the bands could not be estimated. The bands resembled the wind blown streaks of red plankton matter so often seen in the Red Sea. After several minutes maximum brilliance was attained, but it soon diminished, and by 2300 the bands were no longer seen. During this time the lookout remarked upon having smelt the characteristic fetid odour which he associated with whales. The bow wave continued to show bursts of phosphorescence at regular intervals. This took the form of phosphorescent nodules about 2 in. in diameter: there were also occasional elongated shapes measuring about 2 in. by 12 in. Air temp. 73°F, sea 78½°. Wind SW′W., force 1–2. Rippled sea with low swell.

Position of ship: 4° 15′N., 12° 02′W.

M.V. *Port Auckland*. Captain C. R. Townshend. Las Palmas to Cape Town. Observer, Mr. J. Hart, 3rd Officer.

28th November, 1957, at 0001 G.M.T. Small particles of phosphorescence were observed in the bow wave, and the opportunity was taken to obtain a sample when the sea temperature was being read. The water in the bucket contained some transparent substance, of the nature of jelly fish, about ¼ in. in diameter and seemingly globular. Phosphorescence was seen when the bucket and contents were agitated, but as soon as the jelly-like substance was separated from the water the glow quickly disappeared.

Position of ship: 18° 48′N., 17° 54′W.

Gulf of Aden

M.V. *Delphic*. Captain C. L. Carroll, D.S.C. Sydney to Aden.

17th October, 1957. At 1900 G.M.T. very bright phosphorescence was observed in the bow wave and the surrounding sea, bright patches appearing beneath the surface of the water as well as on it. It was strong all evening and increased in brightness until about 2000. A band of very bright phosphorescence was passed which stretched in a line lying at 90° to the course. It was about 4 ft wide and 50 yd long and gave out a glow which came from beneath the surface of the water.

Position of ship at 1800: 12° 24′N., 48° 24′E.

Gulf of Oman

M.V. *Scottish Eagle*. Captain A. M. Kennedy. Mena to Suez. Observers, the Master, Mr. A. Stoddart, Chief Engineer and Mr. C. S. Houghton, 3rd Officer.

25th November, 1957. At 0700 G.M.T., while steaming at 13·5 kt, a line of phosphorescence was seen right ahead extending laterally on either bow. On approaching, it was seen to have a wavy pattern with a rather criss-cross effect, and as the vessel passed through the middle, the phosphorescence assumed the form of waves running down both sides of the ship. These were curved and converged away from the vessel. The effect was similar to that produced by a strong light shining from beneath the surface and being at the same time rotated. The wave effect seemed to be the result of the flashing on and off of the bands of phosphorescence. The light given off was quite bright and faintly illuminated the ship for 3 or 4 min. Small particles of normal phosphorescence were also present. The impression was gained that the display was something akin to a phosphorescent wheel. Air temp. 73°F, sea 80° (engine room intake). Wind calm, slight swell.

Position of ship: 25° 47′N., 57° 07′E.

Arabian Sea

M.V. *Cingalese Prince*. Captain R. C. Proctor, O.B.E. Alleppey to Cochin. Observers, the Master, Mr. P. R. Toomey, 2nd Officer and Mr. A. G. Clarke, Junior 3rd Officer.

27th October, 1957, 1415 to 1615 G.M.T. Between latitudes 9° 33′N. and 9° 53′N., 6 miles off the Travancore coast large oval patches of phosphorescence, up to about 20 ft across, were observed in 8–11 fm. They were visible for about ½ mile. Shoals of intensely phosphorescent fish were also clearly seen. The bow wave and the wake were a brilliant, luminous green colour. Air temp. 81°F, sea 82°. Wind N′W., force 2.

29th October. Cochin to Suez. Between 1645 and 1700 G.M.T. large shoals of intensely phosphorescent fish were observed, well clear of the ship's bow wave and the wake, which were also vividly phosphorescent.

Position of ship: 9° 55′N., 76° 11′E.

Indian Ocean

S.S. *Reynolds*. Captain J. C. Pratt. Aden to Singapore. Observer, Mr. G. W. Brown, Chief Officer.

23rd October, 1957. At 0030 G.M.T. the vessel passed through an area of phosphorescence stretching as far as the eye could see and approximately 2 to 3 miles in width, in which the slightest agitation of the water produced a vivid green light sufficient to illuminate the ship. The edges of the phosphorescent area were clearly outlined by luminous objects of about ½ in. to 2 in. in diameter floating on the surface, and also by the sea surface changing from glassy smooth to choppy, as the vessel left the region. Sea temp. 81°F.

Position of ship: 6° 32′N., 77° 26′E.

Brazilian Waters

M.V. *Highland Princess*. Captain E. N. Giller, M.B.E. Rio to Santos. Observer, Mr. H. S. Jones, Senior 3rd Officer.

31st October, 1957. From 0530–0600 G.M.T., the ship passed through a large area of bright phosphorescence. The wave caps, as far as the eye could see, appeared as bright streaks and the whole sea surface emitted a diffused glow. Sea temp. 80°F. Wind E., force 6. Overcast.

Position of ship: 24° 00′S., 45° 30′W.

Australian Bight

S.S. *Thaumastus*. Captain E. Macdonald. Miri to Geelong. Observers, Mr. R. L. Evans, 3rd Officer and Mr. R. Hart, Radio Officer.

24th December, 1957. At about 0000 G.M.T. the vessel passed through an area of phosphorescence 3 miles in length. The phosphorescence consisted of shapes which were 12 in. and 15 in. in length and about 3 in. in width. The light emitted was bright enough to be visible at distances up to 400 yd, the colour being greenish white. No other phosphorescence was seen either in the bow wave or in the wake. Air temp. 58°F, sea 61°. Sea slight.

Position of ship: 38° 52′S., 142° 07′E.

MIGRATION OF GRASSHOPPERS

South Atlantic Ocean

M.V. *Cambridge*. Captain P. P. O. Harrison. Observer, the Master and all officers.

11th December, 1957. At 0400 S.M.T. (in position 6° 48′S., 4° 39′W.) the Officer of the Watch trod on a locust-type creature: at 0900 half a dozen were seen landing on board and also easily flying ahead of the ship which was travelling at 16 kt. At 1500 (in position 4° 40′S., 6° 10′W.) over two dozen were seen coming in from approximately 055°; in the evening they were heard chirping and there were also large numbers of black terns flying round the ship and crying, but it is thought they were not after the insects, several of which were caught and preserved in a bottle. The nearest mainland, Cape Palmas, Liberia, was 690 miles away, while Ascension Island was 565 miles distant. Air temp. 72°F, sea 72°. Wind SSE., force 4.

Note. Dr. Uvarov, Director of the Anti-Locust Research Centre, comments:

"We are particularly glad to have these specimens submitted by Captain Harrison, because they are not locusts but long-horned grasshoppers of a migrating kind. The record is most valuable as it is only seldom that we get such precise information with regard to this particular insect. We are looking into the scanty previous records and may possibly publish a note, if the available data would justify it."

ABNORMAL REFRACTION

North Atlantic Ocean

M.V. *Port Launceston*. Captain W. Eastoe. Las Palmas to Cape Town. Observers, the Master and Mr. M. F. Annett, 3rd Officer.

30th October, 1957. At 1345 G.M.T., what appeared to be two ships were seen on the horizon close together, at a distance of 12 miles, and as there was a considerable amount of smoke or steam it was assumed that either refuelling was in progress or a collision had occurred. The appearance of reality and solidity was so convincing, even after careful examination through binoculars, and so deceiving was the funnel smoke, that course was altered in spite of the fact that only one radar echo was being received, in case assistance was required. At a distance of 8 miles, it became clear that a mirage was responsible for the illusion and that there was one vessel only, which turned out to be the *Balaena*, proceeding peacefully on her way. *Port Launceston* then resumed her original course. Air temp. 71°F, dew point 68°, sea, 74°. Overcast with rippled sea and low swell.

Position of ship at 1500: 21° 53′N., 17° 58′W.

RAINBOWS

North Pacific Ocean

S.S. *Ramsay*. Captain B. F. Thomas. Hong Kong to Vancouver, B.C. Observer, Mr. M. W. England, 2nd Officer.

25th October, 1957. Part of a very faint rainbow was seen at 2358 G.M.T. below some low Cu, but by 0004 it had become very brilliant and showed the full range of the spectrum. There was also a much fainter secondary bow. Both disappeared at 0014. At 0016 a partial bow appeared from low cloud ahead of the ship but it was not quite so bright as the first one. A few minutes later, another one was seen, cutting across the first one. This bow had a vivid green centre with violet along each edge. At 0030 both bows disappeared. A complete bow appeared at 0100 but it became partial as low cloud increased again. At 0115 rain was seen falling near the top of the bow and across it, making the normal colours change to a straw colour. At 0125 there was a very heavy shower and the bow disappeared.

Position of ship: 45° 43′N., 165° 14′W.

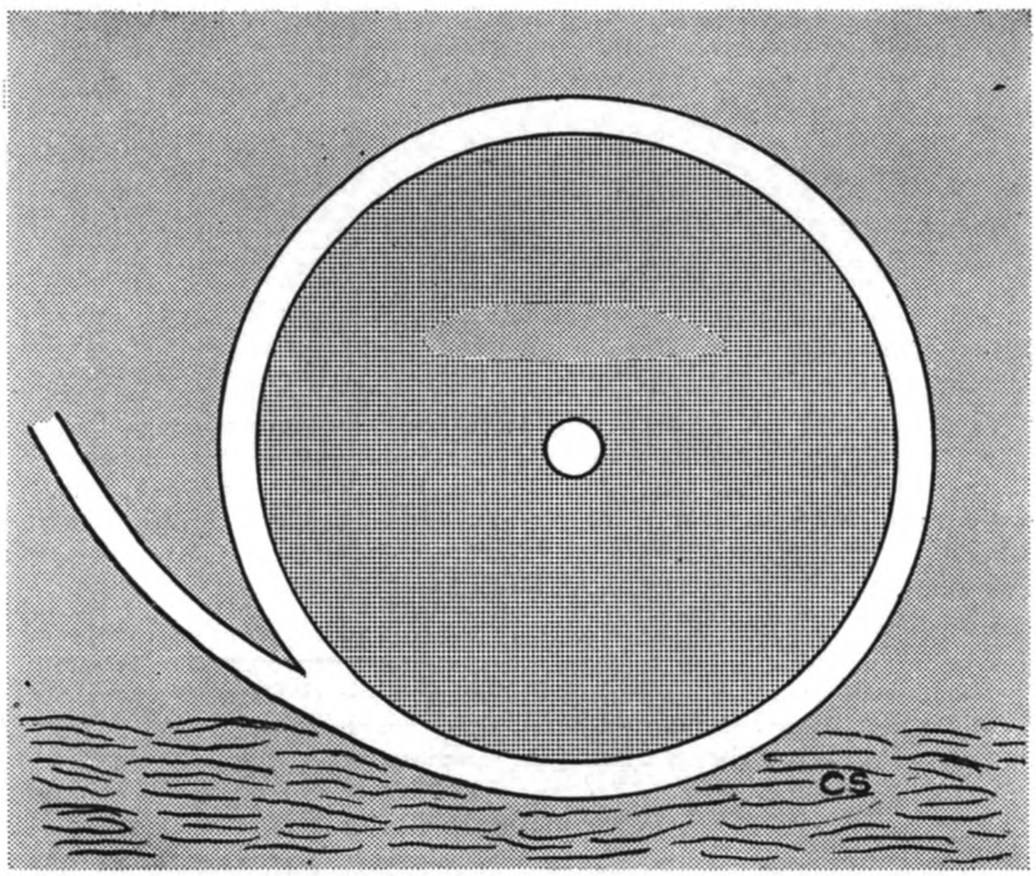
Note. The partial bow seen at 0016 was presumably a part of the primary bow. In a sketch sent in the logbook it is shown as a short arc reaching the horizon. The green and violet bow is a similarly short arc intersecting the other one and also reaching the horizon. It is an abnormal bow, both in colouring and position. Abnormal bows, more usually partial bows, have been observed on many different occasions, but the mode of their formation is unknown in most cases.

LUNAR HALO

North Atlantic Ocean

M.V. *Tarantia.* Captain R. S. Paton. Glasgow to New York.

8th October, 1957. The lunar halo of approximately 21½° radius and arc of



contact, shown in the sketch, were clearly visible between 2020 and 2115 S.M.T. The moon bore 140° and the approximate altitude was 45°. There was high Cs cloud in the region of the lowest part of the halo.

Position of ship: 42° 48′N, 50° 42′W.

Note. The point of interest in this observation is the occurrence of the lower arc of contact to the 22° halo. The upper arc of contact to this halo is very frequently observed but the lower arc is much rarer and is often incomplete, being seen on only one side of the halo, as in the present observation. An observation of the lower arc of contact, by M.V. *Port Chalmers* on 22nd November, 1947, was published in *The Marine Observer*, Vol. XVIII, page 192, and one is also shown in Fig. 31 of the *Marine Observer's Handbook.*

DOUBLE LUNAR HALO

North Atlantic Ocean

M.V. *Nottingham.* Captain F. G. Bevis. Curaçao to Rotterdam. Observers, the Master, Mr. P. Egan, 2nd Officer and Mr. F. F. Michael, 3rd Officer.

11th October, 1957. From 0200 till 0600 G.M.T. two well-defined lunar halos were observed. The inner halo had a diameter of 46°, while that of the outer one was approximately 118°. The width of each was about 2½°. All angles were measured by sextant.

Position of ship 32° 25′N., 48° 09′W.

Note. There is a halo of 23½° radius, which, if the common halo of 22° is also present, can only be seen as a widening of the 22° halo. It is not stated whether the diameters given in the observations were measured to the inside or outside edges of the halos. If measured to the inside edge the smaller halo might have been that of 23½°.

The two largest halos known are those of radii 46° and 90°. The radius of the large halo described above was either 56½° or 59°, according to the method of measurement. Abnormal halo phenomena, complete halos or more usually arcs of halos, are seen from time to time and the present observation comes within this category.

SETTING OF THE PLANET VENUS
Indian Ocean

S.S. *Strathnaver.* Captain I. M. Sinclair. Australia to London. Observer, Mr. J. C. Vint, Supernumerary 2nd Officer.

6th December, 1957 at 2105 S.M.T. The accompanying sketch illustrates the

changes observed in the planet as it was setting. Prismatic binoculars were used to observe the phenomena.

Position of ship: 01° 40′N., 84° 32′E.

Note. The phenomena seen at the setting of the bright planets Venus and Jupiter vary considerably on different occasions and are always interesting. Sometimes no double images occur. When they are seen, they may be of the same or different colours. The green colour is not always seen before the instant of setting, as it was in this observation.

AURORA

Note. Observations have been received from 17 ships, in addition to those published below. All have been forwarded in full to the Aurora Survey, towards which ships' observations are making a valuable contribution. During the period October to December 1957, covered by the present Marine Observer's Log, the dates when aurora was most widely observed were the nights of 21st–22nd October and 6th–7th November.

North Atlantic Ocean

S.S. *Teviot.* Captain J. H. Napper. Newport News to Hamburg. Observer, Mr. J. Thornhill, Chief Officer.

14th October, 1957. Aurora was observed from 0530 to 0540, the colour being a very pale salmon. Four rays were seen, two of them large, bearing 2° or 3° on each side of Polaris, and flanked by two somewhat narrower ones. The sky from NNW. to NNE., to an altitude of about 30°, appeared much lighter than the remaining part.

Position of ship: 47° 16′N., 15° 49′W.

S.S. *Arabia.* Captain W. B. Tanner, R.D. Montreal to Liverpool. Observers, the Master, Mr. R. Jones, Chief Officer and Mr. F. A. Wood, Apprentice.

21st October, 1957. Aurora was seen at 2200 G.M.T. as a white haze behind clouds between bearings of 050° and 060°. It became a brilliant red by 2300 and attained an altitude of 30°. At 2400 the aurora had increased in altitude to 60° and bore from 050° through S. to 260°, with occasional white rays showing in the N. All the rays reached an apex south of the vessel, now under a canopy of auroral light.

At 0018 the main display was bearing from 070° to 260°. It was white between 15° and 40° elevation and red from 40° to the apex. The red colour began to vary in intensity until 0030 when the display was at its brightest, between bearings of 068° to 250°. The lower part, at an altitude of 20°–30°, was a light green colour, changing to white between 30° and 45°, and to red from 45° to 80°. Three minutes later the green area began fading while the highest parts became brighter. At 0100 on 22nd the display began to fade and by 0130 it had ended.
Position of ship: 52° 10′N., 53° 15′W.

S.S. *Gardenia.* Captain W. Hunter. Ipswich to Philadelphia.
22nd October, 1957, at 0000 G.M.T. A truly magnificent display of aurora was seen in the northern sky. In the central part the rays were strong and white, similar to numerous searchlight beams. They were at first surrounded by a circle of vivid red rays which covered an area of approximately half of the sky. The central white ray was bearing 360° and the ends bore 050° and 310°. Later the colours extended until they covered the whole sky. Finally at about 0200 the aurora became white again, then disappeared.
Position of ship: 43° 45′N., 59° 00′W.

M.V. *Rakaia.* Captain H. N. Lawson. New York to Liverpool. Observers, Mr. D. Hyde, 3rd Officer and Mr. N. W. Elsam, Apprentice.
22nd October, 1957, between 0025 and 0050 G.M.T. The sky had been completely overcast with low stratus cloud, but at 0025 it began to clear and patches of red light were seen in the northern sky. About half of the sky became clear, the cloud over the northern horizon being at an elevation of 15°. Large red and violet patches were seen extending from behind the top of the clouds to a height of 40°, spreading over a section of the sky between N. and approximately NW. Short rays, rose-pink in colour, showing up brightly against the darker red and violet patches, shot up from behind the cloud. One bright pink ray extended to 60° above the horizon. The display lasted 25 min until the sky became overcast again.
Position of ship: 46° 42′N., 38° 27′W.

S.S. *Gloucester City.* Captain S. G. Smith, O.B.E. St. John, N.B. to Glasgow.
6th November, 1957, at 2215 G.M.T. Rays observed on bearings from 100° to 230° through 180°. Initially the predominant colours were green and orange, with a faint tinge of rose, but after approximately 10 min these faded, being replaced by diffused patches of bright pillar box red. These changed but slowly and were seen at first only south of the observer's zenith, at a maximum observed altitude of approximately 70° on a bearing of 200°. The aurora was quite bright and remained so until 2240 when the colour commenced to fade a little to a pale rose, becoming, however, more widespread. Shortly after this the greater part of the nothern half of the sky was tinged with pink and several patches of a more intense shade of rose were observed low in the sky on a bearing of 070°. At 2245 the aurora began to recede and fade and by 2255 had disappeared completely.
Position of ship: 54° 51′N., 21° 00′W.

M.V. *Regent Hawk.* Captain G. H. Hobson. Trinidad to Cardiff. Observers, Mr. R. J. Peters, 2nd Officer and Mr. B. White, helmsman.
7th November, 1957, from 0045 to 0130, the sky between bearings 285° and 315° and between altitudes 12° and 20° was observed to have a faint pink tinge. This deepened to a dark red glow, which after about 15 min changed to purple, and then gradually faded. The sky over a considerable area was tinged by both the red and purple coloration. Bright moonlight.
Position of ship: 49° 41′N., 8° 18′W.

S.S. *Warkworth.* Captain N. Thompson, M.B.E. Quebec to U.K. Observer, Mr. G. B. Bell, Chief Officer.

26th–27th November, 1957, at 2350 G.M.T. A brilliant display of well-defined aurora, in the form of a curtain, was observed stretching through an arc from 330° to 075°, between altitudes 30° to 78°. The curtain was white from 330° to 040° thence merging into a brilliant sunset red for the remainder of the arc, gradually diminishing in intensity. The display disappeared at 0050.

