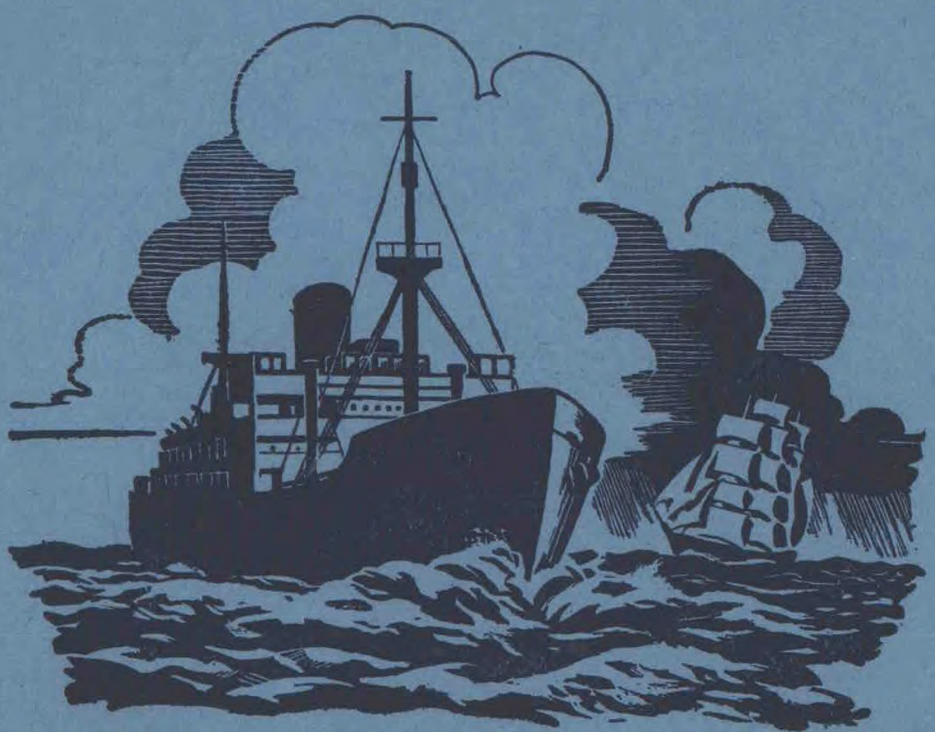
M.O. 667

The Marine Observer

A quarterly journal of Maritime Meteorology



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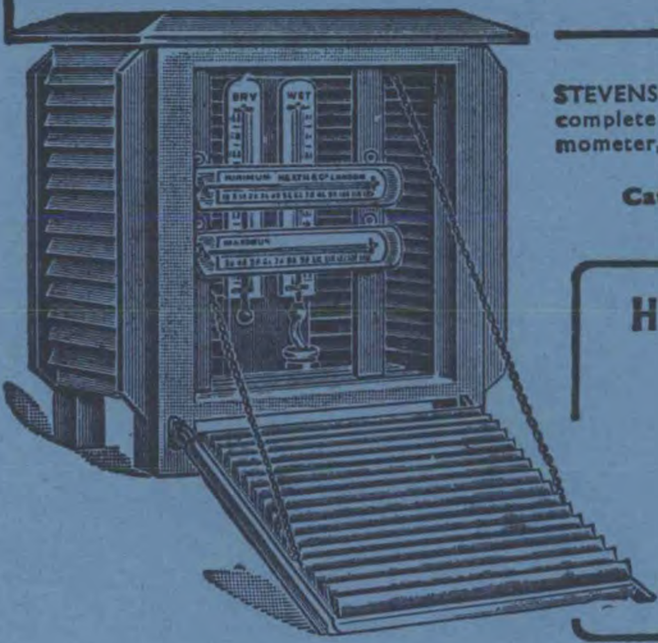

M.O. 667 AIR MINISTRY

THE MARINE OBSERVER

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

VOL. XXX No. 190 OCTOBER 1960

TABLE OF PRINCIPAL CONTENTS

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Editorial

Between mid May and mid June 1960, some 600 Delegates from 54 States attended an International Conference on Safety of Life at Sea at Church House in London. The Conference was held under the auspices of the newly formed Inter-Governmental Maritime Consultative Organisation (IMCO) which is a specialised agency of the United Nations and has its Headquarters in London. Observers from other specialised agencies of United Nations, including the World Meteorological Organisation, were present, and took part in the conference. This was only the fourth ' full dress ' International Conference on Safety of Life at Sea to have taken place, previous conferences having taken place in 1914 (following the *Titanic* disaster), 1929 and 1948—all of them in London, and under the auspices of the United Kingdom Government, which is not surprising when one considers the leading part that this country has always played in the world of merchant shipping.

The general modus operandi of the Conference was to revise and bring up to date the 1948 International Convention for Safety of Life at Sea, which is the basic document governing all safety measures aboard merchant ships at present.

Sir Gilmour Jenkins, leader of the United Kingdom delegation, was elected President of the Conference; he had retired from the position of Permanent Secretary to the Ministry of Transport in 1959, and has thus had much experience of marine safety questions. Admiral Richmond, Commandant of the U.S. Coastguard, and Captain Saveliev of the U.S.S.R. Mercantile Marine Ministry were elected Vice-Presidents.

Every aspect of safety at sea was discussed, and, owing to the complexity of the problems, eight technical committees had to be formed to revise the existing Convention under the following headings: safety of navigation (including a revision of the collision regulations); construction (including such questions as sub-division, stability, machinery and electrical and fire protection); grain and ore cargoes; life saving appliances; nuclear power; radio; dangerous goods; and general provisions.

Meteorological aspects of the Safety at Sea Convention are dealt with in Chapter 5, which was the responsibility of the Safety of Navigation Committee and these were amended and brought up to date by the Conference. Under the heading of Regulation 2—Danger Messages—it was decided to include messages concerning " sub-freezing air temperature associated with gale force winds causing severe ice accretion on superstructures" and messages concerning "winds of Beaufort force 10 or above for which no storm warning has been received ". Regulation 4 was amended to include a reference to the desirability of meteorological services " publishing and making available daily weather charts for the information of departing ships " (as is already done at Gravesend and certain continental ports) and " to encourage the transmission of suitable facsimile weather charts " for the benefit of shipping. A reference was also made to the desirability of all barometric pressure readings being ' corrected ' in radio weather messages from ships (whether they are in plain language or in code). Other minor amendments were made to Regulations and Recommendations with the object of emphasising the importance of authorities making adequate arrangements for the radio reception of weather messages from ships. A permanent Committee was established consisting of representatives of the International Civil Aviation Organisation, the International Telecommunications Union, World Meteorological Organisation and Inter-Governmental Maritime Consultative Organisation to consult each other as necessary about various questions concerning safety at sea.

The Safety of Navigation Committee also dealt with such questions as life-saving signals (for two-way communication with vessels in distress); detailed requirements for the construction and handling of pilot ladders; the greater encouragement of vessels to use the North Atlantic shipping routes, particularly in the ' converging ' areas and various questions concerning the International Ice Patrol.

The Safety of Navigation Committee also revised the whole of the collision regulations, but mariners will no doubt be relieved to know that the revisions were not very extensive and the order and numbering of the rules was mercifully not interfered with, except that Rule 32 was deleted. The most important alteration to these Regulations is that specific provision is made for the use of radar in low visibility, primarily by the addition of an Annex to the Regulations in the form of " Recommendations on the use of radar information as an aid to avoiding collisions at sea ". Other amendments include some changes in the lights for fishing vessels—an innovation being the provision of a special distinguishing signal for all fishing vessels, in the form of a coloured light over a white light.

Apart from the activities of the Safety of Navigation Committee, none of the other subjects dealt with by the Conference had any direct bearing on meteorology, but such questions as the amended radio regulations, the official recognition of inflatable life rafts in the chapter of the Convention dealing with life-saving appliances and even the addition to the Convention of regulations and recommendations concerning the use of nuclear power aboard ship do have an indirect connection with meteorology. Thus an extension of the radio regulations from cargo ships of over 500 tons gross to those of 300 tons gross which was agreed by the Conference ensures that these smaller ships will be more readily able to take advantage of radio weather bulletins issued for ships and that they can transmit radio weather messages themselves. Meteorological conditions played a big part on the preparatory experiments with inflatable life-rafts—particularly with respect to insulation and protecting covering; the British weather ships assisted in sea trials of various types of these rafts. The meteorological aspect of questions concerning the use of nuclear power aboard ship is obvious.

If there were no rough weather and no fog or ice, there presumably would be no need for the stringent regulations on strength, sub-division and stability of ships, or for the precautions that have to be taken for carriage of grain and other bulk cargoes.

The questions discussed at this Conference were of such a technical nature that the majority of the delegates were necessarily shipping experts—Master Mariners, Engineers, Naval Architects or shipbuilders. And as most people in the shipping business are international in their outlook and more or less " speak the same language ", the atmosphere of the Conference was an extremely friendly and co-operative one. There is little doubt that the result of this Conference will be that safety of life at sea is enhanced.

C. E. N. F.

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.

VIOLENT OCTOBER STORM

Aegean Sea

The following account has been taken from the logbook of M.V. *Lingula*, Captain R. W. Lumsden, while on passage from Malta to Istanbul.

24th October, 1959.

0000	G.M.T.	In 38°N., 24°42'E. Wind NW'W, force 1. Cloudy. Visibility 27 miles. Bar. 1008·3 falling. Air temp. 64°F.
0100	,,	Wind freshening; now NNW., force 6.
0200	,,	Wind WNW., force 7. Rough sea and heavy swell. Spray reducing visibility to 5 mi. Bar. 1006·0, falling. Course 027°: Speed 7 kt.
0400	,,	Wind WNW., force 9. Very rough sea and confused swell. Heavy spray. Vis. 4 mi. Bar. 1003·0. Air temp. 53°.
0515	,,	Flat calm. Blue skies. Heavy swell.
0530	,,	Wind E'S, force 2. Backing rapidly to ENE., force 6. Rough sea and very heavy swell. Vis. 4 mi.
0600	,,	Wind NE'N, force 8. Overcast. Bar. 1004·0. Air temp. 58°.
0800	,,	Wind NE., force 8. Very rough sea: heavy swell, lengthening. Vis. 5 mi. Bar. 1006·1, rising. Air temp. 58°. Course 030°: Speed 5 kt.
0900	,,	Wind NNE., force 10. Overcast, ugly and threatening. Sea very rough to high. Heavy swell. Continuous heavy spray. Vis. 2 mi. by radar check. Bar. 1007·4, rising steadily. Course 010°: Speed 3 kt.
1100	,,	Wind NE., force 11. Overcast. Sea high. Heavy swell. Heavy spray. Vis. 3 mi. Bar. 1009·3, rising. Air temp. 53°.
1200	,,	Wind NE., force 11. Overcast. Sea high. Heavy swell. Vis. 3 mi. Bar. 1009·9. Air temp. 53°.
1300	,,	Wind NNE., force 12. Overcast. Sea very high. Confused swell. Vis. 2 mi. Bar. 1011·0. Air temp. 51°.
1400	,,	Wind NNE., force 12. Cloudy, but signs of breaking in the east. Sea very high. Confused swell. Air filled with foam and spray. Vis. 2 mi. Bar. 1012·1, rising. Air temp. 51°. Course 040°: Speed 1½ kt.

1600 ,, Wind N'E, force 11–12. Cloudy but signs of breaking in the east. Sea very high. Confused swell. Vis. increased to 4½ miles by radar check. Air filled with flying spray and foam. Sea completely white from crest to trough. Bar. 1012·0, rising steadily. Air temp. 52°.

1800 ,, Wind N'E, force 12. Overcast. Bar. 1015·9. Air temp. 53°.

2000 ,, Wind N'E, force 8. Sky clearing. Vis. 10 mi. Heavy sea and swell.

2200 ,, Wind NNE., force 8. Fair. Vis. 15 mi. Heavy sea and swell. Bar. 1019·8, rising. Air temp. 52°.

25th October

0000 G.M.T. In 39° 48'N., 25° 48'E. Wind N'E, force 7. Cloudless. Vis. 20 mi. Bar. 1019·9. Air temp. 52°.

0200 ,, Wind NNE., force 8. Blue skies. Vis. 20 mi. Sea rough with moderate swell. Bar. 1021·8. Air temp. 51°.

Note. This is a most unusual report. It describes a sequence of phenomena almost exactly as would be experienced traversing a tropical hurricane.

Initially it would seem that the centre of the depression lay to the north-east of the vessel, which was heading north-east. Relative to the vessel the depression was moving south, and it appears that the centre must have passed very close to the vessel, slightly to the east of the latter.

The sequence of WNW., force 9, then flat calm with blue skies, then wind NE'ly, force 8, increasing to force 12 is very like the sequence of events experienced in a tropical hurricane. Of special interest is the reference to blue skies. While small circular storms, which may be rather violent, are not particularly uncommon in the Mediterranean, storms having a clear centre, like the ' eye ' of a tropical hurricane are very rare.

There are few statistics available concerning the frequency of very strong winds over the sea in the Aegean. Winds of force 8 and above, irrespective of direction, amount to 3 per cent of all wind observations in this area, and gales from the north-east amount to only 1 per cent. It is thought that force 12 must be of very rare occurrence.

Since the vessel was well away from any land before encountering the highest winds, no local effects can be invoked.

TYPHOONS ' FREDA ' AND ' EMMA '

Western North Pacific Ocean

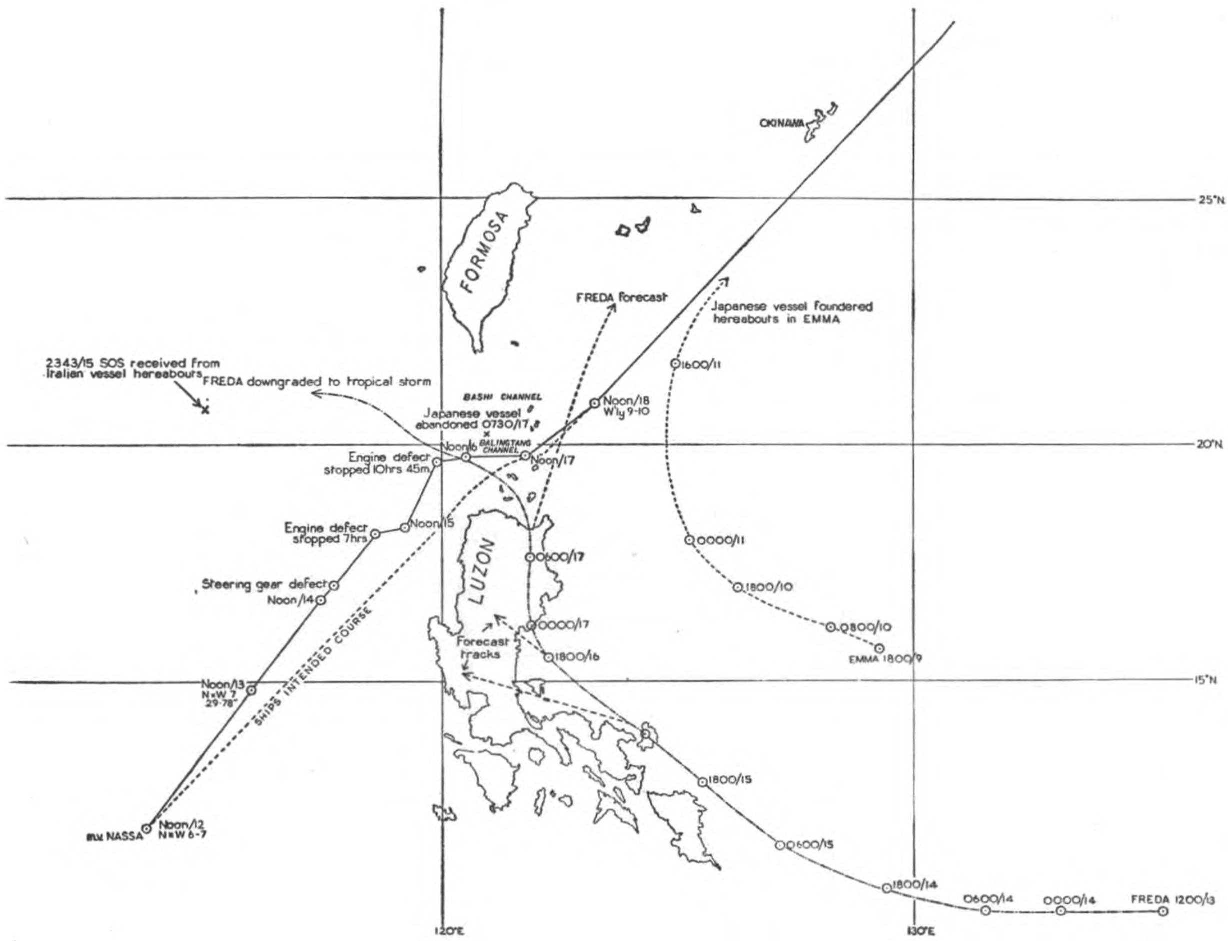
M.V. *Nassa*. Captain J. L. Charlton. Pulo Bukom to Yokohama. Master's report forwarded to the Meteorological Office by the owners (Shell Tankers, Ltd.).

8th November, 1959. Sailing at 0417 G.M.T. from Pulo Bukom, fine, calm, clear weather was experienced until the forenoon of 10th, when the vessel commenced shipping spray on main decks and pitching easily. Weather reports indicated that typhoon ' Emma ' had developed E. of the Philippines and I judged that this was the cause of the slight deterioration in the weather. It was obvious that the typhoon would be well clear of the ship before we traversed the Balintang Channel, for which course had been set.

11th. By nightfall *Nassa* was experiencing N'ly winds, force 7–8, pitching and shipping water. Typhoon ' Emma ' had now passed NE. of Luzon and was approximately 600 miles distant.

12th. Typhoon ' Emma ' had recurved and was well clear of the ship and weakening. Wind had decreased to N'W, force 5–6. Seas were shipped occasionally.

13th. Weather reports and forecasts showed that a second typhoon, ' Freda ', had developed, and plotting showed it to be well E. of the Philippines (see map). At the same time a secondary low with tropical storm indications had developed in the region 15° 30'N., 119°E., close enough to the ship to be uncomfortable. This was forecast as moving W. to WSW. and as I could not get behind it due to the



Tracks of Typhoons ' Emma ' and ' Freda ', and M.V. *Nassa.*

Palawan Reefs, I had no alternative but to cross it as far as possible from the centre and as quickly as possible. This was successfully done during the 2000 to midnight watch on 13th, with winds force 7–9 moderating to force 5–6 as they shifted. Meanwhile, typhoon ' Freda ' had advanced at about 10 kt practically due W. along latitude 10°N. Her westerly course was maintained until about 0600 G.M.T. on 14th when the reported position indicated a slight movement northward and possible recurvature. At about this time it was found that the ship's steering gear was defective. Speed was reduced and the defect repaired, and passage resumed about an hour later, wind then being NE'E, force 7; shipping water.

At 2012 on 14th engines had to be stopped due to a defect. Repairs were carried out and passage resumed 7 hours later.

Meanwhile, weather reports still showed that ' Freda ' was recurving and, taking into consideration her speed and probable track, ship's course was altered to traverse the Bashi Channel instead of the Balintang Channel, as this would allow the typhoon more time to pass ahead of the ship. A weather report received about then showed that ' Freda ' had definitely recurved and with the assessment obtained, together with further reports later that afternoon, I eased the engines to allow ' Freda ' to get well ahead, and to avoid being caught on a lee shore, namely the eastern side of the islands in the Luzon Strait. Consequently the vessel was kept on the course for the Bashi Channel at the reduced speed.

