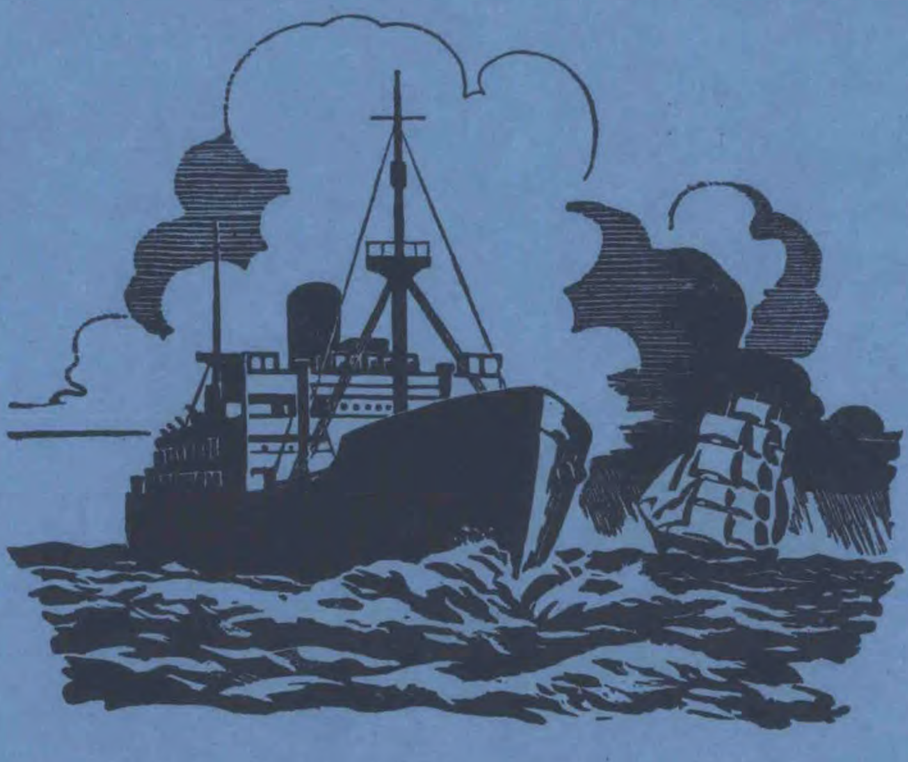
Met.O. 827

The Marine Observer

A quarterly journal of Maritime Meteorology



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THE MARINE OBSERVER

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

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Editorial

They that go down to the sea in ships, that do business in great waters; These see the works of the Lord and his wonders in the deep. Psalm 107.

The Rochdale Committee of Inquiry into Shipping, which had been in operation for some two and a half years, published its report during the summer of 1970. There can be few, if any, aspects of the shipping industry which it did not cover and, though much of the report will be of only academic interest to the seafarer, part of it attaches considerable importance to wastage and the "attitude of seafarers to life at sea"; this is a part which merits close attention. The three points which it emphasized were: (*a*) the industry does not have as good an image as it should, particularly with parents and in the educational world; (*b*) more scientific selection of recruits is needed; and (*c*) nautical training needs to be rationalized and more closely allied with national arrangements so that seafarers may be equipped with nationally-recognized qualifications against the time when they may have to leave the sea and seek employment ashore.

These are points which are doubtless discussed in the half-decks of many a ship today just as they were discussed 45 years ago when the writer was serving his time. But in those days the profession of the sea did not enjoy even the same social status as it does today. Looking back now it seems almost as though it was barely emerging from the age-old tradition of ignorance and uncouthness which it had built up over many years. Perhaps this had been done voluntarily; at all events, nothing seems to have been done to discountenance it. Officers educated to the standard of what is now called 'A' level or even to 'O' level were the exception then; the ancient doors of the Guildry of London, which had been closed for more than 200 years, were still some way from being opened to admit a company of seamen, the Honourable Company of Master Mariners, then itself in its formative stages; the day when a reigning sovereign would assume the title of Master of the Merchant Navy and Fishing Fleets was still many years ahead whilst no Royal tour had, up till then, been based in a merchant ship. But now that all these things have come to pass the image is still not right.

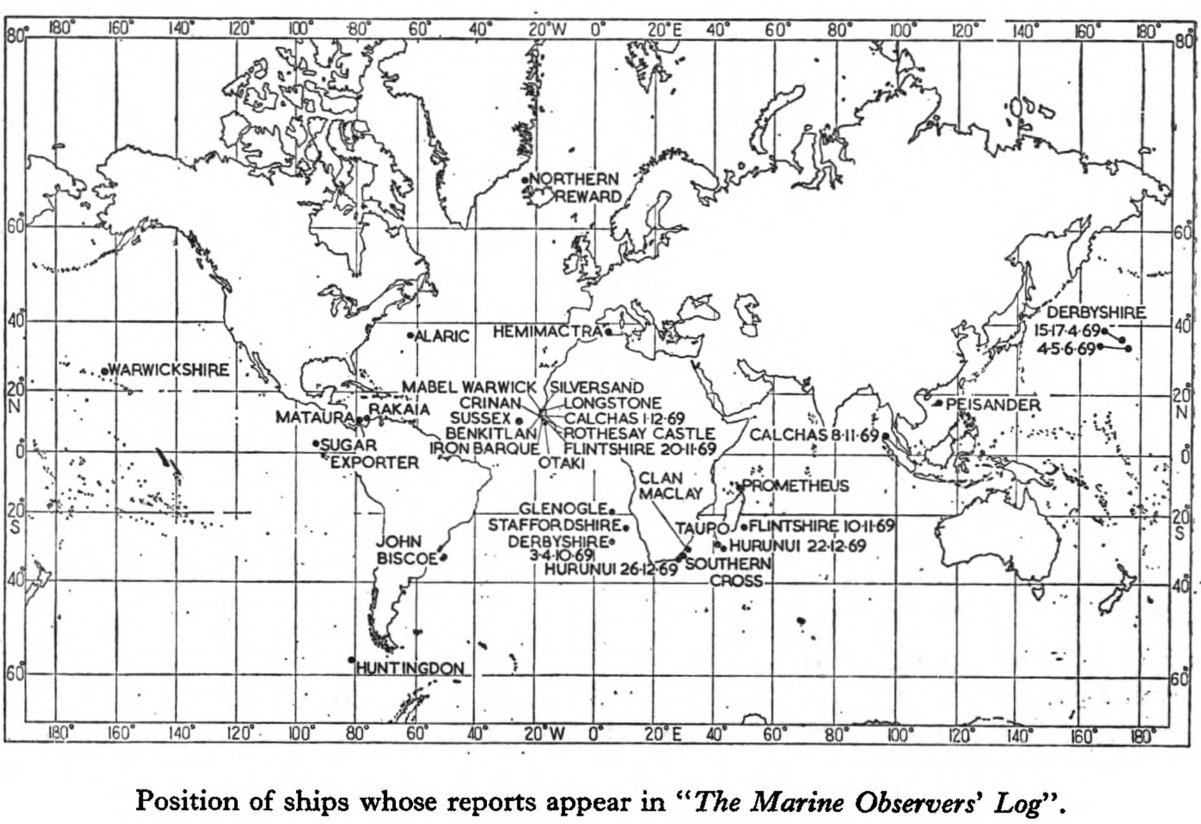
Rochdale particularly mentions parents and educational bodies as those to whom the presentation must be improved. Indeed, few of these good people ever seem to have got it quite right. Many of them in the past, seeing promising material which they had hoped would make some mark in the academic, business or social world go away to sea instead, would perhaps derive their only comfort from the verse quoted above. For at least 'the boy' would be seeing things and savouring experiences undreamed of ashore; perhaps even character could be formed in this way alone. Very often it was so, in testimony of which Joseph Conrad had written: "The sea, perhaps because of its saltness, roughens the outside but keeps sweet the kernel of its servant's soul".

For us who came ashore, our horizon is bounded, at best, by fields and trees and, at worst, by dockside cranes and warehouses whilst our view of the sky is so often spoiled by dust, smoke or street lighting and we cannot but miss, with an odd nostalgia, all the natural phenomena which are embraced by the Psalmist's words quoted above. But we are daily reminded of their age-old truth in our scrutiny of ships' meteorological logbooks; the selection which we are able to make from them for publication in *The Marine Observer* would convince anyone that all this still goes on even if it is half forgotten ashore. In this respect, if in no other, the profession of the sea has the edge on many other professions.

But, in spite of polluted atmosphere, poisoned rivers, indiscriminate plant-spraying and the constant urbanization of rural areas, shore-side as well can sometimes produce evidence that Nature has still a good hand to play. The writer of a nature column in *The Guardian* in mid-May mentioned that he had been holding in his hand a Willow Warbler. The special nature of this otherwise commonplace experience lay in the fact that this bird was not just an anonymous unit among thousands of migrants but a known individual. He had caught and ringed this particular bird between the Newton Wonder and the Sturmer Pippin (to the uninitiated these are apple trees) in July 1965. It was then an adult which meant that it had already been to tropical Africa and back at least once. He did not see it again until July 1968. In May 1969 it was caught once more and now, on 11th May 1970, it had come back yet again. On each occasion the recapture had been at precisely the same spot between the two apple trees! Now this piece of consistency on the part of Nature can only be matched by a piece of inconsistency on her part which had been reported to us some months before by the finder of a bottle on the beach at Mevagissey, Cornwall, on 27th February 1969. A note inside the bottle stated that it had been cast overboard from the *Catalina Star* off Vancouver Island nine and a half years before! But even this was capped in *Lloyd's List* of 26th January 1970 which mentioned another long drift, longer in time though shorter in distance. This particular bottle was cast overboard from the ore carrier *Trinculo* at noon on 6th January 1960 in 32° 12′N, 41° 21′W. Just over ten years later, on 11th January 1970, it was picked up by a boy on the shore of Long Island!

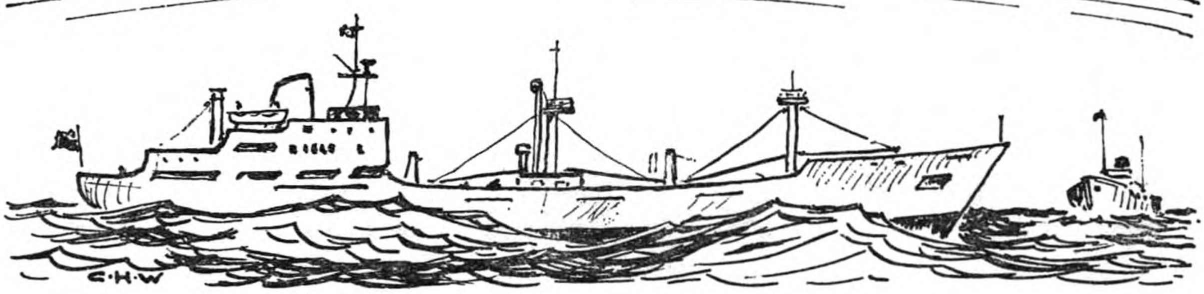
Thus Nature can be delightfully consistent and yet exasperatingly inconsistent. It is with her inconsistencies that the voluntary marine observer is mainly concerned for surely there can be nothing in the world as inconsistent as weather. And yet there is system somewhere: gradually, thanks to the millions of observations which have come in from the voluntary observing fleet for more than a century and aided by electronic computers, weather patterns are being hammered out, compared, and probable future weather patterns derived therefrom. It would seem arrogant to visualize the day when weather can be predicted with the same certainty as the elements in *The Nautical Almanac* or the *Tide Tables* and yet we may be moving towards that day. By keeping on with the observations we are at least playing our part and, while we would hesitate to describe membership of the Voluntary Observing Fleet as a status symbol, no one will deny that it does provide a service to humanity and a much wider knowledge of this fringe activity of the Merchant Navy should do much to improve its image.

L. B. P.



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

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.

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

COLD-FRONT SQUALLS

Indian Ocean

m.v. *Taupo*. Captain F. C. Taylor. Fremantle to Durban. Observers, the Master, Mr. R. C. Anderson, Chief Officer, Mr. B. O'Dea, 3rd Officer, Mr. J. Y. Diggle, Radio Officer, Mr. J. Lavin, A.B. and Mr. R. Robertson, A.B.