Position of ship: 47° 06′N., 70° 42′W.

S.S. *Cairnavon.* Captain G. H. Percy. Quebec to Leith. Observer, Mr. R. M. Somers, 3rd Officer.

11th December, 1957, at 2100 G.M.T. Aurora visible between N. and NW. At 2200 the aurora was centred at a spot to the south of the vessel's zenith, from which it radiated all around the sky.

At 2230 only one band of light remained, extending from the zenith to an altitude of about 45° in a NE'ly direction. At 2240 it disappeared. The colour of the auroral light was white throughout the display.

Position of ship: 57° 30′N., 23° 40′W.

METEOR

North Atlantic Ocean

M.V. *Regent Hawk.* Captain G. H. Hobson. Cardiff to Pointe à Pierre (Trinidad B.W.I.). Observer, Mr. N. A. G. Baird, 3rd Officer.

24th November, 1957. At 0117 G.M.T. a brilliant white meteor appeared in the southern sky, bearing about 210°, elevation 30°. It travelled eastwards and disappeared on a bearing of 190° at an elevation of 23°. It was visible for about 5 sec and although it had a tail about 2° long, it left no trail in the sky. When bearing

195°, the meteor split into two parts, the smaller portion travelling ahead of the larger and having a distinct tail of its own which appeared to partly envelop the bigger portion. There was no change in colour: it remained a brilliant white, comparable in brightness with Venus at magnitude −4·1, and disappeared about ½ sec after breaking up.

Position of ship: 14° 00′N., 59° 10′W.

Gulf of Aden

S.S. *Tregenna.* Captain W. F. Denyer. Mombasa to Aden. Observer, Mr. R. C. Powell, 2nd Officer.

3rd December, 1957. An exceptionally bright meteor was seen at 2250 G.M.T. in the region of τ^5 Eridani. It was visible for only a fraction of a second but it illuminated the ship brilliantly. A thick trail of great brightness about 5° long was left behind, which persisted for 5–10 sec. The measured altitude of this was about 31°. The sky at the time was cloudless.

Position of ship: 12° 19′N., 48° 39′E.

Indian Ocean

S.S. *Helenus.* Captain E. M. Robb. Adelaide to Aden. Observers, Mr. R. H. Sidley, 3rd Officer and Midshipman R. Hogg.

15th October, 1957. At 1655 G.M.T. a meteor appeared, bearing 270° at an altitude of 35°. Maintaining the same bearing it burned out at an altitude of 15°, leaving a trail 20° long, which persisted for about ½ sec. The duration of flight was 2 sec. The meteor, estimated magnitude −1·0, was white, as was the trail, but just before burning out it turned bright yellow for a fraction of a second.

Position of ship: 2° 50′N., 58° 47′E.

North Pacific Ocean

S.S. *Pacific Reliance*. Captain P. F. Owens. Cristobal to Los Angeles. Observer, Mr. D. Bremner, 3rd Officer.

11th November, 1957. Between 0330 and 0600 G.M.T. the following meteors were seen:

0330. A bright white meteor appeared in the vicinity of Cassiopeia, travelling towards Capella, near which it disappeared. Duration, 3–4 sec.

0335. A bright meteor appeared a little below Aldebaran and travelled towards the moon, getting brighter all the time. It disappeared about half-way to the moon. Duration, 2–3 sec.

0430. A bright white meteor was seen just below Orion's belt, moving towards Sirius. Duration, 2–3 sec.

0500. A bright meteor was seen near Capella, falling vertically to an approximate altitude of 20°. Duration, 3 sec.

0540. A bright meteor was observed bearing 190° from the ship at an altitude of approximately 40°. It fell in a S'ly direction and disappeared at an altitude of about 20°.

Position of ship: 17° 30'N., 102° 30'W.

at Apia

S.S. *Waitomo*. Captain J. J. Lyon. Observer, Mr. L. N. Gow, 2nd Officer.

20th October, 1957. While at anchor in harbour at Apia a very brilliant meteor was seen at 1104 G.M.T. It appeared bearing 035° at an elevation of 25°, and travelled eastward on a horizontal path, fading, and disappearing on a bearing of 100°. The brilliance was about three times that of Venus and a double trail was being emitted.

METEOR SHOWER

North Pacific Ocean

S.S. *Ramsay*. Captain B. F. Thomas. Hong Kong to Vancouver, B.C. Observer, Mr. M. W. England, 2nd Officer.

20th October, 1957. At 1540 G.M.T. a group of five meteors, following each other at approximately 2 sec intervals, appeared from a point NW. of Orion's belt. They increased slightly in altitude at first, then began to drop before disappearing at a point below Regulus. The last one of the group was nearly as bright as Sirius and made a very slight crack as it disappeared, leaving a faint trail which lasted for a few seconds. Meteors continued to appear at frequent intervals from this position in Orion throughout the watch, the predominating colour being green.

Position of ship: 43° 30'N., 170° 11'E.

Note. A well-known shower of meteors, directed from a point in the constellation of Orion, occurs each year at this time. This is known as the Orionid shower. It is observed on the nights of the 18th–20th October, the largest number usually occuring on 18th October. Apart from considerations of the state of the sky and the presence or absence of moonlight it is found that the number of meteors seen in a shower of this kind varies in different years. S.S. *Ramsay's* observation indicates that the shower was perhaps more prolific than usual in 1957. The group of five, seen in about 10 sec, is certainly rather unusual and they must have been close together in space when they entered the earth's atmosphere.

Some measurements of temperature and humidity profiles near the sea surface

By H. C. SHELLARD, B.SC.
(Marine Division, Meteorological Office)

1. Introduction

Because of the large proportion of the earth's surface that is covered by the oceans, the energy transferred from the oceans to the atmosphere is an important factor in many meteorological problems. It is necessary, therefore, to develop our knowledge concerning the processes by which this transfer of energy occurs as much as possible. It is fairly certain that the form of the equations representing the vertical distributions of temperature and humidity over land will not usually apply over the open sea and information is lacking concerning the extent to which conditions over the oceans can depart from those of neutral stability. The importance of attempting to make actual measurements of the vertical profiles of temperature and humidity over the ocean is therefore obvious. More extensive discussion of this subject has been given by Charnock.[1]

This paper describes a method of making such measurements and indicates its possibilities by presenting a few results. The instrument used is described in some detail, although it might well be modified in the light of further experience. This account has been written without waiting for further observations because the instrument became unserviceable, mainly because of the difficult conditions of use at sea, and it may not be possible to make any further measurements for some time.

2. Instrumental

(a) The apparatus

One of the major difficulties in measuring temperature and humidity at sea is that the presence of a ship introduces errors in the readings so that they are to some extent unrepresentative. If it is desired to make accurate measurements of the gradients of temperature and humidity near the sea surface such errors become prohibitive. It is therefore necessary to devise an apparatus with which the desired measurements can be made in the free air some distance away from and preferably to the windward of the ship. Such equipment has been developed in the Meteorological Office and is illustrated in operation in Fig. 1. It consists of a modified danbuoy, the spar of which has been replaced by a hollow aluminium pole. This

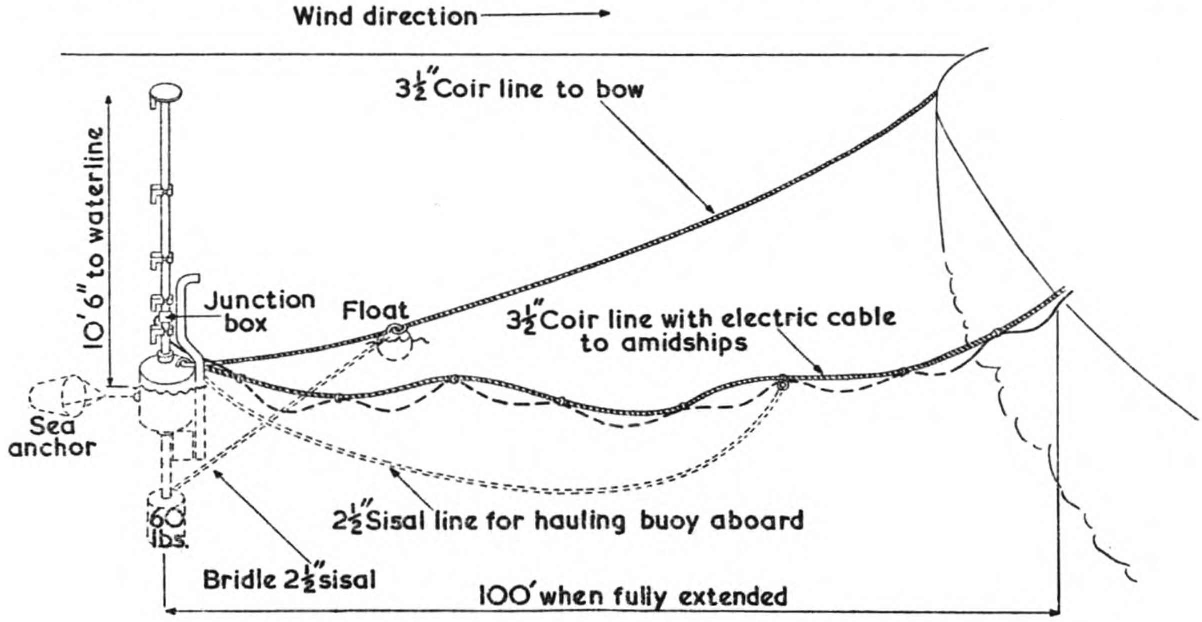


Fig. 1. General arrangement of " thermobuoy " in operation.

pole carries five aspirated dry and wet bulb thermoelectric psychrometers fixed at various distances above the waterline and four single thermocouples, for measuring sea temperature, at different levels below the waterline. A 60 lb ballast weight is attached to the bottom of the pole to assist in keeping it vertical in the water. Each psychrometer is encased in a tufnol housing, painted white to reduce radiation effects, each wet bulb element having a wick leading to a water reservoir. The thermocouple elements are similar to those used by Pasquill.[2] Ventilation is provided by blowers driven by two electric motors mounted in a watertight housing below the danbuoy and exhausting downwind through a rubber " snort " tube. Water traps are provided at the bottom of the mast and the " snort ". The ventilation rate is controlled by a butterfly valve in each housing, the valves being set to give the same ventilation rate to each psychrometer. This rate is about 2·2 m/sec, when the lag coefficients of the dry bulb and wet bulb elements are about 70 seconds and 45 seconds, respectively. Suitable cables, supported by floats, are used to carry power from the ship for the motors and to connect the various thermocouples to a switch which enables them to be connected in sequence on board to a potentiometer, an ice-junction being used as a reference. The heights of the elements above the water line in the 1956 trials of the equipment, the results of which are here presented, were 56, 89, 135, 195 and 287 cm. (i.e. 22, 35, 53, 77 and 113 in.) and the depth of those below the water-line 13, 30, 66 and 122 cm. (i.e. 5, 12, 26 and 48 in.). There had been some earlier experiments in which thermisters were used as thermometer elements but difficulties were experienced due to calibration shifts.

(*b*) *Operation and exposure*

The complete apparatus, which has become known as a " thermobuoy ", is launched from the stationary weather ship, to which it is attached by mooring lines as well as by the above-mentioned cables. It is allowed to float some 100 feet or so upwind of the ship and readily takes up this position as the ship drifts away from the thermobuoy under the action of the wind. The general arrangement is shown in Fig. 1. It has been found that the thermobuoy, as at present designed, floats in a vertical position in the open sea provided the wind is not much above force 3. It will be noted that although the buoy is upwind of the ship, the water in which it floats may possibly have been previously affected by the ship. It seems possible that this difficulty could be overcome by steaming very slowly at right angles to the wind direction while observations are being made.

3. Observations

The apparatus was tried out successfully at sea from O.W.S. *Weather Recorder* at station India (59°N., 19°W.) in July, 1956. Two sets of profiles which are believed to be reliable, and which have a number of points of interest, were obtained on the mornings of 6th and 9th July, 1956. Further sets were obtained on 10th and 18th, but during the first of these conditions became unsuitable owing to increasing wind and sea and during the second some of the wet bulb readings were doubtful, dry patches afterwards being found on the wicks. The fact that at the next trial of the equipment, from the same weather ship on her next voyage in August, 1956, both the cable and the electric motors were found to have become unserviceable due to penetration of sea water, also suggests that it is as well to reject the fourth set of observations made in July.

Having launched the thermobuoy and got it into position upwind of the ship, readings were taken as follows. Potentiometer readings were noted as pairs of thermojunctions were switched into the circuit in a fixed order, viz. first dry bulb junction at 113 in. against reference junction in melting ice, then each of the other dry bulb junctions in turn against the first, then each wet bulb junction in turn against its corresponding dry bulb junction and finally each sea temperature junction in turn against the first dry bulb junction, proceeding in each case from the highest level to the lowest one. The cycle was then repeated. On 6th July the complete cycle was repeated eight times and took about 90 minutes and on 9th July it was repeated 10 times and occupied about 115 minutes.

It was found that there were appreciable fluctuations of air temperature with time at all levels. The best way of dealing with the readings, which could not in any case have been taken simultaneously at all levels, was therefore to take mean values at each level over the whole run and regard these as giving approximate mean temperature and humidity profiles during the period of the observations. The results could be checked to some extent by comparison with the routine observations being taken on the ship for synoptic purposes and with the air and sea thermograph charts.

The results of the first set of observations with the thermobuoy are given in Table 1. Readings taken from the ship's meteorological logbook and from the

Table 1. Observations taken at Station India (59°N. 19°W.) on 6th July, 1956, 1040-1210 G.M.T.

(a) *Thermobuoy observations*

Height above sea, cm.	Mean dry-bulb temperature, °F.	Mean wet-bulb temperature, °F.	Mean dew point temperature, °F.	Mean Sea temperature, °F.
287	51·23	48·55	46·18	—
195	51·25	48·57	46·21	—
135	51·41	48·63	46·18	—
89	51·32	48·68	46·36	—
56	51·23	48·70	46·48	—
— 13	—	—	—	51·91
— 30	—	—	—	51·91
66	—	—	—	51·89
—122	—	—	—	51·90

(b) *Synoptic observations* at 0900 and 1200 G.M.T. included the following:

G.M.T.	Dry-bulb	Wet-bulb	Dew point	Sea temp.	Cloud	Visibility	Wind	Waves
0900	51·2	48·8	46·3	52·0	3/8 Cu 2,000′ 4/8 Sc 4,500′ Some Ac Total 7/8	Over 12 miles	200°/10 kt	Direction 220° Period 7–9 sec Height 5 ft
1200	51·3	48·3	45·0	52·4	1/8 Cu 2,200′ 4/8 Sc 4,500′ 6/8 Sc 5,900′ Total 7/8	Over 12 miles	200°/12 kt	Direction 220° Period 7–9 sec Height 5 ft

(c) *Air and sea thermographs* indicated the following hourly values (corrected):

Hour, G.M.T.	0900	1000	1100	1200	1300
Dry-bulb temp., °F	51·2	51·3	50·1	51·3	51·3
Wet-bulb temp., °F	48·8	48·6	48·4	48·3	48·2
Sea temp., °F	52·0	52·3	52·2	52·3	52·3

ship's air and sea thermographs are given in the bottom part of the table. It will be seen that the thermobuoy results are in general agreement with the observations taken on the ship and this consistency indicates that the equipment was working satisfactorily. A marked fluctuation in air temperature during the experiment was also clearly shown on the ship's air thermograph. The waves and swell varied the height of the buoy in the water over a range of about 25 cm. (10 in.) but it floated in the correct vertical position. After the experiment the ice standard and wet bulbs were in perfect condition.

The second set of results are given in the same way in Table 2. On 9th July weather conditions were somewhat similar to those in the first experiment but the wind was lighter and recording conditions were much better because there was hardly any roll of the ship and the potentiometer could be read more accurately.

4. Discussion

The results set out in Tables 1 and 2 have been plotted against a linear scale of height in Fig. 2 to show how the dry bulb, wet bulb, dew point and sea temperatures varied with distance from the sea surface. On both days the sea temperature was higher than the air temperature, as measured at the highest level, by between ½ and 1 degree Fahrenheit, and it would be expected that there would be an increase both in temperature and humidity as the sea surface was approached. It will be noted that the temperature rise is very slight; there is in fact a slight inversion between 56 cm. (22 in.) and 135 cm. (53 in.) in Fig. 2(*a*), while in Fig 2(*b*) the whole increase amounts to less than two-tenths of a degree. On both occasions the mean tempera-

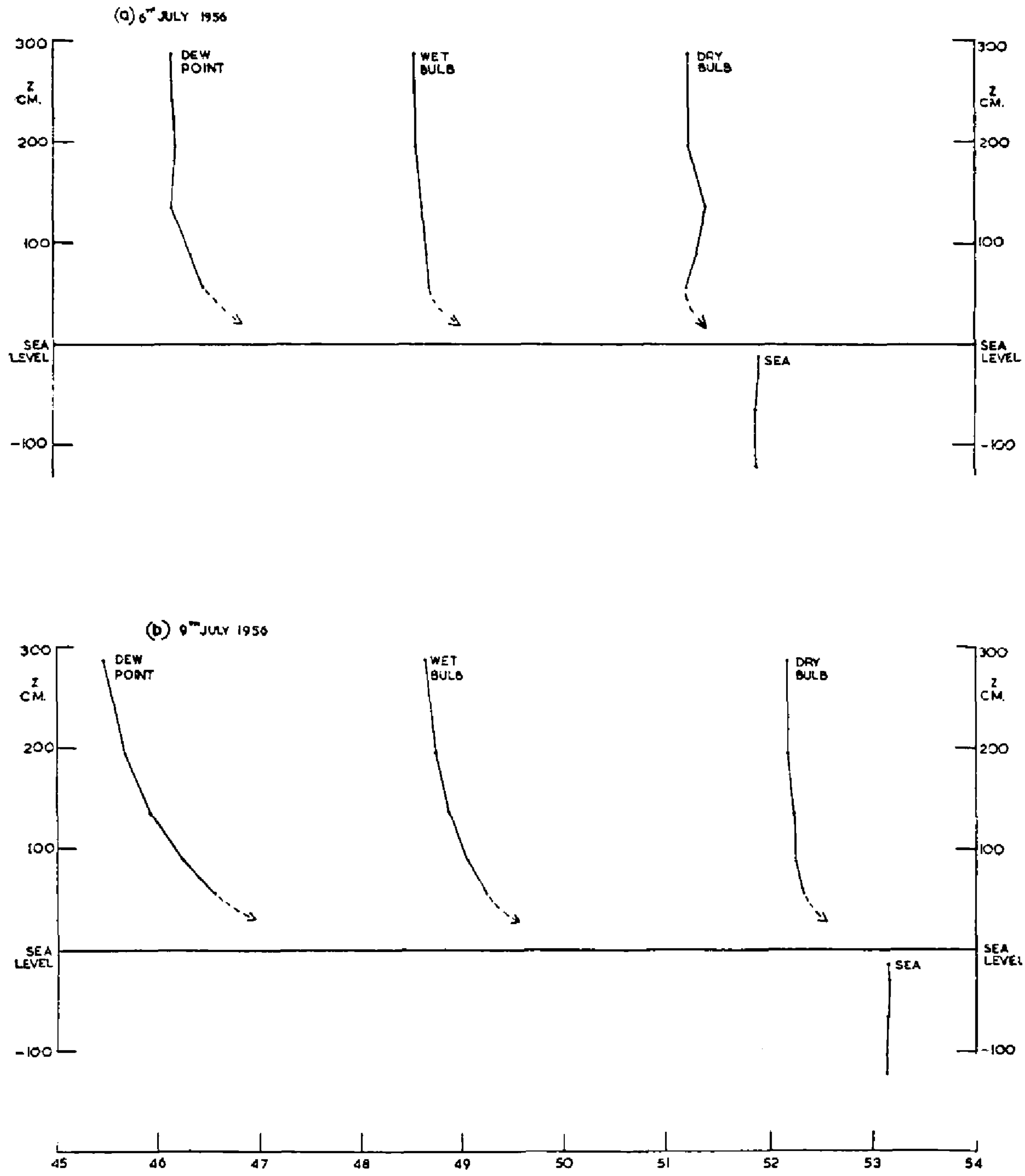


Fig. 2. Profiles measured at ocean weather station I on 6th and 9th July, 1956.