At 2330 on 15th the engines had again to be stopped due to a defect. I considered that it was better to let ' Freda ' pass well ahead of the ship, and in order to avoid getting closer to the centre with the prospect of a complete engine breakdown I decided to carry out repairs then. This took 10 hours and passage was resumed at 0948 on 16th.

The next weather report came to hand at 1030 and showed that ' Freda ', instead of following the normal and expected movement of travelling along the path of recurvature, had slowed down. It was then forecast as travelling in a WNW. to NW. direction and as the ship was travelling would have passed straight over us. It was impossible to turn S., and in view of its erratic history and speed it was considered inadvisable to run before it, as it would overtake us. The only alternative was to try and get across it. The shortest way was through the Balintang Channel and course was altered to do so, the engines being brought to full speed. The next morning radio bearings showed us to have made a speed of approx. 2¼ kt. Heavy gales were experienced all through 17th (i.e., until 1600 G.M.T. on 17th) and the ship's speed was never more than 3¾ kt.

17th. At approx. 0500 a disturbance was observed, thought to be the centre of the storm, and appeared to be travelling in a WNW. direction crossing from horizon to horizon, in about 25 min. Visibility was 5 miles when first sighted. It may be of interest to note that after the trough had passed, the sea became almost flat calm with a wind of about force 2 and absolutely clear weather for about 10 min. Subsequent weather reports showed the typhoon to have followed a completely erratic path, in fact at that time it appears to have been in the shape of an ogee curve.

By 1830 on 17th the worst was over and weather conditions steadily improved, the ship's speed picking up with a moderate gale behind her. The next weather reports showed that 'Freda' was weakening.

Note. This observation was forwarded through the U.S. Weather Bureau to the U.S. joint Typhoon Warning Centre at San Francisco. Commander C. E. Tilden, U.S.N., commanding officer of the centre, comments:

"The experiences of the *Nassa* during typhoon conditions are most interesting and I am pleased to forward comments on the forecasting phase of this storm.

"The track chart prepared by the Master of the *Nassa* indicates that forecasts were received from Guam, Tokyo, Taiwan and Hong Kong. We do not maintain records of the latter three so my comments are necessarily restricted to the typhoon warnings prepared by this activity. Discrepancies between forecasts mentioned in the narrative and those prepared here suggest that those prepared elsewhere were used.

"During 1959 the average position error of 24-hour forecasts for typhoon and tropical storms was 115 nautical miles, a slight improvement over previous years. Our experience with 'Freda' was that she was a 'well-behaved' typhoon. While minor speed changes were forecast, 'Freda' was forecast to move on a course of 300–305° until the 1800 G.M.T. warning on 16th was issued, at which time a northerly movement was forecast.

"The average forecast error during this period was 74 miles, much better than the annual average. The largest error of 136 miles, which was made on the forecast issued at 1200 on 16th, occurred during the period when recurvature was taking place. This continues to be the most difficult, as well as the most critical, forecasting interval.

"The following comment deals with the phenomenon observed at 0500 on 17th. According to aircraft and land radar fixes, it has been well established that, until approximately 1300 on 17th, Typhoon 'Freda' was centered over Northern Luzon. The only explanation that can be offered regarding the observation is that perhaps either a squall line associated with the typhoon or possibly a secondary center caused by the mountains of Northern Luzon was sighted. Whenever a storm moves inland over rather mountainous terrain, the orographic effect quite often produces unusual phenomena such as that sighted by the *Nassa* and which are not possible to explain with any degree of certainty. However, it is believed that the phenomenon observed was *not* the eye of Typhoon 'Freda'."

TYPHOON 'FREDA'

Western North Pacific Ocean

M.V. *Wokingham*. Captain J. C. Lewis. Gladstone to Yawata.

20th November, 1959. At 0430 S.M.T. (19th/1930 G.M.T.) in 28° 10'N., 135° 20'E., the wind was SSE., force 5. At 0445 it veered to N. and increased to force 10–12 with driving rain and a high sea. The barograph reading at 0445 was 999 mb and half an hour later the centre of the typhoon was observed by radar bearing 4 points on the starboard quarter, E'S, at a distance of 14 miles. Ship's course 330°. Speed 6 kt.

At 0000 G.M.T. on 20th: wind N., force 7; visibility very good; air temp. 72°F., sea 76°.

Position of ship at 0000 G.M.T. on 20th: 28° 36′N., 135° 12′E.

CURRENT RIP

West African waters

S.S. *Calabar*. Captain D. H. Coughlan, D.S.C., R.D. Madeira to Freetown. Observer, Mr. P. J. Houghton, 3rd officer.

19th October, 1959, at 1100 G.M.T. Four rips were observed, about 4 miles long and approx. ½ mile apart, running in a N.–S. direction. When crossing them, the vessel yawed through 7–10°. Sea temp. remained unchanged at 81·8°F. Wind NE., force 3; sea slight.

Position of ship: 10° 23′N., 16° 37′W.

Note. This rip and that reported by M.V. *Pennyworth* (below) were observed where the Guinea Current flows adjacent to the Equatorial Countercurrent.

M.V. *Pennyworth*. Captain N. Thomson, M.B.E. Middlesbrough to Monrovia. Observers, Mr. J. Bertram, 2nd officer and Able Seaman Collins.

7th November, 1959. The vessel entered a strong rip at 0345 G.M.T. and for 10 min swung off course up to 10° on each side, although on automatic steering. The depth of water by echo sounder was 75–80 fm and while passing through the rip the sea became a little rougher. From 0403 to 0407 a similar strong rip was encountered, the deviations from course being similar and the depth of water the same. Sea temp. 82·5°F; wind at 0000, calm; speed of vessel 12·7 kt; course 314°.

Position of ship: 10° 05′N., 16° 35′W.

off Galapagos Islands

S.S. *Hororata*. Captain C. P. Robinson. Balboa to Wellington. Observer, Mr. D. T. Evans, 3rd officer.

14th December, 1959. At 1645 G.M.T. a current rip was observed lying NNW.–SSE. and characterised by small waves breaking in a direction opposite to that of the surface wind. On the E. side of the line the colour of the sea was a deep blue while on the W. side it was a pale green. There was a fall in sea temp. of 3°F on crossing the rip. The set and drift of the current in the immediate vicinity was not determinable since stellar observations were not made within 24 hours either side of the rip, due to overcast skies. Solar sights gave a general indication that westerly set was much stronger after passing through the tide rip. At 1800: wind ENE., force 4; swell moderate from S'W; sea temp. 75°F.

Position of ship: 0° 23′N., 92° 40′W.

M.V. *Port Hardy*. Captain R. L. Hagley. Balboa to Wellington. Observer, Mr. E. H. Jones, 3rd officer.

26th December, 1959. A pronounced current rip about 6 miles long was observed lying in a 100–280° direction on the port bow at 2110 G.M.T. On passing through the rip, the ship's head swung about 15° to starboard. Sea temp., which had previously been around 75–73°F, dropped to 68·2° and air temp. fell similarly from 76 to 71°. Two and a half hours later the sea temp. had risen to 70·3°. Course 235°; speed 18 kt; wind SSE., force 3; swell low from S'E.

Position of ship: 0° 30′N., 92° 07′W.

Note. This current rip and that observed by S.S. *Hororata* (above) were experienced where the surface waters of the cold Peru Current converge with the warm waters of the Equatorial Countercurrent (flowing southwards off the coast of Columbia). Current rips and fluctuating sea-surface temperatures may be expected in this marginal mixing zone where the currents converge.

DISCOLOURED WATER

Arafura Sea

S.S. *Orcades*. Captain R. W. Roberts, O.B.E., D.S.C. Sydney to Manila. Observer, Mr. J. S. Fitzwalter, Jnr. 3rd officer.

31st October, 1959. At 0000 G.M.T. streaks of an orange brown colour were observed in the water. Sea temp. 80°F. Wind SE., force 5.

Position of ship: 9° 26′S., 138° 13′E.

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

"This observation from the Arafura Sea comes from an area where dense growth of planktonic algae is frequent, *Trichodesmium* specimens and Dinoflagellate blooms have been recorded nearby, and the wealth of diatom in the area has been recognised from the time of H.M.S. *Challenger* onwards.

"Reports and samples are still very welcome, for the individual organisms responsible for the discoloration have rarely been identified and seasonal distribution of the blooms may yield valuable pointers to underlying physical causes."

Galapagos Islands

S.S. *Paparoa*. Captain D. A. G. Dickens. New Plymouth to Panama. Observers, the Master and all officers.

8th November, 1959. At 2300 G.M.T., when the vessel was passing to the SE. of the Galapagos Islands, it crossed a line of discoloured water, resembling floating sand, which lay in a 150–330° direction and extended on both sides of the ship for at least three miles. Several small, revolving, tide rips were seen in the vicinity.

Sea temp. 72·5°F. Wind S'ly, force 2–3. Weather, overcast with slight drizzle.

Position of ship: 1° 15′S., 89° 00′W.

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

"This observation is most interesting. Reports from the Galapagos area go back to Darwin and Captain FitzRoy in the *Beagle*. But only two examinations of samples are known to me. The first was made by Luther, who collected it from the R.R.S. *Wm. Scoresby* in 1931–32, when she was making an oceanographic survey of the Peru coastal current. The swarm was composed mainly of large colonial radiolarian ('large' in referring to this group means less than pin-head size for individual colonies)."

ICEBERGS

Davis Strait

M.V. *Baffin*. Captain W. N. Kettle. On patrol in Arctic Waters. Observer, Mr. A. R. Turnbull, 2nd officer.

6th to 12th October, 1959. The icebergs and growlers in the Cape Dyer area were plotted every day in the morning and evening, the total number being 32. The general drift was found to be in a SE. direction at a rate varying from ¼ kt to 1½ kt. Inshore, however, the drift tended to swing more to the S. None of the icebergs was of a very large size, the average being between 100 and 175 ft in height and from 200 to 400 ft at the base. Two of these bergs were grounded in 50 fm and 60 fm respectively: one berg, measuring 68 ft in height and 125 ft at the base, was grounded in 28 fm. To mark the most prominent pieces of ice, red and black dyes were used, but this did not prove too successful as not enough dye could be applied to the ice to make the markings distinguishable at a distance.

Position of ship during the period: approx. 66° 30′N., 61° 30′W.

Note. An ice map for the end of October is given on page 90 of *The Marine Observer* for April 1960. The area of the above patrol was free of field-ice. This report gives an interesting picture of the southward drift of icebergs during the period when the large annual movement southward of field-ice and icebergs was over.

SCUM

Galapagos Islands

M.V. *Rangitata.* Captain A. Hocken. Auckland to Balboa. Observer, Mr. B. J. C. Jones, 3rd officer.

19th December, 1959. At 1130 G.M.T. large patches of scum, having a resemblance to the kind associated with detergents, were seen on the sea surface; they had a tendency to lie in a line at right angles to the wind, which had been SE'ly, force 3. On close inspection, with the aid of binoculars, the bigger patches were seen to be interspersed with fairly large air bubbles. They did not swell and burst, but remained constant in size and showed no movement. Air temp. 72·5°F, sea 73·7°; low SE. swell.

Position of ship: 1° 09'S., 88° 40'W.

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

" Near the Galapagos and northern end of Peru current the latter tends to swing off shore. The date suggests something analogous to the El Nino effect.

" Samples from this area around Christmas time could be extraordinarily valuable. Although we know something of the physical background of El Nino—more or less periodic invasion of what should be cold Peru current waters by warmer waters from the west and north—we know little of the blooming of micro-organisms that ensues and which is the more probable direct cause of mortalities."

SUBMARINE EARTHQUAKE

Japanese waters

M.V. *Diomed.* Captain W. J. Moore, D.S.C. Pusan to Otaru.

8th November, 1959. At 2215 S.M.T., when in Otaru Bay, the ship shuddered as if the engines were going full astern, but no reason for this was apparent on board. Next morning the news contained reports of an earth tremor centred in Otaru Bay.

RADIO FADE-OUT

South Pacific Ocean

M.V. *Cornwall.* Captain I. Y. Batley. Auckland to Matarani (Peru). Observer, Mr. R. Lockwood, Chief Radio officer.

28th November, 1959. Between 2020 and 2050 G.M.T., a complete fade-out of radio signals was experienced on frequencies between 6 mc/s and 25 mc/s. At 2010, signals on the 16 mc/s band seemed weak, Irirangi Radio (ZLO) being QSA 2 to 3, and at 2020 neither ZLO nor any other station could be heard. At 2050 occasional signals on the H.F. band were again heard, and by 2055 all seemed normal, ZLO being QSA 3 to 4. Two sunspots were clearly seen, one in each of the lower quadrants.

Position of ship: 39° 55'S., 145° 00'W.

30th November. Between 1740 and 1800 G.M.T., a complete fade-out of radio signals was experienced on frequencies between 6 mc/s and 25 mc/s, and normal conditions did not return until 1825. One sunspot was visible to the left of the sun's centre.

Position of ship: 39°37'S., 130°29'W.

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

" The two fade-outs reported by M.V. *Cornwall* were caused by sudden atmospheric disturbances associated with two large sunspots visible during the period 27th November to 5th December.

" The disturbances on 28th November had little effect on circuits incoming to the United Kingdom, since at 2000 G.M.T. most of the circuit paths would be in darkness. On 30th November, however, a complete fade-out occurred on all incoming circuits between 1748 to 1805 G.M.T., about the time the fade-out was reported by the *Cornwall*. A sudden ionospheric disturbance was also reported by Barbados. Reports from stations outside the U.K. which might refer to the fade-out on 28th November are not, as yet, available.

" The whole period 28th November and 30th November to 5th December was one of intense magnetic activity."

VISIBILITY REDUCED BY RAIN

North Atlantic Ocean

M.V. *San Vulfrano*. Captain R. R. Griffith. Fedala to Curaçao.

12th November, 1959. About 0000 G.M.T. lightning was seen in the NW., and shortly afterwards it was observed flashing in all directions. At 0120 the wind, which had been E'S, force 3, veered sharply to the NW. and a violent rainstorm occurred with the wind reaching force 6. In a matter of seconds visibility was reduced by the rain to 50 yd, having previously been very good. During the whole day there was intense static interference with medium and short wave reception to such a degree that very few signals got through. Air temp. 78°F, wet bulb 73°, sea 78·8°.

Position of ship: 23° 00'N., 39° 03'W.

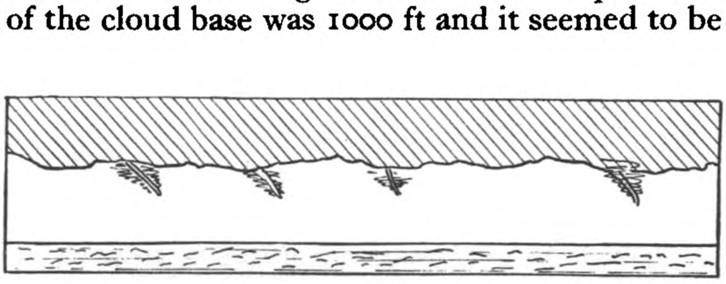
Note. It has been difficult to obtain complete synoptic information covering this area, but this very intense storm appears to be the result of an intrusion of a cold air mass into the sub-tropics, which is unusual at this location.

WATERSPOUT

South Pacific Ocean

M.V. *Rangitoto*. Captain L. W. Fulcher. Observers, Mr. R. Box, 3rd officer, Mr. E. Wilson, 3rd Radio officer and Mr. L. MacLeod, Quartermaster.

2nd October, 1959. At 2000 G.M.T. a long line of Cu with little vertical development, but with precipitation in places along its length, was seen approaching from SE. and rapidly becoming very dark on the under side. The rest of the sky was covered with 8/8 Sc. As the Cu passed overhead, the air temp. fell from 74°F to 70·5°; the wind was ESE., force 3 and no change occurred in the barometric pressure to suggest that the cloud was in the nature of a front. When approx. two miles astern, the section of the cloud that had passed overhead became more isolated and took on the form of a roll, still with little vertical development and from the base three or four thin tornado-like fingers were seen to probe downwards. The estimated height of the cloud base was 1000 ft and it seemed to be moving at about 30 kt.



As the sketch shows, each spout, though short, was well formed, and in most cases the hollow structure of the columns was clearly visible during the 15 min in which they were observed; none of the spouts reached more than half way between the cloud and the sea; some lasted the full 15 min and some only 3 or 4 min. It was not possible to determine either the direction or speed of rotation and, even with the aid of powerful binoculars, no disturbance of the sea surface below the spouts could be seen. Each spout slowly withdrew to the cloud base, and when the last one had disappeared precipitation rapidly took place along the entire length of the cloud, which was by now less dark and no longer isolated. At 1430 the air temp. returned to 74°F and the sea was 74·6°. The wind throughout remained ESE., force 3.

Position of ship: 5° 16′S., 96° 14′W.

Malta Channel

M.V. *British Patience*. Captain J. B. Hunter. Port Said to Swansea. Observers, the Master, Mr. W. A. Whelpton, 3rd officer, Mr. P. D. Guildford, Radio officer and Messrs. Hayward and Davies (Apprentices).

11th October, 1959. Between 0742 and 0756 G.M.T. when the vessel was off Gozo, the waterspout shown in the accompanying sketches was observed. The various stages in the development were as follows:

- 0742 Base of Cb beginning to assume the form of an inverted cone, in one place.
- 0744 The cone lengthening and agitation of the sea surface seen at a distance of about 6½ miles, bearing 195°. Radar showed a faint echo.
- 0745 A long thin tube now reaches the surface and the spray formed increasing in height.
- 0746 The spray reaches a maximum height of 700–800 ft.
- 0747 Vessel enters an area of moderate rain and a rainbow seen. The wind increasing to force 4–5.
- 0749 The spout now less solid looking and, at the base of the cloud, beginning to break up.
- 0752 Now in its final stages. The agitation of the sea surface decreasing and the spout beginning to waver.
- 0754 The spout no longer in contact with the sea, but still signs of agitation of the surface: now apparently withdrawing upwards to the base of the cloud.
- 0755 Rain ceased: spout still disintegrating.
- 0756 Spout no longer seen.

Other incipient waterspouts were seen during the period but none developed beyond the initial stage.

Air temp. 73·9°F, wet bulb 69·8°, sea 74·2°. Wind W'N, force 3. C_L2, C_L3 and C_M3.

Position of ship: 36° 12′N., 14° 07′E.