28th November 1969. Throughout the day the vessel had been steaming in fine conditions with clear skies, a light ENE'ly breeze and a low SW'ly swell. At 1330 GMT Cb cloud was seen massing on the horizon and by 1500 there was 7/8 cloud. During this period the wind had backed to NW, force 3. Later, at 1600, a dark rain cloud was seen to the SSW and a series of radar plots indicated that a frontal system was closing at a relative speed of 50 kt (vessel steaming 270° at 19 kt). Vivid lightning was seen in the darkened area. The system struck the vessel at 1623 and immediately the wind backed to SSW and increased to force 9. A violent downpour accompanied this sudden wind shift and horizontal visibility was reduced to a few yards. The heavy rain and gale-force winds persisted for 10 min and the sky was lit continuously by vivid lightning which was dazzling. From 1623 to 1645 the barograph recorded a rise of 3 mb. It then fell 1 mb but later continued to rise erratically. The air temperature fell from 79·1°F to 69·9° and the sea temperature fell from 80·6° to 75·2°.

By 1645 the SSW'ly wind had decreased to force 3. From this time onwards the lightning consisted of both brilliant sheet and fork, the latter having varied and unusual characteristics. With a blinding regularity forked lightning was seen close ahead, travelling horizontally and for some miles, its progress marked by vivid branches shooting vertically downwards. This forked lightning caused the accompanying thunder to rumble for several seconds. The relative slowness of these forms was such that their horizontal progress was easily discernible. At the same time beaded lightning was also sighted regularly. As the storm moved NE and clear of the vessel, the Cb clouds began to break up and it was at their upper levels that the flashes were at their most remarkable. To the NE fork lightning was seen to 'snake' across the tops of the clouds and, in the same direction, lightning was thrown upwards, resembling an exploding star shell, the branches being scattered upwards and outwards at random. Solitary forks were seen to strike the clouds and be deflected upwards, leaving the vivid impression of a jagged U. Throughout this period the spectacle was heightened by expansive sheet lightning extending the whole length of the horizon from NW to E. A second storm was observed to the SE and here the forked lightning was equally spectacular. Both storms were visible for a further 6 hours. The compasses and radar remained unaffected throughout the period.

Position of ship at 1630: 29° 54'S, 40° 17'E.

m.v. *Hurunui.* Captain R. B. Hood. Fremantle to Durban. Observers, the Master and Mr. H. M. Close, 3rd Officer.

22nd December. The sky had been half covered by moderate Cu and thin Sc clouds but at 1700 GMT it was invaded from the west by thick Sc. Underneath could be seen a heavy roll of black St cloud, with a rain shower at its base, approaching the ship at a considerable speed. At 1750 this struck the ship and the WNW'ly wind backed sharply to SW and increased from force 4 to force 5–6. The heavy rain shower lasted 20 min. The barometer, which had been falling quickly and steadily (2·5 mb in 3 hours), began to climb slowly. The dry-bulb temperature had remained steady throughout but the wet-bulb temperature dropped 7 degF with the passage of the squall. After the squall had passed at 1815 the wind eased to force 4 and had backed to SSW by 1900. The sky was completely overcast with thick Sc and a few patches of moderate Cu. It was noted that the sea temperature just prior to the squall was 73·4°F and afterwards, at 1830, it was 71·3°.

These frontal squalls have been fairly frequent on the passage across the southern Indian Ocean but this one was particularly noted for the speed at which it descended and cleared, its violence while it lasted and the large wind shift during and subsequent to it.

Position of ship at 1800: 30° 18'S, 43° 14'E.

Note. The *Taupo* probably encountered an active cold front sweeping north-eastwards across the south-western Indian Ocean. The account is more typical of the violent squalls of lower latitudes, being particularly similar to the 'sumatra' of the Malacca Strait. These fronts can attain, and sometimes exceed, speeds of 50 kt; in general, the greater the speed the more violent the associated squall. The report from the *Hurunui* emphasizes that these squalls are not infrequent occurrences in the trade-wind belt of the south Indian Ocean.

SUDDEN WIND CHANGES

off Rio Grande, Brazil

R.R.S. *John Biscoe.* Captain M. J. Cole. Southampton to Montevideo. Observers, the Master, Mr. C. R. Elliott, 3rd Officer, Mr. J. P. Morton, 2nd Officer and Mr. A. R. Binder, 4th Officer.

27th October 1969. At 1320 GMT a bank of cloud was observed ahead of the vessel which was on a course of 231° at 12·5 kt. The appearance of the cloud was likened by various observers to that of an ice piedmont, due to its smooth appearance and definite skyline. It was estimated that the bank was 8–10 miles long, base approx. 300 ft and the depth 600–800 ft. Ten minutes later, when within ½ mile of this cloud bank, the air temperature was 66·7°F, wet bulb 64·0°, pressure 1010·2 mb and wind NNE, force 6. At 1342, as the vessel passed under the bank, the wind immediately veered to SSW, force 5, causing a much confused sea with flying spray. Whilst under the cloud bank the air temperature dropped to 64·4°, the wet bulb to 62·6° and the pressure rose to 1011·4 mb.

At 1344 the vessel sailed clear of the bank and the wind immediately veered to N'ly, force 4. However, a second cloud bank was seen ahead, similar to the first although the cloud did not have such a smooth texture. While between the banks the air temperature was 66·0°, the wet bulb 63·3° and the pressure 1010·8 mb. Three minutes later the vessel sailed under this second bank and experienced the same sudden wind change—to SW, force 5; the air temperature was 65·1°, wet bulb 63·0° and pressure 1011·9 mb. Once again the wind veered as soon as the vessel had sailed clear.

In all, the vessel sailed under eight such banks. The cloud base of the successive banks gradually increased to about 600 ft and the general structure of the banks became progressively more ragged until that of the eighth was broken into a series of cumuliform clouds. The drop in air temperature and rise in barometric pressure under the first two cloud banks was quite pronounced but these changes diminished with each successive bank. It took 2–3 min to pass under each bank and 3–4 min between the edges of the banks, which appeared to be parallel, while the vessel steamed at right angles to them. The severe wind changes occurred under each bank. At 1440, when the vessel finally cleared the cloud banks, the wind settled at 'E, force 4 but later became calm.

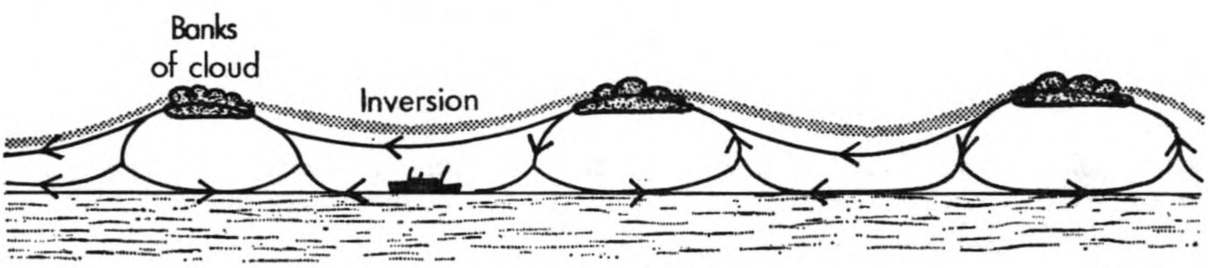
During the afternoon the sky became steadily overcast till, by 1800, there was 8/8 high Sc showing well-defined mamma protuberances. The wind was SW, force 1 and the barometer had begun to fall but otherwise there was little indication of what was to follow.

Slight rain began at 1810 and continued till 1840 when the wind suddenly changed to NNW, force 6. Soon after 1900 a line of white water appeared ahead, running roughly W/E across the vessel's course. At 1910 the wind increased to force 9 and the air temperature rose 5 degF. The wind was blowing just abaft the beam which caused the vessel to list some 10° to port. One indication of the very localized nature of the disturbance may have been that the visibility remained moderate and, even in gusts, did not fall below 1 mile. The barograph trace, which had been falling more rapidly, now dropped 8 mb almost vertically. At 1925 it kicked sharply and the wind moderated to force 7. A long strip of blue sky on the horizon marked the southern extremity of the disturbance while, to the north, the mamma formation of the cloud was exceptionally well-defined.

A slow clearance followed. By 2130 the wind was SW, force 3, the visibility was good and the sky was covered with broken Ac also showing mamma well illuminated in the twilight. The pressure was levelling off again.

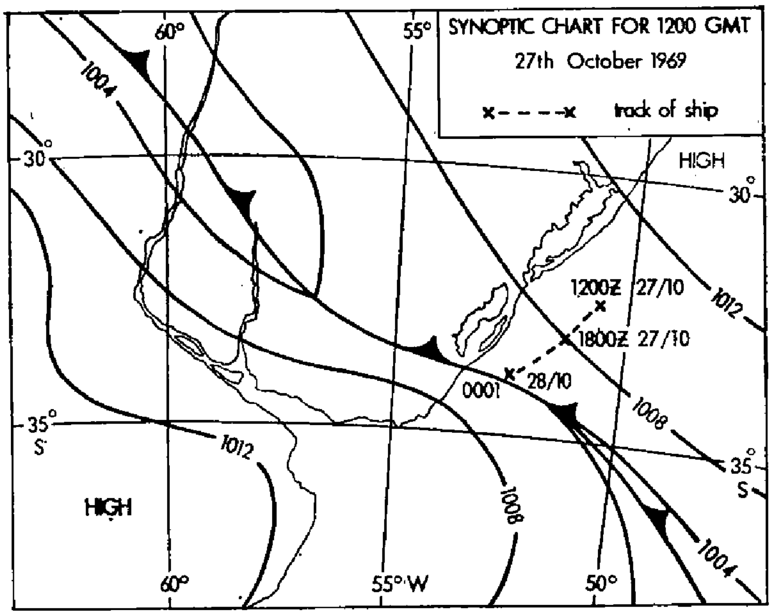
Position of ship at 1320: 32° 41'S, 51° 00'W.

Position of ship at 1800: 33° 34'S, 52° 19'W.



Note. The central part of the east coast of South America is notorious for sudden and violent wind changes, notably the Pampero and Sudestada. A probable explanation for the alternating wind direction is that an inversion with a marked wave structure existed between the low-level NNE winds and a different wind régime aloft, resulting in rolls of cloud forming on the crests of such waves. Further development of the waves would form eddies beneath the wave crests, reversing the surface-wind direction (see diagram). It should be noted that similar parallel bands of cloud are not uncommon but most will not produce changes in the surface-wind direction. Some warning of the wind reversal should be obtained by observing the confused state of sea underneath each bank of cloud.

The second wind change experienced by the *John Biscoe* was associated with the passage of a well-marked cold-front trough which moved NE across the area at about 10 kt (see chart). Strong NE winds ahead of those cold fronts increase to give violent squalls at the passage of



the front, though on most occasions the squalls are from the south-west—the true Pampero. The sequence of the weather conditions after 1925 is fairly typical of cold-front clearances.

SNOW FREEZING ON SEA SURFACE

Denmark Strait

m.t. *Northern Reward.* Skipper W. Harris. At the fishing grounds. Observer, Mr. S. B. Barr, Radio Officer.

28th October 1969. Very heavy snow began to fall at 0930 GMT, settling on the sea and forming ice. This resembled a scum on the surface of the water and was made up of small pieces of ice about 2 inches across. In places there were fields of this ice which could be seen on the radar, the edge showing up through the snow clutter on the screen. By 1100 all the surface within sight was covered by this ice-rind. The sea was calm with just a little swell; there was no wind at all. Air temp. 33·4°F, sea 30·6°.

After 1130 the wind freshened, becoming NE'ly, force 4–5 by 1200. There was still continuous heavy snow but all the ice-rind had gone by 1145. The air temperature fell to 31·6° while the sea temperature rose to 30·9°.

Position of ship: 67° 00'N, 23° 45'W.

Note. The snow would absorb some water in falling on to the sea surface but the salinity of the resultant mixture must have been sufficiently low to allow the mixture to freeze (sea water at normal salinity freezes at about 28°F). The ice fields seen on the radar were probably part of the thicker and older Greenland sea-ice (the edge of which was located close to the position of the *Northern Reward* at the time). With the subsequent freshening of the wind the thin ice, slush, would mix with the underlying salt water and then melt.

SEA SMOKE: WATERSPOUTS

Western North Atlantic

m.v. *Alaric.* Captain R. J. Bland. Durban to New York. Observers, the Master, Mr. J. M. Anderson, 3rd Officer and Mr. W. Marr, Jnr. 3rd Officer.

5th December 1969. At 1600 GMT the vessel passed through a heavy rain shower and then we found ourselves surrounded by sea smoke about 10 ft in height. The wind was NW'ly, force 7, the air temperature 45·2°F, wet bulb 44·0° and the sea 68·8°. Heavy Cb clouds were present and a few minutes later waterspouts were seen to be forming at an alarming rate till as many as five were seen in the vicinity. The nearest was about 1 mile away, about 400 ft in diameter, lasting for about 12 min. At 1615 there was a violent hailstorm for about 1 min and by then the sea smoke had become very patchy. A few minutes later it was non-existent. At 1700: Air temp. 49°, wet bulb 46·3°, sea 68·5°.