Table 2. Observations taken at Station India (59°N. 19°W.) on 9th July, 1956, 1025–1220 G.M.T.

(*a*) *Thermobuoy observations*

Height above sea, cm.	Mean dry-bulb temperature, °F	Mean wet-bulb temperature, °F	Mean dew point temperature, °F	Mean sea temperature, °F
287	52·18	48·64	45·48	—
195	52·18	48·74	45·69	—
135	52·24	48·89	45·94	—
89	52·26	49·06	46·26	—
56	52·33	49·24	46·56	—
— 13	—	—	—	53·15
— 30	—	—	—	53·16
— 66	—	—	—	53·15
—122	—	—	—	53·13

(*b*) *Synoptic observations* at 0900 and 1200 G.M.T. included the following:

G.M.T.	Dry-bulb	Wet-bulb	Dew point	Sea temp.	Cloud	Visibility	Wind	Waves
0900	52·2	49·0	45·6	53·5	3/8 Cb 2,000′ 6/8 Sc 5,000′ Total 6/8	Over 30 miles	330°/3kt	Direction 340° Period 7–9 sec Height 5 ft
1200	52·7	49·0	45·0	53·6	2/8 Cb 2,000′ 4/8 Sc 5,800′ Some Ac Total 5/8	Over 30 miles	310°/9 kt	Direction 330° Period 7–9 sec Height 5 ft

(*c*) *Air and Sea thermographs* indicated the following values:

Hour, G.M.T.	0900	1000	1100	1200	1300
Dry-bulb temp., °F	52·2	52·1	—	52·7	52·7
Wet-bulb temp., °F	49·0	49·0	—	49·0	49·4
Sea temp., °F	53·5	53·5	53·5	53·6	53·7

ture at 56 cm. (22 in) was considerably closer to the temperature at screen height on the weather ship (about 25 feet or 760 cm.) than it was to the sea surface temperature. The dew point profiles, however, show a more significant increase as the sea surface is approached. The increase is more marked in Fig. 2(*b*) and this is consistent with the somewhat lighter winds on this day. It will also be noted that the observations are less scattered under the better recording conditions of 9th July.

The most striking feature of the results, perhaps, is the fact that the difference between the sea surface temperature and the dew point temperature at only 56 cm. (22 in.) from the surface is a large fraction of that between the sea surface temperature and the dew point at the 287 cm (113 in.) level (which is itself not greatly different from the dew point at the level of the ship's screen). On 6th July the dew points at 56 cm. (22 in.) and in the ship's screen were, respectively, 5·4 and 5·7 degrees below the sea surface temperature and on 9th July the corresponding figures were 6·6 and 7·7 degrees, so that even as near to the sea surface as 56 cm. (22 in.), 95 and 86 per cent, respectively, of the difference (sea surface temperature minus dew point at about 25 feet) still existed.

It will be noted that on both days the sea temperature profiles to a depth of 122 cm. (48 in.) were almost exactly isothermal. This is a little surprising because Houghton[3] measured two profiles of sea temperature at station J during the summer of 1950 in somewhat similar weather conditions and found that the temperature at 122 cm. was appreciably colder than that near the surface, but the fact that his observations were made later in the day, at about 1430 G.M.T., may partly account for this and the somewhat doubtful exposure of the thermobuoy so far as sea temperatures are concerned may also be relevant.

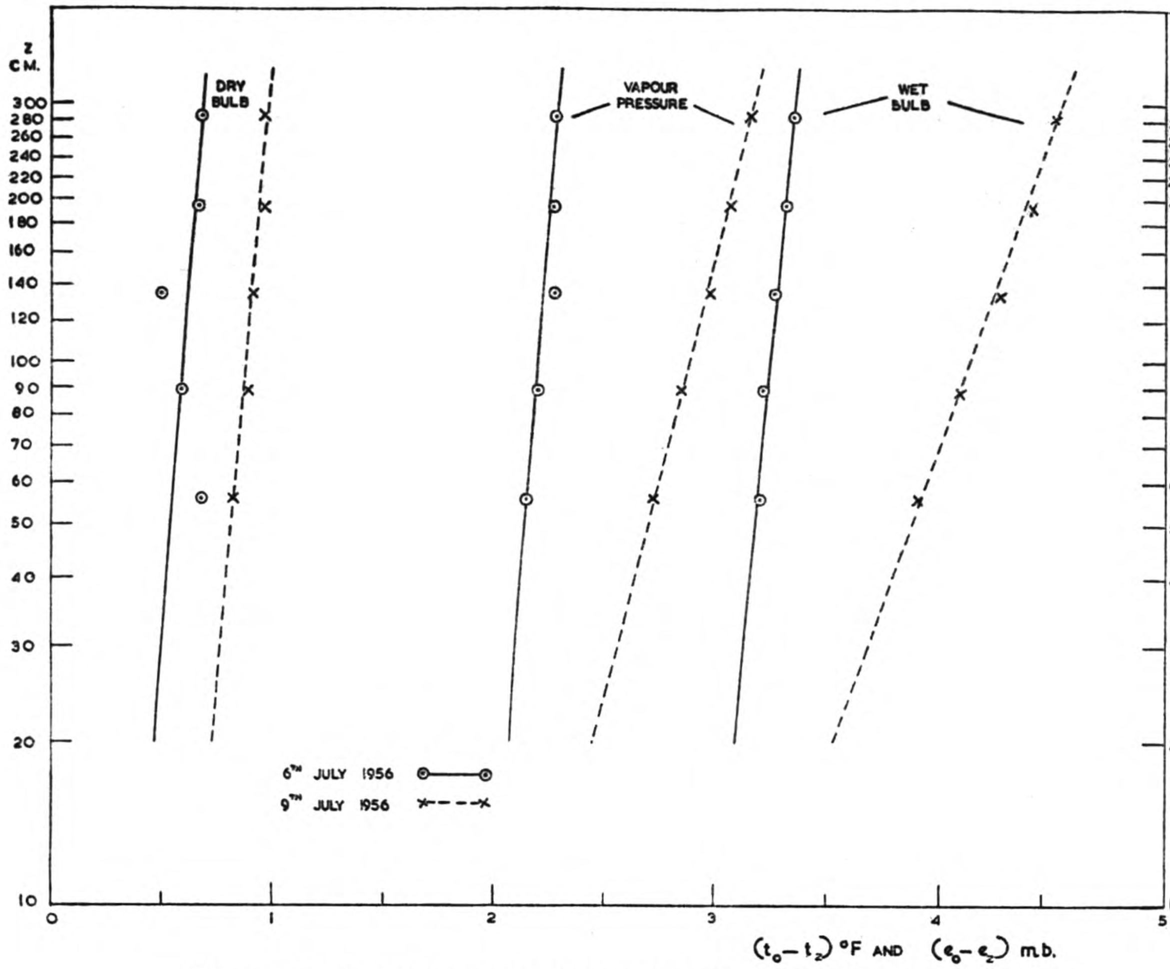


Fig. 3. Profiles of (t_0-t_z) and (e_0-e_z) on logarithmic height scale.

In Fig. 3 are shown, plotted on a logarithmic height scale, the profiles of (t_o-t_z), where t_o is the sea surface temperature and t_z the temperature at height z cm., both for dry bulb and wet bulb temperature, and also of (e_o-e_z), where $e_o = \cdot 98 \times$ the saturation vapour pressure in millibars at the sea surface temperature, ·98 being a correction for salinity, and e_z is the vapour pressure at height z. It is clear that the profiles are reasonably logarithmic, and fit of the second set being particularly good. The straight lines were fitted by the method of least squares and their equations found to be as follows:

6th July, 1956

Dry bulb	$t_o-t_z = \cdot 174 (\log_{10} z + 1\cdot 46)$
Wet bulb	$t_o-t_z = \cdot 233 (\log_{10} z + 11\cdot 98)$
Vapour pressure	$e_o-e_z = \cdot 192 (\log_{10} z + 9\cdot 53)$

9th July, 1956

Dry bulb	$t_o-t_z = \cdot 218 (\log_{10} z + 2\cdot 07)$
Wet bulb	$t_o-t_z = \cdot 866 (\log_{10} z + 2\cdot 78)$
Vapour pressure	$e_o-e_z = \cdot 621 (\log_{10} z + 2\cdot 65)$

It is well known that in neutral conditions the wind profile immediately over an aerodynamically rough surface can be expressed as

$$\frac{u}{u_*} = \frac{1}{k} \log \frac{z}{z_0}$$

where u_* is the friction velocity (defined by $u_* = \sqrt{\frac{\tau}{\rho}}$, where τ_0 is the surface drag and ρ the air density) k is von Karman's constant, and z_0 is the roughness parameter which characterises the geometry of the boundary. Values of z_0 for smooth sea at low wind speeds are now usually thought[4] to be of order 0·02 cm.

Application of the general equation suggested by Charnock[5] for the vertical profile of mean wind over a water surface to the mean wind speeds of 6th and 9th July respectively, gives values of z_0 of about $10^{-2.8}$ and $10^{-3.4}$ cm.

If we refer to the intercept of the temperature or humidity profile on the log z axis as Z_0, by analogy with z_0, it is seen that there is some evidence that the values of Z_0 and z_0 were of the same order in these experiments over the ocean (e.g. on 9th July, 1956 Z_0 was $10^{-2.1}$ cm. for temperature and $10^{-2.7}$ cm. for vapour pressure), and that in these near-neutral conditions the profiles of wind, temperature and humidity are roughly similar. Rider and Robinson[6] have demonstrated that profiles of temperature and humidity over land are roughly similar and it is of importance to test their conclusion over the sea surface under various conditions.

5. Conclusions

The thermobuoy apparatus is capable of giving valuable observations of temperature and humidity profiles near the sea surface, certainly if the wind speed is not much above 12 knots.

The accuracy of the measurements appears to be adequate but in view of the small gradients that have to be measured some improvement in this direction is desirable. On the other hand greater lag in the thermometer elements could probably be tolerated and might be helpful in reducing the effects of fluctuations and the need for so many readings.

Preliminary results indicate that profiles of temperature, humidity and wind are roughly similar. This is a matter of some importance and further observations are needed to confirm these results and to extend them to other wind and stability conditions. It is hoped that it will be possible to do this by making similar measurements at ocean weather stations A, J, K and I. Simultaneous observations of the wind profile would be valuable, but the difficulty in ensuring adequate exposure for the anemometers would be considerable.

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The Process of Forecasting

By C. J. BOYDEN
(Assistant Director [Forecasting] of the Meteorological Office)

A question sometimes asked is why a forecast is issued so long after the observations on which it is based. For instance, the Atlantic Weather Bulletin broadcast from Portishead refers to the chart of over 9 hours earlier. The shipping forecasts broadcast by the B.B.C. at 1340 hours make no reference to what was shown by the 1200 G.M.T. reports. " Does this mean ", an observer might ask, " that my report is not used for some time after I transmit it to Dunstable? " The purpose of this article is to explain broadly how the interval between observation and forecast is accounted for and why it cannot be appreciably shorter.

To get the matter in the right perspective, one must stress that the production of 24-hour forecasts such as these is the outcome of a continuous study of the weather. The arrival of observations is not a starting-point in forecasting but rather a phase in the process. The forecaster knows the pattern of the analysis

(*Opposite page 204*)

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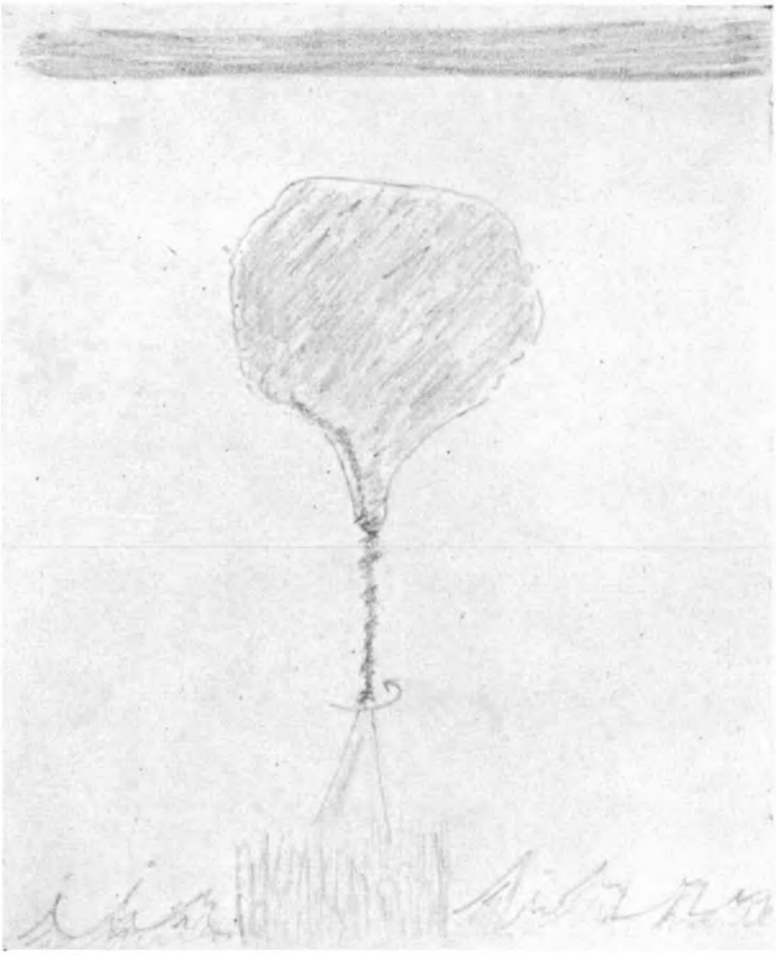
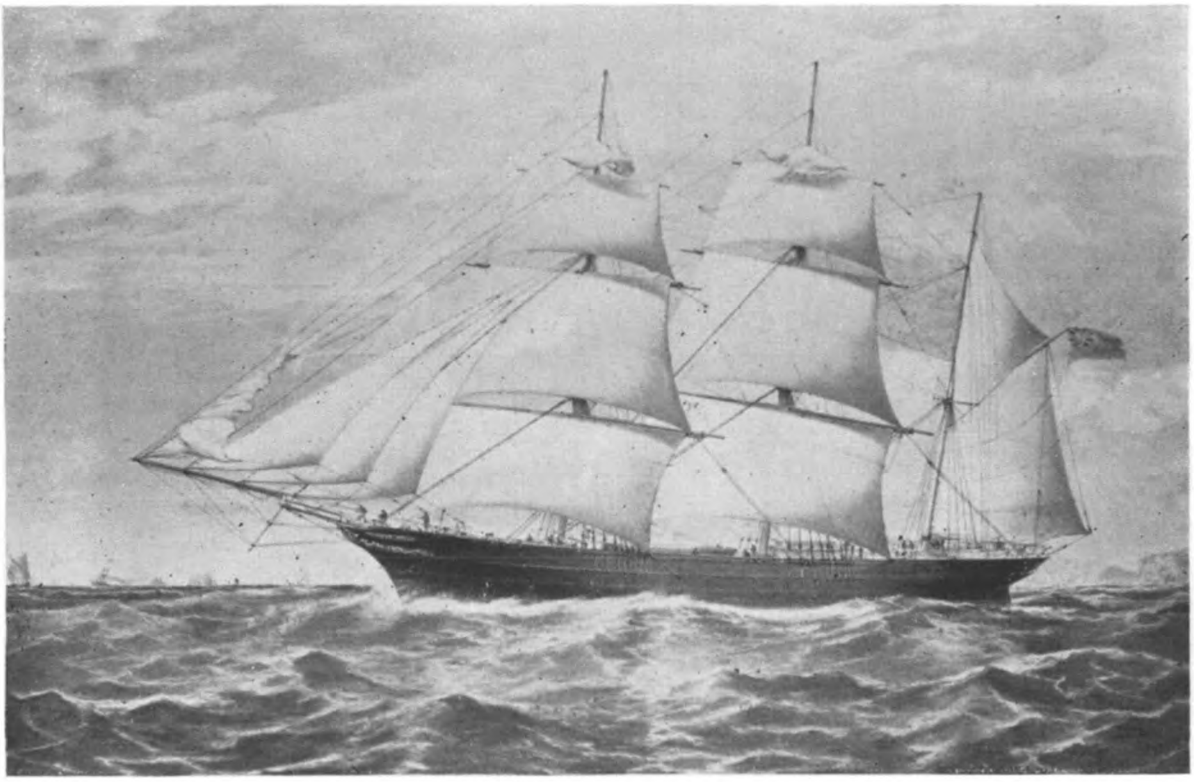
O.W.S. *Weather Reporter*. The officers' wardroom and smokeroom are shown below. See page 216.

By courtesy of Solastos, Ltd.

(*Opposite page* 205)



Waterspout observed from M.V. *Condesa* (see page 187).



By courtesy of the Trustees of the National Maritime Museum.

Alfred Hawley (see page 224)

before he begins to draw his chart, and the observations serve to fix the detail and to indicate the progress of new developments, most of which have already been foreseen as possibilities.

Let us consider, by way of illustration, what happens to midnight observations. A chart at the Central Forecasting Office awaits them, blank except for pencil lines showing where the main pressure centres and fronts are expected to lie. By a few minutes after midnight the reports from the first British stations and some of the ocean weather ships have been plotted, and within half an hour there is also a good coverage over nearby Continental countries. Reports from merchant ships naturally take longer to arrive than reports from stations on meteorological communication networks, but by 0200 G.M.T. a substantial proportion of ships would be plotted on the chart. A chart of this kind has up to 600 observations on it, though the number depends on the time of day, and at times two plotters have to work on it simultaneously to keep pace with the supply, often with a forecaster drawing isobars on any area of the chart that he can get at. A more or less final analysis can be drawn quite soon over areas where the observational network is complete, but elsewhere, and particularly over the Atlantic, the analysis is drawn, discussed and amended as new ideas are developed and late observations arrive. Dubious reports have to be checked against earlier reports from the same area, alternative analyses need to be considered in the areas where observations are sparse, and the final picture must be reasonable in relation to the developments shown by previous charts.

The same kind of routine is going on nearby in the upper air section of the forecast room, where the upper air forecaster makes similar analyses for various levels up to well within the stratosphere. To a large extent developments aloft control the movement, growth and decay of pressure systems at the ground, and forecast changes in the surface pattern are not acceptable if the upper air changes they would require are considered unlikely. Alternatively, upper air changes may give the first vital clue to a new surface development. The upper air over Ireland is perhaps warmer than expected, which may mean the Atlantic depression will turn away north more sharply and spread easterly gales to Rockall and Bailey. It is while charts are being plotted that the forecaster ponders over the significance of points like this, and in this way ideas are formed about future trends.

By now it is past 0300 G.M.T., and the next step is to get ideas on paper. These are embodied in the " prebaratic ", which is a chart of the isobars and fronts as they are expected to be the following midnight. The first tentative lines are drawn, the essentials of the picture take shape and checks are made with the upper air patterns. The final compromise is reached and a quick study of the 0300 G.M.T. reports, especially from ocean weather ships, confirms that developments are starting off on the right lines.