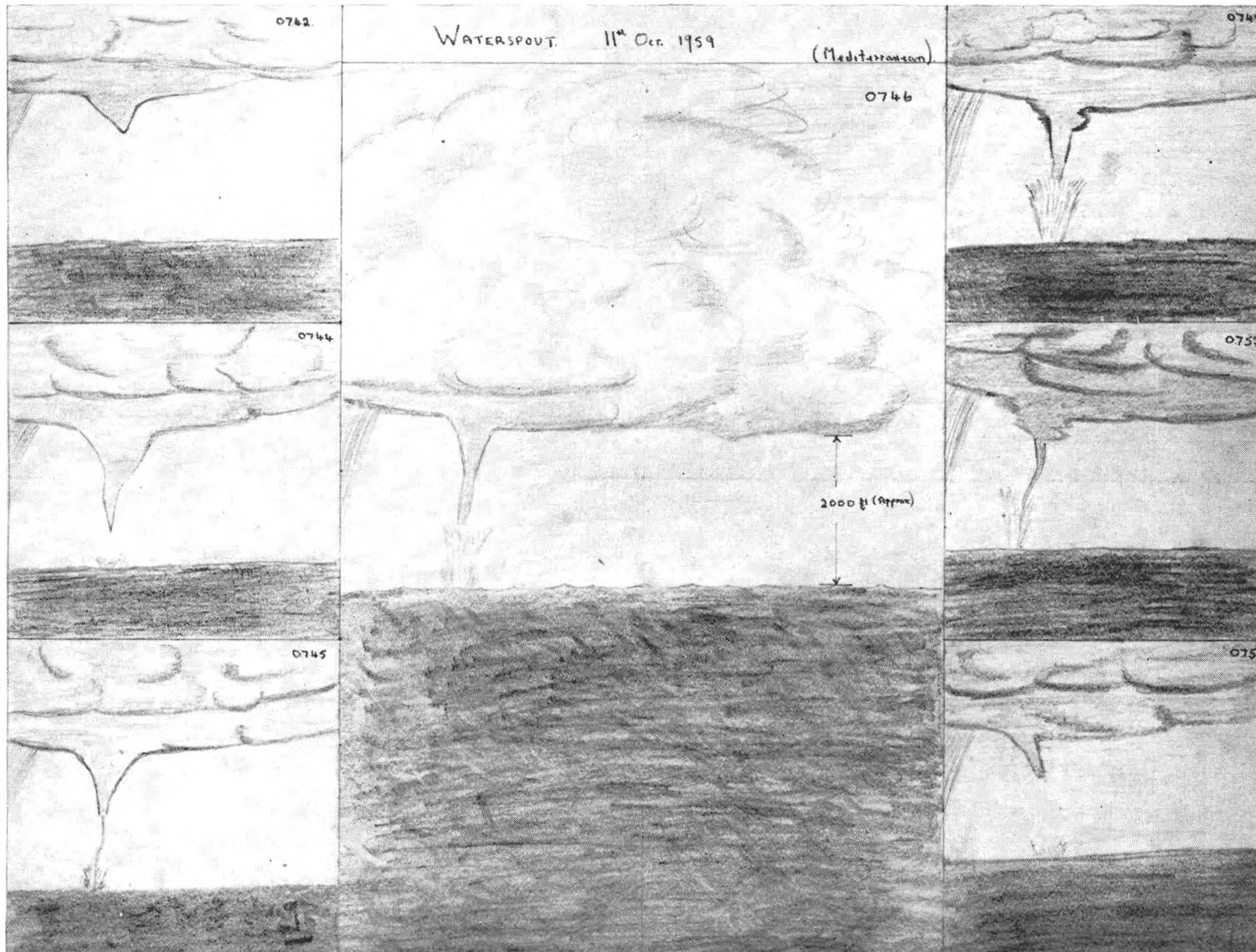
LINE SQUALL

New Zealand waters

S.S. *Dunedin Star*. Captain R. H. Stark. Timaru to Lyttelton. Observer, Mr. P. V. J. Sanders, 3rd officer.

19th November, 1959. At 0510 G.M.T., half an hour after leaving Timaru, the unusual cloud formation illustrated in photo 1 (opposite page 193) was seen forming abeam to starboard and moving in a northerly direction at a speed estimated to be about 24 kt. Just before the cloud reached the vessel, the wind increased from force 3 to force 6, and, although not blowing from off shore, a good deal of dust was felt in the air. As the cloud neared the ship, it was seen to have all the appearance of a cold front, with violent rain falling in places, though at the vessel the rain was slight. The wind raised a good deal of spray as the squall passed towards the South

(Opposite page 192)



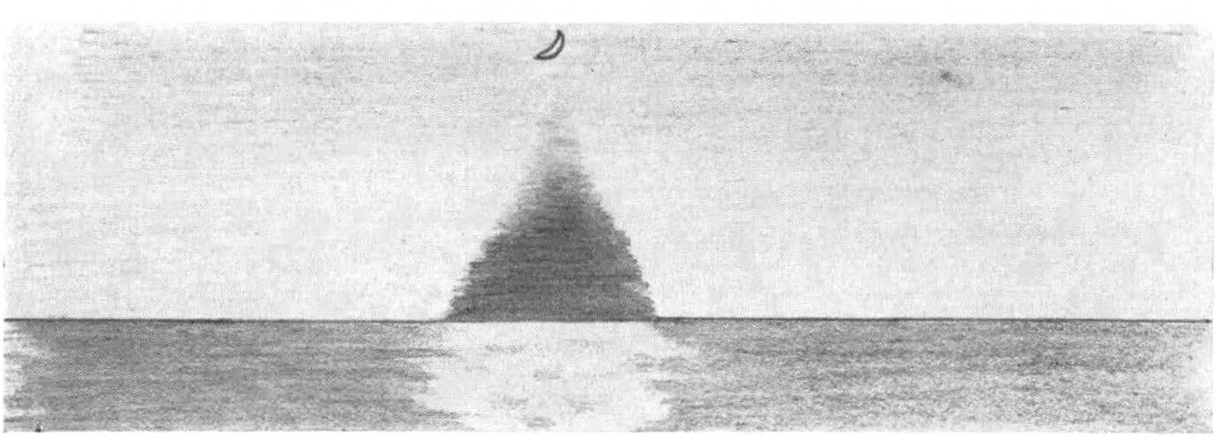
Waterspout observed from M.V. *British Patience* (see page 192).

(1)

[*Photos by Mr. P. V. J. Sanders, 3rd officer*

(2)

Line squall observed from S.S. *Dunedin Star* (see page 192).



Contrast of light observed from M.V. *Dartmoor* (see page 193).

Canterbury Plain, see photo 2. There was a fall in temperature from 57°F to 53° and a rise in pressure from 1005·5 to 1007·5 mb.
Position of ship: Off Timaru.

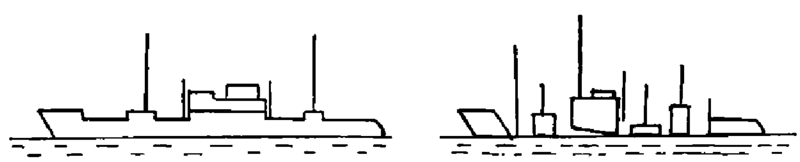
Note. This is a very fine example of a line squall associated with the northward movement of cold unstable maritime polar air. The observer must be congratulated on getting such excellent photographs.

ABNORMAL REFRACTION

North Atlantic Ocean

M.V. *Carnarvon Castle.* Captain J. F. Oakley. Cape Town to Las Palmas. Observers, Mr. R. M. Dunning, 2nd officer and Mr. M. Fazakerley, 4th officer.

2nd October, 1959. During a partial eclipse of the sun which reached its maximum phase about noon G.M.T., a ship on a similar course to ours, at a distance of 8 miles, appeared to break up into sections during the period of greatest eclipse.



(1) (2)

The vessel's normal appearance is shown in Fig. 1. At 1307 it appeared as shown in Fig. 2. At noon: air temp. 80°F, wet bulb 77°, sea 84°; partly cloudy; visibility very good; wind WSW., force 3.
Position of ship: 8° 00′N., 14° 45′W.

Note. It is not certain that the partial eclipse caused the abnormal refraction reported and illustrated here. The physical processes that would produce such a phenomena would be complex and it would be difficult to trace its causes directly to the cutting off of the sun's rays. However, under special conditions this could be the important physical factor in setting up the atmospheric duct producing the abnormal refraction.

CONTRAST OF LIGHT INTENSITY

North Atlantic Ocean

M.V. *Dartmoor.* Captain J. O. Roberts. Cadiz to Port Everglades. Observer, Mr. W. G. Shelton, 3rd officer.

15th March, 1959. Whilst approaching the Providence N.E. channel a dark patch was observed directly under the moon. The night was mainly clear, with occasional scattered rain showers and the moon three-quarters full. For the main part the horizon was clear cut, emphasised by what appeared to a light haze, although visibility was good. Directly under the moon the shading was reversed, the sea being lit up by the moon's reflection and the sky very dark. (See drawing on opposite page.) The shaded patch under the moon was directly over Abaco Island and seemed to rise to the moon, tapering away until lost in the night sky.
Position of ship: 25° 50′N., 76° 40′W.

Note 1. The appearance of a triangle of darkness between the moon and the horizon, contrasting with the triangle of light under the moon which extends from the ship to the horizon, is rare but not unknown. No satisfactory explanation can be given but the effect is thought to be physiological, due to contrast, rather than true. As long ago as 1856 an observer noted that the dark triangle disappeared when he screened off the moon and the lower triangle of light. And when, after turning round, he suddenly looked again, the illusion only re-appeared after a few seconds.

Note 2. The above observation was unfortunately received too late for inclusion in the January 1960 number of this journal, its rightful place according to date, but is published here because of its unusual interest.

IRIDESCENCE

North Pacific Ocean

M.V. *Port Vindex*. Captain E. W. R. Young. Balboa to Auckland. Observer, Mr. J. Burtt, 3rd officer.

4th December, 1959. At 1240 L.M.T., approximately 22 min after the sun had passed the meridian, a bright orange glow was observed at the edge of a patch of double-layered Ac cloud. The light stretched as a band from 180° to 210°, at an altitude of 16°, and lasted for approx. 20 min. Other cloud present was 4/8 Cu. Air temp. 81°F, wet bulb 76°, sea 81°.

Position of ship: 5° 12′N., 81° 06′W.

Note. Iridescent cloud is one of the most beautiful of sky phenomena. The iridescence (a word formed from the name of Iris, the rainbow goddess) is due to diffraction by small water droplets and, though all colours may be seen, often delicately shading into one another, the actual colour or colours seen are determined partly by the size of the droplets and partly by their distance from the sun. The observation from the *Port Vindex* is unusual, in that iridescence is usually seen only on cloud within about 30° of the sun, whereas in the above observation the angular distance would be about 47°.

SCINTILLATION OF STARS

South China Sea

S.S. *Stanvac Sumatra*. Captain W. Rutherford. Observer, Mr. K. S. Schofield, 2nd officer.

1st November, 1959, from 1930 until 2200 ship's time. The stars Capella and Aldebaran, when rising and at an altitude of about 15°, appeared to be flashing red and green, somewhat like a distant aircraft with its wing tip navigation lights flashing on and off, in fact that is what I first took the stars to be, until after closer inspection with binoculars.

The colours were unmistakable and very vivid.

Position of ship: 15° 15′N., 116° 32′E.

Note. The phenomenon of stars appearing to change colour, although not common, is fairly well known. Certain meteorological conditions will cause pockets and layers of various densities in the atmosphere which will in turn cause unequal refraction. Stars may therefore take on the varying colours of the spectrum according to the relative position of the observer with regard to the refracted ray. Colour change is seldom shown by stars above 34° altitude and has never been observed at altitudes greater than 51°.

UNIDENTIFIED PHENOMENON

North Atlantic Ocean

M.V. *Trevean*. Captain J. Williams. Curaçao to London. Observer, Mr. D. C. Penberthy, Chief officer.

1st December, 1959. About 2000 G.M.T. when low cloud was passing across, a bright blue diffused light suddenly grew, as from the clouds overhead. It was thought at first to be an electrical fault in the wheelhouse and I looked inboard for it: a few sec later I stepped out on to the open deck, when the light faded and went out. No actual flash was seen—it was as though a diffused blue light had been gradually unshaded behind the clouds and then gradually covered again. Both the lookout man and the man at the wheel were in agreement about the appearance and intensity of the light. The wind at the time was NW., force 6–7.

Position of ship: 39° 45′N., 17° 40′W.

REACTION OF PORPOISES TO SOUND

North Atlantic

The following item, which may provide an interesting talking-point, has been extracted from the logbook of S.S. *Calabar*, Captain D. H. Coughlan, D.S.C., R.D., on the U.K. to West Africa run. The logbook concerned covered the period 16th August to 18th November, 1959.

"Several passengers and members of the crew have remarked that schools of porpoise do not remain in the vicinity of this vessel as long as they usually do in the case of other ships they have sailed in. It has been suggested that, if this is actually the case, the reason may be due to the quite loud and piercing sounds emitted, at certain drafts, by the propeller. H. A. Ross 2/o."

Note. Dr. F. C. Fraser, of the Natural History Museum, comments:

"In my own experience, dolphins are sensitive to high pitched vibrations and are sometimes, but not always, frightened away by them. I have reported an instance in which a school of 200 or 300 dolphins disappeared over the horizon when an ultra-sonic echo sounder was switched on. I am inclined to think that it is more the sudden switching on of the vibration than the vibration itself which frightens the animal, because there is information that dolphins will approach a vessel in which the echo sounder is operating. In other words, they swim into the sound.

"I am very glad to have this report."

PHOSPHORESCENCE

Gulf of Oman

M.V. *British Splendour.* Captain K. Bruce. Aden to Abadan. Observers, Mr. F. T. Lamb, 2nd officer, the quartermaster and look-out.

27th December, 1959. At 0200 S.M.T., when 28 miles south of the Makran coast, the vessel was steaming through great areas of phosphorescence, contained in a belt about ½ mile wide which extended in a SE.–NW. direction for 2–3 miles. The light from the stars showed large amounts of grey-white matter on the sea where it was disturbed. The phosphorescence was a brilliant green in colour and there was also a continuous glow surrounding the ship which clearly illuminated masts, houses, forecastle, look-out man (220 ft away), funnel crest and colours (350 ft away).

Although phosphorescence has been seen many times in this region and elsewhere, never has anything so spectacular been encountered either by myself or the other two observers, both experienced seamen. A sample of the water has been forwarded to the National Institute of Oceanography, for examination. Sea temp. 75°F; sky cloudless; wind calm; flat sea, no swell.

Position of ship: 24° 50′N., 59° 50′E.

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

"The massive display of phosphorescence described by the *British Splendour* in the Gulf of Oman is most likely to have been caused by large organisms such as an exceptionally dense shoal of *Pyrosoma* Colonies, perhaps augmented by a diffuse glow from various micro-organisms, certain species of Dinoflagellates being the most probable.

"Owing to the unpreserved state of the sample, it was very difficult to identify the remains of the rich microplankton it evidently contained. Apart from the putrifying bacteria, ciliate protozoa were living in it. Sufficient diatom remains survived to show that the Phytoplankton must have been extremely rich with one of the larger and more flaccid tropical solenoids, probably a species of *Rhirosolenia*, dominant. A little *Trichodesmium* and just two specimens of luminescent Dinoflagellates were also recognisable along with two diatom species in small numbers. None of these plants, except the two Dinoflagellates, are known to emit light. Larger organisms, such as *Pyrosoma*, could not occur in such a small sample.

"Reports and samples are still very welcome, for the individual organisms responsible for the discoloration have rarely been identified and seasonal distribution of the blooms may yield valuable pointers to underlying physical causes."

Arabian Sea

M.V. *Cilicia.* Captain A. G. Johnston. Karachi to Aden. Observers, Mr. G. R. Cullen, 3rd officer and Cadet N. Harris.

26th November, 1959. At 1745 G.M.T., when the phosphorescence was first sighted, it lay in a straight line ahead of the ship and extended for about 2 miles on each side of it. On entering the area of phosphorescence, observers on board had the impression of being in heavy seas with breakers and a very confused swell running. At 1735, the ' heavy seas ' began to calm down and by 1755 the phosphorescence started to move off in regular lines at considerable speed in a NW'ly direction. The whole display was unusually vivid. A sounding taken gave a depth of 40 fm.

Sea temp. 80°F; wind E'S, force 3; sea slight; visibility very good; no cloud; course 232°, speed 16·5 kt.

Position of ship: 24° 20'N., 66° 22'E.

Note. Mr. E. W. Barlow, formerly of the Marine Division of the Meteorological Office, comments:

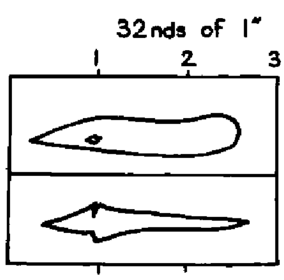
" A similar observation, of the sea apparently becoming rougher when the vessel entered a phosphorescent area, was published in the April 1960 number of this journal (S.S. *Esso Manchester*). It should be emphasised that the rarity of such observations is dependent on the vessel being within the area. The appearance of breakers in a phosphorescent area seen from a distance is quite frequent."

Ceylonese waters

S.S. *Corfu.* Captain W. T. Banks. Colombo to Penang. Observer, Mr. A. J. Foot, Supernumerary 2nd officer.

9th October, 1959. On clearing the anchorage, course was set 180° to pass 9 miles W. of Barberyn Light. Soon after 0100 ship's time, with Galbokka Point abaft the beam 3 miles distant, innumerable spots of light, not unlike fishing boat lights, were observed broad on the starboard bow.

At 0110 the phosphorescence was observed to be stretching across the bows and on to the port bow. The ship now began crossing this very brilliant green band of phosphorescence, which quickly became more concentrated until 0115 when the 20 fm line was crossed. Two min later a sounding gave 28 fm. During the remainder of the watch, scattered phosphorescence was observed. Numerous



tiny organisms, as shown in the sketch, were found in the fire buckets next day. The upper sketch is in profile, the lower as viewed from above. Wind W'ly, force 2; occasional squalls; mainly overcast.

Position of Galbokka Point: 6° 56'N., 79° 51'E.

Note. Mr. E. W. Barlow comments:

" This is an observation of special interest as it is very unusual to have a statement that a concentration of phosphorescence was associated with a depth contour line. On a chartlet sent, but not reproduced, the concentration is shown as following the contour line for a distance of about 8 miles. This line lay obliquely across the ship's southerly course."

Indian Ocean

M.V. *Monmouthshire.* Captain A. K. Sanderson. Aden to Port Swettenham. Observers, Mr. H. T. Reid, 2nd officer and Mr. M. H. Day, 3rd officer.

2nd December, 1959. A considerable amount of phosphorescence was observed between 2030 and 2330 G.M.T. It was, however, responsive only to strong artificial light and did not appear either in the ship's bow wave, wake, or at the ship's side, in the immediate proximity of the reflection of the deck lights. It was noted that when the Aldis light was directed on the sea, large areas lit up and remained so for a considerable time after the vessel had passed. It was found possible to do this at distances up to 2 cables in any direction.

Position of ship at 2030: 8° 08′ N., 73° 19′ E.

Note. Mr. E. W. Barlow comments:

" The experiment of throwing artificial light on to the sea surface has only been made on relatively few occasions. In about one-third of these observations the light produced no effect. In the others, the light stimulated or increased the luminescence of individual organisms, or that of small areas of the sea. The above observation is therefore of special interest on account of the large area affected and the continuance of the luminescence."

Gulf of Thailand

M.V. *Myrtlebank.* Captain L. F. Holden. Yokohama to Cape Town.

15th November, 1959. At 1800 G.M.T., when sailing through the Gulf of Thailand, the vessel passed three large, apparently circular, patches of phosphorescence, estimated at 25 ft in diameter. These patches were flashing at intervals of about 1 sec, the light seemingly starting at the northern end and running through the whole to the southern end. Wind s'ly, force 2; sea rippled.

Position of ship: 12° 55′N., 100° 33′E.

North Atlantic Ocean

M.V. *Trelyon.* Captain F. G. Bolton. Cape Town to Antwerp. Observer, Mr. G. R. Crease, 2nd officer.

7th October, 1959. At 0035 S.M.T., extremely bright phosphorescence was observed. In the bow wave it was a very luminous green, and each breaking wave, as far as the horizon, showed brilliant white sparkles: the whole sea appeared to be glittering. The log line and shell plating moving through the water appeared as though they were trailing tongues of fire. With Cape Verde abeam all these effects decreased and at 0210, when the Cape was two points abaft the beam, the phosphorescence was no longer seen. Sea temp. 83°F; wind NNW., force 1; almost cloudless; very good visibility.

Position of ship: 14° 37′N., 17° 49′W. (18 miles WSW. of Cape Verde).

M.V. *Chantala.* Captain D. W. Speirs, G.M., R.D. Walvis Bay to Las Palmas. Observer, Mr. G. C. Ruaux, 3rd officer.