Position of ship: 36° 57′N, 62° 27′W.

Note. Sea smoke forms when the temperature of the sea surface is much higher than that of the air. In the northern hemisphere these conditions obtain in mid-latitudes on the western sides of the oceans when winds of N'ly origin prevail and also near sea-ice. Evaporation from the warmer sea surface saturates the air in the lowest layer, resulting in 'smoke' rising from the surface. Convection then mixes this saturated air with drier air above and the 'smoke' soon evaporates. (The precipitation reported by the *Alaric* is not essential for this process.)

UNUSUAL WAVES

South African waters

m.v. *Clan Maclay*. Captain B. S. Biggs. Durban to Dakar. Observer, the Master.

10th October 1969. At 0926 GMT, when the vessel was 38 miles south of Durban, an unusually heavy wave struck the ship head-on, causing the foredeck to be swamped by rushing 'green water' which dislodged the deck cargo. The actual height of the wave was hard to judge; it towered high above the bow before breaking over. The wind was SW'ly, force 3, with only a moderate head swell. In order to gain the maximum effect from the Agulhas Current a SW'ly course had been set to follow the 100-fm line parallel to the coast. (Notes on the chart say that the maximum strength of the current is found on the 100-fm line.) On looking at the position of the s.s. *Esso Lancashire* (*The Marine Observer*, July 1969) I find that she was also on the 100-fm line when the unusual wave struck her. This may be just a coincidence but if we also take into account the *Edinburgh Castle*'s experience it would seem that the area from just north of Durban to an area near Port St. Johns certainly has its full share of freak waves.

Position of ship: 30° 35′S, 30° 44′E.

s.s. *Southern Cross*. Captain W. M. Wheatley. Cape Town to Durban. Observers, the Master, Mr. D. J. Hewitt, Extra 2nd Officer and Mr. P. A. Chandler, Jnr. 3rd Officer.

11th October 1969. At 1700 GMT, when the vessel was recrossing the 100-fm line towards the coast, three large and unusually steep waves were encountered. They were approx. 40 ft in height but of short length; the third wave was the most violent but no water was taken in although the vessel pitched heavily. Both sea and swell were on the starboard quarter. Wind SW'ly, force 7–8. Current setting to 220°. Swell from 180° approx. Course of ship 045°.

Position of ship: 32° 02′S, 29° 17′E.

Note. Unusual waves have been reported off the coast of south-east Africa on several occasions. These reports show two common features: namely, a prevailing moderate to heavy S–SW'ly swell and a proximity to the 100-fm line. The report from the *Edinburgh Castle* was quoted in an article "The One from Nowhere", published in *The Marine Observer*, October 1965. In the same issue there was an article on 'Freak' Ocean Waves by Mr. L. Draper of the National Institute of Oceanography.

LINE OF DEMARCATION

off N.W. Madagascar

m.v. *Prometheus*. Captain J. K. Winn. Colombo to Liverpool.

25th December 1969. At 0900 GMT, when the vessel was on a course of 268° at 21½ kt, a line of rubbish (bits of wood, plankton(?) and generally discoloured water) about 5 ft wide was observed, running roughly N/S but not in a straight line. At about the same time as the ship crossed this line (and swung about 2° each side of the course) the speed dropped by about 1 kt almost immediately, as shown by radar on True Motion setting. By 0930 the speed had dropped by $1\frac{3}{4}$–2 kt.

Position of ship at 0900: 11° 50′S, 48° 43′E.

Note. The late Dr. T. J. Hart, National Institute of Oceanography, commented:

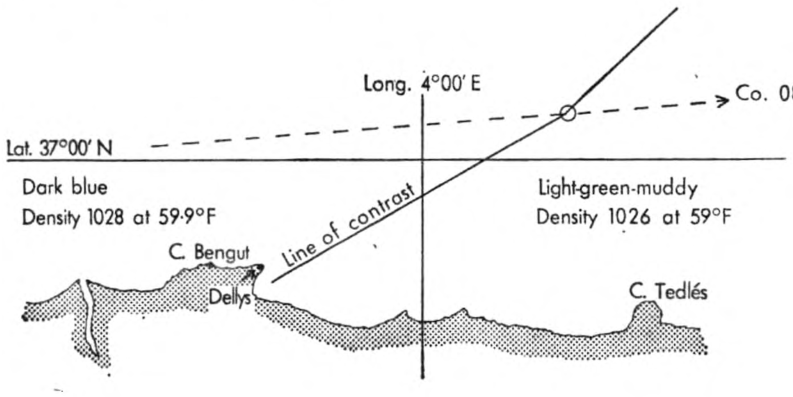
"I have discussed this with Mr. N. R. Merrett who worked for some time in the area when serving on research vessels based on Madagascar. It seems that in its passage north of Madagascar, before bifurcating north and south to form the roots of the north-going Somali Current and south-flowing Agulhas Current, the main Equatorial Current sets up an anti-clockwise swirl round the Komoro Islands and it was probably the convergence between the north-flowing arm of this and the southern margin of the main stream that helped to form the demarcation line observed. Doubtless the effect would be accentuated by the extensive shoal water round the Leven bank, and thus would account for the adverse set experienced after crossing the line. This brief account of the hydrological set-up is necessarily somewhat over-simplified and does not go into the question of seasonal fluctuations which are certainly considerable. The immediate cause of discoloration is most likely to have been concentrations of the microscopic plankton alga *Trichodesmium erythraeum* which tends to be most abundant in those waters at and after midsummer, southern hemisphere—the time of the observation."

off Algerian coast

s.s. *Hemimactra.* Captain M. P. Lee. Rotterdam to Malta. Observer, Mr. G. J. T. Drummond, 2nd Officer.

30th December 1969. At 1315 GMT a distinct line of discoloration was observed ahead, extending from shore to seaward as far as the eye could see, the vessel being approx. 10·5 miles off Cap Tedlès at the time. The density and temperature of the water were taken by bucket before and after crossing the line of contrast and bearings were taken along the line at the time of crossing: 024° seaward and 220° landward. The western edge of the discoloration was a distinct line and extended some 9 miles to the eastward, gradually returning to normal coloration and density. The vessel was experiencing a strong E'ly current of $1\frac{1}{2}$–2 kt at the time. Air temp. 62°F. Wind SSW, force 5–6.

Position of ship: 37° 05′N, 04° 06′E.



Note. A west-going counter-current often occurs close inshore off this coast as far west as Dellys where it recurves and runs north-eastward and later eastward alongside the predominantly easterly set in the offing. The line of demarcation was the boundary between the easterly set and the recurved counter-current.

DISCOLOURED WATER: BIRDS

Eastern Pacific Ocean

m.v. *Sugar Exporter.* Captain D. Patrickson. Lautoka, Fiji Islands to Balboa. Observer, Mr. G. P. Colebrook, 2nd Officer.

20th October 1969. At 1845 GMT the vessel sailed into an area in which mud-coloured streaks were observed lying in the direction of the wind (SSE, force 3–4). The area was about 4 miles long from SSE to NNW and about $\frac{3}{4}$ mile wide. At first it was thought that this was dust or mud but a sample was obtained and found to contain small, transparent, spherical zoo-plankton, each about $\frac{1}{8}$–$\frac{1}{4}$ inch in diameter. Their outer surface was covered in numerous white, fawn or dark-brown dots. One or two of the creatures were not spherical but of uneven formation, particularly those covered in dark-brown dots. Large flocks of unidentified, very small birds were either resting on the water or flying around this area. They were slightly larger than a sparrow, had white bodies and the upper side of their wings were fawn. They flew with much fluttering of wings in the manner of land-birds. At 1800: Air temp. 76·7°F, sea 78·8°. Course 072° at 13 kt.

Position of ship: 02° 40′N, 94° 23′W.

Note. Dr. T. J. Hart commented:

"The sample from the *Sugar Exporter* and the notes on the discoloration observed a bit to the north of the Galapagos Islands were most interesting. The sample contained abundant remains of large colonial Radiolaria with the species *Collosphaera huxleyi* apparently dominant. This form has been known to cause yellow discoloration somewhat further south on two previous occasions. The area around the island group seems to be one where converging ocean currents frequently lead to visible current rips and unusual concentrations of various forms of marine life. The small light-coloured sea-birds with peculiar fluttering flight would almost certainly be Hornby's Storm Petrel. Most records of this species are from further south, but they range over several hundred miles and doubtless there would be a big seasonal shift related to the movement of the trade-wind belt."

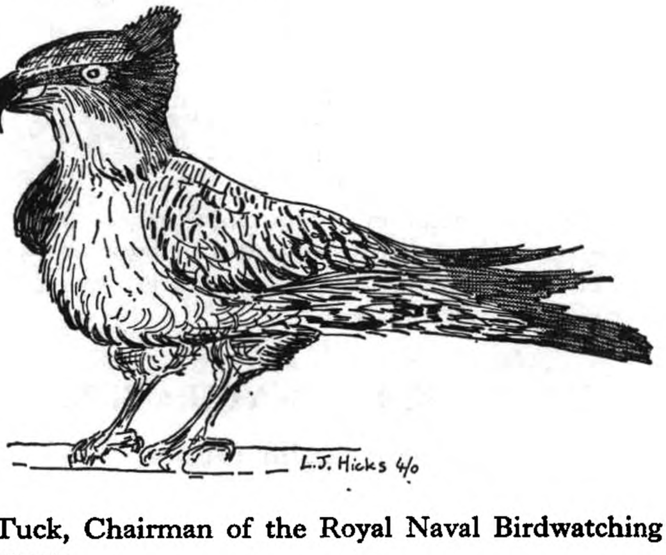
BIRDS

Caribbean Sea

m.v. *Rakaia.* Captain T. Lay. Curaçao to Cristobal. Observers, Mr. E. B. Daubeny, Chief Officer and Mr. L. J. Hicks, 4th Officer.

31st October 1969. At 1100 GMT, when the vessel was 70 miles from land, a small bird of prey landed on the triatic stay. It rested there for several minutes and then flew around the ship for about 45 minutes, apparently taking quite an interest in the dogs being carried on the after-deck, and then flew away. The wing span was 3–4 ft, body about 18 inches long. It had a white breast and a white head with a black band and orange/black tuft. The wings were speckled black and white on the leading edge to two-thirds of the width, then white on trailing edge and all white underneath.

Position of ship: 10° 30′N, 77° 30′W.



Note. Captain G. S. Tuck, Chairman of the Royal Naval Birdwatching Society, identified this bird as a male Osprey.

South China Sea

m.v. *Peisander*. Captain H. Owen. Hong Kong to Singapore. Observers, Mr. R. B. Lough, 3rd Officer and Mr. A. White, Radio Officer.

13th October 1969. At 0100 GMT a sea-bird was observed catching flying fish. The bird was similar in appearance to a Gannet but was mottled brown across its back. Its method of fishing was to station itself above the port bow and, when a fish broke away from the bow wave, the bird dived and picked it up from behind while the fish was still flying and then soared up and ate it. The bird only landed on the water after eating a number of fish. A point worthy of mention is that it worked only the port bow, diving into the sun so that its shadow did not cross the fish. At 0001 GMT: Air temp. 81·6°F, sea 82·9°. Wind ENE, force 4.

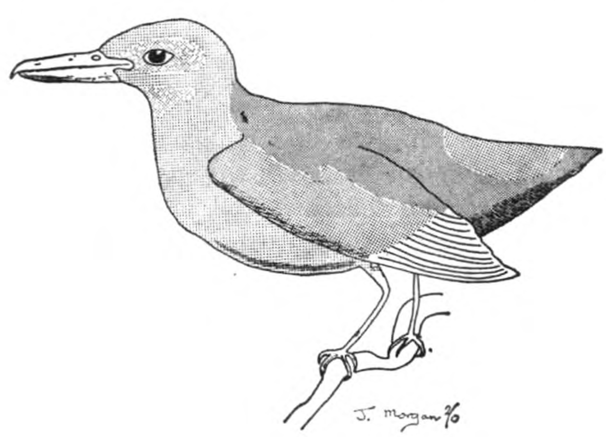
Position of ship: 17° 18′N, 113° 54′E.

Note. This bird may have been a Booby (see Captain Tuck's article on page 180).

Malacca Strait

m.v. *Calchas*. Captain H. K. Timbrell. Port Swettenham to Durban. Observers, Mr. P. A. E. Sambrook, Snr. 2nd Officer and Mr. J. P. Morgan, 2nd Officer.