The forecaster now has the basic framework for his 24-hour forecasts: an actual chart near the beginning of the period and a forecast one for the picture three-quarters of the way through the period. For wind forecasts all that is required is careful interpolation between the two charts, and the broad pattern of any possible gale areas emerges. For forecasts of other elements of the weather each area has to be considered carefully, and the grouping of areas decided upon. Finally, an hour is required for transmission and to allow a small margin for delays, and the shipping forecasts are ready for broadcast by the B.B.C. at 0645 G.M.T. The North Atlantic Bulletin comes afterwards and allows time for minor adjustment in the light of the 0600 G.M.T. ship reports. After that—and other forecasts—the 6-hourly routine begins once more.

It is hoped that the picture emerging from this brief account is of a machine continuously performing a complex procedure of analysis and prognosis, its momentum maintained by prompt and regular feeding with observations. This is something quite different from the conception of a forecaster making rapid decisions and issuing forecasts as soon as significant observations reach him. What is significant in relation to 24 hours of weather is not easy to determine. The longer the period of the forecast, the longer is the time the processing of observations must take to produce a logical forecast.

The Kara Sea

By Captain S. B. JUDGE, O.B.E.

[Captain Judge was Master of the S.S. *Moto* (Pelton Steamship Company of Newcastle), a voluntary observing ship.]

About mid-July each year, the first of the navigation season ships commences to make the passage up the River Yenisey to Igarka, to load timber. It is an interesting voyage, which in many respects has steadily improved since my first visit in 1935. At that time ships made the voyage in convoy with few, if any, aids to navigation and little knowledge or information of ice. Language difficulties were many and misunderstandings, together with loading and navigation difficulties, made the Kara Sea and Igarka run very unpopular with most masters and crews.

Many of the old difficulties have gone and with the introduction of DF beacons and the gyro compass, only ice and fog remain to worry one.

Ice has its different peculiarities each year which have to be accepted as they are found.

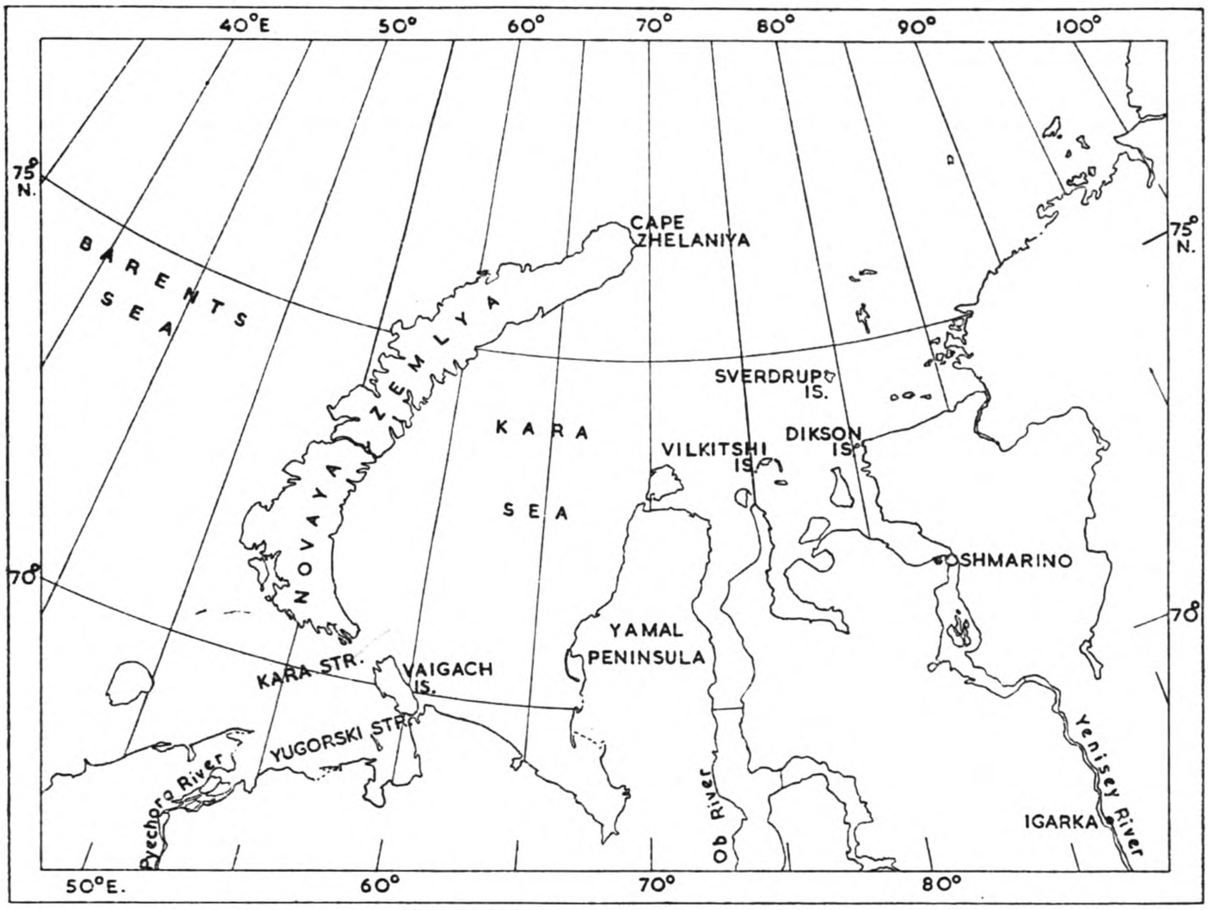
The radio beacons give a fine coverage all the way from the Russian–Norwegian border right through the Kara Sea, and into the River Yenisey to within 40 miles of the Pilot Station. The fact of there being no foghorns at headlands in the Kara Sea makes radar extremely valuable and a ship with magnetic compasses only and without radar does indeed have a difficult voyage in the Kara Sea, for magnetic anomalies abound off the shores and fog is a fairly constant factor.

The Russians have instituted the Kara Sea Ice Agency at Dikson Island and all ships are obliged to report to this Agency twice daily, at 0300 and 1500 Moscow time, after passing the meridian of 30°E. bound to Igarka and until they cross the meridian of 30°E. again homeward bound. Each ship gives her position, course, speed, weather, etc. The Ice Agency, in turn, gives ice information and, at times, gives points to steam between in order to avoid bad ice.

In the past it has been the practice of the Russians to time-charter foreign tonnage for this trade, with about 40 to 50 foreign ships of various nationalities. Some Russian ships load for Europe each year but their ships are mostly employed between Russian ports.

The normal passage into the Kara Sea is through Kara Strait, though at times ships are diverted to Yugorski Strait to avoid the old winter ice drifting across the Kara Strait entrance. It is not uncommon to find the Kara Strait blocked by ice as late as August, though I have had clear passage through in mid-July. The entrance by Kara Strait is quite good in clear weather and clear water, but is quite different with fog or ice. The Strait is affected by the Barents Sea and Kara Sea meeting there, together with the sea bed being so very uneven. These two facts set up a heavy surface ripple which, in fog, is most disturbing when seen on the radar screen. It shows as shoal water or a reef right across the ship's course and doubtless raises doubts in the minds of many seeing it for the first time. The land of Vaigatch Island at the Strait is low and a bad target for radar. I found that " sounding " in fog from 100 miles west of the Strait together with the DF beacons gave a much more satisfactory feeling when navigating the Strait. The Pyechora River causes a current to the north towards southern Novaya Zemlya which can be allowed for by soundings. However, the soundings are of little use in the Strait with its uneven bottom.

Ice can be expected at any time after entering the Kara Sea and the floes are of a similar shape and size year after year. They are often a ¼ mile across and the average thickness is between 10 and 14 feet. These floes of old winter ice are influenced by the Kara Sea current and wind, and as a rule are close packed near



Map of the Kara Sea region.

the Strait. The current flowing down the east side of Novaya Zemlya and back up the Yamal Peninsula in an anticlockwise direction is not as a rule more than a ½ knot, but strong wind accelerates the speed of the current or decreases it altogether.

There is a strong tendency for the ice to drift into the Kara Strait and beyond. This causes the ships to be routed either by Yugorski or, as was the case in 1957, around the north of Novaya Zemlya. On this occasion the first ships of the season were warned by the Ice Agency that Kara Strait was blocked and that a passage must be made by the north of Novaya Zemlya. With this warning came explicit instructions regarding the DF beacon at Cape Zhelaniya and a grave warning of icebergs. The Russian icebreaker *Captain Varonin* was working in that vicinity and we passed the islands of Oranskiye to port about noon on 21st July.

We had met drifting ice in about 76° 30′N. which had become thicker and more heavily packed as we approached the northernmost part of the course. The floes were clean white ice of the usual thickness, 10–15 feet with good leads to work in, and thus we made a fair speed around the tip of Novaya Zemlya. The land was hardly evident except in glacier form and most difficult to establish until its northerly point was abeam. The glaciers were a pale blue and green in colour with high drifted snow behind to the east. Our charts were supplied by the Russians and were fairly accurate except that the glacier formation did not agree with observations taken from time to time. The current was estimated to be flowing to the WNW. until we had rounded the headland. After that, because we were working ice leads in many directions, it was not checked. The refraction and poor radar reception made navigation difficult until points of land came down out of the sky with our near approach.

There were many white bears about on the ice and a lot of seals. I noticed that the seals had a much cleaner appearance than those seen about the Kara Strait and Ob River entrance. Passing close to one floe we saw signs of a fight or struggle of savage dimensions. A bear's carcass lay in a huge pool of blood and a small heap of human clothing, it looked like a pullover and jacket, lay on the edge of the floe. The 3rd Mate and I wondered what story lay there in that pool of blood, but as we were in difficult ice lanes at the time, it was soon forgotten.

After working about 80 miles through the leads and in radio contact with the icebreaker, a target was seen on the radar screen which turned out to be the *Captain Varonin.* It was snowing heavily by now, but doubtless we had been sighted on her radar screen for she quickly came into position ahead and broke a clear channel for us for about 100 miles. On leaving us she gave us the latest ice information which enabled us to make an eastern passage, first for clearer water, then south to the River Yenisey and Dikson Island. Passing the northern tip of Novaya Zemlya on 21st July the temperature was 33°F. Steaming up the Yenisey on 23rd July the temperature was 72°F, and becoming warmer! Such is the short Siberian summer.

The " false spindrift " of the Kara Sea was evident shortly after passing the north of Novaya Zemlya and became more pronounced as we neared Sverdrup Islands. This strange spindrift is an aeration near the surface of the sea and foams with winds of force 4 or above. It shows up a ship's wake for great distances and always gives the impression of a much stronger breeze than is actually present. The first winter formation of ice in its sago-like form has a resemblance to this strange aeration and a similar pattern can be seen on the early pancake ice. It is also very evident all down the River Yenisey though not as pronounced as at sea.

The shores of the Yenisey at this early season have frequent blocks of ice in various shapes which have stranded there on the passage to sea. The tundra land at this time shows a clear pale green colour and for the first 300 miles passage from Dikson to the south is all the vegetation one can see. The Pilot Station situated at Oshmarino, about 140 miles from the sea, is a collection of huts in a low valley protected from the north and east winds. On the opposite bank of this wide part of the Yenisey is the fishing station of Galchikha, populated also by native Siberians of the Samoyed type. The current of the river always flows to the north and during the navigation season can be reckoned at 1 knot. It is, however, affected by winds from north or south which increase or decrease the depth of water respectively. According to wind force, the difference of depth may be as much as 7 feet, and a southerly wind increases the speed to as much as 2 knots and a northerly wind decreases it.

The passage from sea to Igarka is about 500 miles and is pilotage for 360 miles of that distance. The Yenisey is, however, navigable by river ships carrying 500 passengers on a light draught of 7–8 feet for a further 1,000 miles to Krasnoyarsk. At Igarka the ice breaks up as a rule about 5th June, when severe flooding takes place. One can see stranded timber scows high up on the banks of the river and a steady trail of stranded logs. The river rises some 70–80 feet during this flooding and doubtless carries all the old ice to sea on its roaring torrent.

Igarka is formed of two towns built around a saw-mill sprawling across about 3 miles of countryside. It is the usual Arctic town built of wood with wooden roads, high up from the river side. Loading is quick and is carried out throughout the full 24 hours. The season ends there as a rule about 5th–8th October, when winter has commenced and temperatures are about 14° to 19°F. For the last four years a few of the charter ships have made two voyages per season to Igarka. My ship was the first to do this and on such occasions one had the last of the old ice in July and the growing winter ice in October.

We left Igarka on 3rd October, 1957 with winter rapidly closing. The town of Igarka was well covered in ice, the small tundra streams had frozen and all the river banks were snow swept. The trees had all taken on their fine winter colour and the river current was slowed almost to a stop. When the snow cleared away we met frost smoke drifting across the river continuously. The rigging, ropes, etc., rapidly became many times their normal thickness and the deck load of timber had a covering of ice. The two Russian pilots were making their last trip on the Yenisey for that season and, according to conversation with one of them, were looking forward to a winter's session at school, learning the English language. After steaming about 280 miles down the river we met pancake ice in places but in the main had clear water.

The pilots were discharged at Oshmarino, where the river is beginning to widen to a gulf, and shortly after we lost the frost smoke. However, we met ice of varying thickness brought by current and wind. The Ice Agency gave us an optimistic picture of the ice situation which persuaded me to carry on without icebreaker assistance. Ice working in a steamer which has a metal propeller and no ice stiffening makes icebreaker assistance necessary much earlier than otherwise.

The wind was light and we were able to use the " cracks " to steam in a general direction towards the coast but we made only slow progress out past Dikson Island and to the west. When in a position about 73° 45'N., 77° 20'E. the wind freshened from the north-east and the vessel became fast with hard pressure along her starboard side. I radioed for icebreaker assistance and received an immediate answer from the icebreaker *Siberiakov* that she was coming to our assistance at 8 knots. We could only try to keep the propeller clear and wait the 7 hours until she would arrive. The nights draw in rapidly at that time of the year and normally every night gives a display of northern lights. We eventually saw the icebreaker's searchlight swinging about as she steamed towards us. The light was searching for ridged ice caused by the wind pressure and odd leads of easy steaming which they used at every opportunity.

When the icebreaker commences to release a ship she steams close past, about 14–20 feet away, along one side, as a rule to leeward. The ship needs to have her engines going ahead at this manoeuvre so that she may slip in the wake of free water astern of the icebreaker and as close as possible. Close station-keeping makes the icebreaker's work a great deal easier for the lane will close rapidly with any wind pressure. If the wind is strong across the track the 80 foot channel in the ice closes astern at ½ mile and thus the icebreaker has to return and repeat the manoeuvre of breaking out. Progress is slow and difficult, especially at night. Those icebreaker men are very patient and fine chaps to work with. *Siberiakov* assisted us about 180 miles then gave his DR position and a cheery message of good sailing, to which we replied with grateful thanks. The *Siberiakov* then returned to the Yenisey to bring out the last ice convoy of Russian ships. They always leave a few days later than the foreign ships and at times have a most difficult passage.

Snow was the difficulty for the rest of the Kara Sea passage and only 6 hours after leaving the Kara Sea for the Barents Sea we had a temperature above freezing and sunshine. We found that the usual current off Vilkitshi Island, ½ knot to WSW., was accelerated by wind pressure and ice to drift us about 2 knots. Many seals were lying about the ice and a great number of them were swimming about on the surface near Kara Strait. The ice of Kara Strait, which we had found to be heavily packed in August, had all cleared away. The surface ripple was there and the land of Vaigatch Island looked most inhospitable.

The Kara Sea provides a great variety of weather, navigation, scenery and temperatures, and is most interesting.

Whales Observed in the Atlantic Ocean

NOTES ON THEIR DISTRIBUTION PART II*

By S. G. Brown
(National Institute of Oceanography)

Sperm whales

Forty-three sightings of sperm whales were reported from vessels for which the mileage steamed has been calculated (Fig. 3). The number of whales seen was 148.

* Part I of this paper appeared in the last number of *The Marine Observer*.

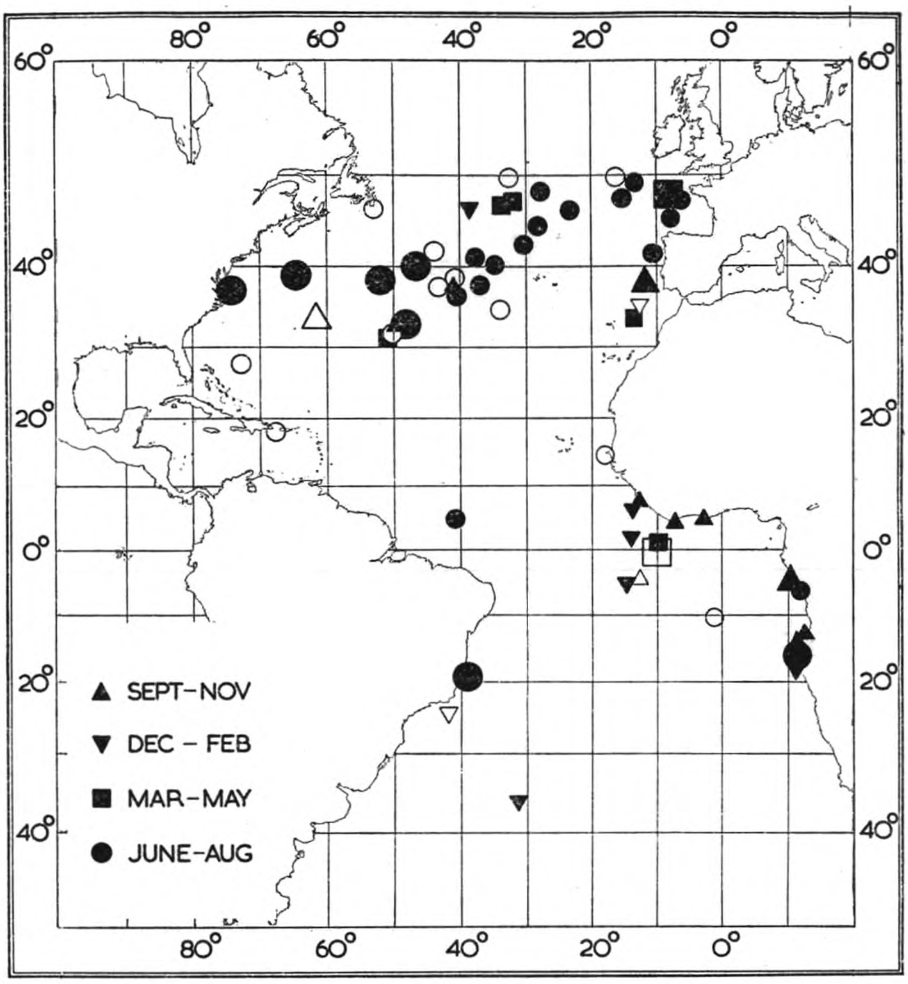


Fig. 3. The distribution of sightings of sperm whales. (Black symbols denote mileage reports, open symbols denote *M* reports; small symbols denote 1–4 whales, large symbols denote 5 or more whales.)

Twenty-seven of the sightings were of one or two whales only and the greatest number seen at one time was about 20 animals.

Thirty-four observations of 111 whales (0·20 whales/1,000 miles) were made in the North Atlantic Ocean. Twenty-seven of these observations (101 whales) were in the Europe-North America zone (0·27 whales/1,000 miles). Nine whales (0·09 whales/1,000 miles) were seen in African coastal waters.

In the South Atlantic Ocean there are nine sightings of 37 animals (0·24 whales/1,000 miles). Of these, 29 whales were seen in six sightings in African waters (0·48 whales/1,000 miles).

A further 17 sightings of 45 sperm whales were noted on the *M* reports and these are indicated by open symbols in Fig. 3. Thirteen of these sightings were in the North Atlantic Ocean, 10 being in the Europe–North America zone.