26th November, 1959. Very marked phosphorescence has been seen for the last few days, but between 2200 and 2330 G.M.T. it was visible right out to the horizon, and the light wind blowing at the time gave the impression of being far stronger than it actually was, as every wave top was phosphorescent and appeared to be breaking. Large fish left glowing trails; the light given off from the sea was as bright as that from a full moon and ships' steaming lights on the horizon were hard to see at times with the naked eye. The whole effect was unusual. Sea temp. 80°F at 1800, 76° at 2400; wind N'E, force 2; cloudless with excellent visibility.

Position of ship: 14° 24′N., 17° 32′W. (20 miles S. of Cape Verde).

Note. Mr. E. W. Barlow comments:

" This observation and that of *Trelyon* (above) put on record the occurrence of unusually brilliant luminosity in the Cape Verde region."

South Pacific Ocean

M.V. *Sussex.* Captain J. R. Ramsay. Auckland to Balboa. Observers, Mr. F. F. Michael, 3rd officer and Mr. T. D. Mason, Chief radio officer.

22nd November, 1959, 2140 ship's time (0820 G.M.T./23rd). Unusual bioluminescence was observed at a considerable depth. It flashed as the ship passed, and had the appearance of puffs of smoke. There were many individual flashes, each varying in size, intensity and depth; each piece was observed to flash only once. They were too far below the surface for the size of any individual piece to be observed, but each flash appeared to cover several square yards and to be of uniform intensity. Sea temp. 59·5°F; wind light and variable, force 1; swell, SSW., 13 ft; cloudy, with excellent visibility.

Position of ship: 35° 25′S., 160° 43′W.

Note. Mr. E. W. Barlow comments:

"Flashing bioluminescence may be classified under several headings. The characteristics of the type to which the above observation is appropriate are that there is no previous steady luminosity of areas which subsequently flash, and that the flashes illuminate areas large enough to be visible as such. Only 7 previous observations of this type have been received."

AURORA

[The following collation of auroral observations has been prepared at the Balfour Stewart Auroral Laboratory of Edinburgh University by Mr. B. McInnes and Mr. K. A. Robertson of the Aurora Survey.]

The period under consideration, October to December 1959, was quiet as far as aurora was concerned. There are 32 nights for which reports have come from ships in the Atlantic and 3 nights with reports from ships in southern waters. The following list gives the details of the ships' positions and summaries of the observations. (Reference may be made to the July issue for an explanation of the various columns of the list.)

The beginning of October was a moderately active period, with fairly extensive displays several nights in succession. From the reports of these displays we select one which records several interesting features. S.S. *Dorset* was off New York when the display of 30th September to 1st October was at its height and observations were made as follows.

"Aurora was visible in the northern sky between 0430 and 0750 G.M.T. Cloud blocked out the lower part of the phenomena. The aurora covered an arc from 320° to 050° and reached a maximum height of about 15°. At various times it brightened and faded, and vertical streamers would appear, converging at a point far below the horizon. At 0700 G.M.T. it reached its maximum brilliance with about twenty shafts of white light and a bright arc stretching from 315° to 052°. Pulsating bands of light parallel to the horizon were in rapid motion, sometimes two a second, whilst other pulsating arcs were in motion but appeared to be coming from a different source. The phenomena gradually faded away but the pulsating effect remained until 0705 G.M.T."

In that report, the 'vertical streamers' and the 'shafts' are the forms properly called rays. Their appearing to converge at a "point far below the horizon" is a perspective effect. Rays are in fact parallel to each other, but because they are so long they do show perspective convergence. The point of convergence in this case was the 'anti-coronal point', the point on the celestial sphere diametrically opposite the coronal point. Since magnetic inclination in the neighbourhood of New York is about 72°, the "point far below the horizon" would be in fact at 72° below the horizon, in the direction of the magnetic meridian. If the rays had risen far enough towards the zenith, the observer would have seen them converge at their upper ends on the coronal point, about 18° S. of the true zenith.

The greatest activity of the period, as measured by geomagnetic disturbance, was reached on 28th November. Parts of the report from S.S. *Andria* may be quoted to give some impression of the auroral manifestations that accompanied the geomagnetic storm. The ship was at around 42° N., 60° W.

"At 0115 G.M.T. aurora was observed shining from behind a bank of low cloud in the form of many white beams radiating in a fan shape from a point approximately due N. The light gradually increased in height to an approximate altitude of 35°. By 0115 it was diffused with a brilliant red in certain upper sections of the display. It thus continued for about 5 min before fading. At 0545 aurora was observed again, but partially obscured by cloud. At 0550 the clouds disappeared and the light increased in brilliance, then extended to the zenith, and faded. At 0600 there appeared a brilliant red glow within the main auroral display, bearing

270° at 20° altitude, lasting about 5 min. From 0600 to 0610 the auroral light was confined to an arc between 350° and 010°, of altitude 30°, and very brilliant. The red glow reappeared, bearing due N. at 45° altitude."

A commendable feature of this report is the number of times given: accurate timing of observations is very important from our point of view. On the other hand, the terms used here for the characteristic auroral forms are not those in general use. The 'beams' should be called rays, the word 'arc' should be reserved for the form known by that name, and the 'glow' described here was in fact a red surface. We hope that observers will adopt the standard names* in future reports; this will make these already very useful reports even more valuable to us.

DATE	SHIP	GEOGRAPHIC POSITION	Λ	Φ	I	TIME (G.M.T.)	FORMS
1st Oct.	*Taranaki*	46° 06'N. 39° 52'W.	040	+56	+68	0340	HA
	Dorset	40° 31'N. 72° 08'W.	360	+51	+72	0430–0750	HA, R, P
2nd	*Lismoria*	56° 10'N. 13° 00'W.	070	+61	+71	2040–2130	HB
3rd	*Birmingham City*	51° 35'N. 56° 15'W.	020	+63	+75	0030–0830	HA, RA, RB, P ↗ C
	Wendover	49° 25'N. 61° 50'W.	010	+61	+75	0300	R
	Rookwood	47° 20'N. 70° 30'W.	360	+59	+76	0440–0530	HA, RA, R ↗ C
	Explorer	58° 24'N. 02° 40'W.	080	+61	+72	2015–2330	R
	Weather Recorder	62° 02'N. 33° 57'W.	060	+70	+76	2210–0300	HA, RB, R ↗ C
	Velletia	44° 50'N. 47° 20'W.	030	+55	+70	2300–0300	G, S
4th	*Alsatia*	44° 00'N. 50° 20'W.	020	+55	+70	0350–0444	RA, F
	Explorer	58° 40'N. 05° 00'W.	080	+62	+72	0400	G, R
	Lismoria	55° 00'N. 42° 54'W.	040	+65	+74	2200–0105	RB ↗ C
	Weather Recorder	62° 07'N. 34° 28'W.	060	+70	+76	2215–2350	G, R
5th	*Dorset*	Gulf of St. Lawrence	010	+61	+76	0001–dawn	RA
	Rookwood	47° 30'N. 70° 10'W.	360	+59	+76	0330–0534	HA, RA, RB, S
	Calgaria	54° 00'N. 37° 30'W.	040	+63	+72	0330–0615	HB ↗ 90°
	Explorer	61° 30'N. 7° 00'W.	080	+65	+74	1920	RB
	Birmingham City	53° 42'N. 34° 30'W.	050	+62	+72	2200–0020	G, R
	Lismoria	52° 30'N. 53° 12'W.	020	+63	+75	2300–0215	RB
6th	*Araluen*	40° 01'S. 172° 27'E.	250	−45	−66	0915–0925	R, red S
	Explorer	61° 30'N. 7° 00'W.	080	+65	+74	1916–0510	G, R, RA, HA
	Manchester Spinner	56° 38'N. 27° 22'W.	060	+64	+72	2330–0035	RA
7th	*Lismoria*	50° 00'N. 62° 20'W.	010	+61	+76	0001	HA
	Weather Recorder	62° 06'N. 33° 00'W.	060	+70	+76	2220	G
9th	*Weather Recorder*	61° 41'N. 33° 26'W.	060	+70	+76	2345–0430	R, HA
11th	*Weather Recorder*	61° 32'N. 33° 05'W.	060	+70	+76	2035–2049	RB, P
13th	*Weather Recorder*	61° 46'N. 33° 15'W.	060	+70	+76	2350–0005	P, R
17th	*Weather Recorder*	61° 50'N. 33° 20'W.	050	+70	+76	0230–0305	RA
18th	*Consuelo*	59° 21'N. 17° 40'W.	070	+65	+73	0001–0028	R
	Weather Recorder	61° 29'N. 33° 40'W.	050	+70	+76	2040–2110	RA
22nd	*Weather Recorder*	61° 33'N. 33° 36'W.	050	+70	+76	2000–2400	G, R
	Weather Observer	62° 36'N. 20° 00'W.	070	+68	+75	2030–0300	G, HB
24th	*Weather Observer*	62° 42'N. 30° 00'W.	060	+70	+76	2330–0005	HA
26th	*Weather Observer*	61° 54'N. 32° 48'W.	050	+70	+76	2330–2345	G, HA
29th	*Laurentia*	River St. Lawrence	360	+59	+76	0120–0500	G, R, RB
30th	*Corinthic*	49° 35'N. 5° 46'W.	080	+53	+66	2200–2210	R
	Laurentia	50° 00'N. 65° 00'W.	010	+61	+76	2210–0430	R, P
31st	*Beaverford*	51° 48'N. 55° 18'W.	020	+63	+75	0520–0600	RA
	Glitra	56° 32'N. 2° 24'E.	090	+59	+71	1800–2130	G, HA, R
	River Afton	58° 43'N. 10° 00'W.	080	+63	+72	1900	RB
	Weather Observer	62° 18'N. 33° 00'W.	050	+70	+76	2112–2117	HB
1st Nov.	*Jason*	36° 48'S. 128° 06'E.	200	−48	−69	1227–1242	RB
2nd	*Beaverford*	53° 15'N. 36° 22'W.	040	+63	+72	0215–0245	HA
	Weather Observer	62° 00'N. 33° 18'W.	050	+70	+76	0230–0247	HA
	Weather Observer	61° 50'N. 32° 24'W.	050	+70	+76	2000–0220	HA
3rd	*Laurentia*	55° 30'N. 37° 12'W.	040	+65	+73	0100–0220	PS, R
5th	*Beaverburn*	52° 42'N. 50° 36'W.	030	+63	+74	0600–0900	R ↗ C, F
7th	*Weather Observer*	62° 00'N. 32° 24'W.	050	+70	+76	0200–0310	HA
12th	*Weather Observer*	62° 06'N. 33° 00'W.	050	+70	+76	0210–0220	RA, P
23rd	*Port Lincoln*	48° 30'N. 62° 48'W.	010	+60	+75	0001	R
	Beaverlodge	53° 05'N. 47° 40'W.	030	+63	+74	0018–0545	R
26th	*Weather Recorder*	58° 40'N. 18° 35'W.	070	+65	+73	2230–0300	RA, R
27th	*Gloucester City*	50° 00'N. 38° 48'W.	040	+60	+70	0100–0300	G
28th	*Andria*	41° 39'N. 59° 49'W.	010	+53	+71	0115–0120	R
	Asia	50° 24'N. 33° 36'W.	050	+59	+70	0230–0545	HA, G, R
	Dunera	44° 35'N. 8° 23'W.	070	+49	+62	0415–dawn	G, R
	Manchester Venture	50° 50'N. 37° 44'W.	040	+60	+71	0520	RA
	Andria	41° 34'N. 61° 28'W.	010	+53	+71	0545–0620	L
30th	*Weather Recorder*	58° 24'N. 19° 05'W.	070	+65	+73	2300–0415	RB, G
5th Dec.	*Rialto*	47° 40'N. 60° 10'W.	010	+59	+74	0900–dawn	G, R
	Welsh City	28° 23'S. 98° 28'E.	170	−39	−65	1709–1721	R (red)
	Weather Recorder	58° 54'N. 18° 52'W.	070	+65	+73	1900–2130	RA, RB, P
	Argyllshire	38° 45'S. 81° 20'E.	140	−49	−68	1945–2040	R
6th	*Weather Recorder*	59° 08'N. 18° 55'W.	070	+65	+73	2330–0120	HA, RA
19th	*Weather Observer*	59° 00'N. 19° 06'W.	070	+65	+73	2045–2130	G
26th	*Northumberland*	off Newfoundland	010	+60	+75	2230	G

* The standard names are defined in the July 1960 number of this journal, pages 148–9.

Some Features of World Weather during the Summer of 1959

By A. I. JOHNSON
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By the time this article appears in print the character of the summer of 1960 will have revealed itself and will probably be of more interest and concern to readers than the summer of 1959. However, the summer of 1959 was so warm, dry and sunny over much of the British Isles that it will perhaps stand out in the memories of those who experienced it for some time to come. Although this account is primarily concerned with the summer weather on a world-wide scale it is appropriate to begin by recalling the main features of the summer in Britain.

Over England and Wales the brilliant weather lasted from the beginning of May to early October, a period of over five months, with only short interruptions. Mean monthly temperatures were above average throughout this period and daily maximum teperatures were consistently higher than usual. They often exceeded 80°F (27°C) and a value of 96°F (36°C) was reported in Lincolnshire during a particularly hot spell in July. Taking England and Wales as a whole, the rainfall from May to September was less than in the same period of any of the last 200 years although it was not quite as low as in the period from April to August 1870. Over Scotland the summer was somewhat less outstanding but even there it was very warm generally and dry in the east and south. In many western and northern districts depressions moving northeast across the Atlantic into the Norwegian Sea gave some rather stormy weather during June and July. Sunshine amounts exceeded the average throughout the period from May to September everywhere in Britain except for parts of Scotland in July.

With regard to the synoptic patterns of the summer, anticyclonic conditions predominated but there were a few short breaks when the high pressure régime gave way to a cyclonic type with unsettled weather and some rain. The rain was sometimes of a thundery character, particularly in June and July. After some violent thunderstorms over southern England between 9th and 11th August, however, there was a marked decrease in the amount of thundery activity and it was almost completely absent in September. The period from mid August to the end of September was the most settled part of the summer with only one or two minor interruptions in some six or seven weeks of fine weather. During this time there was no measurable rainfall at all at many places in eastern England, and in various other parts of the country diminishing water supplies gave cause for concern. At Lowestoft and other places in that area there was no measurable rain for 57 days between 14th August and 10th October. This was almost as long as the longest drought reliably recorded in the British Isles which lasted for 60 days during the late spring and early summer of 1893. Apart from September, no individual summer month during 1959 was really outstanding over a large area of Britain: in England and Wales it was easily the driest September since before 1870 and probably 1754.

Turning now to the summer weather in other parts of the hemisphere the overall character of the summer with regard to temperature and rainfall is shown in Figs. 1 and 2. Fig. 1 shows average of the anomalies of mean temperature in each of the five months May to September. (The anomaly of a mean monthly temperature is the difference between that temperature and the long-period average in the same month.) Regions where it was on the whole a warmer or cooler summer than usual can easily be picked out. Fig. 2 shows areas in which rainfall during the same five months was either more than or less than average. It should perhaps be mentioned that in subsequent paragraphs the word 'summer' relates to this 5-month period as it was approximately the period of the fine weather in Britain. Because of sparse data it has not been possible to draw isopleths on Figs. 1 and 2 over central Asia and certain smaller areas where the lines have been broken, or shaded areas are not clearly bounded.

From Fig. 1 it can be seen that a large area of Europe, almost all except the south-east, had a warmer summer than usual with the greatest over-all anomalies of temperature occurring in southern England and northern France. Anticyclonic conditions predominated over much of Europe besides Britain and mean monthly pressures were consistently above average. At most places the highest temperatures of the summer occurred during heat waves in July. Among the exceptionally high values were 100°F (38°C) at Berlin on 13th, the hottest day of the century there, 105°F (41°C) at Seville on 6th, and 97°F (36°C) at Vienna on 15th. It was also a very dry summer in northern France, northern Germany and southern Scandinavia where, by August, the hot dry weather had had a very noticeable effect on the vegetation. Leaves and grass became very parched and the countryside in places took on an appearance more like that of a desert. Towards the end of the summer a number of villages in these areas were entirely without water supplies.

In contrast, many parts of central and southern Europe had a wet summer. Many violent thunderstorms developed in the unusually warm and unstable air masses and there were some quite long periods of locally heavy rain in weakly cyclonic situations. This happened in Austria where there were two spells of particularly heavy and prolonged rain. One occurred during June and the other in August: on both occasions the rain was continuous in places for almost 48 hours and was followed by flooding of the Danube and other rivers. At the beginning of September there were floods in central and southern provinces of Italy, and rainfall for the month reached four times the average at some places in Spain.

The vigour of the cyclonic activity over the North Atlantic underwent some interesting variations during the summer. In May depressions were mainly of average intensity for the time of year but their eastward movement across the Atlantic was restricted for much of the month by a blocking anticyclone centred initially north of Britain and later to the west. During June and the first part of July the depressions were considerably more intense and moved from mid Atlantic to the Barents Sea on tracks which were farther east than usual despite the fact that there was a strong northeastward extension of the Azores anticyclone across Britain for a lot of the time. Gales over the ocean in the latitudes of the British Isles occurred with a greater frequency than usual. Towards the end of July the activity decreased to a more normal level while in August it was mostly weak. There was however one depression which moved north off the west coasts of Ireland and Scotland on 13th and 14th of August which had a minimum pressure of 972 mb, unusually low for the time of year. During September cyclonic activity quickly became more intense again and the mean pressure chart for the month showed a strong southwesterly flow between Britain and Iceland. It can be seen from Fig. 2 that it was a wetter summer than usual in the Faeroes, Shetlands and northern Norway; much of the rain in these places fell during the period of intense cyclonic activity in June and July.

Another feature of the summer in the Atlantic sector of the hemisphere was that temperatures were consistently a little lower than usual in northern Iceland, eastern Greenland and over the western part of the Norwegian Sea. Furthermore, 1959 was one of the heaviest ice years for some time in that region. Jan Mayen was surrounded by ice until late July and navigation to northeast Greenland was particularly difficult.

A wide variety of conditions was experienced over the North American continent. With regard to temperature (see Fig. 1) the main features were warmth over much of the United States, with maximum over-all anomalies near the Great Lakes and in California, and cool conditions over Canada west of Hudson Bay. Unusually warm air masses were present over the northeastern states of the U.S.A. for long periods throughout the summer. They were often associated with a westward extension of

Fig. 1. Average of monthly temperature anomalies from May to September 1959 (°C).

the Azores–Bermuda high pressure system which gave a strong southerly or south-easterly advection into that area. Exceptional heat wave conditions occurred during the second half of August and at the same time the air was uncomfortably humid. Washington D.C. had its hottest August on record and at Boston temperatures exceeded 90°F (32°C) on 11 days. In Toronto, Canada, it was the warmest August since records began in 1841. On the other side of the continent the months of June, July and August were all the hottest on record at Los Angeles. At Yuma, Arizona, maximum temperatures in June equalled or exceeded 109°F (43°C) on fifteen consecutive days and the average July temperature of 96·7°F (36°C) was the highest on record for any month. Conditions of extreme heat together with a long drought gave a very high risk of forest fires in northern California and Oregon and a number did occur. Many of the central states had a rather stormy summer with more tornadoes and thunderstorms than usual. On 3rd June a freak hailstorm in Kansas covered the ground to a depth of 18 in. over several square miles and drifts of up to 3 ft deep accumulated. It was reported that during a hailstorm in Nebraska later in the month some of the hailstones were the size of grapefruit and damage to crop and property was estimated at several million dollars.

Although it was one of the hottest summers on record in southern Ontario, over the prairie provinces and western Canada the summer was predominantly cloudy and rather cold. However, temperatures were above average over much of the region in July and maxima of over 100°F (38°C) occurred at some stations in southern Saskatchewan. In the maritime provinces June was one of the cloudiest and wettest on record. The first three days were particularly stormy and there was a further stormy period about a fortnight later: on the night of 19th a particularly vicious storm struck a fleet of small fishing boats off the coast of Nova Scotia and many lives were lost.