8th November 1969. The body of a small bird, thought to be an Indian Pitta, was found on the wing of the bridge. It had apparently flown into the superstructure but there were no marks on it to show cause of death. The bird was 6¾ inches in length from the tip of the beak to the end of its very short stubby tail and had a wing span of 14 inches. It was highly coloured with kingfisher-blue on the top of



its tail and wing. The back was emerald-green with a black and white strip on its wing tips. The head and front of its body were light golden-brown with a vivid scarlet stripe extending from its chest to under its tail. Four hours after finding the body a similar bird was seen to be perching up on the fo'c'sle. This was seen to hop into the air and fly low over the water towards the nearest land, that being Sumatra, 27 miles away. It did not appear to be a strong flier but this may have been because it was exhausted from a long migratory flight. However, if the bird had come from India, no doubt it would have been exhausted.

Position of ship: 5° 40′N, 96° 36′E.

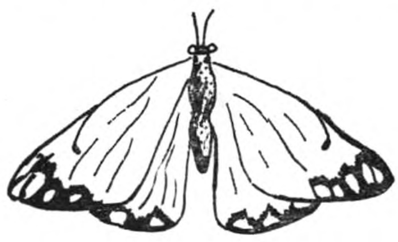
Note. The pittas are tubby little birds which inhabit the thick undergrowth of Old World jungles and tropical forests. They spend most of their time on the ground, rummaging with their bills and feet in fallen leaves in search of small insects, etc., but the powers of flight are well developed in the migratory species.

BUTTERFLIES

off West Africa

m.v. *Flintshire.* Captain J. C. Liptrot. Table Bay to Brixham. Observers, Mr. D. P. Wallace, 3rd Officer and Mr. N. W. Hunt, Officer Cadet.

20th November 1969. From about 1000 GMT onwards an occasional butterfly was being carried past the ship by the wind (NNE, force 3–4). Then, from 1400 to 1500, the number increased to many thousands blowing past like pieces of ash from a bonfire. Hundreds landed on the ship. All those observed seemed to have the



same markings as the two specimens forwarded, i.e. pale-yellow wings with markings in various shades of brown. All were of approximately the same size. A few continued to be seen until about 1700 when the wind veered to NE, force 3. From 1000 to 1700 the vessel was passing about 45 miles off the coast of West Africa. At 1000: Air temp. 82·4°F. [A drawing was made of the mounted specimen before it was forwarded to Dr. R. A. French, Rothamsted Experimental Station.]

Position of ship at 1000: 11° 37′N, 17° 30′W.

Position of ship at 1400: 12° 01′N, 17° 37′W.

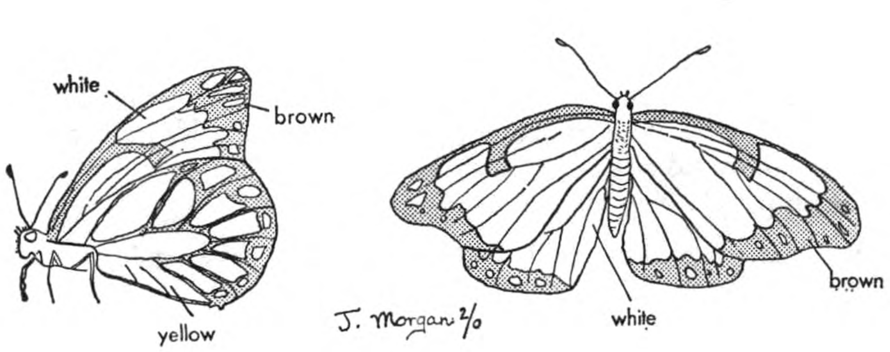
m.v. *Benkitlan.* Penang to Le Havre. Observers, Mr. J. M. Anggang, 2nd Officer and Mr. C. Jaggar, Cadet.

30th November 1969. Numerous white moth-type insects were first sighted at 1200 GMT, flying at an altitude of 5 to 50 ft in the direction of the prevailing wind (NE, force 3). The density was about a dozen insects to every 8,000 cu. ft, spaced about 20 ft apart. They were visible as far as the eye could see on either side of the vessel which finally passed the insect-infested area after having travelled for 5 hours on her course (353° at 13·5 kt) for a distance of about 70 miles. Air temp. 83°F.

Position of ship at 1200: 12° 37′N, 17° 36′W.

m.v. *Calchas.* Captain H. K. Timbrell. Durban to Liverpool. Observer, Mr. J. P. Morgan, 2nd Officer.

1st December 1969. From 1100 to 1800 GMT, when we were about 60 miles from the nearest land, numerous butterflies were seen around the ship. They were white with brown markings. The wind was N'ly, force 3–4, blowing the butterflies into the ship's structure. One was captured at 1700 and released in the wheel-house where it came to rest on a window and seemed to become sleepy as the sun set. By



the next morning it was dead and a long, coiled-up tongue was then visible. [Sketch reproduced life-size.]

Position of ship at 1700: 12° 44′N, 17° 43½′W.

m.v. *Silversand*. Captain D. W. Bowen. Mossamedes, Angola to U.K.

8th December 1969. At 1100 GMT, when 8 miles west of Dakar, large swarms of butterflies came from the mainland over the vessel and a specimen was obtained. Wind NE′N, force 3–4. Air temp. 77·2°F.

Position of ship at 1200: 14° 48′N, 17° 36′W.

Note. The butterfly caught aboard the *Silversand* was sent (with other insects) to the Natural History Museum and Dr. Paul Freeman, Keeper of Entomology, identified it as *Anaphaeis aurota* Fabricius (Pieridae). The specimen has been retained for their National Collection. The butterflies caught aboard the *Flintshire* and *Benkitlan* were sent, with the sketch from the *Calchas*, to Dr. R. A. French, Rothamsted Experimental Station, Harpenden, who comments:

"I am able to confirm that all three butterflies were of the same species, namely *Anaphaeis aurota*. That caught on the *Flintshire* was very different from the other two and puzzled me until I consulted the Natural History Museum but it turned out to be a male while the other two were females.

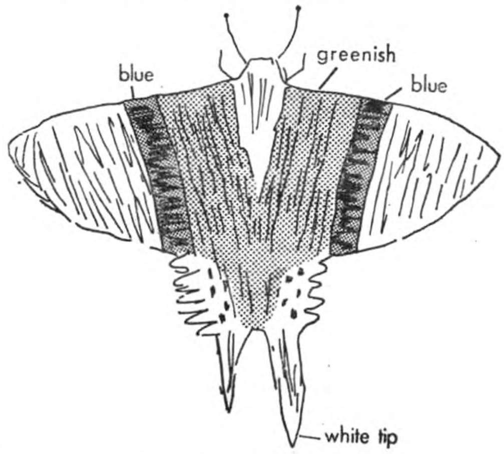
"In case it is of interest I have looked out some additional information on this butterfly. It occurs in Africa, parts of the Middle East, India and Ceylon; its occurrence in the Middle East is probably as an immigrant from further south. It is well known for its migratory movements in many parts of south, east central and north-east Africa. In West Africa swarms have been seen on a number of occasions and have, as in the above reports, been far out to sea. In 1938 observations came from three ships off Gambia (27th November), off Cape Verde (2nd December) and off Dakar (10th December) recording this butterfly at sea. It is a member of a family that contains many migrant species including our own Cabbage White butterflies. In East Africa the main season for migration is January to March while in West Africa it seems to be November, December."

MOTHS

Caribbean Sea and Canal Zone

m.v. *Mataura*. Captain E. F. H. Allen. Curaçao to Panama. Observers, Mr. J. Murt, 3rd Officer and other officers.

3rd–4th October 1969. At 2200 SMT on the 3rd this moth [sketch reduced to half-scale] flew into the chart room when the vessel was 62 miles from the nearest land (to the south-west). The wind at the time was SW, force 3. Eight were found on the vessel the same evening. Although the off-shore wind may account for them, it was noticed that there was lightning to the north-east which may have been attracting these moths. The right tail-fin was longer than the other and had a white tip. This right tail seemed to vibrate a great deal.



At 0442 the next day we arrived at the north end of the Panama Canal and, during transit, thousands of the same species of moth were crossing the Canal from west to east.

Position of ship at 2200 on 3rd: 10° 18′N, 78° 02′W.

Note. Dr. R. A. French, Rothamsted Experimental Station, Harpenden, comments:

"This is a very interesting observation of a well-known day-flying migrant moth, *Urania fulgens*. There are a number of records of this moth being seen on migration in Central America (Mexico to Panama) and also in Colombia and Ecuador. Most of these records come from Costa Rica and Panama, in the latter case chiefly due to the presence of interested observers on board ships on passage through the Canal. The number of moths involved, as in the above observation, is frequently quoted as 'thousands' and often the flight continues all day and sometimes into the night. The flight may be seen passing for several days. While most of the insects fly near the ground they may occasionally be seen up to hundreds of feet in the air.

"Generally the flights in March, April and May are to the north or north-west and from June to October they are to the east or south-east. The latter flight seems to involve the greatest numbers.

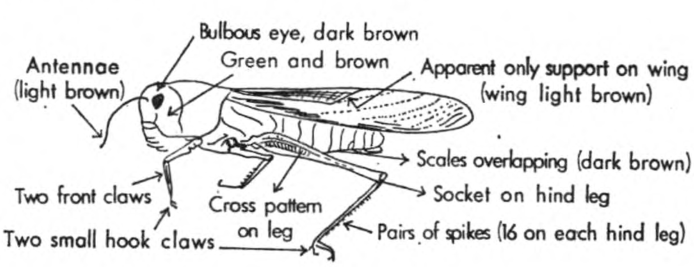
"The moths caught at sea on the 3rd were almost certainly part of the same migration seen during passage through the Panama Canal the next day. The sw'ly winds of force 3 strongly suggests that the moths were blown off shore. With a flight speed for the moths of about 6–10 m.p.h. and a wind of force 3 the moth, provided it kept flying, would have to go where the wind took it."

LOCUSTS

off West Africa

m.v. *Iron Barque*. Captain K. L. Smith. Tyne to Takoradi, Ghana. Observer, Mr. D. W. Reid, 2nd Officer.

13th November 1969. At about 1200 GMT several locusts were seen aboard the ship, the probable number on board being about 40 to 60. The drawing is the actual size of the largest caught [reproduced half-scale]. It was killed by insecticide which may have affected its natural colouring.

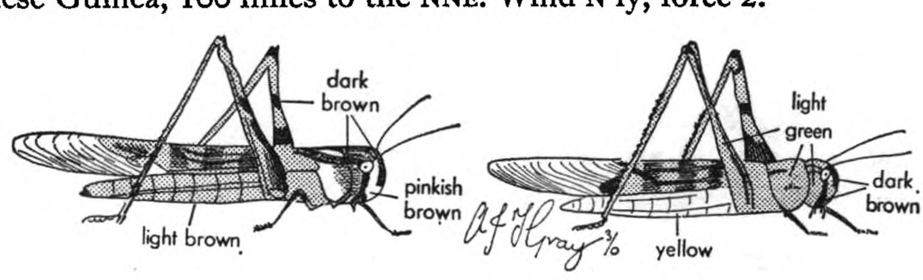


Also seen aboard at the same time were two dragonflies and several small butterflies, some yellow, some white. Wind N'E, force 3. Course 173° at 13·5 kt.

Position of ship: 12° 24'N, 17° 24'W.

m.v. *Otaki*. Captain J. Weston. Durban to Marseilles. Observers, Mr. A. J. T. Gray, 3rd Officer and Mr. W. Jenkins, Bos'n.

3rd December 1969. At 1130 GMT a brown locust was found on board. Its body length was $1\frac{3}{4}$ inches and the wings were 2 inches long. The head was striped brown and pink and the feelers were pink, about $\frac{3}{4}$ inch long. The upper parts of the back legs were banded dark brown on the insides. There were faint spots on the wing towards the root, the rest being striped. The nearest land was Orango Island, Portuguese Guinea, 100 miles to the NNE. Wind N'ly, force 2.



At 1500 a yellowish locust came on board. It had green markings on head and wings. Orango Island was then 70 miles to the NE. (Locust telegrams were sent and specimens were later forwarded to the Anti-Locust Research Centre.)

Position of ship at 1130: 9° 27′N, 16° 34′W.

Position of ship at 1500: 10° 10′N, 17° 02′W.

Note. The reports and sketches from the *Iron Barque* and the *Otaki* were forwarded to the Director, Anti-Locust Research Centre. The small butterflies seen aboard the *Iron Barque* may have been of the same species as those observed in the same general area in November–December (see Note on page 165).

CRICKETS

off West Africa

m.v. *Crinan*. Captain J. Dunipace. Port Talbot to Monrovia. Observers, the Master and Mr. I. S. Buchan, 3rd Officer.