The number of sperm whales sighted is not greater than the combined total of rorquals and humpback whales, either north or south of the equator. This was also found to be the case in the Indian Ocean.

The seasonal distribution of sperm whales shown on the chart agrees very well with the distribution of this species in the Atlantic Ocean as indicated by Townsend[2] on his charts plotted from the logbook records of nineteenth-century American whaleships. The summer whaling in the North Atlantic Ocean on the " Western Ground " and to the east and north of it, and the whaling throughout the year on the " Coast of Africa " ground in the South Atlantic compare closely with the sightings in these regions. A few of the sightings, however, cannot be paralleled on his charts. The most noticeable difference is in the records in the western approaches to the English Channel, the Bay of Biscay, and off the coast of Portugal; an area in which Townsend has hardly any records. This is a result of

American whalers not frequenting this area, for it is known that British sperm whalers of the period saw sperm whales in these waters. Bennett,[3] referring to the distribution of this species says (page 181, footnote), " Captain T. Stavers informs me, that he has lowered his boats in pursuit of a school of Cachalots when but forty-eight hours' sail from Portsmouth harbour." The logbooks of two British whalers[4] examined by the author also include references to sperm whales seen in this area. The *Matilda* (Captain W. T. Brookes) saw several sperm whales, and took one large one, on 19th August, 1832 in position approximately 43° 39′N., 10° 55′W., and the *Active*, under the same commander, saw a sperm whale (or whales) on 13th June, 1838 in position approximately 37° 47′N., 13° 50′W.

The need for caution in interpreting the present series of charts is emphasized by the absence of observations in the Azores area and the southern North Atlantic Ocean generally. There is, however, a flourishing sperm whale fishery in the Azores, the largest numbers being taken in the months June to August (Clarke, 1956, page 284, Fig. 14).[5] Similarly, Townsend's[2] evidence of the movement of sperm whales in the North Atlantic Ocean southwards towards the equator in the northern winter, to the " Cornell ", " San Antonio " and " Twelve-Forty " grounds (between the equator and 20°N., and west of 20°W.), cannot be confirmed on the present chart. The explanation is, of course, that few shipping routes cover these regions. Only 3,000 miles were steamed in the Azores " square ", of which only 1,000 miles were in the period June to August.

Kirpichnikov[6] has given an account of some large whales seen in the Atlantic Ocean on a voyage of the " Slava " whaling fleet from Gibraltar to the Cape of Good Hope in November, 1947 and on the return voyage by nearly the same route in April and May, 1948. During the return voyage sperm whales are reported to have been seen many times, single whales or small groups of whales being encountered nearly every day from 28°S. to 26°N. Precise details of date and position are given, however, for only four sightings, and one of these is difficult to interpret. The other three records refer to a solitary male, two schools of eight and six whales respectively, and to some small schools, all seen close inshore off the north-west African coast between 19°N. and 27°N. on 12th, 13th and 14th May. These observations thus fill a gap in the present series.

Rorquals

Forty-five sightings of rorquals were reported by vessels for which routes have been plotted and these are shown in Fig. 4. The number of whales seen was 223. Twenty-nine of the sightings were of one or two whales only. Schools of 10 or more whales were seen on five occasions and the greatest numbers seen at one time were about 50 and about 30 whales, both sightings in the North Atlantic Ocean.

An additional 14 sightings of 50 whales are plotted from the *M* reports, 10 of them in the Europe–North America zone. These *M* sightings are not included in the discussion below except where they are specifically mentioned.

If Fig. 4 is compared with Fig. 3 it will be seen that the rorquals tend to have

Table 3. Sightings and numbers of rorquals in different seasons in the Europe–North America and South Africa–South America zones.

	Miles steamed	No. of sightings	Sightings/ 1,000 miles	No. of whales	Whales/ 1,000 miles
Europe—North America					
September–November ..	80,900	4	0·05	12	0·15
December–February ..	69,800	1	0·01	2	0·03
March–May	88,700	3	0·03	54	0·61
June–August	135,800	12	0·09	69	0·51
South Africa—South America					
September–November ..	19,400	11	0·57	50	2·58
December–February ..	13,800	6	0·43	11	0·80
March–May	4,400	—	—	—	—
June–August	5,000	1	0·20	2	0·40

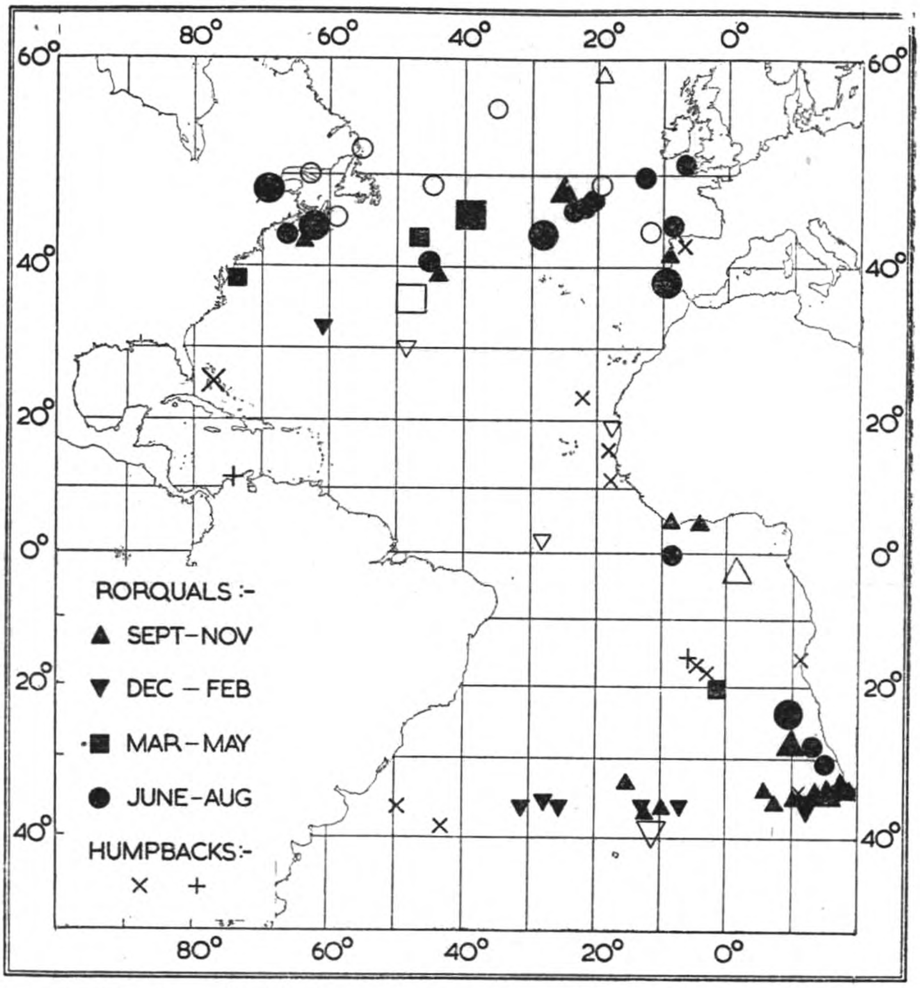


Fig. 4. The distribution of sightings of rorquals and humpback whales. (Black symbols and X denote mileage reports, open symbols and + denote *M* reports; small symbols denote 1–4 whales, large symbols denote 5 or more whales.)

been seen farther from the equator in both hemispheres than the sperm whales. This is in accordance with what is known of the distribution of the different species.

There are 22 sightings of 140 whales (0·25 whales/1,000 miles) north of the equator, 20 of them (137 whales) in the Europe–North America zone. A calculation of the numbers of sightings and whales per 1,000 miles steaming (Table 3) suggests that the greatest number of rorquals is present in this zone in the period June to August. It is perhaps significant that 7 of the 10 *M* sightings in this zone are in the same period. (The high figure for the period March to May results from the inclusion of a sighting of 50 whales.) Earlier work by several authors has shown that rorquals were present in numbers in the summer months in the waters west of the Hebrides and around Iceland, the Faroes, Finmark, Bear Island and Spitsbergen. The occurrence of numbers of rorquals at this season in this zone much farther south is interesting. It may be that numbers of rorquals in the North Atlantic Ocean either miss the northern migration altogether, or get out of step with the main migration movements. This has been suggested in the case of rorquals in the North Indian Ocean.[1] It must be remembered, however, that if there were as much coverage in higher latitudes, it might be shown that the density of the population in this temperate region is far less than in arctic or subarctic latitudes.

There are no sightings in the Caribbean area and only one *M* sighting in the Central area but the total distances steamed in both areas are small and it is probable that more rorquals are present than are suggested by these observations.

The five sightings just north and south of the equator are of special interest in connection with the seasonal migrations of the stocks of rorquals in the northern and southern hemispheres. The one *M* sighting mentioned above was of three whales in January, and it is possible that these were northern hemisphere whales at the southern limit of the southward winter migration. On the other hand, the two sightings off the Guinea coast in November, one of a single whale, the other of two whales together, may be of southern hemisphere whales at the northern extremity of their northward winter migration. This is suggested by the date of the sightings and their position close to the long stretch of east-west coastline which forms a northern boundary to the eastern half of the South Atlantic Ocean. The two sightings just south of the equator in this region support this possibility. One is of a single whale at the beginning of August and the other, in approximate position 3°S., 1° 30′E. of about 12 whales in September. All these dates are consistent with these whales belonging to the southern hemisphere stock.

In the South Atlantic Ocean there are 23 sightings of 83 whales (0·53 whales/1,000 miles). Eighteen sightings (63 whales) are in the South Africa–South America zone. Records from this zone are valuable because they may give a clue to the routes followed by rorquals in their annual migrations to and from the Antarctic. The observations made in each period in this zone are given in Table 3. Seventeen of the 18 sightings were made in September to November and December to February, and these are likely to be of migrating animals on their way southwards. (All the December to February sightings were made in December.) Few vessels cover this region and the number of observations is very small but it seems that the greatest number of rorquals is seen in this zone in September to November. There are no observations in the period March to May, when whales on their northward migration might be expected to be met with, but the distance steamed at this time is very small.

Table 4. Distance steamed, sightings, and numbers of rorquals between 30° and 40° S. in September–February.

	Degrees West 60°–50°	50°–40°	40°–30°	30°–20°	20°–10°	10°–0°	0°–10°	10°–20° Degrees East
Miles steamed	2,200	3,000	2,100	2,000	2,400	3,900	4,600	11,400
Sightings	—	—	1	2	3	2	2	7
Sightings/1,000 miles . .	—	—	0·48	1·00	1·25	0·51	0·43	0·61
Number of whales . .	—	—	1	2	4	4	5	45
Whales/1,000 miles . .	—	—	0·48	1·00	1·67	1·03	1·09	3·95

Table 4 shows the distance steamed, sightings and numbers of whales seen in each of the 10° " squares " between 30° and 40°S. from 60°W. to 20°E. in September to February. The sightings considered by themselves suggest that there may be a concentration of rorquals between 30°W. and 10°W. but the figures for the numbers of whales seen per 1,000 miles steaming suggest that they are fairly evenly distributed across the zone from 30°W. to 10°E. and that there is a concentration close to the South African coast. The absence of sightings near the South American coast may be significant but further records from this zone are necessary before any definite conclusions can be drawn.

In the central South Atlantic there are only two sightings and there are none in South American waters. There has been very little observation in these areas and this is unfortunate because it is possible that many rorquals from the Atlantic sector of the Southern Ocean are to be found here during the period of their winter stay in tropical and subtropical waters.[7]

Kirpichnikov[6] gives details of a number of sightings of rorquals off the west coast of Africa between approximately 6°N. and 30°N. Four blue whales were sighted on 10th November, 1947 in about 18°N., 18°W. Fin whales were sighted on two days. On 12th May, 1948 four fin whales were seen at about 20° 50′N., 18° 10′W. and on 16th a number were seen north of the Canary Islands. Sei whales were seen on three days in May. On 8th, in position 6° 30′N., 14°W., single specimens were sighted. Two were observed on 12th at 20°N., 18° 20′W., and on 15th a number were recorded between the Canary Islands and the African coast. Apart from a single *M* sighting in January there are no records of rorquals in the present series in this area so that here, as in the case of the sperm whale sightings, the Russian observations fill a gap.

Humpback whales

There are very few records of humpback whales in the reports. Eleven sightings of 22 whales were noted in the reports used in the mileage calculations, and some of them are based on rather doubtful identifications. There are two additional *M* sightings, each of two whales. All the sightings are shown in Fig. 4. Only two observations refer to more than one or two whales; three whales were seen together off the Guinea coast in November, and a school of seven in the Bahama Islands in March.

The North Atlantic Ocean records fit into the pattern of humpback whale migration suggested by Kellogg,[8] except for two sightings in June and July off the west African coast. The sightings in South African waters in September and October, and in South American waters in November and December, agree with what is known or conjectured about the movements of this species in the South Atlantic Ocean.

The three sightings near St. Helena in December, April and July, however, are more difficult to fit into the accepted pattern of migration in coastal waters. It may be that the identifications are incorrect but it is suggestive that three sightings (two pairs and a single whale) all believed to be humpback whales should have been made in this restricted area in mid-ocean. One of the sightings is a record from St. Helena itself and refers to two whales, described by local fishermen as being of the " hump-backed " species seen close inshore on 18th July, 1952. The report mentions that the last occasion on which whales visited the island was in 1950 when a cow and a calf remained in various bays around the north side of the island for over a week. This record is especially interesting in view of Bennett's references (1840, page 232)[3] to the distribution of humpback whales. He refers to this species being seen in the Atlantic and Pacific Oceans " seldom at any very considerable distance from land ", and goes on, " Examples are occasionally seen in the neighbourhood of the islands of the Pacific; and very frequently in the deep waters around the Island of St. Helena, where their visits are far from pleasing to the fishermen, who believe that they destroy the fish, or frighten them from the coast." Later, referring to value of the flesh of the calf as food, he says, " I am informed by Captain Stavers, that upon the occasion of his killing a calf of this species, whilst his ship was at anchor in St. Helena Roads, the flesh was sought as a delicacy by every class of residents on that island ".

Whether any large numbers of humpback whales are to be found in mid-ocean in the South Atlantic at some season cannot be decided until many more observations have been made in the area. Wheeler's mention[7] of " Two whales (? Humpbacks) ", seen on 23rd August in approximate position 19°s., 22°w. is interesting in this connection.

Southern right whales

Two naval vessels have sent in reports which include notes on whales seen at Tristan da Cunha. The first report refers to some whales seen around the island in the last week of October, 1952. The report states that, " Two were seen close inshore and appeared to be standing on their nose as the tail was sticking up out of the water. One was seen to come some distance out of the water (about a third of its length) and then dive down into the sea again. Its overall length appeared to be about 60 feet. It was black in colour."

The second record refers to the period 1st–5th October, 1955. It reads, " Whales could be observed at practically any time. Often seen with their tails in the air feeding off the bottom in the kelp. They could be heard blowing at night. Classified locally as southern right whales. Certainly no dorsal fins were seen ".

There seems no doubt from the descriptions that these whales were southern right whales. On the basis of observations in the period January, 1950 to October, 1952 at Tristan da Cunha, Elliott[9] states that the right whale is, "Becoming increasingly numerous and almost a pest. At least a hundred round Tristan and Nightingale in 1951. Appears in July off Settlement beaches, reaches a peak in October and leaves again in December." Townsend's charts[2] show right whales taken on the "Tristan Ground" in the period August to March, chiefly in the months of September and November to January.

Conclusions

The main conclusions may be summarised here. There is apparently not a great difference in the overall density of the population of large whales per unit area in the North Atlantic as compared with the South Atlantic Ocean. The highest concentrations of large whales in the Atlantic Ocean as a whole occur in the temperate zones between South Africa and South America, and Europe and North America; and there are numbers also in African waters. The smallest concentrations are found in the central areas north and south of the equator.

As in the Indian Ocean, the number of sperm whales seems not to out-number that of the different species of baleen whales combined, in either hemisphere. In summer the concentration of baleen whales in the Atlantic sector of the Antarctic is many times greater than in the Atlantic Ocean, but in winter the difference is much less.

Some rorquals in the North Atlantic appear either to miss, or get out of step with, the main migration movements to the north for the summer. Rorquals observed in the 30° to 40°S. zone between South Africa and South America were probably on their southward migration, and there is some evidence of a concentration of these whales close to the South African coast.

The occurrence of humpback whales in the central South Atlantic Ocean, and of southern right whales at Tristan da Cunha, has been noted.

As mentioned in the introductory paragraph, the main purpose for which reports are required* is to obtain new information on the world distribution of the cetacea, especially that of the larger whales, of which the rorquals and the sperm whale are of commercial importance as the basis of the whaling industry throughout the world. Evidence of the relative concentration or sparseness of the whale populations in different areas is very useful because the abundant species are ecologically important as animals at the top of the food chain ultimately founded on the small planktonic animals and plants of the oceans.

The National Institute of Oceanography will be most grateful for the continued co-operation of mariners who are willing to make whale observations.† Reports are required from all oceans and of all species of whales. If full records can be given, with the vessel's noon position for each day (or every second or third day), these will be most valuable, as they allow the vessel's track to be plotted, and estimates of the mileage steamed by vessels and the coverage of different areas to be made. However, all records are useful and will be examined.

It is hoped to publish further preliminary reports on the results in due course.

Acknowledgments

The National Institute of Oceanography is indebted to the Director-General of the Meteorological Office, Sir Graham Sutton; the Marine Superintendent, Commander C. E. N. Frankcom; his staff, and the Port Meteorological Officers for their help in organising and operating the scheme, and for the extracts of whale observations from the meteorological logbooks of vessels.

* See also *The Marine Observer*, **22**, 1952, pp. 87–90.

† Special forms for this purpose and all necessary instruction can be obtained from any Port Meteorological Officer in United Kingdom ports. Further supplies of these forms will be sent to the ship by the National Institute of Oceanography.

These notes are based on whale reports received from a total of 159 ships, of which five were H.M. ships, up to December, 1956. We wish here to thank all masters of vessels and observers who have sent in these reports, and to record our appreciation of the trouble they have taken to make useful observations for us. It is hoped to send an offprint of this paper to each vessel concerned.

The author is indebted to the Director of the National Maritime Museum, and his staff, for facilities in the Reading Room there, and he wishes especially to thank Miss Katherine Lindsay-MacDougall for her help. He is grateful to Dr. N. A. Mackintosh for his helpful advice and criticism and to Mr. A. Style for his valuable assistance in the preparation of the figures.

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A New Ocean Weather Ship

On 16th May, 1958, the former " Castle " class frigate H.M.S. *Oakham Castle* was renamed O.W.S. *Weather Reporter* by Lord Hurcomb, chairman of the Meteorological Committee, thus marking the beginning of her career as an ocean weather ship (see photographs opposite page 204).

Weather Reporter replaces *Weather Explorer*, which was formerly the Royal Naval " Flower " class corvette *Thyme*, and which is the first of the earlier British weather ships to be withdrawn from service. *Weather Explorer* and her three sister ships—*Observer*, *Recorder* and *Watcher*—have done over 11 years strenuous service as ocean weather ships in the Atlantic. Prior to that all these ships did a very good job on the exacting duty of convoy escort vessels and it is scarcely surprising that they are now " showing their age ", and need replacing by somewhat newer vessels.

It is right to mention that the choice of these ships as ocean weather ships has been amply justified. They have been economical to operate, they have been excellent sea boats and have carried out their duties very effectively. But the " Flower " class corvettes are rather small and their accommodation is inevitably cramped. The " Castle " class frigates being somewhat larger in size (length about 230 feet, compared with 205 feet) can provide much more comfortable accommodation than their predecessors. They also have the advantage of greater fuel capacity, which enables them to operate at either of the Stations, A, I, J or K without the necessity of refuelling.