It can be seen from Fig. 1 that the area of warmth over Europe extended eastward over much of Russia and it was consistently warmer than usual along the northern coast of Asia. Precipitation in this latter area was generally in excess of

Fig. 2. Rainfall from May to September 1959 compared with the long-period average. (Rainfall above average in shaded areas and below average elsewhere.)

normal. The southwest monsoon over southern Asia gave more rain than usual over much of India and Pakistan; there were exceptionally heavy rains in western districts during September with bad flooding in and around Bombay. June was a very wet month in parts of south-east Asia and many lives were lost in floods in southern China, particularly around Hong Kong where about 18 in. of rain fell in one period of three days.

Some of the most spectacular weather of summer is often associated with the tropical cyclones which occur over both the Atlantic and the Pacific. Between the beginning of May and the end of September 1959, approximately the average number was reported in the Atlantic sector while over the Pacific there were one or two more than usual. The most violent of the Atlantic storms was hurricane 'Gracie' which developed near Puerto Rico on the 20th September and crossed the coast of the United States just south of Charleston, South Carolina, on 29th. Winds reached hurricane force along 125 miles of coast and gusts of 138 m.p.h. were recorded. Although maximum winds quickly decreased as the storm moved inland damage was heavy and communications were badly disrupted. The Pacific storms caused more damage over adjacent land areas than in an average summer. During August and September typhoons did severe damage and were responsible for considerable loss of life at places near the coast of China, in south Korea and in Japan. The most devastating of all was a typhoon which struck the industrial city of Nagoya, Japan, on 26th September. In the widespread flooding and destruction which occurred many thousands of people were killed or injured.

This brief review will have been sufficient to show that there were large variations in the character of the summer of 1959 over different parts of the hemisphere. As far as Britain is concerned, however, it is natural to enquire whether there were any physical causes responsible for the persistence of anticyclonic conditions for as long as five months with only a few short breaks. An excess of ice on the western

Atlantic in the vicinity of Newfoundland in the late spring and early summer, or the variations of solar activity as indicated by the 11-year sunspot cycle, are two of the suggested causes. It is unlikely that the full answer will be found in the immediate future but it is hoped that studies now in progress in the Climatological Research Division of the Meteorological Office will soon throw some light on this very interesting problem.

Migration Notes from the Western Approaches, Spring 1958

By IVOR McLEAN (Meteorological Office) and
KENNETH WILLIAMSON (Migration Research Officer, British Trust for Ornithology)
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Introduction

During the month from 13th April to 13th May, 1958, the first-named author did a tour of duty as meteorologist aboard the British weather ship *Weather Observer* at ocean station K in the Western Approaches, in approximately 45°N., 16°W. This position is about 500 miles south-west of Land's End and 600 miles west of the Biscay coast of France. Considerably more migration was witnessed than during the first three weeks of April 1957, and altogether some 72 individuals of a dozen species were seen. Swallows were the most numerous species, followed by ruffs, and there were several whimbrels, dunlins and turtle doves. Occurrences of short-toed lark, woodchat, shrike and Sabine's gull are of interest.

A number of birds came aboard the ship to rest, a few roosting overnight. Whimbrels circled the vessel, alighting on it only momentarily; ruffs preferred to rest for a few seconds on the sea close to the ship, though in one case this proved fatal. Most of the hirundines stayed for periods of from 5 to 25 minutes before continuing their migration. Water and ants' eggs were put out, but were apparently ignored by most birds.

Systematic list of birds observed

KESTREL (*Falco tinnunculus*).—A female appeared at 1735 G.M.T. on 30th April (wind 120°, 8 kt) and circled the ship until dusk, when it settled for the night on the balloon shed deckhead. It spent much of its time there the next morning and would quickly return if disturbed. It was not seen to take water, or scraps of raw meat put out for it, and was last noted in fair weather at 1340 on 1st May (wind 280°, 8 kt).

WHIMBREL (*Numenius phaeopus*).—Two parties appeared on 29th April, and a single exhausted bird on 1st May. The parties circled close to the ship, and even settled on it momentarily on several occasions: they flew off to the north and east-north-east respectively. The tired bird was not easily disturbed, and if forced to fly returned very quickly to the ship. It was not observed to take ants' eggs or water put out on deck. At 1730 on 2nd it fell into the sea and was drowned.

DUNLIN (*Calidris alpina*).—Two in summer plumage circled for about a quarter of an hour from 0840 on 30th April (wind 120°, 9 kt) when one settled on the forecastle and the other disappeared. The one on board was disturbed by a passing Arctic skua (*Stercorarius parasiticus*) and was not seen again. A dunlin also circled for 35 minutes from 1240 on the same day (wind 150°, 8 kt).

RUFF (*Philomachus pugnax*).—No fewer than 17 birds came under notice between 1035 and 1445 on 30th April, and all appeared somewhat fatigued. The first three groups circled the ship before passing on, and frequently took brief rests on the surface of the sea close to the vessel, usually staying for less than 30 seconds but once close on a minute. One of the birds in the third party became water-logged whilst resting in this way and drifted helplessly away from the ship, to be pounced upon and killed by a lesser black-backed gull (*Larus fuscus*). The survivors were not seen after 1300. The last two birds were exhausted; one died at 1120 and the other at 1855 on 1st May. Both took water and ants' eggs whilst on board.

SABINE'S GULL (*Xema sabini*).—An adult in summer plumage settled on the sea close to the ship and stayed for a quarter of an hour from 1603 on 10th May (wind 290°, 18 kt). The slate-grey head, forked tail and distinctive wing-pattern were well seen; the bill was black with a yellow tip and the legs grey.

TURTLE DOVE (*Streptopelia turtur*).—Several birds were encountered between 30th April and 3rd May, mostly in the early part of each day.

SHORT-TOED LARK (*Calandrella cinerea*).—A small, light-coloured lark settled on the forecastle, where it preened for several minutes, at 1855 on 20th April (wind 100°, 12 kt). The white under-parts, with an ill-defined buff band across the breast and dark markings at the sides of the neck, were well seen, and the generally tawny appearance of the upper-parts suggested the south European subspecies *brachydactyla*. When disturbed it fluttered round the ship at deck level and entered a cabin through an open porthole, where it was caught and identification confirmed by plumage and wing-formula examination. When released at 1915 it flew away directly down-wind.

SWALLOW (*Hirundo rustica*).—A marked passage of hirundines, nearly all swallows, was in progress at station K between 30th April and 6th May, birds appearing singly or in small parties at all times of the day. Altogether 32 birds were seen, and they usually stayed with the ship for a short spell of between 5 and 25 minutes before passing on. Those which entered the balloon shed perched on ledges and made short flights outside during their stay. Two late arrivals roosted on board, but another (6th May) continued its migration at 2235. The first arrival on 4th May flew into cabins and alleyways and was seen to catch several house-flies; it died at 1645.

Other swallows were seen when the ship was returning to port through the Irish Sea on 13th May. Two passed by to the north, flying at deck level, and at 1100 another flew past heading for Ireland, which was clearly visible. Later a fourth passed to the north.

HOUSE MARTIN (*Delichon urbica*).—One was found on the balloon shed deck at 1405 on 5th May (wind 190°, 22 kt): it was easily caught. It was placed on a ledge, and had flown away half an hour later.

SAND MARTIN (*Riparia riparia*).—One, in company with a swallow, circled the ship for 10 minutes from 0840 on 30th April (wind 120°, 9 kt).

WILLOW WARBLER or CHIFFCHAFF (*Phylloscopus sp.*).—One flew aboard at 0730 on 13th April when the ship was in the Irish Sea: it was very active and restless, and had gone an hour later. Another flew aboard at 0957 on 15th (49° 48′N., 08° 31′W.), but stayed only four minutes, flying away low to the south-east. A leaf-warbler was aboard at station K at 1120 on 30th April (wind 120°, 5 kt), and stayed for 15 minutes; it was very active and was seen to take two small flies during its stay.

WOODCHAT SHRIKE (*Lanius senator*).—This easily identifiable bird settled aboard at 1140 on 22nd April (wind 360°, 15 kt). Although restless and easily disturbed on 22nd, it was more approachable next day, when it was seen at 1530 in fair weather (wind 295°, 17 kt). Water and ants' eggs were available at several parts of the ship, but it was not observed to show interest in them. It roosted overnight on the balloon shed deckhead.

The weather

A depression, approaching from the Atlantic, was centred on station K late on 19th April and during 20th, with southerly wind backing easterly over Biscay and the Western Approaches. The short-toed lark may well have originated in the Iberian Peninsula, but the woodchat shrike of 22nd April could have come from as far north as the Channel region, then dominated by the southern part of an

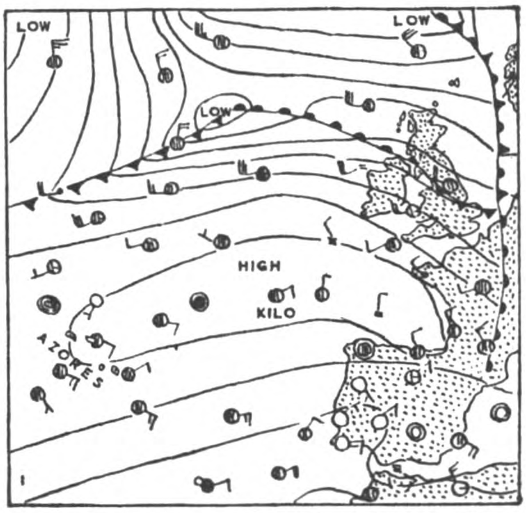


Fig. 1. Mid-day on 28th April, 1958.

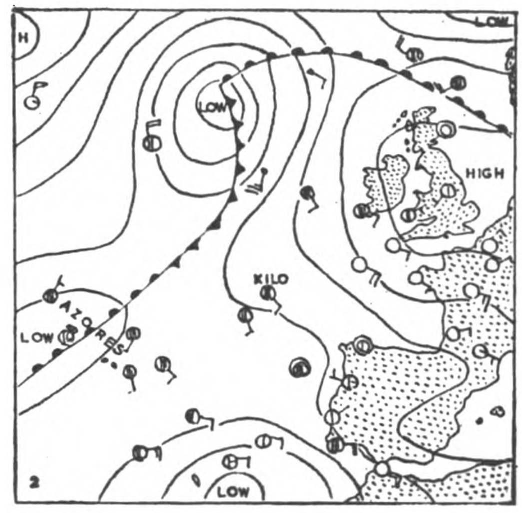


Fig. 2. Mid-day on 30th April, 1958.

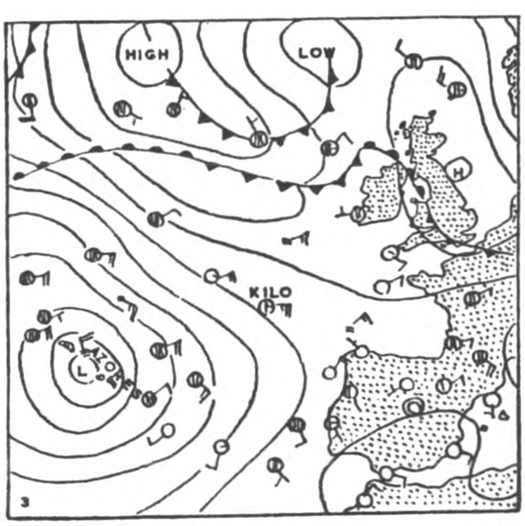


Fig. 3. Mid-day on 3rd May, 1958.

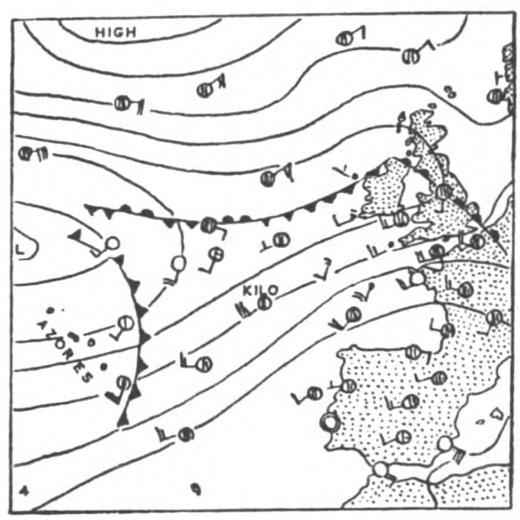


Fig. 4. Mid-day on 4th May, 1958.

The Figures show the weather situations associated with the probable drift of birds from the Mediterranean to the Azores (Fig. 1); the passage of ruffs, turtle doves, swallows, etc., at station K (Fig. 2); the continuing passage of turtle doves and swallows at station K (Fig. 3); and the re-determined passage at station K of swallows from the Azores (Fig. 4).

English anticyclone. With the low pressure moving towards North Africa on 21st there was an east to north-east flow south of the English high, affecting most of the Biscay coast, Finisterre and Cornwall. This easterly airflow broke down late on 22nd. For several days afterwards, with an Azorean high to the west of station K and a depression near Iceland, the wind at the weather-ship was westerly and no birds appeared.

This high moved slowly north-eastwards, so that by 28th April station K was near its centre and there was again easterly wind to the south, between the Iberian Peninsula and the Azores (Fig. 1). Next day, with the centre of the high in sea-area Finisterre, this easterly airflow was maintained and birds began to arrive. The first to do so, from mid-morning on 29th were whimbrels; then the dunlins and first hirundines appeared early on 30th, followed by a turtle dove, and soon by the ruffs and a *Phylloscopus* warbler, and in the evening the female kestrel arrived (Fig. 2). The passage of swallows continued throughout 1st May, with another whimbrel and more turtle doves, under similar weather conditions, though with the high now over the southern part of the North Sea and a low covering the Azores. The airstream from the Iberian Peninsula and North Africa was south-easterly. There was little change in the pressure distribution on 2nd and 3rd, and there was evidence at station K that the anticyclonic drift of swallows out to sea continued (Fig. 3).

An interesting change took place late on 4th May, the deepening Azores depression expanding north-eastwards and bringing a veer of wind to the south-west at station K. From the afternoon of 4th it held in this direction, and there was in fact a direct airstream from the Azores to the Channel region between this low and a Mediterranean high (Fig. 4). Yet in this period of south-westerly weather swallows continued to pass the ship, mostly in small parties, and the likeliest explanation is that they were part of a strong re-determined passage of birds which had drifted west to the Azores in the anticyclonic airflow of the previous few days (Fig. 1). Although this weather was maintained during 7th and 8th the passage, as observed at station K, finished on 6th.

A complex low-pressure situation developed over the eastern Atlantic on 8th and 9th May, with centres south of Iceland and off the Cornish coast. The effect of this change was to impose a north-westerly airstream across the ocean between Greenland and the Western Approaches, and this may well have brought the Sabine's gull which was observed on 10th.

CHANGE FROM FAHRENHEIT TO CELSIUS SCALE OF TEMPERATURE

Since the existence of meteorology as a branch of modern science is dependent on the rapid and efficient international exchange of meteorological information, the desirability of adopting a common system of meteorological units has long been recognised. In Resolutions of the World Meteorological Organisation, in Congress II in 1955 and in Congress III in 1959, it was recommended that Members should adopt the Celsius degree and metric system of units for the evaluation of meteorological elements and for use in coded messages for international exchanges.

The Celsius scale of temperature is now generally used for the evaluation of all upper air temperatures and for use in coded messages for international exchange of upper air observations, and this has been the practice of the British Meteorological Office since 1st January, 1956. Also, temperatures for aviation purposes (e.g., the temperatures at the various levels for which upper winds are included in flight forecasts) have been expressed in degrees Celsius for many years.

The Director-General of the British Meteorological Office has now decided to take a further step towards the implementation of a Resolution of Congress III on this question by introducing a change from the Fahrenheit to the Celsius scale in the United Kingdom for all surface observations with effect from 1st January, 1961, both for international exchange purposes and for official purposes within the Meteorological Office. This will bring the U.K. practice into conformity with that of most European countries.

What is the Celsius scale? It was formerly known in the Meteorological Office as the Centigrade scale, but following a recommendation by the International Bureau of Weights and Measures it was decided in 1955 to change the name from Centigrade to Celsius, thereby commemorating the name of the Swedish physicist who first introduced a thermometer in which the interval between the freezing and boiling points of water was divided into 100 parts. The abbreviated form of degrees Centigrade, i.e., °C, was unaltered by a change of name to Celsius. As is well known, 0° on the Celsius (Centigrade) scale corresponds to 32° on the Fahrenheit scale, and a change of 1°C equals one of 1·8°F. A disadvantage of the Celsius scale is that all temperatures below the freezing point of water (0°C) have to be preceded by the negative sign. In the coded messages this difficulty is overcome by adding 50, but ignoring the minus sign, e.g., a temperature of −7°C is coded as 57. On the other hand one degree on the Celsius scale is identical with one degree on the Absolute scale and a temperature in degrees Celsius can be converted into the corresponding temperature on the Absolute scale by simply adding 273. This is a great advantage in scientific work since calculations in many meteorological problems (e.g., those involving density, heat content, radiation) are simplified by using the Absolute scale. The thermometer attached to the marine barometer is graduated in this scale, as observing officers well know.

Ships' officers will not be asked to report temperatures in degrees Celsius for meteorological observations until thermometers graduated in the Celsius scale have been supplied to all ships of the Voluntary Observing Fleet; accordingly, aboard British voluntary observing ships, the change from Fahrenheit to Celsius will not take place until 1st January, 1962. When this change of procedure does come into force, all temperature observations aboard British Selected and Supplementary Ships will be logged and coded in degrees Celsius wherever their voyages take them. Such a procedure is already in use aboard the ships of most European countries. This eventual introduction of the Celsius scale will mean a complete break with a long tradition, but it is in the best interests of the science of meteorology, and we feel sure that ships' officers will co-operate willingly when the time comes to make the change. All the necessary instructions will be issued in due course.

Auxiliary Ships, which are only asked to transmit radio weather messages in a simplified code form when in ocean areas where shipping is sparse, and which are not supplied on loan with official instruments, will continue to use the scale of their own thermometers.

All voluntary observing ships will be supplied with a comprehensive conversion table to convert Celsius temperatures to Fahrenheit, if required for the ships' own purposes.

This change from the Fahrenheit to the Celsius scale will not apply to temperature readings included in U.K. radio weather bulletins for shipping (e.g., in Parts V and VI of the Atlantic Bulletin), which will continue to be expressed in degrees Fahrenheit.

F. E. L.

The Thames Navigation Service

By J. C. MATHESON, MASTER MARINER
(Port Meteorological Officer, London)

Since 1948 the Port of London Authority has introduced progressive schemes for using R/T to assist shipping in the River Thames and approaches. These schemes all used Amplitude Modulation and the V.H.F. bands, but international discussions were taking place to decide whether Amplification of Frequency Modulation should be universally adopted for Maritime V.H.F. purposes. The culmination of these discussions was a Conference at The Hague in January 1957, which confirmed an earlier agreement to use Frequency Modulation, and in particular establish a frequency allocation plan, which includes frequencies for port operations.

The Port of London Authority decided to introduce a scheme, conforming to the Hague agreements, to be known as the Thames Navigation Service. The Service now functions from an Operations Centre, under the control of the Harbour Master, Lower District, immediately adjacent to the Trinity House Pilot Station at Royal Terrace Pier, Gravesend, and in close proximity to the Port Health and Customs centre. (See photographs on opposite page.)