6th October 1969. At 0500 GMT, when 64 miles from the nearest land, a large swarm of crickets, numbering several thousands, landed on the ship. The wind was W'ly, force 3 at the time. It was thought that the swarm was forced out to sea by a belt of torrential rain which reached the ship at 0930 when the wind had become E'ly, force 6.

Position of ship at 0500: 12° 48′N, 17° 51′W.

Note 1. Dr. D. R. Ragge, Deputy Keeper of Entomology, Natural History Museum comments:

"I have now received, through the Anti-Locust Research Centre, some specimens of the crickets which had been sent by Mr. Buchan. They are, in fact, true crickets belonging to the common African species *Gryllus bimaculatus*. It is most interesting that this insect should have been able to fly over such a long distance."

Note 2. The report from the *Crinan* was the first of many received of the swarming of this particular species of cricket during October 1969–January 1970. A selection is printed below and the report from the *Longstone* includes an excellent sketch which shows how these crickets differ from locusts.

m.v. *Mabel Warwick*. Captain J. Boothby. Middlesborough to Lower Buchanan, Liberia.

21st–31st October 1969. At 0400 GMT on the 21st, when 15 miles SW of Dakar, the ship was invaded by what appeared to be 'cicadas'. By 0430 there was just one continuous noise of squeaking like a bicycle in very great need of oil. The creatures were mainly black, about 1½ inches long. The squeaking appeared to be produced by the wing cases being rubbed across each other. There must have been at least a couple of thousand on board and in the evening a dustpan-full of corpses was swept from the wheel-house alone. On arrival at Lower Buchanan at 1330 on the 23rd numerous insects were still on board. On the morning of the 31st, when the vessel was just west of Josephine Bank, there were still one or two chirping in sheltered corners. At the time of the invasion the wind was N'W, force 4. [A specimen was forwarded, with this report, to the Natural History Museum.]

Position of ship at 0600 on 21st: 14° 00′N, 17° 42′W.

m.v. *Rothesay Castle*. Captain P. St.Q. Beadon. Tenerife to Durban. Observer, Mr. M. G. Ward, 3rd Officer.

23rd October 1969. At 0500 GMT when about 45 miles off the coast of Portuguese Guinea, roughly off the mouth of Rivière Casamance, the ship was suddenly engulfed in a swarm of what are believed to be crickets. There appeared to be two main types: firstly the brown-winged variety approx. 2 inches long, ½ inch broad, ½ inch high with front feelers approx. 2 inches long. They had six legs, four at the front and two at the rear. There also appeared to be a short, sharp tail and two rearward-facing feelers. This type made a whistling noise by raising the wings slightly and rubbing them together. Between the head and the wings there appeared to be a hard, black, protective hood and the head itself was hard, black and had two eyes raised on its surface and what appeared to be 'paws' either side of the mouth. This is believed to be female as they were seen to be mounted by the other type after many advances had been made by the female. The second specimen, believed to be male, was a little larger, approx. 2½ inches long. It was similar to the female in appearance except that the wings were black and slightly different in shape. The tail was a little longer and had a small, triangular bulb at the end.

These insects survived in nooks and crevices throughout the ship and many were still in evidence later although the weather became colder. They liked heat and darkness. Sunlight evidently killed them if they stayed out in it for a few minutes. Specimens were preserved in methylated spirit. At 0500: Air temp. 84·2°F, wet bulb 79·7°. Onshore wind WSW, force 2.

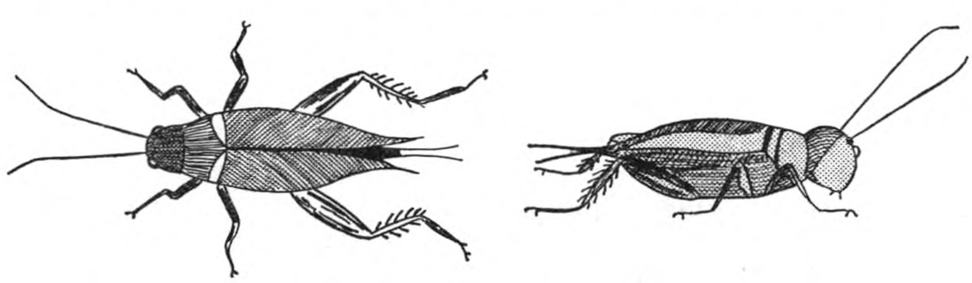
Position of ship: 12° 30′N, 17° 30′W.

Note. Dr. D. R. Ragge comments:

"Thank you for this interesting report. This is the fifth such report that I have had, all referring to swarms of crickets landing on ships in a small area of the Atlantic off the west coast of Africa. The specimens sent, as in all other cases, are *Gryllus bimaculatus*, a common African cricket. As far as I know, this behaviour by crickets is extremely unusual and I should therefore be very glad to hear of any other similar reports."

m.v. *Longstone*. Captain J. Walker. Newport, Mon. to Mossamedes. Observers, the Master, Mr. K. Raisbeck, 2nd Officer and Mr. P. McConochie, 3rd Officer.

5th December 1969. During the night watch, when we were 60 miles from the coast, noises were heard on deck which were taken to be crickets. At this time they did not seem to be in any great number; however, by daylight, their numbers had increased enormously, amounting to several hundreds although none as yet had ventured inside the accommodation. They were about 2 inches long and were of two different types, one being completely black except for a white band across the base of the wing, the other had a lighter, brownish body. They were most active



during the hours of darkness and most noisy at the approach of dawn, the cacaphony of chirruping subsiding when the sun rose. It was also noticed that the insects were cannibalistically inclined. Any that were killed by members of the ship's company, accidentally or otherwise, were immediately devoured by their fellow crickets, the only left-overs being the head and legs. While they were present on the ship, several of those that entered the accommodation settled in the radio room. It may have been that the continuous sound of morse coming from there resembled the noises that the crickets made and in some way attracted them.

Position of ship (approx.): 13° 33′N, 17° 42′W.

m.v. *Sussex*. Captain J. S. Laidlaw. Port Chalmers to Las Palmas.

29th–30th December 1969. During the hours of darkness numerous crickets arrived on board. In the few days prior to their landing E'ly winds had prevailed. A specimen was preserved in formalin. A second species of cricket was reported to have been seen at the same time but unfortunately no specimens were obtained.

They were evidently identical to the bottled specimen except that it had a black body while the first one was brown. Both varieties had a black head.

Position of ship at 0200 GMT on 30th: 09° 36′N, 25° 13′W.

Note. Dr. D. R. Ragge comments:

"This is the eighth report I have received of migrating crickets landing on ships off the West African coast, and the species in every case has been *Gryllus bimaculatus*. These occurrences are very unusual and seem to be the result of exceptionally large populations of this cricket on the mainland of West Africa."

FISH

North Pacific Ocean

m.v. *Warwickshire.* Captain A. Hudson. Yokohama to Balboa. Observer, Mr. K. Bowers, 3rd Officer.

3rd October 1969. At 2230 GMT a flying fish surfaced nearby and paced the vessel (speed 17 kt) for fully 1 min before submerging again. At the time the sea was glassy with a short, low swell with no wind. The flying fish occasionally touched the surface of the sea during its flight but the most noticeable thing was the speed at which it flew.

Position of ship (approx.): 26° 06′N, 164° 00′W.

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

"Thank you for this information. It is certainly of interest to have verification of the speed at which flying fish can move above the surface."

Indian Ocean

m.v. *Flintshire.* Captain J. C. Liptrot. Penang to Brixham. Observer, Mr. N. W. Hunt, Officer Cadet.

10th November 1969. The following measurements were taken of a flying fish which had landed on deck during the morning when the vessel was between Réunion Island and Madagascar:

length overall	245 mm	max. body depth	36 mm	diameter of eye	14 mm
length of body	194 mm	max. body width	29 mm	dorsal fin	34 mm
length of wing	135 mm	tail height	133 mm	ventral fin	54 mm

The dorsal scales and tail were steel-blue, the ventral scales cream-coloured and the Chinese bos'n said it tasted very good. At 0001 GMT: Air temp. 75·9°F, sea 78·8°.

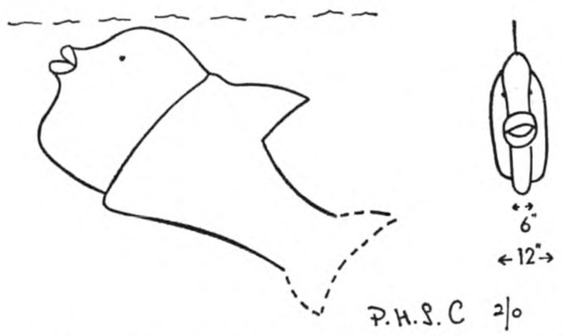
Position of ship at 0001: 24° 24′S, 50° 06′E.

South Atlantic Ocean

m.v. *Staffordshire.* Captain L. H. Sheldrake. Las Palmas to Cape Town. Observer, Mr. P. H. S. Coventry, 2nd Officer.

14th November 1969. At 1200 GMT a very large and ugly fish was observed on the port side, about 50 ft from the vessel. It was dark green, approx. 8 ft in length, with a very long, thin face and pouted lips. On either side of the body, about 3 ft from the front, there was a 3-inch ridge sticking out (see sketch). The dorsal fin, the only fin seen, was about 1 ft long. The fish was thought to be dead as no movement was seen even when it was struck by the ship's wash. (Not being an artist I am afraid the sketch does not do justice to the shape and ugliness of this fish.)

Position of ship: 24° 42′S, 10° 48′E.



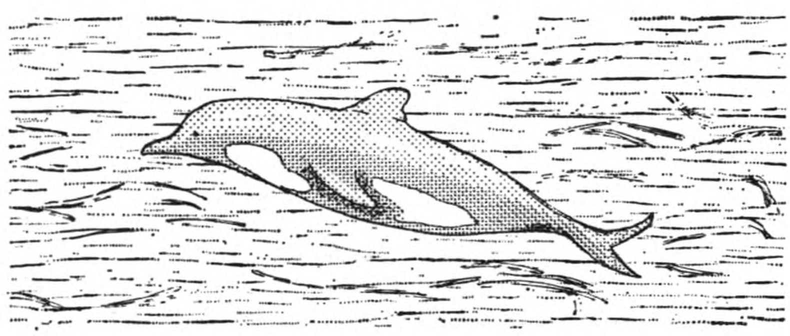
Note. Mr. G. Palmer of the Fish Section, Department of Zoology, Natural History Museum comments:

"The large, ugly fish may have been an example of a sunfish, *Mola mola*. These are ungainly fishes, reaching a large size and are very poor swimmers."

CETACEA

South Pacific Ocean

m.v. *Huntingdon*. Captain D. E. Moran. Wellington to Las Palmas. Observer, Mr. S. A. Mieszkowski, 2nd Officer.



10th December 1969. At 0915 GMT 6 to 8 porpoises were seen following the vessel in formation for about 3–4 min. They were grey/black in colour with white markings as shown in the sketch.

Position of ship: 57° 13′S, 81° 30′W.

South African waters

m.v. *Hurunui*. Captain R. B. Hood. Durban to Flushing. Observers, the Master and Mr. H. M. Close, 3rd Officer.

26th December 1969. During the morning the vessel was running down the SE coast of South Africa, about 7 miles off shore, course 220°, with the Agulhas Current. Over most of the forenoon watch, 0800–1200 SMT, numerous schools of dolphin were seen travelling in a NE'ly direction against the current. A few of the schools were quite large, up to 100 animals, but the majority comprised only about 10. About half of the dolphins appeared to be travelling in pairs and on several occasions we saw adult animals with one or two young dolphins keeping close consort. On several occasions the ship passed through one of the schools but this did not seem to perturb the animals which frolicked about in her wake with apparent enjoyment. All the animals which passed close to the ship were of a uniform slate-grey colour, the length of the largest being between 3 and 4 m [*see* photograph opposite page 176]. However, some of those seen further away, although about the same size, were either all white or with black and white patches. No further details could be determined as they passed at least half a mile away and seldom surfaced.

Position of ship: 33° 00′S, 28° 15′E.