Oakham Castle was built at Glasgow by Messrs. A. J. Inglis and launched in July, 1944. Her conversion to an ocean weather ship, which involved quite extensive work and which took about nine months, was carried out by Messrs. James Lamont & Co. at Glasgow.

The renaming ceremony was carried out at Princes Pier in Greenock; this pier adjoins the riverside and provides a good view of the Clyde and of the hills surrounding the Gare Loch. About 150 guests were present including the Provost of

Greenock and other prominent local citizens, representatives of foreign Governments which are signatories of the North Atlantic Ocean Station Agreement, and representatives of British and foreign airlines operating across the Atlantic. Wives of the ship's company of *Weather Reporter*, and representatives from other weather ships and from the weathership base, were also present. Fortunately, the weather was fine with a fresh northerly breeze. The ship's white hull and bright yellow upper works, in contrast to the black hull of the earlier ships, gave her a gay and cheerful appearance. At her foremast flew the flags of the other countries which operate weather ships in the North Atlantic—a tribute to her international work.

During the forenoon, Lord Hurcomb had made an unofficial inspection of the ship. Before officially renaming the ship he inspected the ship's company, totalling 56, who were lined up on the pier in front of the ship and he had a few words to say to each man. In his address to the assembled company, Lord Hurcomb emphasised the good work which had been done by the original weather ships since the first North Atlantic Ocean Station Agreement was signed in 1947; he referred to the international nature of the work of these ships for peaceful ends and for the benefit of humanity and pointed out that the observations provided by the weather ships give a regular series of observations at the surface and in the upper atmosphere from fixed points in the Atlantic, which supplement the surface observations provided voluntarily by observers aboard a large number of merchant ships. Lord Hurcomb stressed the good job which had been done by the men serving aboard the weather ships during these 11 years, in carrying out these important duties in all weather in the notoriously stormy North Atlantic Ocean; he drew particular attention to the fact that the meteorologists and some of the radio and radar staff aboard these ships are not professional seamen but have nevertheless stood up to the job admirably. He referred to the difficulties of launching a meteorological balloon in a storm, and tracking the balloon by radar in such circumstances, and preparing hot meals in heavy weather—tasks which were regularly carried out no matter what the weather was. Finally, Lord Hurcomb expressed a hope that the crew would be happy in their new ship and that she would prove even more successful than her predecessor.

Lord Hurcomb then went aboard the ship, accompanied by the Master, and officially renamed her by releasing a canvas cover which exposed her name painted on the bow and said " I rename this ship *Weather Reporter*—may good fortune attend all those who sail in her ".

A meteorological balloon carrying a radio sonde and target was then released for the benefit of the guests; visitors were then invited aboard the ship to inspect her. An exhibition of air/sea rescue equipment—such as inflatable life rafts, immersion suits, first aid equipment, portable radio sets for use in boats, and rescue belts, was displayed on the quay alongside the ship. Afternoon tea was served, by arrangement with British Railways, aboard restaurant cars drawn up on the station alongside the pier.

An inspection of the ship showed that her accommodation was considerably more spacious and better fitted out than that of her predecessors, which were converted soon after the war when almost everything was in short supply. Every officer and petty officer has a well-appointed cabin to himself whereas the ratings are accommodated in three-berth cabins. The messes and smoke rooms for officers, ratings and petty officers are lined with comfortable cushioned settees and they are attractively furnished generally. The decks throughout the accommodation are covered with semastic non-skid tiles. The sides and deck head of all the accommodation are decorated in cheerful colours and so treated that they do not require painting. The sides of public rooms and of most cabins are covered with a plastic material similar to wallpaper, bonded to special marine asbestos sheeting.

The meteorological office is situated on the upper deck aft, immediately forward of the balloon shelter. It is a bright and cheerful room lighted with four 21-inch portholes. The equipment includes two radio sonde receivers, a plotting table for upper winds, three mercurial barometers and a " precision aneroid ", a distant-reading thermograph from the engine room intake, a distant reading psychrometer from screens on each side of the bridge, and a distant reading anemometer and wind direction dials, the instruments being mounted on a yard each side of the mainmast. For radio sonde reception a special aerial is mounted on top of the balloon shelter. A wave recorder connected to instruments located in the engine room, and a recording potentiometer which records total radiation and net flux of radiation from instruments mounted near the bridge, are also included.

Hydrogen stowage is provided on deck each side of the balloon shelter but for use in very heavy weather a few cylinders are provided inside the shelter. The balloon shelter is provided with special ventilation system to obviate any risk of a hydrogen explosion and there are no electrical fittings of any kind inside it. Special wiring has been installed between the meteorological office and various points in the ship where experimental meteorological equipment may need to be installed, such as the bridge, masts and bow of the ship, so that special investigations can be carried out as necessary. The masts are provided with reasonably spacious platforms from which it will be possible to carry out experimental work aloft more easily.

The radio equipment, which is of a more modern type than that installed in the earlier weather ships, includes HF and MF W/T and R/T, VHF and UHF R/T, MF and VHF D.F., a non-directional MF beacon, and " walkie-talkie " sets for use in the lifeboats. A 10 cm. naval type radar similar to that installed in the earlier ships is provided, as well as a " Decca " radar for navigational purposes. In order to reduce the number of aerials between the masts and to obtain improved performance, " whip " aerials are extensively used.

The ship's navigational equipment includes a gyro compass, an echo sounder, Loran, " clear view " screen.

The ship's machinery consists of a 4-cylinder triple expansion reciprocating engine associated with two oil-fired water tube boilers, in separate " enclosed " stokeholds. Normally the ship will operate on one boiler only. Electrical power is provided by two 80 kw generators.

The 24 feet lifeboats constructed of aluminium alloy, provided with diesel engines, and fitted with canvas protection hoods are for the dual purpose of ship's lifeboat and air/sea rescue. A capstan, which can also be used for mooring the ship aft, is used for hoisting the boats.

Two 10-man and two 20-man inflatable dinghies are also carried as part of the ship's lifesaving equipment, as well as several similar dinghies for air/sea rescue purposes.

Weather Reporter is under the command of Captain A. W. Ford, who has served aboard the weather ships since they first came into service in 1947; he was formerly in command of *Weather Recorder*. C. E. N. F.

SPECIAL LONG-SERVICE AWARDS

Each year since 1948 special awards have been made to the four voluntary marine observers whose long and meritorious work at sea for the Meteorological Office is considered as deserving special recognition.

All officers who have sent us meteorological returns in 15 or more individual years and who have sent in at least one meteorological logbook in the previous calendar year, come into the zone of consideration for these awards. Their records are abstracted from the personal cards which have been compiled for them from their logbooks through the years, and a mathematical formula, which takes into account the number of years observing and the assessment which has been accorded to each of their returns, effectively places them in an order of merit.

This year the Director-General is pleased to make awards to the following captains:

1. Captain G. G. Langford (Port Line) whose first meteorological logbook was received here in 1924. In 16 years he has sent us 30 returns, 23 of which have been classed excellent.

2. CAPTAIN F. G. WATTS, R.D. (Cunard Line). A voluntary observer since 1926. In 18 years he has sent us 48 returns, 21 of them being classed excellent.
3. CAPTAIN C. R. TOWNSHEND (Port Line), who started observing for us in 1921. In the 15 years in which he has been observing all but two of his 29 returns have been classed excellent.
4. CAPTAIN H. A. WRIGHT (Royal Mail Lines), whose first meteorological logbook also came to us in 1921. Since then, in 18 years, he has sent us 33 returns, 11 of which have been classed excellent.

We congratulate these four captains on this recognition of their voluntary work for the Meteorological Office over many years. The award will, as in past years, be in the form of a suitably inscribed barograph. The captains will be personally notified of the award and of the arrangements which will be made for its presentation.

CANADIAN EXCELLENT AWARDS, 1957

The names of the officers and ships in the Canadian Weather Observing Fleet who have won Excellent Awards for marine weather observing carried out in the year 1957 are printed below.

NAME OF VESSEL	OBSERVING OFFICER(S)	RADIO OFFICER(S)	COMPANY
Bluenose	D. Rush ..	H. Whitehead..	Canadian National Railways
Esso San Juan ..	R. M. Shave ..	F. A. Domina..	Imperial Oil Shipping Co., Ltd.
Imperial Edmonton	E. J. Samson .. N. Miles ..	R. E. Phillips ..	Imperial Oil Shipping Co., Ltd.
Imperial St. Lawrence		R. Anderson .. L. J. Fitzgerald	Imperial Oil Shipping Co., Ltd.
Imperial Toronto	J. H. A. Surrey	N. Loisel ..	Imperial Oil Shipping Co., Ltd.
Irvingbrook ..		F. Wittig ..	Kent Lines, Ltd.
Irving Glen ..		R. Schmidt ..	Kent Lines, Ltd.
John W. Mackay			I. H. Mathers & Son, Ltd.
Lakonia	J. W. Brewster	J. Cox	Donaldson Lines, Ltd.
Lord Kelvin ..		C. Jackson ..	Western Union Telegraph Co.
Paloma Hills ..	M. Wagner ..	A. W. Horwill	Shell Canadian Tankers, Ltd.
Pinnacles	C. A. Bradshaw	J. Weir ..	Shell Canadian Tankers, Ltd.
Princess Helene ..			Canadian Pacific Railway Co.
Rincon Hills ..	G. Bush ..	D. A. Brady ..	Shell Canadian Tankers, Ltd.
Suva	A. Wadey ..	N. Nelson ..	B. C. Ship Chartering Co. Ltd.
Waihemo		R. J. Balcanquall	Union Steamship Co. of New Zealand

Mr. Andrew Thomson, Director of the Canadian Meteorological Branch, states:

"This is the tenth in our annual Marine Award series. A total of 40 awards, divided into three categories, are presented each year. A copy of the book entitled *Peter Freuchen's Book of the Seven Seas*, by Peter Freuchen, was presented to the masters of the 15 ships which had carried out the best overall work during the year. This "ship award" is intended to be placed in the ship's library for the benefit of all crew members.

"Another 15 awards were also presented to the radio officers of award-winning ships, who had transmitted 200 or more reports to shore receiving stations. The book selected for this award was *Pioneers of the Seven Seas*, by Alan Villiers. The remaining 10 awards were made to the Principal Observing Officers who had done the best overall work in weather observing during the year. *Peter Freuchen's Book of the Seven Seas* was also selected for this award.

"A total of 57 ships co-operated with our Service last year, and made a total of approximately 17,000 observations while at sea. All ships' meteorological records are returned to this office and examined for accuracy and completeness. From the results of these examinations, the award-winning officers and ships are selected. Both quantity of observations and quality are considered for award purposes, but the more emphasis is placed on quality."

SHAW SAVILL AND ALBION COMPANY, LIMITED

In the October number of *The Marine Observer* we have, since 1956, published photographs of a present-day observing ship, together with two of her predecessors of the same name and ownership which have also been units in the British voluntary observing fleet.

This year, being the centenary year of the Shaw Savill and Albion Company, it was hoped to continue the series with photographs of three of their ships.

Unfortunately for the scheme, however, in the 85 years of our association with them, Shaw Savill's have not had three ships of the same name observing for the Meteorological Office. Thus a departure from usual custom is rendered necessary and the photographs on opposite page are of the *Crusader*, the first one of their ships from which a meteorological logbook was received, and their two *Athenics*, both of which have been voluntary observing ships.

The *Crusader* was an iron Glasgow-built clipper of 1,058 tons, bought by the Company in 1869. In their centenary booklet, *100 years under the Southern Cross*, the owners have written " She was one of the fastest and most beautiful sailing vessels of all time—a ship that in her day was even more famous than the *Cutty Sark* and which once did the passage from Lyttelton to the Lizard in the almost incredible space of 69 days. Her average passage over many years for the New Zealand run was 91 days, and half a century later, when her sailing days were done, the survivors and descendants of those who had first travelled to New Zealand in her made her unique among ships by founding in her memory the Clipper Ship Crusader Association, a body which still meets regularly to honour her and the pioneer days of New Zealand's history."

Two meteorological logbooks were received from the *Crusader* in 1874 and 1876 when she was commanded by Captain Charles H. Renaut. The duration of her round voyage to New Zealand was between 5 and 6 months, very little different from today's turn-round in that trade.

The second picture is of the first *Athenic*. She was built in 1901 in the yard of Harland and Wolff, Belfast, a passenger liner of some 12,000 tons. As a voluntary observing ship she carried Meteorological Office instruments on loan from 1905 until 1928, during which time a considerable number of logbooks was received from her.

Our third picture is of the present *Athenic*, built in 1947 and first recruited as a selected ship in December of that year when she was commanded by Captain (later Sir David) Aitchison.

We are indebted to the Shaw Savill and Albion Company Limited for the pictures which we reproduce, and for permission to quote from their centenary brochure. This is also a suitable opportunity to record the appreciation of the Meteorological Office of the voluntary service of the masters and officers of their ships for over 85 years. At present, of their fleet of 26 ships, 13 are observing for us.

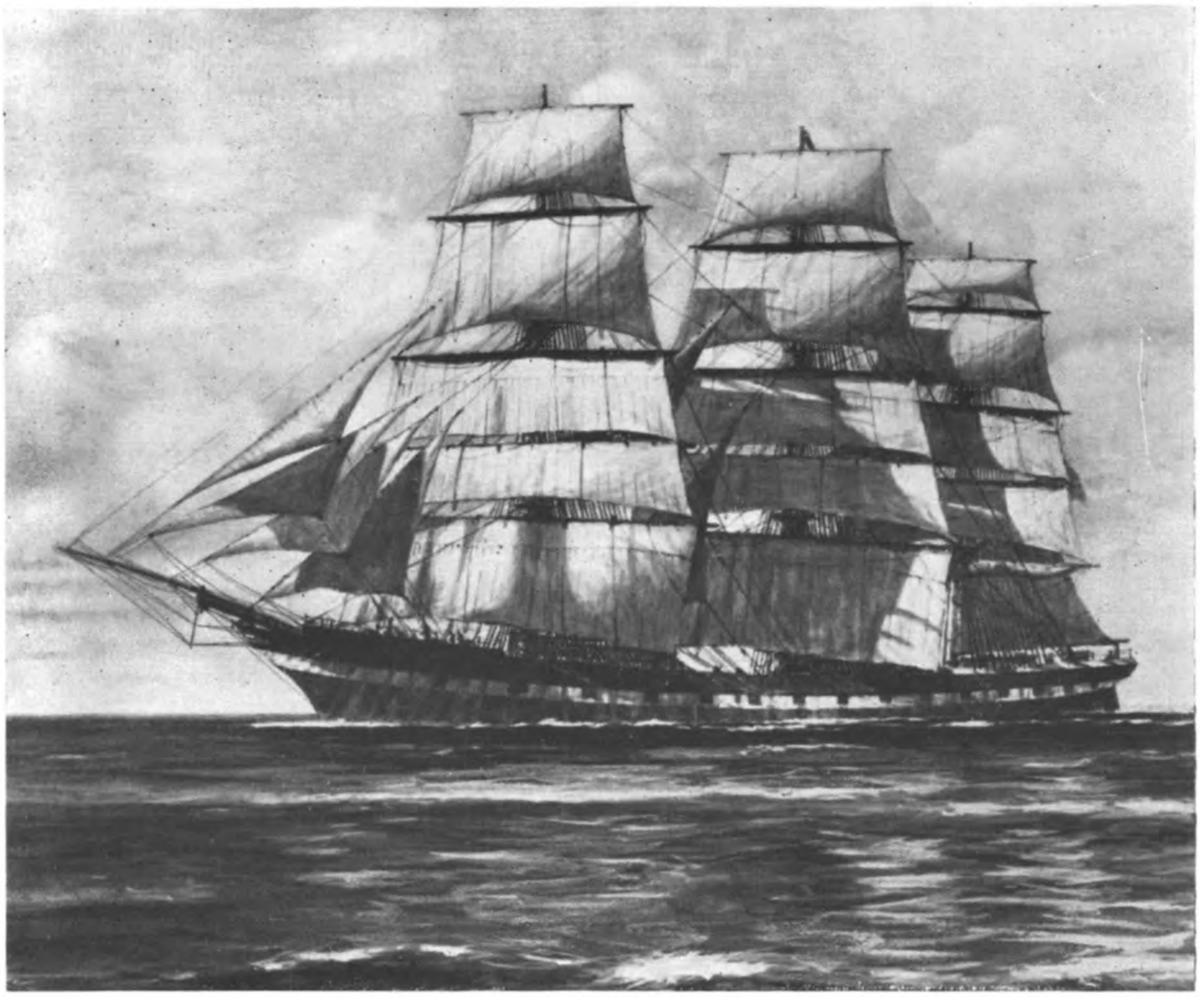
L. B. P.

Old Time Marine Observers' Log

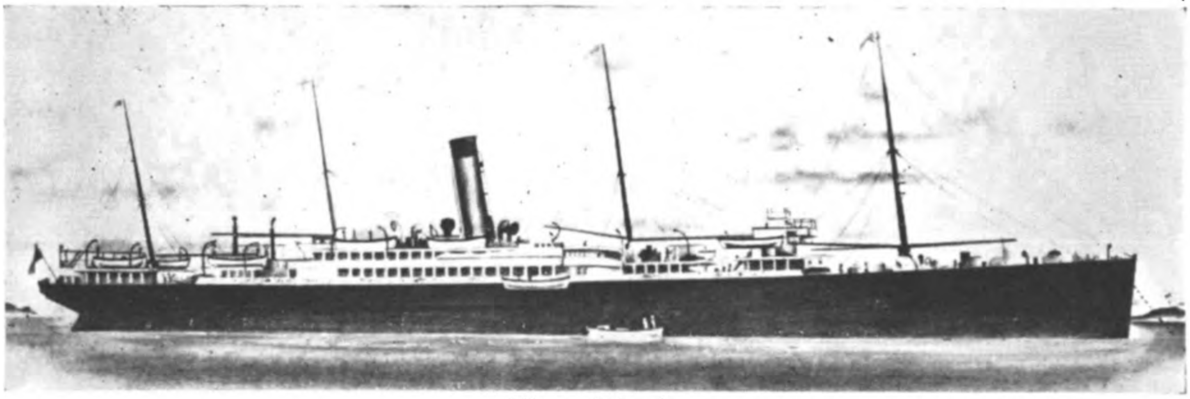
In the January 1958 number of *The Marine Observer* an account was published of a mutiny aboard the iron barque *Hermine*, 538 tons, S. Griff Jones, Master, which had been extracted from one of her meteorological logbooks.

An older meteorological logbook from the same ship and master, received on 28th June, 1881, tells of a 133-day passage from Liverpool to Talcahuano, which included 40 days trying to beat round Cape Horn.