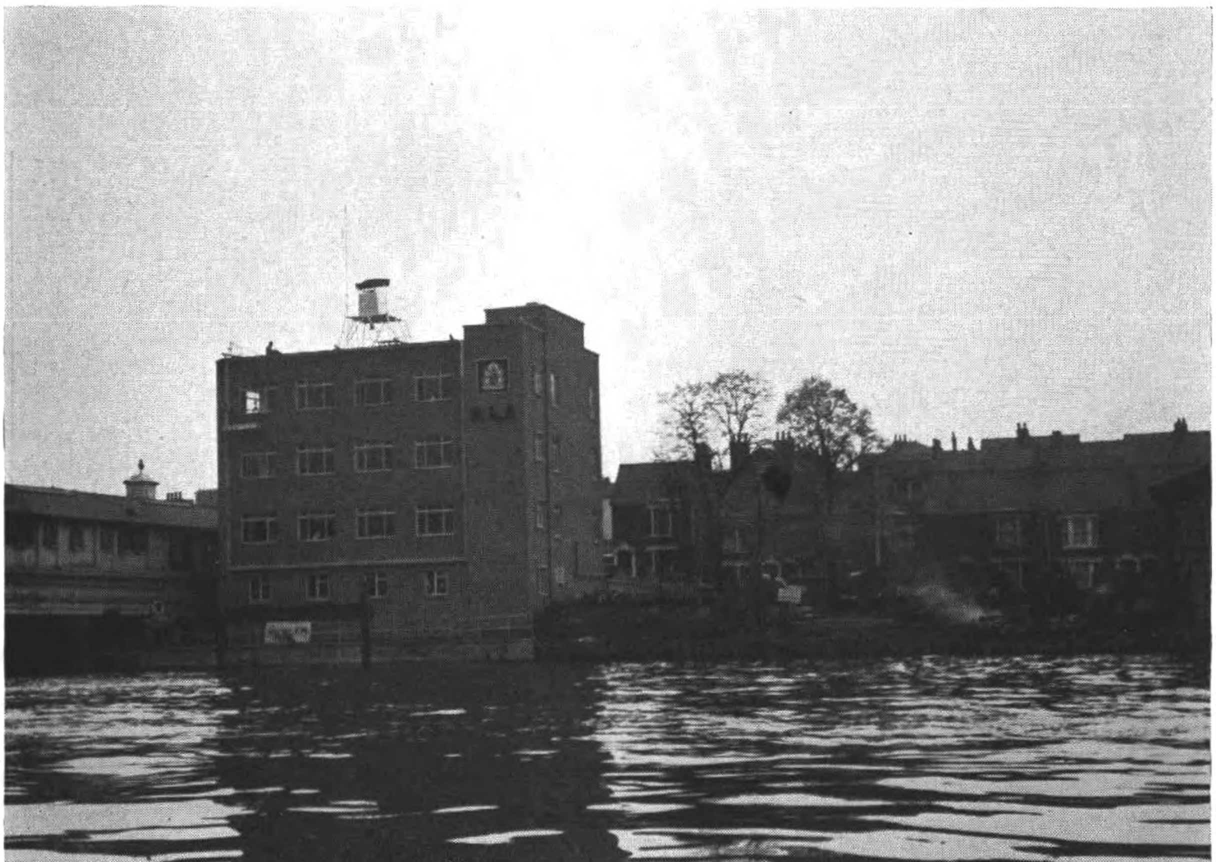
The operations room, from which this service emanates, is manned continuously by three operators, and embodies a network of communications to receive and transmit essential information regarding port operations from and to shipping and shore establishments, by V.H.F. or telephone.

The V.H.F. system will eventually comprise nine channels through two remote radio stations ashore—one in the upper and one in the lower reaches of the river—controlled by land line from the operations room. This system will ensure complete radio coverage to the outer limits of the port.

Vessels make initial contact with the operations room on the international 'Calling and Safety' channel no. 16 and then are told to switch to one or other

[Photo by courtesy of A'Court Photographs, Staines, Middx.

(a) Interior view, showing the illuminated map of the Thames.

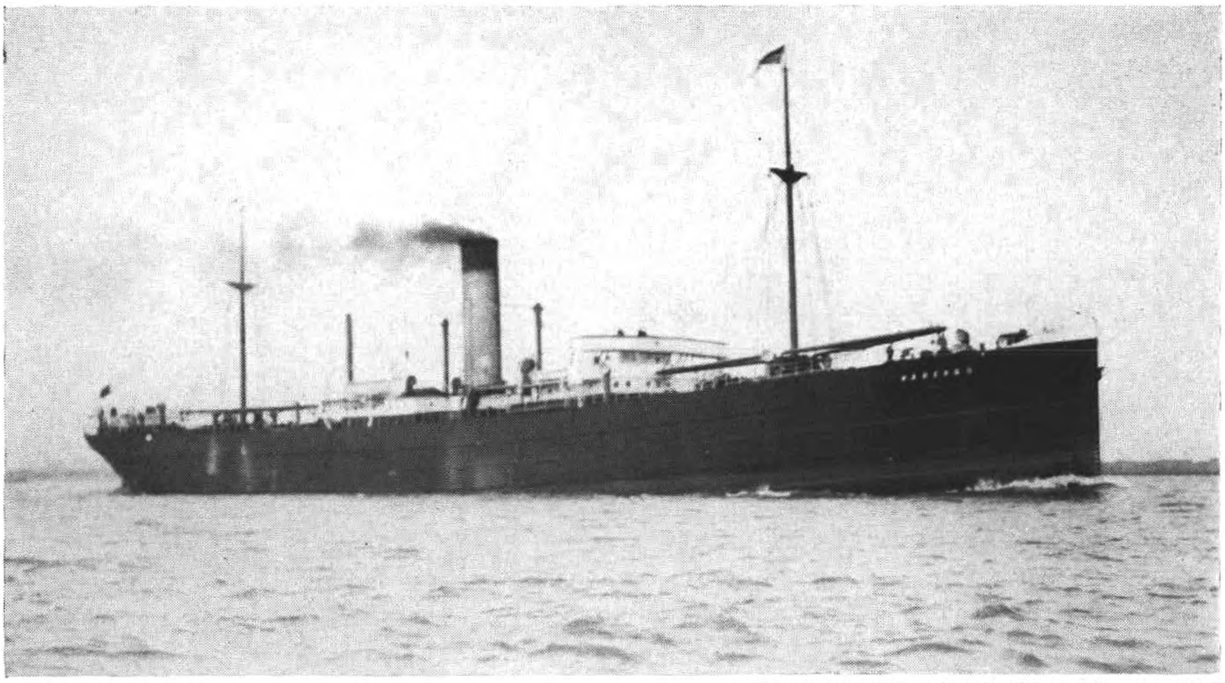


[Port of London Authority

(b) Exterior view.

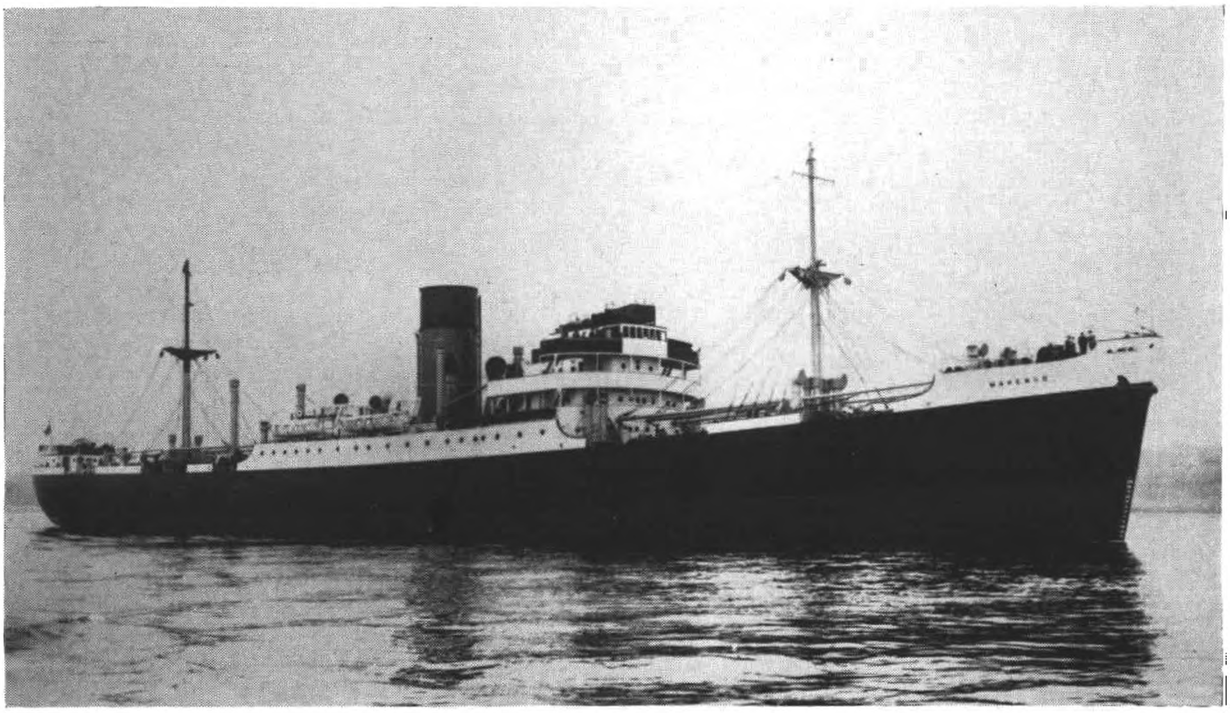
THE PORT OF LONDON AUTHORITY'S THAMES NAVIGATION SERVICE BUILDING AT GRAVESEND (see page 208).

(Opposite page 209)



[Photo loaned by the Maritime Museum, Hull

Second *Marengo*.



Third *Marengo*.

TWO OBSERVING SHIPS OF THE SAME NAME (see page 214).

channel as decided by the duty officer on the following basis. The river is divided into two sectors: the east sector, from the seaward limit to Gravesend, uses channels 12 and 20 at present; the west sector, from Gravesend to London Bridge, uses channels 14 and 22 at present. When traffic increases in the future, as the result of more vessels being fitted with V.H.F., channels 18 and 21 will be brought into use for the east and west sectors respectively. Channel 19 has been earmarked as a berthing frequency for tankers using oil wharves at Thameshaven, Shellhaven, Canvey Island and the Medway, and channel 6 is available for intership communications. Channels 8 and 10 are available for communication between ships and tugs, on which the operations room do not keep a listening watch. The allocation of channels is designed to cater for small vessels fitted only with the minimum R/T equipment and they can, if desired, operate successfully on only four channels, viz. no. 16, 6, 12 and 14. As the number of ships fitted with F.M. V.H.F. increases so will the value of the service increase.

The information required by the operations room is obtained from the following sources:

(*a*) The Port Authority's harbour craft are in radio communication and supply necessary information regarding river navigation, including the state of and amount of traffic in the reaches, visibility, obstructions, dredging and salvage operations.

(*b*) The Dock Masters at the various dock systems are in direct telephone communication and provide their intended programmes, on each tide, of vessels arriving and departing and report on local visibility.

(*c*) Harbour Service piers and certain selected river side wharves also supply visibility reports and local information.

(*d*) Special weather forecasts for the river and approaches are obtained twice daily from the London Forecast Office at 0800 and 2000 hours. When adverse weather conditions threaten or prevail, forecasts are obtained as often as required.

(*e*) The Meteorological Office has supplied on loan to the Thames Navigation Service an anemometer, barometer and barograph so that accurate wind speeds, barometric pressure and tendency at Gravesend Reach can be supplied if required.

(*f*) From readings direct in the operations room from remote tide gauges, the state of the tide can be obtained.

On the roof of the operations building is a radar scanner, which operates on the harbour band of 9490 megacycles with a peak power of 10 kilowatts and gives a radar picture of Gravesend Reach on a screen in front of the operating dais. This enables the operations room, during times of reduced visibility, to have an appreciation of the volume of shipping in Gravesend Reach, thus enabling vessels to be advised whether to proceed up river to an anchorage at or above Gravesend or to wait below until the volume of traffic reduces or vice versa. The scheme of radar installation has been designed so that radar coverage can be extended to the seaward limit if it is considered desirable and a further stage giving coverage from Gravesend to London Bridge can be catered for in the future should the need arise.

The service is intended to assist in co-ordinating the activities engaged in shipping, including pilots, H.M. Customs and Excise and the Port Health Authority. These bodies function from Gravesend and arrangements have been provided for H.M. Customs and the Port Health Authority to be represented in the building and the Trinity House pilots have easy access from the Royal Palace Pier. The general intention is for their respective functions to be co-ordinated so that vessels can be boarded before passing Gravesend with the view to expediting their passage through the controls.

In front of the operating dais above the radar installation is a 20 ft long panoramic view of the River Thames from London Bridge to the seaward limits. On this is recorded and maintained the position of vessels at buoys and at anchor, the position of wrecks and obstructions, the degree of visibility in all reaches, the state of the tide, and any other features of navigational significance. There is a viewing gallery at the back of the dais from which pilots can observe the state of the river in all its aspects and they can discuss with the duty officer any particular problem before they proceed afloat.

The duty officer can obtain in advance the expected arrivals and departures. As vessels enter the port limits they can impart information regarding draft, expected time of passing Gravesend, etc., and can receive precise information regarding the suitable time to arrive at river berth or dock entrance, etc. As vessels proceed up river they can receive instructions as to the order of docking and if necessary speak direct to Dock Master, the control switching of radio channels being done by the operations room.

Every half hour a general broadcast is made to both the east and west sectors of relevant immediate information regarding each sector so that vessels can act accordingly if necessary, and during times of reduced visibility information is given regarding the extent of same from the seaward limit to London Bridge and when reduced visibility is confined to small areas, shipping is told that beyond certain points visibility improves.

Information is also given when the conditions are widespread and that movement of shipping should be restricted.

This service commenced operating in May 1959 and it has already proved its worth. It is up to all expectations in carrying out the work for which it was originally designed.

NORTH ATLANTIC PASSAGE IN LIGHT CONDITION

The following is an extract from a personal letter from Captain Davison of the M.V. *Middlesex* to Captain Youngs, Marine Superintendent of the New Zealand Shipping Company, in October 1959, concerning a passage across the North Atlantic in light condition. Captain Youngs kindly forwarded it to this office, and it is published here with the permission of both of them.

> With regard to weather forecasts from the Meteorological Office, they are certainly of use in endeavouring to avoid gale and storm areas.
>
> As I discussed with you prior to sailing from London, I intended to keep south through the Azores. Considering that, from the very beginning of the passage, one depression after another was crossing the Atlantic, with gale or storm force winds, I am more than glad that I was heading to the southward, as even so, steaming conditions were not all they could have been!
>
> In the light condition that the ship was in, a moderate swell was enough to start her pitching and crescendoing to pounding. To avoid this, I steamed further to the southward, without reducing speed being necessary for a start, as having the swell fairly broad on the bow stopped the pounding. At this time I was steering to pass south of Santa Maria Island.
>
> I received reports from Washington Radio regarding hurricane 'Hannah' when it was well to the west of me, and successive plottings of its position indicated that it was travelling in the unorthodox direction of south of east.
>
> By all the Laws of Storms, I felt that it would eventually start travelling north of east. As later forecasts still showed it not heading northerly at all, and as I was still north of it and not wanting to cross its path, I altered course to north. A later report gave its position as located by aircraft, and it was still travelling to pass well south of me, but about 12 hours after I had altered course to north, so did the hurricane!! Not to due north, but north of east. It eventually passed through the middle of the Azores, and much closer to me than it would have done if I had kept on my original course! I experienced gale force winds, but no more.
>
> Regarding the services supplied by the Met. Office, I can't think of any way in which they could be improved, as I feel that a very good job is done by the people at Dunstable.
>
> There is one point that I would mention, and that is that positions of low centres given by Dunstable and Washington seldom agree exactly. Sometimes there may be a discrepancy of over 100 miles, and if this applies to hurricanes, it makes quite a difference.
>
> I think too, that when a hurricane is still well in the western half of the Atlantic, that

Dunstable could perhaps report it earlier, even though it may not be affecting their forecast areas.

Concerning the penultimate paragraph of this letter, Mr. Boyden, Assistant Director of Central Forecasting at Dunstable, comments:

It is not at all surprising that a pressure centre as given by Dunstable may be over 100 miles away from the position broadcast by Washington. The centre of a low is to a large extent found by drawing successively lower-valued isobars, working inwards to the centre from the available ship observations. This usually involves some assumptions as to the precise structure of the depression. There is also the problem on occasions of deciding between alternatives when the observations are not mutually consistent.

Occasionally a special report is received at Dunstable which describes significant changes over a period of 2 or 3 hours. Such a report may give the forecaster invaluable information in the form of a cross-section through a depression. A most helpful message of this kind was sent in by the *Rangitoto* on 19th November, 1959. It read as follows:

RANGITOTO POSITION 1100 GMT 48.24 NORTH 11.18 WEST COURSE 070 TRUE SPEED 17 KNOTS STOP AT 0900 GMT WIND NORTHEAST FORCE 6 BARO 970.8 FALLING 0930 GMT WIND VEERED SOUTHEAST FORCE 8 BARO 968.6 FALLING 1020 GMT WIND VEERED SOUTHERLY FORCE 5 BARO 966.6 FALLING 1040 GMT BARO 965.4 RISING SHARPLY 1100 GMT WIND NORTHWEST FORCE 8 BARO 968.7 RISING+

As Captain Davison says, it is in the hurricane that the precise position of the centre is important. From the forecaster's point of view (and only his!) it is unfortunate that the intense part of a hurricane is smaller than in an ordinary depression. Moreover, hurricanes in the North Atlantic favour the areas where reports are not plentiful. For these two reasons the *exact* position of a hurricane often cannot be located unless an aircraft has been sent out to find it. Even so, the important information is where the hurricane is likely to be in, say, 24 hours' time. A forecast of this position is usually included in our Atlantic Bulletin, with a revised judgement broadcast as necessary in the form of an additional storm warning.

WORLD-WIDE OBSERVING FLEETS

Voluntary observers may be interested in the following list, which shows how the world total of 3,256 Selected and Supplementary Ships is divided between the various countries, as on 1st January, 1959. The information is taken from a publication of the World Meteorological Organisation.

Arab Republic	3	France	182	Japan	219	Spain	22
Argentina	107	Germany	179	Malaya	17	Sweden	20
Australia	35	Greece	24	Netherlands	241	Thailand	7
Belgium	38	Hong Kong	67	New Zealand	46	U.K.	545
Brazil	17	Iceland	8	Norway	37	U.S.A.	865
Canada	55	India	81	Pakistan	9	U.S.S.R.	108
China	14	Ireland	3	Philippines	15	W. Indies	1
Denmark	21	Israel	33	Portugal	70	Yugoslavia	105
		Italy	49	S. Africa	13		

SPECIAL LONG-SERVICE AWARDS

Each year since 1948 the Director-General of the Meteorological Office has made special awards to the four voluntary marine observers whose long and meritorious work on behalf of the Meteorological Office is considered as deserving special recognition.

All officers who have sent us meteorological records in 15 or more years, and who have compiled at least one meteorological logbook during the previous year, come within the orbit of the special award scheme and each year their personal record cards are scrutinized. A mathematical formula which takes into consideration the number of years observing and the number of records classed 'excellent', 'very good' or 'good' in relation to the number of records received, effectively places them in an order of merit.

This year there were 35 officers with 15 or more years' voluntary service (these years have, so far, never been continuous but often spread over 30 or more years) and the Director-General is pleased to make the special awards to the following shipmasters:

1. CAPTAIN N. C. H. SCALLAN, R.D., of the Canadian Pacific Steamships whose first meteorological logbook was received here in 1922. During 20 years as a voluntary observer he has sent in 60 records, of which 25 have been classed 'excellent'.