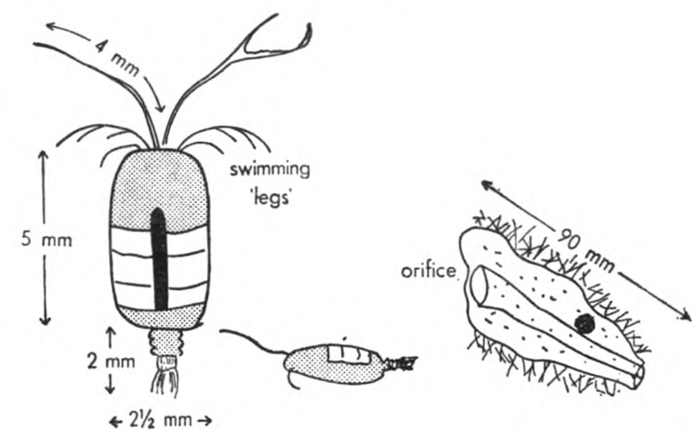
Note. To quote from an earlier comment from Dr. F. C. Fraser, formerly Keeper of Zoology, Natural History Museum: "These reports bring up a controversial matter based on the lack of precision in the connotation of the terms 'porpoise' and 'dolphin'". He added that while it was quite usual for dolphins to leap clear of the water it was most unusual for at least the Common Porpoise to behave in this way.

MARINE LIFE

South Atlantic Ocean

m.v. *Derbyshire.* Captain P. Saunders. Durban to New York. Observers, the Master, Mr. A. Hughes, Chief Officer, Mr. K. McLeod, 2nd Officer, Mr. R. W. Bell, 3rd Officer, Mr. T. Watson, Mr. J. Slater and Mr. S. Anderson, Cadets.

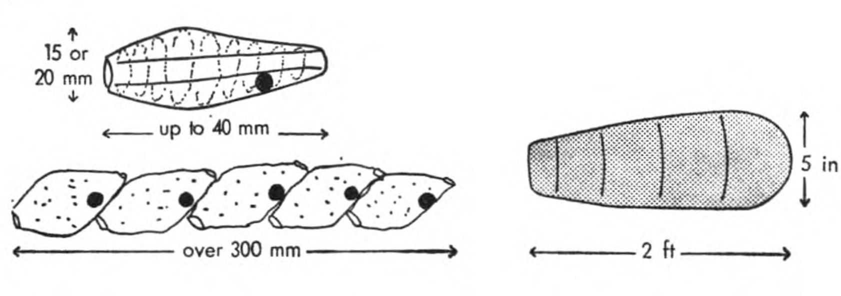
3rd–4th October 1969. During the afternoon of the 3rd, while the vessel was stopped for engine repairs, a number of sea-water samples were taken [and later forwarded to the National Museum in Ottawa]. These samples were found to contain organisms of various types and attempts were made, with the help of binoculars and a magnifying glass, to sketch the more interesting ones. (Sea temp. 62·6°F.)



1 2

The body of the creature shown in sketch 2 was of flaccid, transparent jelly, with 'jelly icicles' sticking out at all angles. It was very similar to another type which was caught in fair quantity but was distinguished by the 'jelly icicles', its size (being easily the largest single organism) and the fact that it was caught by itself, whereas the others were joined in chains, only separating some time after capture.

The transparent creatures in sketch 3 were linked in chains, some as much as 3–4 ft long. After being kept in a bucket of sea-water for a little while some chains separated into individual units while others remained intact. They propelled themselves by passing water through their bodies by muscular contractions. Occasionally one of the other types of minute organisms would be sucked in at the front and expelled unhurt at the rear. The bodies of these creatures seemed fairly fluid in shape but, on being removed from the water, they deflated and assumed a definite diamond shape.



3 4

During the period 1830 GMT on the 3rd to 0400 on the 4th points of 'neon green' light were observed emanating from single organisms (sketch 4) visible up to 400–500 ft away, as many as ten of these at one time. When lying on the surface they glowed brightly and, when close enough, their shape was distinct but they showed as a diffused glow when under the surface. The Aldis lamp provoked immediate reaction: the beasts 'switched off' and dived out of the beam. The switching-off process seemed to take place by sections, the middle 2 or 3 inches of the body being the last to extinguish. Unfortunately none came close enough to be captured but, viewed through binoculars, they resembled a bath loofah in size and shape, colour yellowish-brown, about 2 ft long and 4–5 inches wide.

Position of ship at 1800 on 3rd: 28° 13′S, 05° 19′E.

Position of ship at 0500 on 4th: 28° 02′S, 05° 09′E.

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

"Sketch 1 is a calanoid Copepod, one of a group which is very abundant in the zooplankton of the sea (and, indeed, on land although the freshwater species are quite different from the marine ones, as you would expect).

"A good reference book is *The Open Sea: the World of Plankton*, by Sir Alister Hardy, published by Collins (last reprinted 1964), price 35*s*.

"I hope that the sea captains of today can be encouraged to collect more records and also more material such as anchor mud from their various ports of call. Much of our early knowledge of the diversity of marine life came from collections made in this way."

Note 2. Miss A. M. Clark of the Echinoderm and Protochordate Sections, Department of Zoology, Natural History Museum comments:

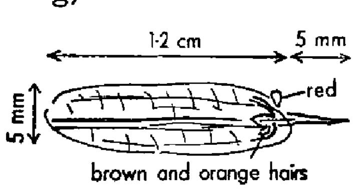
"The bioluminescent organism (sketch 4) was certainly the tunicate *Pyrosoma*. This is a colonial animal in the shape of a hollow cylinder closed at one end and moving by jet propulsion. It is fairly common in warmer waters and is well known as being highly luminous. Sketch 3 also shows a tunicate but one belonging to the orders Salpida or Doliolida. The relatively large number of transverse (muscle) bands drawn suggests the latter (there should be eight rather than nine) but the size may be excessive for a doliolid. Animals of both groups occur either as solitary individuals or as aggregated ones budding from a chain which finally splits up. Probably sketch 2 also shows a salp, judging from the tubular form and the coloured 'nucleus', but I cannot account for the 'jelly icicles' sticking out of it unless it had been rubbing up against something (such as a sponge, though that seems improbable) in the net. Thank you for the data. I am keeping a copy of it and the drawings."

Note 3. The *Derbyshire* is a Canadian Selected Ship.

South Atlantic Ocean

m.v. *Glenogle*. Captain R. C. Riseley. Las Palmas to Singapore. Observer, Mr. C. Dalton Jones, 2nd Officer.

3rd November 1969. At 0550 GMT a large patch of brown water was observed ahead of the vessel, similar in colour to the deposits left by tankers when cleaning tanks only far more concentrated. On passage through the brown water, which was about 15 ft by 6 ft, a sample was taken by sea bucket, the water temperature then being 65·0°F. When the water was transferred to another bucket a number of small black specimens, about 2 cm long, were seen swimming in a jerky circular motion,



anticlockwise. Others, presumably dead, rested on the bottom. After half an hour the specimens were falling to the bottom more readily so the majority were placed in formalin. They were then seen to have a transparent body with darker lines forming their cage and a channel running through from the black (presumably head) end. An hour later some others, two live and one from the bottom of the bucket, were put in a bottle with sea-water for further observation. Their swimming motion was far slower and less jerky. When not moving they took station half an inch below the surface with the black part downwards.

Position of ship at 0550: 19° 30′S, 05° 18′E.

Note. Miss A. M. Clark comments:

"The specimens are pelagic salps, probably *Thalia democratica* which is common throughout the Atlantic and elsewhere. It is interesting to hear that a dense shoal of these can discolour the water to a significant extent. I have only seen preserved specimens which are almost completely transparent. The note on the swimming behaviour is also of value."

POSTSCRIPT

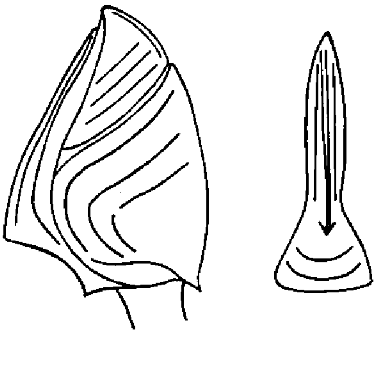
North Pacific Ocean

m.v. *Derbyshire*. Captain R. Weir. Vanvouver to Muroran and Kushiro to Balboa. Chief Observer (and artist), Mr. P. Howland, 3rd Officer.

A report from the *Derbyshire* on barnacles seen in April and June 1969 in the North Pacific was published in the April 1970 number of *The Marine Observer*, together with comments from Dr. K. G. McKenzie, Entomostraca Section, Department of Zoology, Natural History Museum. These were read with interest by Mr. J. Roskell of the Oceanographic Laboratory, Scottish Marine Biological Association, Edinburgh who has been in touch with Dr. McKenzie and who has written as follows:

"May I add my comments to the interesting observation of *Lepas* barnacles, made in the North Pacific by m.v. *Derbyshire*?

"These specimens were most probably *Lepas fascicularis* Ellis and Solander. The description of the 'long streaks' aligned by the wind is suggestive of the shoals reported in both the South Atlantic and North Atlantic (e.g. off Ireland, in 1905, by Farran) and by Willemoes-Suhm in the North Pacific on the *Challenger* expedition. The *Challenger* found these shoals along latitude 35°N, over a large area of the Kuro Shio Current, where the Russian biologist, Savilov, has described a community of animals living at the surface of the sea, of which *L. fascicularis* is a characteristic species. This is just the area where the *Derbyshire* sighted these barnacles.



"The description of the barnacles as having 'a brittle blue-grey shell' is very appropriate for *L. fascicularis* (there is a good coloured photograph of this species on the front cover of the German magazine *Natur und Museum*, June 1966), while the absence of any mention of a floating object to which the barnacles were attached is suggestive of this species. Although, like other barnacles, the cypris larva of *L. fascicularis* requires a floating object to which it can initially attach, this species has the capability of secreting a yellow spongy float to support itself, and a number of specimens may be fused together to form a ball. In the Pacific, the medusa *Velella* (the subject of the previous note, and also mentioned by Miss Clark in her article on the Portuguese Man-of-War, in the same issue of *The Marine Observer*) is another characteristic species of Savilov's surface community, and its horny skeleton frequently forms the foundation for *L. fascicularis*. In the north-eastern Atlantic the species is most often found attached to fragments of seaweeds, which themselves have gas vesicles for floatation.

"I think that two of the illustrations supplied by the *Derbyshire* are sufficient to identify the species as *Lepas fascicularis*. The sketch of the side view at the lower left of the figure shows clearly the sharply-angled broad carina (the word 'shell' to the left) which, complete with the growth bands on the plate, is shown in the upper right sketch of the end view. These may be compared with the accompanying drawings of a specimen of *L. fascicularis* washed up in the Orkney Islands. The scale line represents 2 cm."