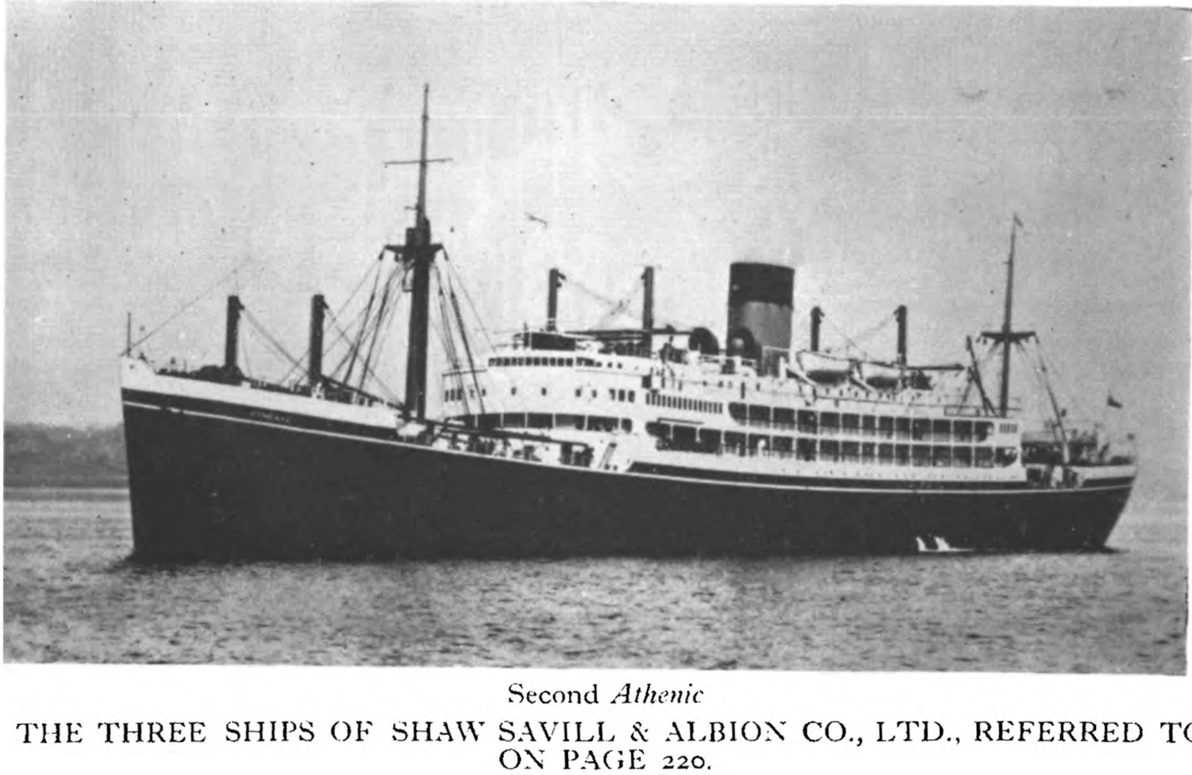
Captain Jones's book is outstanding in its neatness, legibility and in the variety of observations of marine life recorded. The original track chart of the beat round



Crusader



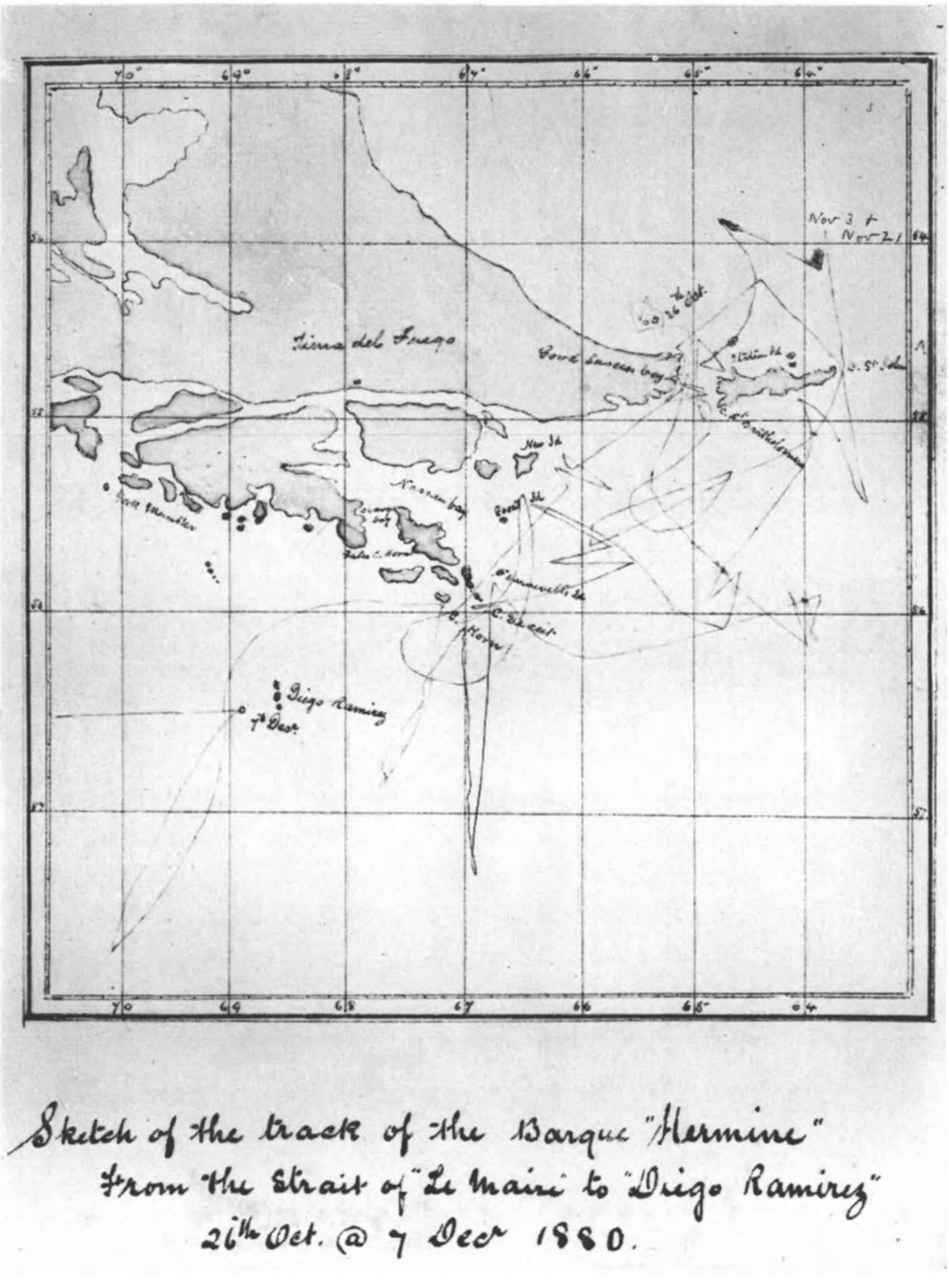
First *Athenic*



Second *Athenic*

THE THREE SHIPS OF SHAW SAVILL & ALBION CO., LTD., REFERRED TO ON PAGE 220.

(*Opposite page* 221)



Track chart of *Hermine* (see opposite page) the Horn given in this book is reproduced on opposite page. Only a very slight amount of retouching has been rendered necessary due to the fading of the ink over the passage of 77 years. In other respects, however, the reproduction has been taken directly from the chartlet in the book.

As a preliminary to the voyage, Captain Jones wrote " thermometer observations are by Joseph Metcalf and Charles A. Trevor, our senior apprentices, the same persons as took them in my former logs. I verify their readings at least three times per day and find them correct. Barometer at midnight and 4 a.m. is read by Henry Smith, our 2nd Officer, in whose observations I have perfect confidence. All other observations are done by myself, the calculations are all done by myself, the 1st Officer gives his own separate account. We compare at noon. My knowledge of zoology is rudimentary."

The ship left Princes Dock, Liverpool, at 11.15 a.m. on 7th August, 1880 and at midnight on 9th August was abeam of the Arklow light-vessel. Fair winds from between north and east took her down to the tropics but on 29th August, 1880 (noon position 20° 42′N., 25° 24′W.), Captain Jones records:

> 6 a.m. Weather thick and rainy.
>
> 2 p.m. Wind very unsteady in its force and direction from NE. to ESE. and from force 5 to force 7 with thick rainy weather and occasional very heavy showers, the clouds visible being low stratus and nimbus.
>
> At 4.30 p.m., wind and sea increased rapidly with squalls and rain. Barometer falling fast. Shortened sail as soon as possible.
>
> At 5 p.m. wind blowing in gusts force 9 and 10 from E. by S. to SE. by S. Short, heavy toppling sea from ENE. to SSW. Weather very thick and gloomy with prodigious rain.
>
> 5.30 p.m. Wind hauling continually, obliged to keep ship before the squalls and to save sails.
>
> 6 p.m. Force 10½. Rain. Weather so thick that we could hardly see the vessel's length. Barometer at its minimum 29.450. Butterflies, moths, dragonflies very numerous.
>
> 6.30 p.m. Wind SSE., force 9. Rounded-to on port tack, head reaching under easy sail.
>
> 7 p.m. Less wind, barometer rising, sky clearing up. A circular patch of blue sky studded with pale reddish-yellow cirro-cumulus from zenith to SW. All round the horizon covered with dense, heavy stratus of crimson hue, apparently as if revolving round the clear sky.
>
> 8 p.m. Wind hauling, less sea. Made sail.

The above remarks indicate, with little doubt, that the vessel was in the area of a tropical revolving storm. In August, 1880, four such storms were reported and charted, a number well above the average for this month. None of these storms was detected until well to the westward, the last one being first reported in 24°N., 59°W. on 28th August, 1880. Later knowledge of these storms, however, which shows them to originate during August and September much further to the eastward than was suspected 78 years ago, makes it seem probable that Captain Jones met yet another storm which was not further traced.

The observation at 7 p.m. is particularly interesting. There does not appear to be any other report of the circular motion of the clouds round the eye of a storm. In recent years radar photographs taken from above the centre, have, of course, portrayed a circular or nearly circular structure.

This storm heralded the tedious and heartbreaking passage through the doldrums. In an effort to pick up the south-east trades as far north as possible, so that he could run with them to the Brazilian coast, Captain Jones stood even further to the eastward than was the normal custom of the day. On 14th September, 1880 in 3° 31′N., 14° 53′W., when he might reasonably have expected the wind to come from the SE., he turned. The wind, however, obstinately stayed in the SW. quadrant for several days, though as he approached the coast of South America, it did back sometimes as far as SSE. His course at this time compelled him to remain close-hauled for the next fortnight and it was not until 28th September (noon position 16° 39′S., 36° 26′W.) that he was able to write:

p.m. Steered a course the first time since we lost the NE. trades. I would like to know how those got on who made a more westerly crossing.

His relief at this change of fortune is reflected in an entry for 30th September, 1880 (noon position 20° 40′S., 38° 16′W.):

9 p.m. A most beautiful night, an agreeable dewy freshness fills the cool atmosphere. Occasional small patches of cloud pass along gently with the wind.

The rivalry which existed between shipmasters of those days is illustrated by an entry for 14th October, 1880 (noon position 37° 50′S., 53° 51′W.):

At 4 p.m. an American ship which came in sight at noon is just passed. We saw her before off Cape Verde Island, easily known by her peculiar spritsail and a red streak above an oak plank around the hull. Probably this vessel has been jammed off Cape San Roque, very few vessels stood as far east as we did. Probably did not study their data for square 3, if they have any.

Land was raised at 11 a.m. on 23rd October but the first definite land fix was not secured until 26th October when the following entry was made:

8.10 a.m. Middle Brother S.19.W. East Brother S.7.W. Cape San Diego S.43.E. This gives a position of 54° 31¼′S., 65° 14′W. At the same time chronometer showed the longitude to be 65° 14′ 45″W.

(The accuracy of the chronometer after a sea passage of 82 days is truly remarkable.)

Having reason to conclude that this wind is from the SW. on the other side of the Strait [Strait of Le Maire] deemed it to our advantage to stand off and on under easy sail until we have a better prospect of heading up for Cape Horn.

The next day, 27th October, 1880, at 3.30 a.m., Captain Jones shaped a course for Cape San Diego. With three other vessels in company she rounded the Cape 3 miles distant.

Here the Captain describes at some length the topography of the Strait of Le Maire, from which we quote briefly.

All the slope along the western shore of the Strait of Le Maire shows a sudden and severe breaking up of the winter's snow. There are numerous strips on these slopes of the hills completely denuded of their trees and vegetation. The lower base of the glacier melting quickly by the action of the warmer sea or rivulet, the whole mass of snow rushing down the sloping hill, carries everything along with it leaving a smooth bare strip of clear earth and as if it had been prepared by human hands, skirted on the side with the upright trees of the surrounding forest at the sides of which a few fallen ones still lie. . . . Later I found the same evidence of short avalanches or snow slips all along the coast from Cape Good Success to Cape San Pio and more especially on New Island. On the latter there are two or three strips so yellow, fresh and earthy as to remind one of civilisation and its early sowing spring. These snow slips seem to have occurred mostly on the eastern side of a sharp smooth sloping declivity where the contents would be carried away by the sea or a stream at the bottom of a valley. Many of these clearings are to be seen covered with grass and virgin trees, according to the number of years passed since the avalanche denuded it of its growth. These snow slips are evidently the source and mode of supply of the large quantity of drift wood met with to the east of the Falkland Islands and on its southern shore.

(The present day *South America Pilot*, Volume 1, mentions this drift under the sub-heading Southern Ocean Current on pages 19 and 20.)

Eight years later the *Hermine* rounded Cape San Diego at a lesser distance, and when about 2 miles to the south-eastward of it touched the bottom. This shoal of 2½ fathoms appears (P.D.) on the Admiralty charts today and is mentioned in the *South America Pilot*, Volume 2, page 58.

This day marked the commencement of the eternal battle of trying to get to the westward so well known to an older generation of seamen. The remarks column of the logbook gives a continuous narrative of this struggle and entries recording winds of force 10 and 11 from the SW. and W. are common.

. . . this sw'ly swell is 26 ft., trough to crest, with occasional winds much higher. . . . At times a very heavy sea tumbles along and seems as if about to engulf our little bark. but she lifts herself so proudly and hardly takes a drop on deck . . . instead of diving through it she mounts every ridge of a wave that comes along.

The combined influence of wind and the Cape Horn current, however, took the ship continually to the eastward and at noon on 2nd November she was actually well east of Cape St. John (eastern end of Staten Island) and from here the Captain records:

Before we rounded Cape St. John the current seemed to carry us far to the eastward but after, it turned first towards the N. and finally to the NNW.

Being now to the north of Staten Island, sail was made and *Hermine* stood down for the Strait of Le Maire again. At 2.15 p.m. on 4th November, 1880, Captain Jones anchored in Good Success Bay in 12½ fathoms with 75 fathoms of cable, to await a more favourable opportunity of beating round the Horn.

Early in the morning of the next day he hove short but " wind again increasing and every indication of a strong gale on the other side of Cape Good Success determined to remain." That morning a party landed for fresh water.

The water was cool and very refreshing to the palate but its colour was of a dark reddish vegetable green. I was much surprise at the abundance of vegetation everywhere existing . . . young celery was very abundant with which we are making soup today. . . . We only saw one native from which we purchased a bow and arrows, there were many traces of their camps with accumulation of empty shells of keyhole limpets. Between Cape San Diego and Maurice Cove, we saw a couple of fires and several natives straying along the beach.

In the afternoon, Captain Jones hove short again but a rapidly falling barometer decided him to remain. His decision was justified, for on the next day he writes:

A barkentine, which was in company with us on 27th October, was seen in the offing endeavouring to shoot the Strait, but when nearly abreast of Cape Bartholomew she was caught aback when she was put on the port tack having the appearance of having the wind from ESE. and light. She kept making more sail but in the space of an hour was carried back by the flood as far as Cape Middle. At the same time we experienced a strong current making up for the head of this bay, being obliged to heave in the second anchor to keep it clear of the other. Soon after 4 p.m. a dark threatening nimbus appeared in the SSW. . . . presently a thick and dense snow cloud began to cover the heights and valleys. At the same time thunder, and a few flashes of lightning, became audible among the mountains. In a few minutes a most tremendous squall burst from W. by S. hauling directly to SW., and then lasting over two hours with force 10 and 11.

And again the next day, 7th November:

5 p.m. wind died away to force 1 and 2 . . . clouds travelling from W. and WNW. Hove short and prepared to sail as soon as the wind would freshen

but at 9 p.m.—

wind having backed round to WSW began to moan and increase rapidly, clouds rapidly from WSW., determined to remain.

At 9 a.m. on 8th November:

began to heave up the anchor but after three hours' effort, failed, the wind being too strong.

But in the evening the wind fell light and variable:

Taking advantage of a light air from the westward weighed anchor and proceeded. I expected to find a strong ebb tide but it was hardly perceptible. Midnight 3 miles outside of the South Head, ship making but little way.

Thus began another attempt to round Cape Horn which was not to be successful for another month. Moderate to fresh south-westerly winds were experienced for the next four days and *Hermine* made slow but steady progress. On 10th November, in fine weather, she passed between the inner and outer Deceit Rocks.

Myself at the masthead but there appeared to be no indication of danger between these Rocks.

At 4 o'clock that evening Cape Horn summit bore N.64.W and Deceit Rocks bore

N.14.E. Here, however, his progress was arrested, and at 11 a.m. the next morning Cape Horn was still bearing only NW.¾.W. The ship was destined to take many more bearings of Cape Horn during the next three weeks.

On 14th November, 1880,

> A few minutes after 2 p.m., a most tremendous snow squall burst upon us, had to let everything fly except lower topsails which were hung on to in order to wear round, being doubtful if we would drift clear of Cape Horn on the port tack with the wind from SE. to E.½.S. Two jibs and the spanker were split but succeeded in spilling the other sails. The snow was so thick that we could not see twice the vessel's length. At 2.20 p.m. wore to ENE., wind and snow continued until 4 p.m. when it began to moderate and clear up. At 6 p.m. Cape Horn bore W. by N.½.N.

On 17th November the ship's noon position was 55° 57′S., 65° 20′W., well to the eastward of Cape Horn. Captain Jones wrote:

> At noon the sun occasionally visible, made more sail. This continual detention causing me extreme anxiety, my natural history entries have been neglected.

By 20th November the vessel was back in the vicinity of Staten Island. The Captain records:

> Find current carrying so far to the eastward, I have again determined to try and regain our longitude to the north side of Staten Island.

22nd November, noon position 54° 11′S., 63° 31′W.:

> A most lovely day. The rocky heights of Staten Island and Tierra del Fuego are perfectly visible. Prognosticator of dirty weather.

On 23rd November, 1880, *Hermine* again passed southward through the Strait of Le Maire. The wind was " light and variable but this, with the short chopping tide swell caused much anxiety."

At noon on 24th November she was in 55° 35′S., 65° 28′W., only a few miles from where she had been a week before and from here, in the face of westerly and south-westerly winds often of force 9 and carried by the Cape Horn current, she continued to set to the eastward. On 27th November she was lying hove-to in approximately 56° 02′N., 63° 56′W., with wind SW. by W. force 10 " very heavy squalls with much hail and barometer falling, gloomy in the WNW."

Later that day, however, she was able to make sail again and on 1st December at 8 a.m. Cape Horn was again sighted on the lee bow. The battle continued and it was not until 10 p.m. on 3rd December, 1880, that she reached the longitude of Diego Ramirez, some 50 miles west of Cape Horn.

At noon on 7th December, the southern part of Diego Ramirez bore NE. distant 26 miles. The wind which had fallen light during the afternoon freshened up from the east and with the " sky looking serene and fine ", she was able to make all plain sail again.

The remainder of the passage to Talcahuano seems to have been uneventful and the vessel anchored off the town in 5½ fathoms at 9 a.m. on 18th December, 1880.

We have been unable to obtain a photograph of the *Hermine*, whose meteorological logbooks under Captain Griff Jones were always so meticulously kept and from which the meteorologist, the historian and the student of natural history can derive so much pleasure and profit. She was an iron barque of 538 tons, length 159·7 feet, breadth 27·4 feet and moulded depth 18 feet. She was built in Liverpool by R. &. J. Evans and Company in 1865 and in 1889 was owned by G. H. Fletcher.

Opposite page 205 of this number, however, a picture is published of a vessel whose scantlings and sail plan were not very different from those of *Hermine*. This was the *Alfred Hawley*, a barque of 420 tons, length 134 feet, breadth 29 feet and depth 16 feet. She was built by Pile's of Sunderland in 1860 and in 1864 was owned by Walker & Company. L. B. P.