2. CAPTAIN C. L. CARROLL, D.S.C., R.D., of the Shaw Savill Lines. A voluntary observer since 1930, he has in 18 years of actual observing sent us 33 records, of which 21 have been classed 'excellent'.

3. CAPTAIN J. G. BRADLEY, R.D., of the Cunard Line. Since his first meteorological logbook was received in 1925, he has, during 19 years of voluntary observing, sent us 75 records, of which 35 have been classed 'excellent'.

4. COMMODORE R. G. REES, of the New Zealand Shipping Co. During 16 years' service as a voluntary observer, since his first meteorological logbook was received in 1926, he has sent in 28 records, 24 of which have been classed 'excellent'.

As in past years, the award will be in the form of a suitably inscribed barograph and we congratulate these four captains on this recognition of many years' voluntary meteorological work at sea. They will be personally notified of this award and of the arrangements which will be made for its presentation.

INDIAN EXCELLENT AWARDS, 1958–59

We have been informed by the Deputy Director-General of Observatories (Forecasting) of the India Meteorological Department that Excellent Awards, for outstanding work during the year 1958–1959, are to be given to the officers named below.

The awards, which are in the form of books, are made to captains, observing officers and radio officers who have been in the ships concerned for six months or more during the award year. The Deputy Director-General says that the useful work put in by the other officers who served in these ships for lesser periods than six months is also very much appreciated.

NAME OF VESSEL	CAPTAIN	OBSERVING OFFICER(S)	RADIO OFFICER(S)	COMPANY
State of Bombay	S. K. Kaikobad	K. V. Hora	C. D. Joshi S. M. Villait	Eastern Shipping Corporation, Ltd.
Rajula	H. C. Turner	P. Kieth T. Shield	L. Philiphs W. Hall	British India S.N. Co., Ltd.
Islami	G. C. Greig	E. G. Davis A. A. Nazarath	T. J. Kutinho S. G. Choudhury	Mogul Line, Ltd.
Kampala ..	C. L. Broadhurst	B. M. Curtis A. R. Ross	H. Ranall R. C. Berry	British India S.N. Co., Ltd.
State of Madras	M. K. Nambiar	B. S. Patwardhan P. D. Bhansali	B. Mallik P. Bajaj	Eastern Shipping Corporation, Ltd.

ASSOCIATION OF NAVIGATION SCHOOLS

The Annual General Meeting of the Association of Navigation Schools was held this year at the Bristol College of Technology on 26th and 27th May. In addition to delegates from the navigation schools and pre-sea training establishments, guests at the 'open' session of the conference included representatives of the Merchant Navy, Ministry of Transport, Royal Navy, Honourable Company of Master Mariners, Meteorological Office, Seafarers' Education Service, Merchant Navy Training Board and some shipping companies.

The 'open' session commenced with a discourse on the tank testing of ships' hulls, well illustrated by film and slide projection, and including a discussion of that controversial amphibian the Hovercraft, by the Chief Engineer of Messrs. Saunders Roe, Ltd. This was followed by the 'highlight' of the day—the discussion and analysis of Ministry of Transport examination results in 1959 by Captain W. Douthwaite, Deputy Examiner of Masters and Mates, on behalf of Captain H. Topley, the Principal Examiner, who was unable to be present.

The number of candidates attempting the examinations, with the number of certificates gained in 1959, are given below, with the figures for 1958 in parentheses.

Grade	No. of Candidates		No. of Certificates Gained		Percentage Pass	
Master	1,049	(1,066)	749	(767)	71·4	(71·9)
First Mate	1,295	(1,404)	931	(1,012)	71·9	(72·1)
Second Mate	1,595	(1,695)	985	(973)	61.8	(57·4)
Master (H.T.)	52	(68)	44	(49)	84·6	(72·1)
Mate (H.T.)	97	(123)	49	(81)	50·5	(65·9)
Totals	4,088	(4,356)	2,758	(2,882)	67·5	(66·2)

The number of Extra Master's certificates gained was one less than in 1958, namely 23. The number of apprentices and cadets entering the service dropped from a total of 1,574 in 1958 to 1,420 in 1959, which figure is about the average for the post-war years. The total number of cadets and apprentices in the service on 1st January, 1959 was just over 5,000.

Some interesting facts on the pre-sea training of cadets are noted, thus: of the 1,420 cadets and apprentices who started their career in 1959, 998 (70%) are reported to have had pre-sea training, compared with 1,020 (65%) in 1958. The proportion of candidates who obtain certificates at the end of their apprenticeship, who have had pre-sea training, is about 70%. It is estimated that about 75% of those who commence their career at sea as cadets and apprentices finally obtain a certificate. The remainder fall by the wayside and do not become deck officers, although some may return to the industry as deck ratings.

On behalf of the Marine Division of the Meteorological Office, the following subjects were introduced for discussion by Captain F. G. C. Jones, Port Meteorological Officer for the Bristol Channel:

(*a*) The usefulness to the mariner of forecasts of wave conditions at sea in addition to the existing forecasts of wind direction and force.

(*b*) The value to the mariner of weather maps and ice charts by facsimile (on the assumption that facsimile receiving apparatus is available on board the ship).

It was pointed out that since it is primarily waves (both sea waves and swell waves) which retard the progress of a ship at sea, the U.S. authorities have been carrying out research into the weather routing of merchant vessels in order to arrange the route to avoid areas where wave conditions are excessive.* Apart from this weather routing technique, investigations are being made by the World Meteorological Organisation into a proposal that forecast wave information might in certain circumstances enable a vessel to avoid an area where wave conditions are such as to affect the safety of the ship, cargo, or passengers. With regard to the value to the mariner of weather maps and ice charts transmitted by facsimile apparatus, it is noted that the meteorological services of many nations in the northern hemisphere do issue routine facsimile weather maps at present on frequencies which are suitable for reception on board ship, also that ice information for the Davis Strait and Grand Banks area is already issued by the U.S. authorities in a facsimile transmission. Such facsimile charts can provide the shipmaster with the latest information on weather and the ice situation, without the expenditure of time on plotting. It is considered feasible that written information (forecasts, etc.) can also be produced on the charts, as would be included in the W/T weather bulletins.

* An article on this subject appeared in *The Marine Observer*, July 1960.

The next item on the Agenda was a discussion on the training of young officers in the qualities of leadership, introduced by Dr. Ronald Hope, Director of the Seafarers' Education Service. Dr. Hope pointed out that the ability to handle men is a quality essential to the ship's officer, and since this quality is not tested specifically by M.O.T. examination, in his view the subject tends to be neglected. He suggests that courses in leadership training would be of benefit to ships' officers and that good human relationships on board tend to produce a happy and efficient ship.

The problems involved in the training of officers and the manning of a large modern fleet were discussed by Captain R. C. Marsh of the B.P. Tanker Co., Ltd. Captain Marsh deplored the fact that about 25% of cadets and apprentices left the sea before obtaining their 2nd Mate's certificate. This meant that much of the effort put into the training of cadets by highly qualified instructors, and a proportion of the money spent on pre-sea training establishments, was wasted. Captain Marsh suggested that more care should be given to the selection of apprentices and that it was essential that they should initially be fully informed about the demands which a seafaring life requires of them, particularly in comparison to life ashore.

The meeting concluded with a vote of thanks to the Principal and Governing Body of the College. The next Annual General Meeting of the Association of Navigation Schools will be held in Belfast in 1961. F. G. C. J.

"MARENGO"

Each year in the October number of *The Marine Observer*, we publish photographs of ships of the same name and ownership, each of which has, at some time in her career, been a voluntary observing ship.

The fourth of this series appears opposite page 209, being photographs of two ships named *Marengo* belonging to the Ellerman's Wilson Line, formerly T. Wilson & Co. of Hull.

The first ship of the name was built in 1879 and sent us a meteorological logbook in 1884, covering two voyages to New York. This was her only meteorological logbook. Unfortunately, we have been unable to procure a photograph of her.

The second *Marengo* was built in 1910 and we received her first meteorological logbook in 1912. This also covered several passages between Hull and New York. Her observing career was a longer one and it was not until 1932, when she went to the breakers, that she disappears from our registers. She figures in the Excellent Award list in 1925.

The present *Marengo* was built in 1947 and was recruited to the Selected list at the commencement of her first voyage. Like her predecessors she has given us much useful information from the Western Ocean run and earned herself Excellent Awards in 1953, 1957, 1959 and 1960.

This is a convenient opportunity of recording our appreciation of the voluntary services of the masters and officers of " Wilson's of Hull " for the past 82 years. Their first meteorological logbook came from the *Tasso* in 1879. In 1955 and 1956 we had the pleasure of publishing a photograph of their *Rialto* as being one of the three best observing ships in each of those years, whilst again in 1957 the same ship gained a place in the short list. L. B. P.

NOTES ON ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM APRIL TO JUNE 1960

Relevant Weather Factors

An outstanding characteristic of this period was the sub-normal temperatures over Greenland and adjacent seas and the western Atlantic. Temperatures were generally higher than normal over north-eastern Canada, east of the Canadian Arctic Archipelago and western Europe while they were generally below normal over the Russian side of the Polar basin.

Throughout the period, depression activity was at a high level over the North Atlantic owing to the high incidence of northerly cold air in the west of the area. The Azores high was not excessively active but the North American and Eurasian continental anticyclones were more active than normal.

Baffin Bay and Davis Strait

Throughout the period, large amounts of pack-ice moved southwards over most of Baffin Bay and Davis Strait, but the area of open water to the west of Greenland increased and spread northwards, extending to Smith Sound by the end of June. There was less than normal pack-ice off Labrador throughout the period. The amount of open water in the Davis Strait appeared to be larger than normal but the rate of the southward movement of field-ice in Baffin Bay appears to have been normal. There were few large concentrations of icebergs reported except off western Greenland in the open water north of the Arctic Circle, where large numbers were reported during most of the period. There were considerable amounts of pack-ice west of Cape Farewell but they were generally below normal.

Eastern Greenland, Spitsbergen, Bear Island and Areas North of Iceland

There was evidence of a considerable movement of pack-ice out of the Arctic, between Greenland and Spitsbergen, during April. This caused a general increase in pack-ice along the coast of eastern Greenland, but in general the amount of pack-ice was below normal, particularly off south-eastern Greenland, south of the Arctic Circle, where little or no field-ice was reported towards the end of June. The flow of icebergs along eastern Greenland was moderate, with no accumulation at Cape Farewell. Considerable amounts of pack-ice were reported off north-west Spitsbergen in April, but this had apparently disappeared by May although ice floes were reported several times south and west of Spitsbergen by trawlers and aircraft. Little or no ice was reported after April from Bear Island and Jan Mayen.

It appears from the two sections above that this is a sub-normal ice year at two of the Arctic outlets, i.e., Baffin Bay, and that between Greenland and Spitsbergen.

Sea areas adjacent to Norway and the White Sea were apparently free of ice over the whole of this period.

Grand Banks and the Belle Isle Strait

This period was one of below normal amounts of field-ice, particularly in its extent eastwards from the Labrador and Newfoundland coasts. However, towards the end of May, although the area of ice was less extensive than usual, large quantities of dangerous pack-ice containing icebergs moved south towards the Grand Banks off the east coast of Labrador, obstructing the approaches to the Belle Isle Strait and to ports off north-eastern Newfoundland. By the end of June, most of this field-ice had dispersed completely from the sea areas east of Newfoundland and the approaches to Belle Isle Strait, but large numbers of icebergs continued to obstruct the sea route through the Belle Isle Strait.

Table 1 summarises the iceberg sightings (but not radar targets) by merchant ships in the north-west Atlantic. It should, however, be remembered that these are greatly influenced by the routing of the ships. The extent of the southward and eastward penetration of ice-

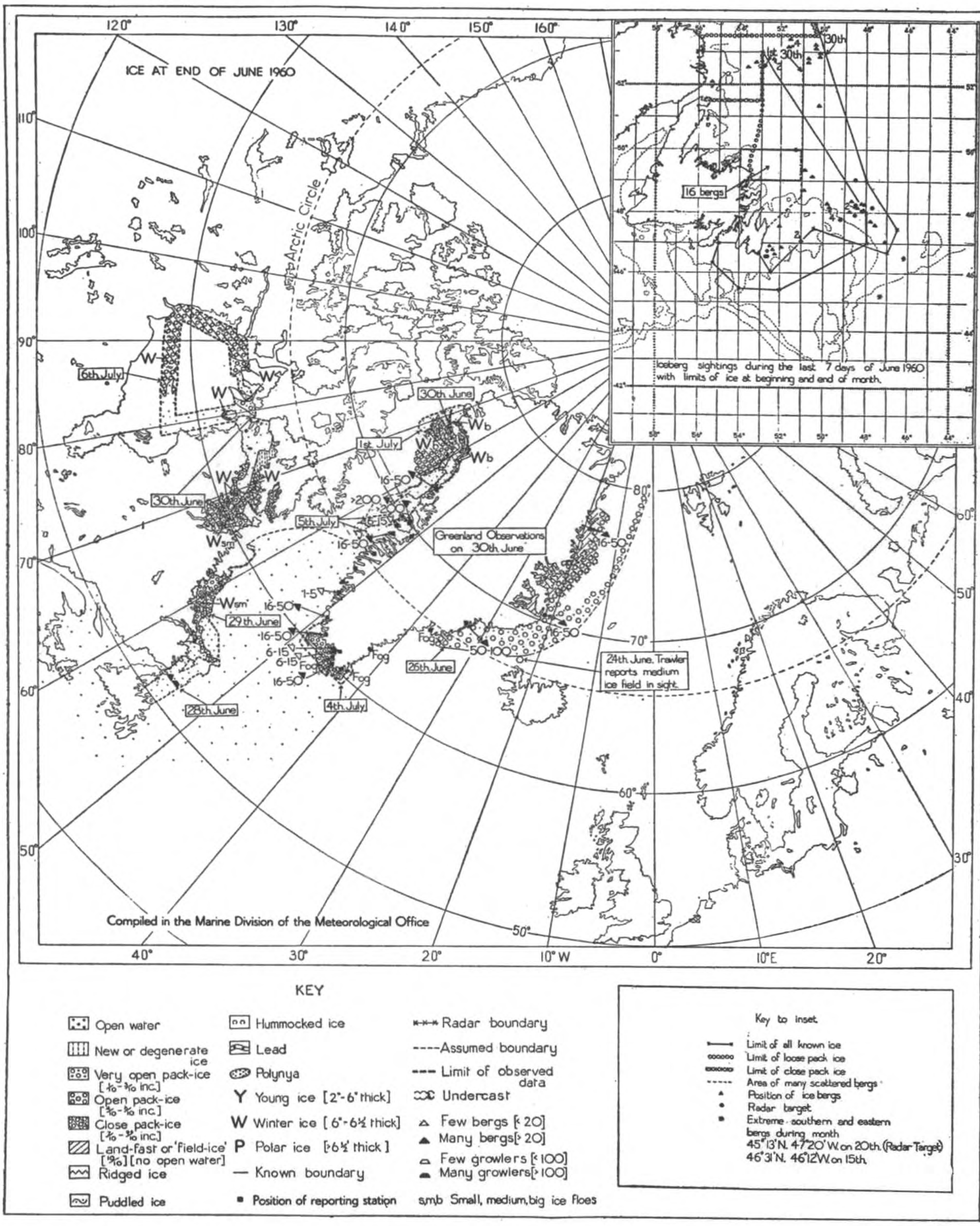
Table 1. Icebergs sighted by merchant ships in the North Atlantic

(This does not include radar targets)

Limits of latitude and longitude		Degrees north and west										
		60	58	56	54	52	50	48	46	44	42	40
Number of bergs reported south of limit	April	•	130	128	128	122	120	39	0			
	May	>313	>312	>311	>308	>308	>308	>290	38	2	0	
	June	•	273	272	269	247	240	199	0			
	Total	•	>715	>711	>705	>677	>668	>528	38	2	0	
Number of bergs reported east of limit	April	•	•	•	130	119	89	33	6	0		
	May	>313	>312	>312	>284	224	127	22	1	1	1	0
	June	•	•	273	262	170	103	27	0			
	Total	•	•	•	676	513	319	82	7	1	1	0
Extreme southern limit	April	46° 40′N., 45° 40′W. on 26.4.1960										
	May	43° 00′N., 49° 46′W. on 18.5.1960										
	June	46° 07′N., 53° 17′W. on 16.6.1960										
Extreme eastern limit	April	52° 00′N., 45° 00′W. on 27.4.1960										
	May	49° 01′N., 41° 25′W. on 9.5.1960										
	June	46° 31′N., 46° 12′W. on 15.6.1960										

• Probably large numbers, but none sighted.

> indicates 'greater than' where there is some doubt as to actual numbers of bergs. The value given is likely to be lower than the true value.



bergs moving southward from the Davis Strait was greatly below normal. This contrasted with the corresponding period in 1959 when Atlantic track A was used. During 1960 track B was always available and never in danger. The greatest eastward and southward penetrations occurred towards the middle of May, but large numbers of bergs continued to move over the northern half of the Grand Banks in early June. By the end of June few sightings were being made over the Grand Banks, but there remained many bergs to the north in the approaches to the Belle Isle Strait.

Baltic Sea

Early in April ice cleared from the southern Baltic and the approaches from the North Sea under the influence of warm air advected north-westwards from southern Europe. Ice conditions, however, remained severe and above normal in the Gulfs of Bothnia and Finland. Ice cleared from the Gulf of Riga towards the middle of April and was decreasing and breaking up in the Gulf of Finland, but remained fast in the north of the Gulf of Bothnia and in Swedish ports north of Stockholm. There was an accelerated decrease in ice generally in the last

Table 2. Summary of Ice Conditions reported from a selection of places in the Baltic Sea

PLACE	April 1960: Length of season — First day	April 1960: Length of season — Last day	April 1960: No. of ice days — Any ice type	April 1960: No. of ice days — Continuous landfast ice	April 1960: No. of ice days — Pack-ice	April 1960: No. of ice days — Shore lead	April 1960: Navigation conditions, no. of days — 'Dangerous to navigation', but assistance not required	April 1960: Navigation conditions, no. of days — Assistance required	April 1960: Navigation conditions, no. of days — Closed to navigation	May 1960: Length of season — First day	May 1960: Length of season — Last day	May 1960: No. of ice days — Any ice type	May 1960: No. of ice days — Continuous landfast ice	May 1960: No. of ice days — Pack-ice	May 1960: No. of ice days — Shore lead	May 1960: Navigation conditions, no. of days — 'Dangerous to navigation', but assistance not required	May 1960: Navigation conditions, no. of days — Assistance required	May 1960: Navigation conditions, no. of days — Closed to navigation
Aarhus	—	—	0	0	0	0	0	0	0	—	—	0	0	0	0	0	0	0
Copenhagen	—	—	0	0	0	0	0	0	0	—	—	0	0	0	0	0	0	0
Kiel	—	—	0	0	0	0	0	0	0	—	—	0	0	0	0	0	0	0
Stettin	—	—	0	0	0	0	0	0	0	—	—	0	0	0	0	0	0	0
Gdansk	—	—	0	0	0	0	0	0	0	—	—	0	0	0	0	0	0	0
Klaipeda	2	15	12	0	9	0	8	0	0	—	—	0	0	0	0	0	0	0
Riga	1	16	11	0	11	0	7	2	0	—	—	0	0	0	0	0	0	0
Pyarnu	1	30	29	22	7	0	3	7	18	1	3	3	0	3	0	0	0	0
Leningrad	1	30	20	11	8	0	7	12	0	1	2	2	0	2	0	0	0	0
Viborg	1	29	29	29	0	0	0	29	0	1	5	5	4	1	0	4	0	0
Helsinki	1	25	25	12	3	0	24	1	0	—	—	0	0	0	0	0	0	0
Turku	1	18	18	18	0	0	5	7	0	—	—	0	0	0	0	0	0	0
Mariehamn	1	18	18	0	16	0	18	0	0	—	—	0	0	0	0	0	0	0
Mantyluoto	1	18	16	9	7	0	4	12	0	—	—	0	0	0	0	0	0	0
Vaasa	1	21	21	21	0	0	3	1	17	—	—	0	0	0	0	0	0	0
W. Norrskar	1	25	25	0	11	14	0	9	16	—	—	0	0	0	0	0	0	0
Oulu	1	23	23	22	1	0	0	1	22	—	—	0	0	0	0	0	0	0
Lulea	1	30	30	30	0	0	0	0	30	1	11	11	11	0	0	2	0	9
Bredskar (Umea)	1	30	30	30	0	0	9	0	21	1	2	2	1	1	0	1	0	0
Alnosund	1	16	16	14	0	0	3	5	8	—	—	0	0	0	0	0	0	0
Stockholm	1	24	24	21	3	0	3	21	0	—	—	0	0	0	0	0	0	0
Norrkoping	1	10	10	4	6	0	6	4	0	—	—	0	0	0	0	0	0	0
Visby	—	—	0	0	0	0	0	0	0	—	—	0	0	0	0	0	0	0
Kalmar	1	5	5	0	0	0	5	0	0	—	—	0	0	0	0	0	0	0
Goteborg	—	—	0	0	0	0	0	0	0	—	—	0	0	0	0	0	0	0
Oslo	—	—	0	0	0	0	0	0	0	—	—	0	0	0	0	0	0	0
Kristiansand	—	—	0	0	0	0	0	0	0	—	—	0	0	0	0	0	0	0

week of April, when Helsinki and Stockholm became ice free. During the first half of May ice broke and decreased rapidly in the Gulfs of Bothnia and Finland (Leningrad cleared on 3rd May). The last ice to be reported was in the north of the Gulf of Bothnia on 23rd May.