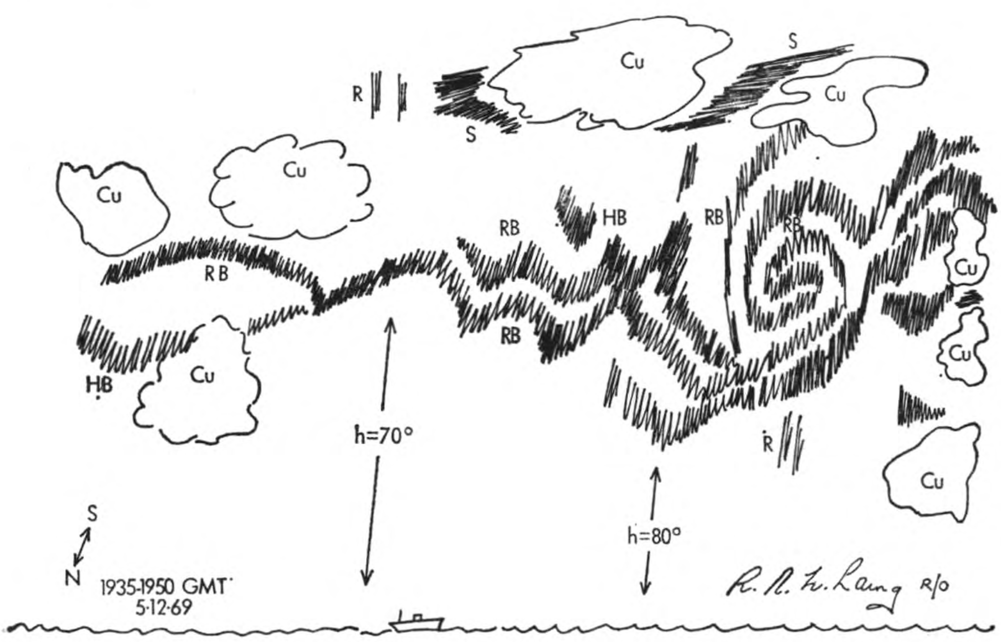
AURORA

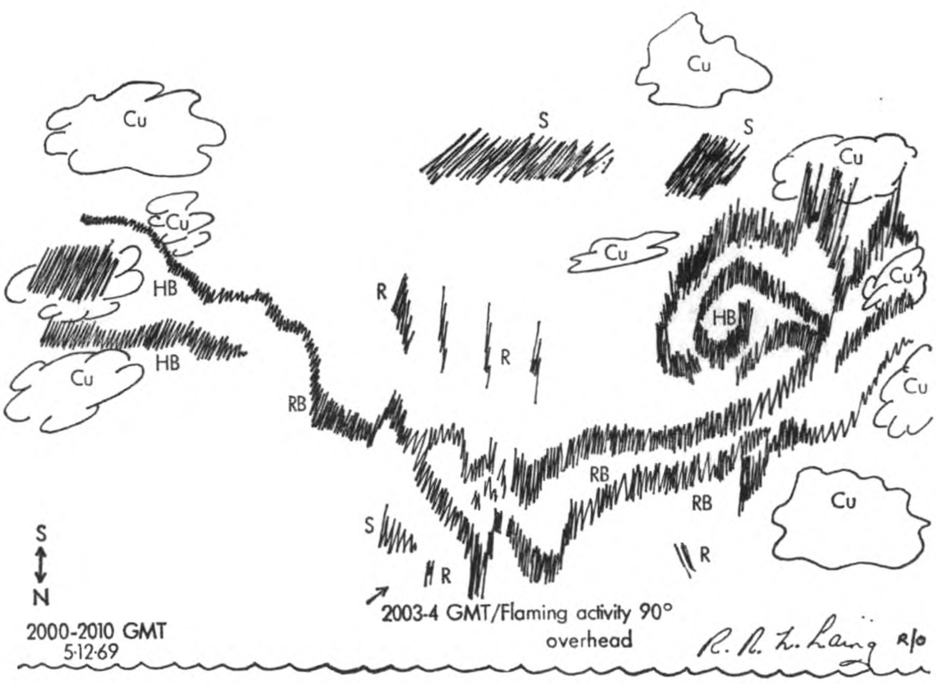
The following notes have been received from Mrs. Mary Hallissey of the Aurora Survey:

"Auroral observations reported from British ships for the three months October–December 1969 are listed below, preceded by three observations for earlier months and recently received at the Balfour Stewart Auroral Laboratory of the University of Edinburgh.

"The reports are in the main from ships positioned at higher latitudes—there were no periods of high magnetic activity during these three months. The detailed sketches by Mr. R. R. N. Laing of the *Ross Orion*, who reports the display of 5th/6th December as being one of the finest and most brilliant he has had the good fortune to witness, give us some idea of what we miss at our more southerly latitudes. The only other report of this display received here came from a voluntary observer who spent a December holiday around Shetland in the hope of seeing aurora and was, fortuitously, ashore at Baltasound at the time and witnessed the display between showers.

"Reports are received occasionally which definitely do not refer to aurora, though it is often difficult to know for sure what their light source might be. The sketch by an observer in *Crystal Crown* on 30th December certainly gives the impression of being an auroral form, but there is, so far, no supporting evidence that aurora would be visible at that latitude and time. Many experiments are being carried out with rockets high in the atmosphere, the side effects of which might easily be confused with natural phenomena. We hope you will continue to report all sightings so that we may reject the few which are neither aurora nor noctilucent cloud."





Date (1969)	Ship	Geographic Position		Λ	Φ	I	Time (GMT)	Forms
15th May	*Tongariro*	35°21′S	122°11′E	190	−46	−68	Sunset–1513	RR, N
19th Aug.	*Port Burnie*	48°25′N	69°15′W	360	60	+76	0230–0325	HB, RA, N
6th Sept.	*Huntingdon*	48°09′N	61°57′W	010	60	+74	0005–0030	HB
2nd Oct.	*Weather Surveyor*	59°00′N	19°20′W	070	65	+72	0129–0155	RR, N
4th	*Weather Surveyor*	58°55′N	19°10′W	070	65	+72	2312–2350	HB, RP, N
6th	*Weather Surveyor*	59°07′N	19°06′W	070	65	+72	2100–2115	N
7th	*Weather Surveyor*	58°59′N	19°06′W	070	65	+72	0150–0218	HA
		58°58′N	19°24′W	070	65	+72	2310–2350	HA
8th	*Weather Surveyor*	59°10′N	19°05′W	070	65	+72	2215–0035	RR, N
9th	*Weather Surveyor*	58°08′N	18°54′W	070	65	+72	2100–2355	HA, N
10th	*Weather Surveyor*	59°08′N	18°46′W	070	65	+72	0310–0500	RB, N
		59°11′N	18°37′W	070	65	+72	2100–0050	RB, N
15th	*Weather Surveyor*	59°00′N	18°36′W	070	65	+72	2140	N
16th	*Weather Surveyor*	59°02′N	18°07′W	070	65	+72	2000–0110	N
17th	*Weather Surveyor*	57°55′N	12°48′W	070	62	+71	2100–2230	N
	Weather Reporter	52°32′N	19°48′W	060	59	+69	2200	HB
18th	*Weather Reporter*	52°31′N	20°12′W	060	59	+69	0550	N
27th	*Joseph Conrad*	71°53′N	34°06′E	130	66	+79	1957–2001	HB
29th Nov.	*Weather Reporter*	61°51′N	32°51′W	060	70	+76	2040–2200	RA, RB
30th	*Weather Reporter*	61°50′N	32°54′W	060	70	+76	0045	RB
		61°50′N	32°42′W	060	70	+76	2345–0100	HB, RB, RR, V
3rd Dec.	*Orsino*	65°44′N	25°54′W	070	73	+77	2000	HB
	Weather Reporter	61°48′N	32°06′W	060	70	+76	2145–0225	HB, RA, RB, P, N
5th	*Ross Orion*	72°45′N	25°20′E	130	68	+79	1930–2030	HB, RB, RR, P
	Weather Reporter	62°06′N	32°36′W	060	70	+76	1945–2015	HA
8th	*Weather Reporter*	62°08′N	32°49′W	060	70	+76	2145–0220	HB, RR, P, N
10th	*Weather Reporter*	62°00′N	32°24′W	060	70	+76	1940–2400	HB
	Weather Adviser	59°07′N	18°57′W	070	65	+72	2305–2340	N
12th	*Weather Reporter*	62°00′N	33°12′W	060	70	+76	2345–0100	N
13th	*Weather Reporter*	62°00′N	33°12′W	060	70	+76	0130–0550	HB, RA, RB, N
14th	*Weather Reporter*	61°48′N	33°06′W	060	70	+76	0001–0445	HA, HB, N
15th	*Weather Reporter*	61°48′N	32°54′W	060	70	+76	0250, 0350 0550	P, V, N
	Orsino	66°12′N	24°06′W	070	72	+77	0300	RA
	Northern Reward	64°05′N	06°25′E	100	65	+75	2240–2350	HB, RA, RB
	Weather Reporter	61°45′N	33°12′W	060	70	+76	2345–0200	RB, N
20th	*Weather Adviser*	59°02′N	18°40′W	070	65	+72	0400	HA, RA, N

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

551.507.362.2:629.12

Application of Weather Satellite Photographs to Ship Routeing

By U. Domb and R. A. Raguso
(Bendix Commercial Service Corporation, New York, N.Y.)

Ocean-going ships can be routed in a time-saving manner when surface winds and sea conditions are known with a reasonable degree of accuracy. The techniques for formulating a wave spectrum and selecting an optimum track are documented and well known.

Wind velocity and direction at the sea surface are directly related to movement of air masses in the upper atmosphere. Therefore weather satellites taking time-lapse cloud pictures defining global atmospheric circulation can be used to provide long-range wind and sea forecasts for use in optimum ship routeing. By using weather satellites the movement of clouds and their changing patterns can be followed day by day. Fronts, troughs, ridges and storm centres can be located and tracked. The accumulated data can then be extrapolated to build 'flow' charts defining the large-scale movement of air masses that determine sea-surface winds and the state of the sea.

Optimum ship routeing

The Corporation's Marine Science Services is in the business of analysing oceanographic and weather information available from the U.S. Coast Guard, the U.S. Weather Bureau, ships and weather satellites to select an optimum track enabling a subscriber ship to reach its destination in minimum time under acceptable safety conditions. This service is known as Optimum Ship Routeing. Areas of high winds and seas are defined for the duration of a ship's voyage and tracks are selected either to minimize adverse weather or to benefit from favourable wind and sea currents. Each subscriber ship is kept under surveillance daily while *en route* and advisory messages are issued, as required, to bring the initial track recommendation up to date.

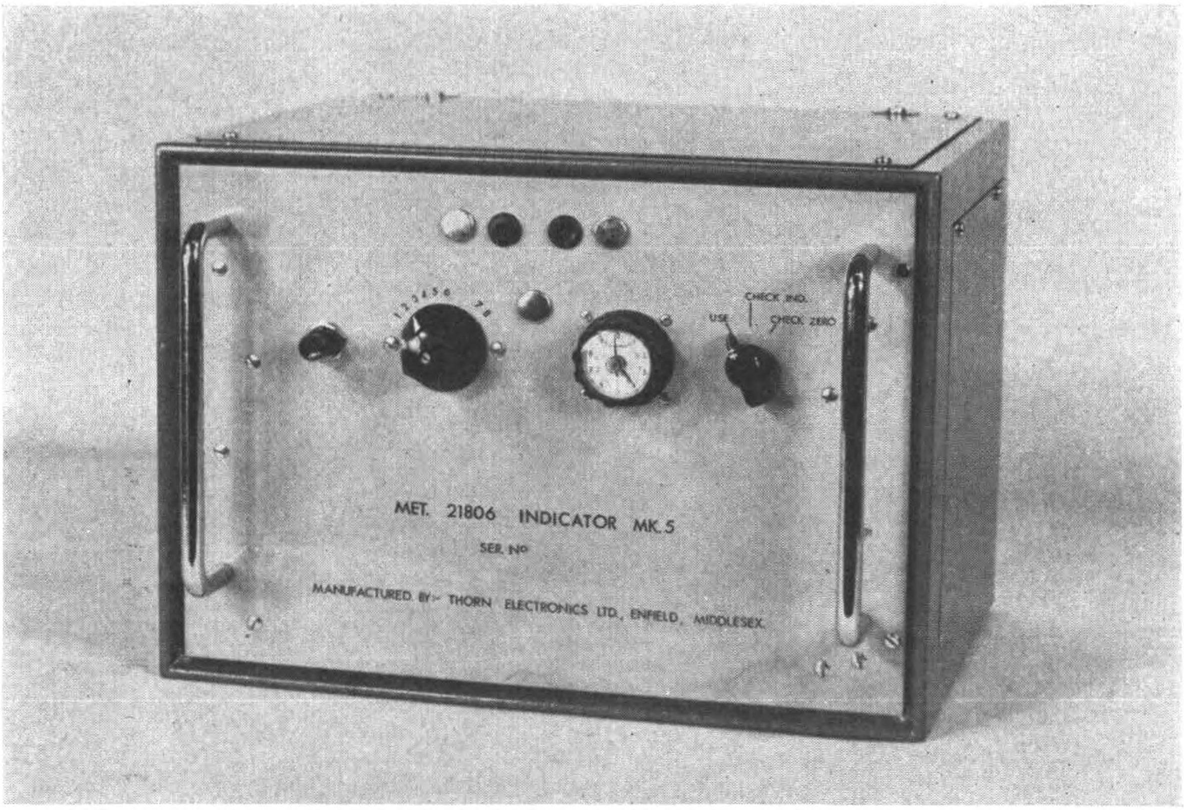
Satellite data acquisition

For day-to-day use in ship routeing, cloud pictures taken by weather satellites must be available as a routine, with minimum delay, at regular intervals. The pictures from each orbit should overlap to provide continuous monitoring of cloud movements and patterns, and should identify distinctive cloud patterns such as the spiral banding associated with most cyclonic-storm systems. Cloud-picture information from weather satellites is processed in both analogue and digital form. The final product is a cloud map (nephanalysis) with the proper grid superimposed by computer. For ship routeing the nephanalyses can be transmitted by facsimile process from receiving ground-stations to ship-routeing stations. The entire process should be as rapid as possible for the data to remain valid. The type and format of data received by ground stations depend on the photography and recording equipment aboard the satellite, the most common devices presently in use being the AVCS (Advanced Vidicon Camera System), APT (Automatic Picture Transmission), SSCC (Spin-Scan Cloud Camera), HRIR (High-Resolution Infra-red), and DRIR (Direct Read-out Infra-red).

The AVCS is a fast-scan camera system (800 lines per 6·75 seconds) which can either store pictures on recording tape or transmit them directly to ground stations. The APT system, by comparison, has a slow scan rate (240 lines per minute) which results in a narrow transmission band width producing a high signal-to-noise

(*Opposite page* 176)

One of the dolphins seen from the *Hurunui* on 26th December 1969 (*see* page 170).