ASSOCIATION OF NAVIGATION SCHOOLS

The Annual General Meeting of the Association of Navigation Schools for 1958 was held at Fleetwood, at the North Euston Hotel.

At the "open" session on 16th May, the guest speaker was Mr. A. A. Part, Under-Secretary at the Ministry of Education. He emphasised the need for boys who go to sea these days to have an aptitude for science and technology in addition to the traditional qualities of good character, keenness and versatility: to stress this point he said that the bridge of a modern trawler was more complicated than that of a trans-atlantic liner of 30 years ago. As an addition to the help given to boys by pre-sea training, there was a suggestion under consideration by the Ministry of releasing boys for a period of study ashore in the middle of their apprenticeship.

In his address, Captain Topley, Principal Examiner of Master and Mates, said the major stumbling-block in the written part of the Second Mate's examination was the mathematics paper, and whilst some candidates had a good grounding on the subject there was quite a large number who did not seem to have any grasp of the most fundamental mathematical reasoning.

Figures of passes in the various categories for 1957 are shown as under, 1956 figures in brackets:

Grade	Number of Candidates	Number of Certificates issued	Percentage Pass
Master	904 (953)	652 (690)	72·1 (72·4)
First Mate ..	1,174 (1,223)	830 (848)	70·7 (69·3)
Second Mate ..	1,611 (1,611)	886 (946)	55·0 (58·7)
Master (H.T.) ..	78 (87)	62 (64)	79·5 (73·6)
Mate (H.T.) ..	147 (118)	81 (68)	55·1 (57·6)
Total ..	3,914 (3,992)	2,511 (2,616)	64·2 (65·5)

This showed a slight drop in the overall percentage passes. The number of Second Mate's certificates obtained by ex-ratings was 52, against 65 in 1956.

In the examinations for Extra Master, the number of certificates issued was 17, nine fewer than in 1956.

The conference was entertained to lunch by the Mayor of Fleetwood, Alderman T. Smith, J.P., at the Marine Hall.

It had been decided to hold the Annual General Meeting for 1959 at Cardiff, but no date had yet been decided upon. J. R. R.

Book Reviews

Meteorology of the Antarctic, edited by M. P. van Rooy. 11½ in. × 9¾ in. pp. xi + 240 + charts and diagrams. Weather Bureau, Department of Transport, Pretoria, South Africa, 1957. 60s.

This comprehensive publication fulfils a long felt need for a reference book on meteorology of the far south, and is likely to be a valuable source of information for many years to come.

It was planned to appear in advance of the beginning of the International Geophysical Year, in July, 1957, but unfortunately took a year longer to prepare than was anticipated. In his foreword, Dr. Schumann indicates that the publication will need thorough revision within a relatively few years, mainly as a result of the detailed observations now being made at stations in the interior of Antarctica, but he rightly claims that a considerable part of the book contains material of lasting value.

Chapters 1 and 2 deal with geographical and hydrological features and sources of meteorological data. The latter will be particularly valuable to research workers in the meteorology of the Antarctic. It is evident that reports from British whaling and expeditionary ships, as well as those from " regular " Commonwealth shipping on various voyages through the waters of the Southern Ocean which have been placed on punched cards, have made a significant contribution to the still somewhat limited coverage of the Antarctic Ocean. Lists of many of these observations have been provided by the Meteorological Office, whose assistance is gratefully acknowledged. The next chapter discusses instruments and observations in polar regions and draws attention to the many difficulties and the ingenuity needed to overcome them. It is surprising to find a statement that " the Dines anemometer is the best all-round wind measuring instrument as it also gives a good indication of gustiness, which the cup anemometer does not " and, on the same page, a reference to the electrical anemograph due to Hartley,[1] which does of course use a cup anemometer and which provides a record of gusts similar to that obtained from a Dines instrument.

When discussing anemometers for use on ships, the author states that because of pitching and rolling and the perturbation of the airflow by the ship, estimation of wind from the appearance and size of sea waves is still preferred. Surprising omissions are: (1) that of the bathythermograph when discussing the measurement of sea temperatures; and (2) that of the frost point hygrometer and the dewcell when discussing the measurement of humidity. With an eye on the future the hope is expressed that automatic weather stations are being tested *in situ* during the I.G.Y. and a brief description is given of the transosonde—a balloon-borne meteorological transmitter which floats along a standard pressure surface for several days and transmits data to ground stations and which can also be equipped to drop radio-sondes at intervals to make vertical soundings over uninhabited areas.

The next six chapters contain a detailed discussion of the variation of the meteorological elements over various parts of the area, including the Antarctic ocean, the sub-Antarctic islands, the Antarctic coast and the Graham Land region. There is an error on page 91 where reference is made to some papers which are described as " a few modest attempts at discussing the marine data of the Antarctic Ocean ". In fact, the papers referred to deal with marine data in other oceans of the world. When discussing surface wind data from the sub-Antarctic island stations, it is interesting to note how much has to be rejected as being unrepresentative, owing to exposure difficulties. This emphasises the great importance of reliable observations from ships in these areas. The lack of sea temperature observations is also noted. It appears that observations of cloud are particularly difficult to deal with in Antarctic regions because there is so often a thin haze covering the sky which one observer interprets as eight oktas and another as nil. As, until recently, all continental stations with relatively long records were sited along the coast of Antarctica, very little is known yet about the meteorology of the vast interior. It is here, of course, that the I.G.Y. data will be invaluable. Nevertheless some interesting charts are given showing the probable mean temperature distribution in July and January.

Chapter 10 covers the upper air over the Antarctic and analyses all the data available, most of which relates to the post-war period, while the final chapter is concerned with synoptic meteorology. This includes a list of the available series of synoptic maps for the southern hemisphere and it is fascinating to learn that the oldest set are those for the Indian Ocean extending to 46°s. for the year 1861, prepared by Dr. C. Meldrum. They were drawn daily for three months and contain the surprisingly large average number of 100 ship reports. The basic problem in preparing synoptic maps for the southern hemisphere is the uneven distribution of data and, particularly, the existence of a blank zone of nearly 20 degrees of latitude between the southern limit of merchant ships and the northern boundary of whaling operations. The lack of voyages round Cape Horn nowadays is also referred to. The chapter analyses the distribution of depressions with central pressure 950 mb. or less, and anticyclones with central pressure 1020 or more, and includes a detailed synoptic study of three depressions and two anticyclones.

The book is excellently printed and lavishly illustrated by charts, photographs, figures and tables. There is a valuable comprehensive bibliography of over 300 items, but a subject index is lacking. H. C. S.

REFERENCE

[1] HARTLEY, G. E. W. Remote-recording electrical anemograph. *Met. Mag., London*, **84**, 1955, pp. 111–115.

Teach Yourself Navigation, by A. C. Gardner. $7\frac{1}{4}$ in. × $4\frac{1}{2}$ in. pp. 192. *Illus.* English Universities Press, Ltd., London, 1958. 6s.

This little book, a welcome addition to the " Teach Yourself " series, is written by one highly qualified in the art of navigation having spent 20 years as a practical navigator and 10 years teaching the subject.

For those whose requirement is a simple and concise introduction to the theory and principles of navigation, it should have special appeal.

The first two chapters deal briefly with the history and development of navigation and the magnetic compass. Magnetic variation and compass deviation are well explained.

Chapters III and IV deal with chart work and the calculations involved in finding the course and distance between two points by parallel sailing, plane sailing, Mercator's sailing and great circle sailing.

The sextant and astronomical navigation dealt with in chapters V, VI, VII and VIII are presented in such a way that even those with very limited mathematical knowledge will find little difficulty in following the calculations involved in the astronomical " fix ".

Chapter IX describes briefly modern navigation instruments, including Consol, Gee, Loran and Decca, and their application.

The illustrations and worked examples followed by numerous examples for exercise of each calculation, with the answers given in the Appendix, should enable a student to quickly acquire a useful knowledge of navigation.

This book will be found a useful addition to the bookshelf of any student of navigation, and is a companion volume to *Teach Yourself Seamanship*, which we reviewed in October, 1954. At the price of 6s. it is excellent value. A. D. W.

Letter to the Editor

PHOSPHORESCENCE

SIR,—In view of the remark in the April, 1958 number of *The Marine Observer*, page 70, that you rarely have observations of phosphorescence in British waters, this was very well developed on the night of 22nd July, 1952 when I was crossing in the *Duke of York* on the Harwich-Hook passage. The bow wave was all blue-green fire. The weather was very fine and warm and the observation was made, say between 2200 and 2300 U.T., soon after leaving Harwich.

CICELY M. BOTLEY.

2, Park Road,
Tunbridge Wells.
7th May, 1958.

Personalities

RETIREMENT.—COMMODORE E. SCRYMGEOUR retired from the sea in June, 1958 when he brought the *City of Manchester* into London.

Edward Scrymgeour was born in 1892 at Seaforth, Lancs. and served a four-year apprenticeship in the sailing ships of Messrs. G. Windrum and Company.

He joined the Ellerman Hall Line in September, 1914 as third officer of the

Trentham Hall and continued to serve the same company throughout his seafaring life. He passed for master in August, 1918, and was promoted to his first command, the *City of Bristol*, in July, 1935.

In December, 1936 he was appointed to command the *City of Canton* and was in her when she was sunk by enemy action on 17th July, 1943. Captain Scrymgeour spent 6½ days on one of the ship's rafts, being ultimately picked up by a French cruiser and landed at Durban. He was later mentioned in despatches for his services in connection with the loss of his ship.

Captain Scrymgeour continued in command of various steamers until his retirement. On 1st February, 1957, whilst in the *City of Manchester*, he was appointed Commodore of the Ellerman Lines fleet. It is interesting to note that in 49 years at sea this was the only ship he served in which was not registered at the port of Liverpool.

By his retirement the Meteorological Office loses one of its more senior voluntary observers, for it was as long ago as August, 1919, when he was 2nd Officer of the *Newby Hall*, that his first meteorological logbook was received. Since then he has in 8 years sent us 29 returns, of which five have been classed excellent. He received an excellent award in 1949.

We wish him health and happiness in his retirement. L. B. P.

RETIREMENT.—CAPTAIN P. L. HOCKEY retired in June last after 46 years at sea, 40 of which were served with the Pacific Steam Navigation Company.

Philip Lewis Hockey made his first trip to sea in the schooner *Carrie Bell* and subsequently served in the full-rigged ships *Ben Lee* and *Celtic Glen*, in the latter ships as 3rd Officer. On obtaining his 2nd Mate's certificate in October, 1918 he joined the Pacific Steam Navigation Company as 3rd Officer of the *Orita*. After nearly 22 years passing through the usual officer grades, Captain Hockey was appointed to his first command, the *Lautaro*, in January, 1940. He subsequently commanded *Lobos*, *Lagarto*, *Loreto*, *Losada*, *Salamanca*, *Flamenco*, and his last command, the *Pizarro*. Both world wars were spent at sea in the Merchant Navy.

When in command of *Flamenco* some three years ago, Captain Hockey had the unusual experience of being piloted to sea, from Canada Dock to Point Lynas, by his own son who is a first class pilot in the Liverpool Pilot Service. An event such as this not having been heard of before, it was broadcast by the B.B.C.

Captain Hockey's record with the Meteorological Office dates back to 1922 when serving in *Losada*. In 14 years he has sent in 18 log books, three of which have been classed " Excellent ". He received an Excellent award in 1949 when in command of *Losada*.

We wish him health and happiness in his retirement. J. R. R.

Notices to Marine Observers

NEW FORECAST CODE

The World Meteorological Organization has decided to introduce a new marine forecast code, to be known as the " MAFOR " Code, for use by nations whose shore stations have difficulty in providing a weather forecast for shipping in English. This code is to be introduced on 1st January, 1959. It is not anticipated that it will be widely used, as most nations have no difficulty in providing the weather forecasts in English as well as in their own language, as prescribed in W.M.O. regulations.

This code will give details of wind direction and force, weather, visibility, state of sea, maximum and minimum temperatures, direction of swell, period and height of waves, for specified areas and periods. Details of the code tables to be used will be given in Amendment List No. 3 to M.O. 509, *Decode for use of shipping*, and in *Admiralty List of Radio Signals*, Volume III.

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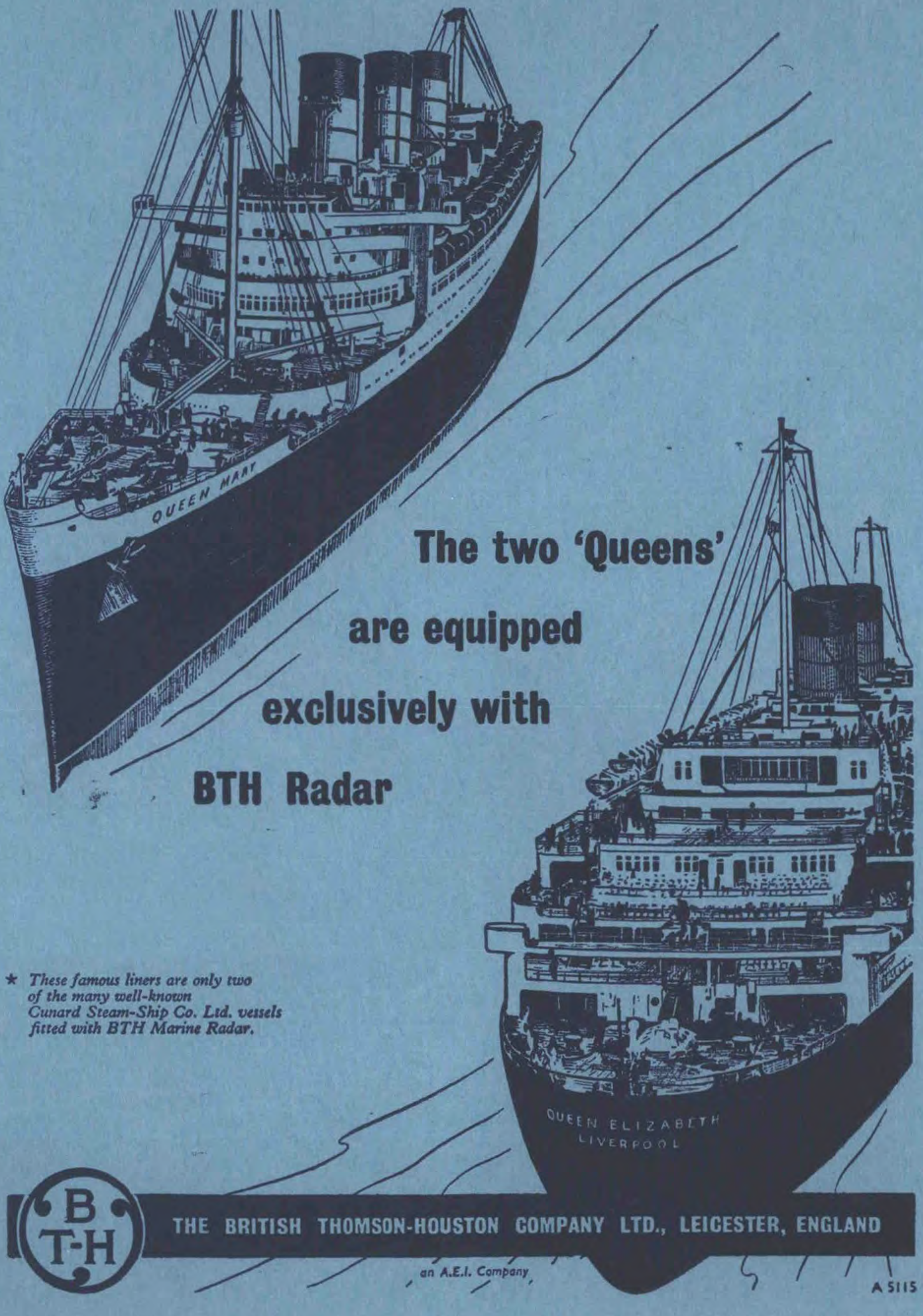
ERRATUM

The Marine Observer, July 1958, page 119 and photograph opposite page 124. We regret that the name of the Principal Observing Officer was given as Captain of the Sheldrake. The name should have been Captain A. E. Guest.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Meteorological Office (Marine Division) Atlases

The following are published by the Marine Division of the Meteorological Office and may be purchased from the bookshops of Her Majesty's Stationery Office at any of the addresses on the title page. Copies are available for reference by shipmasters and shipowners in the offices of Port Meteorological Officers.

Meteorological Atlases

Monthly Meteorological Charts of the Atlantic Ocean. M.O.483, 1948. (60°S–70°N, 80°W–40°E) *Reprinting*

Monthly Meteorological Charts of the Western Pacific. M.O.484, 1956. (60°S–60°N, 100°E–155°W) (16¾″ × 23¾″) 105*s.* (post 2*s.* 9*d.*)

Monthly Meteorological Charts of the Eastern Pacific. M.O.518, 1956. (60°S–60°N, 160°W–60°W) (17½″ × 24½″) 147*s.* (post 3*s.* 3*d.*)

Monthly Meteorological Charts of the Indian Ocean. M.O.519, 1952. (50°S–30°N, 20°W–120°W) (16½″ × 22½″) *Reprinting*

The above four atlases contain monthly charts of wind, barometric pressure, air and sea temperature, and all meteorological elements including some typical tracks of tropical revolving storms.

Monthly Sea Surface Temperatures and Surface Current Circulation of the Japan Sea and Adjacent Waters. M.O.M.447, 1944. (20°N–47°N, 110°E–150°E) (20″ × 17″) 7*s.* 6*d.* (post 9*d.*)

Monthly Sea Surface Temperatures of Australian and New Zealand Waters. M.O. 516, 1949. (50°S–10°S, 100°E–180°) (19¾″ × 12¼″) 10*s.* (post 7*d.*)

Monthly Sea Surface Temperature of the North Atlantic. M.O.527, 1949. (30°N–68°N, 80°W–15°E) (19¾″ × 12¼″) 10*s.* (post 7*d.*)

Monthly Meteorological Charts and Sea Surface Current Chart of the Greenland and Barents Seas. M.O.575. (60°N–80°N, 30°W–120°E) *Reprinting*

This atlas contains a generalised surface current chart for the area and monthly charts of wind, barometric pressure, air and sea temperature, and all meteorological elements.

Current Atlases

Currents of the Indian Ocean. M.O.392, 1939. (50°S–30°N, 20°E–140°E) (30″ × 20″) 10*s.* (post 7*d.*)

South Pacific Ocean Currents. M.O.435, 1938. (60°S–0°, 140°E–70°W) (22″ × 34″) 10*s.* (post 1*s.* 1*d.*)

The above two atlases contain quarterly "current arrow" and "current rose" charts.

Quarterly Surface Current Charts of the Atlantic Ocean. M.O.466, 1957. (60°S–70°N, 80°W–20°E) (22½″ × 18″) 32*s.* 6*d.* (post 1*s.* 6*d.*)

Quarterly Surface Current Charts of the Western North Pacific Ocean with monthly chartlets of the China Seas. M.O.485, 1949. (0°–60°N, 98°E–160°W) (21″ × 16″) 25*s.* (post 11*d.*)

The above two atlases contain current rose charts, predominant current charts, and vector mean current charts.

Ice Atlases

Monthly Ice Charts of the Arctic Seas. M.O.M.390a, 1944. (60°N–80°N, 80°W–110°E) (12″ × 7″) 3*s.* 6*d.* (post 5*d.*)

Polar ice, mean limits of sea ice, extreme limits of sea ice, extreme limits of bergs.

Monthly Ice Charts of Western North Atlantic. M.O.478, 1944. (37°N–53°N, 72°W–35°W) (12″ × 7½″) 4*s.* (post 7*d.*)

Mean limits of pack, extreme limits of pack, mean limits of bergs, extreme limits of bergs.

Her Majesty's Stationery Office

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