Table 2 gives a summary of ice conditions in the Baltic during April and May 1960.

G.A.T.

OFFICIAL PUBLICATION—SURFACE CURRENT CHARTS OF N.E. PACIFIC

The last of a series of five atlases giving a world-wide coverage of the ocean current circulation has been published by the Marine Division of the Meteorological Office.

The new atlas, numbered M.O.655, and entitled *Quarterly Surface Current Charts of the Eastern North Pacific Ocean*, covers the area north of the equator and from 160°W. to the coast of the Americas.

It is uniform with others of this well-known series and is made up of quarterly charts of:

(*a*) surface current roses;
(*b*) surface current predominant direction and average rates;
(*c*) surface current vector means.

These charts have been compiled from observations of surface currents sent to the Meteorological Office by voluntary marine observers in British merchant ships and from observations made in H.M. ships forwarded by the Hydrographer of the Navy. The observations cover the period 1855 to 1952.

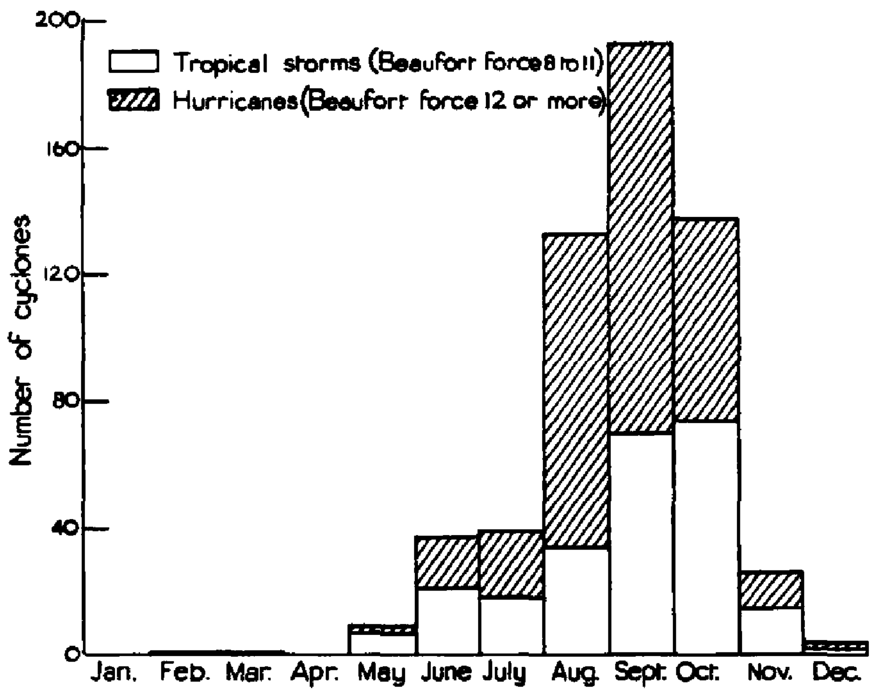
The atlas, which is available on free loan to U.K. voluntary observing ships from their Port Meteorological Officers (see page 222), may be purchased from H.M. Stationery Office at 15s. net (11d. postage).

Book Reviews

North Atlantic Tropical Cyclones. U.S. Weather Bureau, Technical Paper No. 36. $10\frac{1}{4}$ in. × $7\frac{7}{8}$ in. pp. 21, plus 193 pages of maps. Washington, 1959.

This publication deals with the life history of all known North Atlantic tropical cyclones (581 in all) occurring in each year from 1886 to 1958 inclusive, and apart from a short discussion of data sources, tropical cyclone tracks and frequencies, consists entirely of charts depicting the cyclone tracks. The cyclones are divided into two categories—tropical storms (winds not exceeding Beaufort force 11), and hurricanes (winds reaching force 12 or higher).

Table 3 of the paper gives the number of tropical storms and hurricanes occurring in each month of each of the 73 years, and these data have been reproduced as a histogram in the figure below. The histogram shows that a large proportion (82%)



of tropical cyclones occur in the three months August, September and October. The frequency of hurricanes reaches a maximum in September, but the frequency of tropical storms has its maximum in October, so that in October the odds are slightly against any cyclone reaching hurricane intensity. However, it should be borne in mind that the proportion of storms to hurricanes can only be roughly estimated, since on many occasions there must be considerable doubt whether or not a tropical cyclone has in fact reached hurricane intensity.

The numerous charts which constitute the main body of the publication show the tracks of the cyclones

(*a*) in each year,

(*b*) in each ten-day period from June to November for all years combined,

(*c*) for the years 1886–1890, and for each decade 1891–1900, etc., for June, July, November, and for ten-day periods in August, September, October.

Off-season charts covering December to May are also included under (*b*) and (*c*).

The charts show that the favourite track of tropical storms in their extra-tropical stage has been north-east towards Iceland, but a considerable number have taken a more eastward track towards the Azores and Spain. Altogether, 20 tropical storms have passed within 200 miles of the Azores during the 73 years being considered.

A novel feature of the charts is that the tropical storm stage, hurricane stage, extra-tropical stage and dissipation stage are depicted on each track (e.g., broken line for tropical storm, continuous line for hurricane), but the authors point out that the precise locations of the intensity changes cannot always be accurately determined.

The secular change of tropical storms and hurricanes is briefly discussed. There has been a sharp increase in activity since 1930. During the 28 years 1931–58 there have been only five seasons with below average numbers. This increased frequency, both of tropical storms and of hurricanes, is considered to be partially but not wholly explained by improved detection techniques.

The treatment of the subject is entirely statistical. No attempt is made to deal with the physical processes underlying the development and movement of tropical cyclones. Nevertheless, the paper contains information from which useful deductions can be made as to the probability that any particular place will be affected by a tropical cyclone at different times of the year. F. E. L.

Light and Colour in the Open Air, by M. Minnaert, translated by H. M. Kremer-Priest, revised by K. E. Brian Jay. 8¼ in. × 5¾ in. pp. 362. *Illus.* G. Bell & Sons, Ltd., London, 1959. 25s.

The retired shipmaster, or the officer who has secured the much coveted 'shore job', will not be many years ashore before he misses, with an odd nostalgia, the velvet blackness of the night sky with each star suspended as it were and shining in its own right, and the unending beauty of the day sky with its infinite variety of tints and the transition from one to the other. For these things are denied to us ashore, whose horizon is bounded at best by fields and trees and at worst by dock-side cranes and warehouses, and whose view of the sky is so often spoiled by dust, smoke or street lighting.

Ships' observations published in *The Marine Observer* over many years have exemplified the number and variety of optical phenomena which may be observed at sea. We are always glad when we find narratives of this type in the additional remarks pages of the meteorological logbooks, for optical phenomena are almost invariably inseparable from meteorological conditions. Thus the observer of, say, a superior mirage is also, perhaps unconsciously, observing that the sea temperature is much lower than that of the air and that the latter is increasing with height (the meteorologist's 'inversion').

This book, the first English translation of which was published 20 years ago, gives a clear and concise description of dozens of natural phenomena, together with a detailed explanation of each when possible or, in some cases, a theory. Some of the phenomena described are familiar but are made far more fascinating by being studied from a scientific viewpoint. Some again are unfamiliar, yet are frequently to be seen if one knows what to look for. Finally there are some rare and remarkable wonders that may perhaps be seen only once in a lifetime. Quite rightly, Professor Minnaert emphasises the need to "touch your eyes with the magic wand of knowing what to see", in support of which he mentions that the corona, now regarded as the most striking phenomenon of a solar eclipse, was scarcely noticed before 1842, although innumerable eclipses had been observed in the Middle Ages and in ancient times. Every year new phenomena are recorded. "It is strange to think", writes the author, "how blind and deaf we must be to so many things that posterity is bound to notice."

The thirteen chapters of the book cover the whole field of optical phenomena: sunlight and shadows, reflection, refraction, the curvature of light rays, the intensity and brightness of light, the eye, colours, after-images and contrast phenomena, shape and motion, rainbows, halos and coronae, light and colour of the sky, light and colour in the landscape, and finally luminous plants, animals and stones.

It seems a pity that in the final chapter the subject of phosphorescence is over simplified. To dismiss the awe-inspiring majesty of the phosphorescent wheel as "wind waves and bow waves of the ship, which, as they pass along, make the water turbulent and therefore luminous", simply begs the question. So little is known of the cause of this phenomenon, although ships' observations are doing much to help research, that it would have been better not to have attempted an explanation. Perhaps the subject of phosphorescence does not properly belong to this book anyway.

But apart from this, the book makes a fascinating study for the ship's officer, than whom there can surely be no one in a better position to study nature's moods in their infinite variety. It will teach him what to look for, why he sees it, how to look at it and how to record it so that it may be compared with other observations of a like nature. L. B. P.

Personalities

RETIREMENT.—CAPTAIN A. C. JOHNSTON, O.B.E., retired from the Anchor Line at the end of last year after 45 years' service with that Company.

Alexander Campbell Johnston served the whole of his apprenticeship, which commenced in October 1909, aboard the *Bellucia*, owned by the Bell Line of Glasgow.

On obtaining his 2nd Mate's certificate in February 1914, he joined the Anchor Line and was appointed to the *Perugia* as 3rd Mate in New York. He served in troopships for the first three years of the First World War, and subsequently saw service in the Army as a Lieutenant in the Royal Engineers (Inland Water Transport Section). After demobilisation in June 1919 he rejoined the Anchor Line, being appointed to his first command, the *Elysia*, in June 1938. For the first six months of the Second World War he served as Lieutenant-Commander R.N.R. aboard the *Transylvania*, an armed merchant cruiser, on the northern patrol. Subsequently he commanded the *Waban* (renamed *Empire Sanbar*, later renamed *Empire Beaver*), *Castalia*, *Cameronia* (renamed *Empire Clyde*), *Egidia* and *Silicia*, his last command.

We received Captain Johnston's first meteorological logbook in 1932 when he was in the *California*. In 14 subsequent years he sent us 36 logbooks, 14 of which were classed ' excellent '.

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

RETIREMENT.—Mr. M. J. MURPHY recently completed his last voyage in the S.S. *Strathmore* after 46 years at sea as a radio officer.

Michael Joseph Murphy first went to sea in August 1914 in the employ of the Marconi International Marine Communication Co., Ltd. and served in the following vessels: *Norman Prince*, *Talthybius*, *Bayano*, *Camito*, *Neuralia*, *Empress of France*, *Port Victor*, *Beaverford*, *Alcantara*, *City of New York*, *Moldavia*, *Orontes* (12 years), *Largs Bay*, most of which were observing ships. In 1954 Mr. Murphy joined the staff of the Peninsular and Oriental Steam Navigation Co., serving in the *Strathnaver*, *Strathaird*, *Himalaya* and *Strathmore*, all being Selected Ships.

No records of radio officers were kept by the Meteorological Office before the war, but since 1946 Mr. Murphy's name has appeared as the Senior Radio officer in 23 books, of which 12 were classed ' excellent ', and he received Excellent Awards in 1953, 1955 and 1958.

Mr. Murphy ' closed down ' his station on 25th May and we wish him health and happiness in his retirement. J. C. M.

RETIREMENT.—CAPTAIN R. S. PATON retired from the Anchor Line last November after 47 years' service at sea.

Robert Scott Paton first went to sea in April 1913 as an apprentice in the *Glenelg*, owned by J. Gardiner & Co. of Glasgow, and remained in her until April 1917.

On obtaining his 2nd mate's certificate in May 1917, he joined the British India S.N. Co., and was appointed to the *Colaba* as 3rd officer. He sailed as 3rd and 2nd officer with this Company until January 1919 when he joined the Indian Government ships as Chief officer. Whilst in that Service he obtained his Master's certificate in July 1920 and was given a temporary command until the end of that year. From the beginning of 1921 until 1925 he served in ships owned by the Nourse Line of London.

In April 1925 he joined the Anchor Line and was appointed to the *Scindia*. He served in their ships until the outbreak of the Second World War when he was called up as Lieutenant R.N.R. On demobilisation in April 1946 he rejoined the Anchor Line, being appointed to command the *Tarantia* in 1949. Subsequently he commanded the *Egidia* and finally the *Tahsinia*.

Captain Paton's record with us goes back to 1937, when he was in the *California*. Since then he has, in 10 years, sent us 26 logbooks, of which 21 have been classed 'excellent'. He received Excellent Awards in 1959 and 1960, the former occasion being marked by the publication in the July 1959 number of *The Marine Observer* of a photograph of his ship *Tarantia*, one of the three best observing ships of that year.

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

RETIREMENT.—CAPTAIN H. A. SHAW, O.B.E., recently retired from the sea, completing his last voyage in command of the *Pacific Stronghold*.

Hendry Alldred Shaw first went to sea in 1911, and, serving in various companies while obtaining his certificates, passed for Extra Master at the early age of 23. During the First World War he was torpedoed when 2nd officer of the *Baron Blantyre*.

In 1920 he joined the Prince Line as 2nd officer, and was appointed to his first command, the *Syrian Prince*, in 1938. He served with that company until 1953, when he was transferred to the sister company of Furness, Withy on their Pacific service. During the Second World War, while in command of the *British Prince*, his ship was sunk by enemy action on the east coast in 1941. Captain Shaw then served for a long period in the Mediterranean during the Middle East and North African Campaigns and took part in the initial landings in Sicily.

In 1957 he was awarded the O.B.E. Captain Shaw's first meteorological logbook was received in 1951 and in 9 years observing he forwarded 19 logbooks, of which 9 were classed 'excellent'. He received an Excellent Award in 1953.

We wish him health and happiness in his retirement. J. C. M.

OBITUARY.—We regret to record the sudden death, at the end of June, of CAPTAIN HENRY HULME ARTON, who collapsed and died off Cape Town at the early age of 50 while in command of the *Australia Star*.

Captain Arton joined the Blue Star Line as a cadet in 1926 and served with them throughout his sea-going career, except for a period during the war years in the R.N.R. He was appointed to his first command the *Vancouver Star* in March 1959. He subsequently commanded the *Newcastle Star* and *California Star* and in April of this year was appointed to command his last ship, *Australia Star*.

Captain Arton's first connection with the Meteorological Office was when he was serving in the *Royal Star* in 1934, and meteorological logs to which he contributed have been received from *Royal Star* and *Imperial Star* before the war and *Geelong Star*, *California Star* and *Australia Star* since the war.

Captain Arton leaves a widow and four children to whom we extend our condolences. J. C. M.

Notice to Marine Observers

NAUTICAL OFFICERS AND AGENTS OF THE MARINE DIVISION OF THE METEOROLOGICAL OFFICE, GREAT BRITAIN

Headquarters.—Commander C. E. N. Frankcom, O.B.E., R.D., R.N.R., Marine Superintendent, Meteorological Office, Air Ministry, Headstone Drive, Harrow, Middlesex. (Telephone: Harrow 4331, Ext. 324.)

Captain A. D. White, R.D., Lt.-Cdr. R.N.R., Deputy Marine Superintendent. (Telephone: Harrow 4331, Ext. 323.)

Lieut.-Commander L. B. Philpott, D.S.C., R.D., R.N.R., Nautical Officer. (Telephone: Harrow 4331, Ext. 31.)

Mersey.—Captain J. R. Radley, Port Meteorological Officer, Room 709, Royal Liver Building, Liverpool 3. (Telephone: Central 6565.)

Thames.—Mr. J. C. Matheson, Master Mariner, Port Meteorological Officer, South Side, King George V Dock, Silvertown, London, E.16. (Telephone: Albert Dock 3931.)

Bristol Channel.—Captain F. G. C. Jones, Port Meteorological Officer, 2 Bute Crescent, Cardiff. (Telephone: Cardiff 21423.)

Southampton.—Lieut.-Commander E. R. Pullan, R.D., R.N.R., Port Meteorological Officer, 50 Berth, Old Docks, Southampton. (Telephone: Southampton 24295.)

Clyde.—Captain R. Reid, Port Meteorological Officer, 136 Renfield Street, Glasgow. (Telephone: Glasgow Douglas 2174.)

Forth.—Captain G. N. Jenkins, " Fairwind ", Kings Road, Longniddry, East Lothian. (Telephone: Longniddry 3138.)

Humber.—Lieut-Commander W. H. Carr, R.N.R., c/o Principal Officer, Ministry of Transport, Trinity House Yard, Hull. (Telephone: Hull 36813.)

Tyne.—Captain P. R. Legg, c/o F. B. West & Co., Custom House Chambers, Quayside, Newcastle upon Tyne. (Telephone: Newcastle 23203.)

INDEX TO VOLUME XXX, 1960

[*Subjects of* Book reviews, Editorials, Notices to marine observers, *and* Photographs *are indexed under those general headings*.]

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, reprinted 1959. (60°S–70°N, 80°W–40°E) 180*s*. (post 3*s*. 3*d*.)

Monthly Meteorological Charts of the Western Pacific. M.O.484, 1945, reprinted 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, 1950, reprinted 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, 1949, reprinted 1959. (50°S–30°N, 20°E–120°E) (16½″×22½″) 126*s*. (post 2*s*. 9*d*.)

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, reprinted 1950. (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, 1959. (60°N–80°N, 30°W–120°E) 126*s*. (post 2*s*.)
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, reprinted 1956. (50°S–30°N, 20°E–140°E) (30″×20″) 10*s*. (post 7*d*.)

South Pacific Ocean Currents. M.O.435, 1938, reprinted 1959. (60°S–0°, 140°E–70°W) (22″×34″) 12*s*. 6*d*. (post 1*s*. 0*d*.)
The above two atlases contain quarterly "current arrow" and "current rose" charts.

Quarterly Surface Current Charts of the Atlantic Ocean. M.O.466, 1945, reprinted 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*.)

Quarterly Surface Current Charts of the Eastern North Pacific. M.O.655, 1959. (0°–60°N, 160°W–65°W) (23″×17″) 15*s*. (post 10*d*.)
The above three 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.

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