The electrical thermometer indicator (Mk. 5), now being installed in newly-built British observing ships (or in ships undergoing major refits), from which the wet-bulb, dry-bulb and sea temperatures can be read.

(*Opposite page* 177)

National Aeronautics and Space Administration photo

The Earth photographed (originally in colour) from 22,300 miles in space by the NASA ATS-III satellite on 10th November 1967 from its on-station position at 47°W on the equator over Brazil (*see* page 177).

ratio; ground stations equipped with facsimile recorders within broadcast range of the satellite can receive the cloud picture instantaneously. The multicolour SSCC, which is mounted on the ATS satellite, produces a single horizon-to-horizon picture (*see* photograph opposite this page) consisting of 2,400 scan lines; the basic display is produced by photo-recorder on a 4 × 5 inch Polaroid positive and negative film sheet. The HRIR recorder produces data to be used in determining cloud distribution and surface temperatures at night; it processes data in a manner similar to that of the AVCS, but gives night-time capability. The DRIR system is a modified HRIR system which transmits the same way as the APT system; therefore APT-system ground stations can receive high-resolution pictures from an APT-equipped satellite in the day-time, and can receive informative but less clearly-defined infra-red pictures from a DRIR-equipped satellite at night.

Application of weather satellite photographs

From the summer of 1961 through the spring of 1964 hundreds of satellite photographs of hurricanes and typhoons were studied in detail by the Meteorological Satellite Laboratory of the U.S. Weather Bureau. A method was developed for estimating the maximum wind speed of storm formations based on their size and appearance on a satellite photograph.

To facilitate recognition of storm formations, tropical and sub-tropical disturbances were classified into stages and categories according to shape and concentricity of the associated cloud masses (see Fig. 1). Empirical curves were then developed

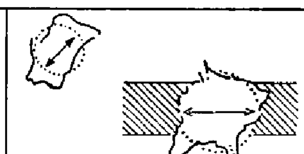
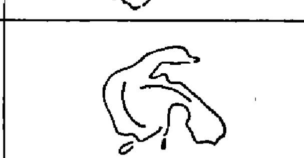
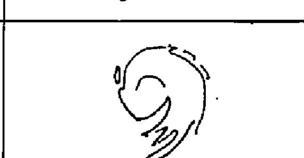
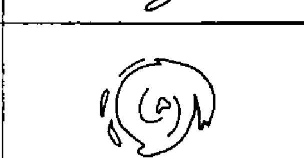
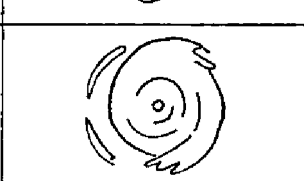
STAGE A No curved cloud lines or bands	
STAGE B Poorly-organized curved cloud lines and bands Ill-defined centre	
STAGE C Well-organized curved cloud lines and bands Well-defined centre outside dense cloud mass	
CATEGORY 1 Poorly-organized spiral bands Ill-defined centre of organization within central cloud mass	
CATEGORY 2 Well-organized bands Spiral bands define centre within cloud mass	
CATEGORY 3 Moderate degree of concentricity to cloud bands Irregularly shaped eye within centre cloud mass	
CATEGORY 4 High degree of concentricity to cloud bands Round eye near centre of central cloud mass	

Fig. 1. Tropical and sub-tropical disturbance classification from satellite data.

for each of the categories relating the size of a storm to maximum wind speed (see Fig. 2). Results of wind estimates using these curves have been good and errors in estimating maximum winds have been minimal.

Other applications of satellite cloud photographs to date include:

(*a*) Locating fronts and wave formations along fronts.
(*b*) Locating vorticity maxima.
(*c*) Locating areas of 'positive relative vorticity advection' as manifested in middle and high cloud patterns.
(*d*) Locating 500-mb troughs and verifying trough axes by noting the distinct changes in cloud formations at the intersection line of the 500-mb troughs.
(*e*) Locating 500-mb ridges to determine the limits of cloud formations in the forecast region.
(*f*) Identifying migratory surface ridges when surface observations are not available.
(*g*) Locating the jet stream aloft, defining the location of higher sustained winds.
(*h*) Identifying cold, dry, continental air-mass advection over warm sea-surfaces, indicated by suddenly-building cloud lines. Identifying this cloud pattern gives clues to the wind structure and temperature field where observed.
(*i*) Identifying cumuliform and stratiform clouds.
(*j*) Notating cloud-eddy patterns to determine the wind flow around the lee side of islands, mountains and elevated coastal terrain.
(*k*) Identifying formative stages of tropical cyclone development and classifying tropical disturbances for maximum-wind estimates.

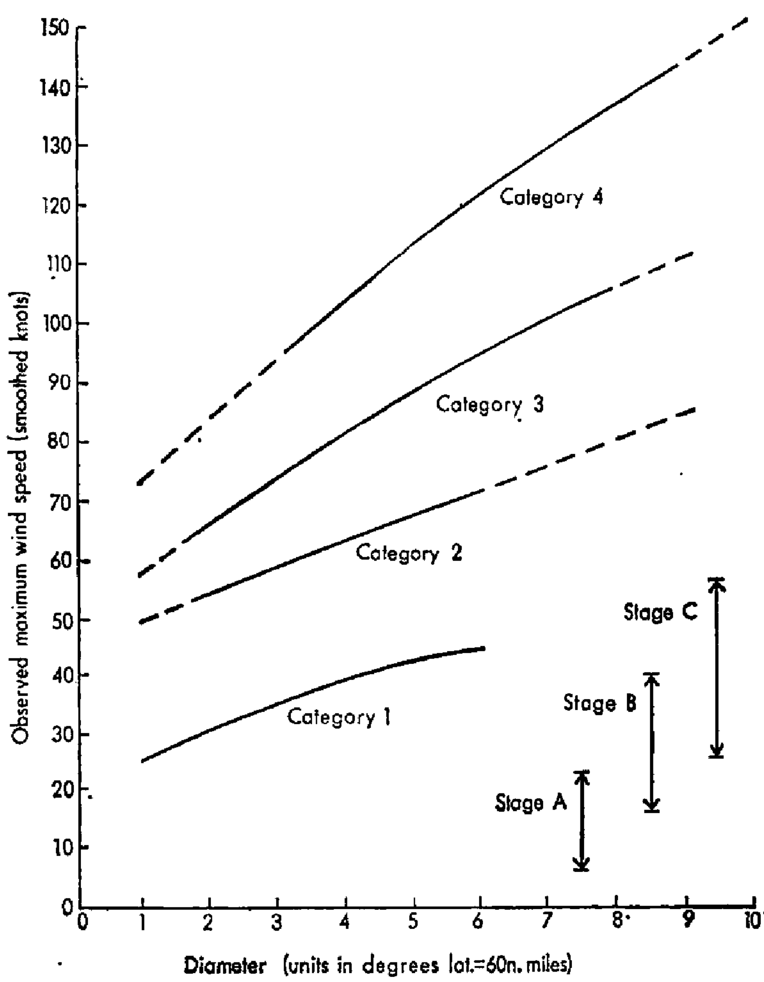


Fig. 2. Empirical curves relating size of storm to maximum wind speed.

Recent and current weather satellites

A number of weather satellites have been launched in the past ten years. The best known is TIROS (Television and Infra-red Observation Satellite) which provided the first global meteorological information system. The TIROS series, placed in near-circular orbit around the earth, were equipped with two television cameras, radiometers, tape recorders, and transmitters. The NIMBUS satellite, equipped with AVCS and HRIR sensors, was placed in near-polar orbit providing continuous pictures from pole to pole.

The most important satellite for continuous cloud coverage of a given region, at the present time, is ATS (Applications Technology Satellite) which, equipped with a Spin-Scan Cloud Camera system, collects sunlight reflected either from the earth surface or from clouds. In particular, the ATS-I and ATS-III satellites are useful for ship routeing as they orbit synchronously with the earth over the Pacific and Atlantic oceans, respectively.

Other current weather satellites include TOS (TIROS Operations Satellite) and ESSA (Environmental Science Services Administration) which provide continuous observation of earth cloud cover from near-circular orbit using APT.

Weather satellites in use

Since trade routes are virtually world-wide, data are required from far reaches of the globe. Initially it was found that data relayed from areas in the Pacific Ocean and the southern hemisphere were not available in time to be of consequence. Out of necessity, real-time and delayed transmissions of satellite weather information were investigated. As a result it is now possible to fill data gaps where no observing ship passes, no shore-side station is located and no radiosonde or balloon tracing of upper-air wind is practical. By using weather satellites it is now possible to pinpoint the locations of tropical storms, elusive cold fronts and the meanderings of the inter-tropical convergence zones.

The following case, illustrating the use of weather satellites as an aid to ship routeing, involved a ship, deeply laden, departing from the Panama Canal for Japan. Prior to the ship's departure, an initial advisory was delivered to the ship's Master. The advisory reviewed storm-track information gleaned from the latest cloud photographs and flow charts, located semi-stationary high-pressure ridges and inter-tropical convergence zone activity, and recommended a route that manœuvred the ship along the Mexican coast to a position 20°N, 107° 30′W before making good a great circle to 30°N, 160°W for crossing rhumb line to Japan. This track initially saved some 150–200 miles over the standard seasonal track that passes south of Hawaii and offered almost the exact weather with mostly following and beam winds and seas. The only risk for adverse conditions with this route could occur when the ship passed abeam the Gulf of Tehuantepec, Mexico, should one of the local gales be blowing.

Subsequent to departure a close watch was maintained for cold-air advection from the north into the central mountain regions of Mexico. This was considered a possibility during the crossing as satellite cloud photographs on departure day had depicted a sharp cloud-band oriented from the Florida panhandle, through the central portion of the Gulf of Mexico, to an area just south of Brownsville, Texas. Further analysis of subsequent cloud photographs indicated that a cold front was indeed migrating southward at a speed that could reach the central Mexican mountains at the same time that the ship would be crossing the Gulf of Tehuantepec. If this were to happen, the cold air funnelling through the mountains would create a furious gale that would jeopardize the ship's crossing.

A warning was cabled to the ship's Master recommending a slight change of course to add distance between the ship's track and the coastal region along the Tehuantepec Gulf, but still effect a time saving over the standard seasonal track.

The ship's Master responded, directing the ship outside the Gulf's immediate area, and when the local gale set in, as forecast, the ship was far enough off shore to realize only minimum adverse effects. In fact the Master reported a saving of 16 hours in transit over normal crossing time, Panama to Japan.

598.2:629.12

Sea-birds on board Ships

By Captain G. S. Tuck, D.S.O., R.N.
(Chairman, Royal Naval Birdwatching Society)

If we except the commoner gulls which become accustomed to alighting on ships in harbours sea-birds have no need to alight on ships. For them their 'platform' is the sea itself; moreover, their webbed feet are ill-adapted to perching and in many cases they are unable to take off from the decks. The large albatrosses and the oceanic petrels and shearwaters only very rarely occur on board although certain species will follow close astern, wrangling for titbits passed over the side.

Yet certain sea-birds are more prone than others either to alight of their own accord or to find themselves unwittingly on board. A classic example in the first category is the Red-footed Booby of the tropical belt (Fig. 1). There are many cases

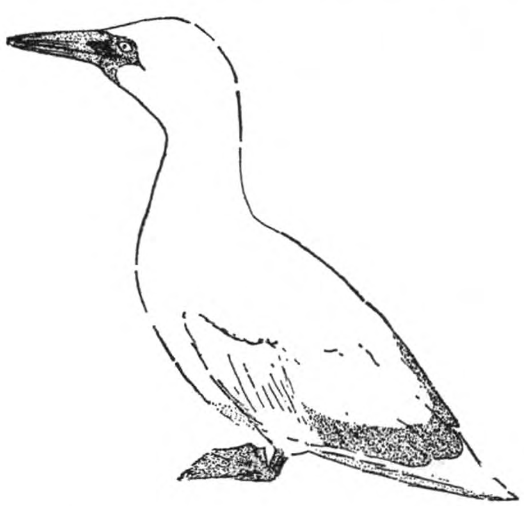


Fig. 1. The Red-footed Booby; length 26–30 in.

of this large bird of the Gannet family alighting on ships and perching, more frequently on a fo'c'sle coaming where they sometimes remain for hours, leaving at intervals to capture flying fish disturbed by the bow wave. Whether adults be seen in their pale phase or brown phase, their bright-red legs and feet will distinguish them from other Boobies. On the wing in the pale phase this mainly-white Booby in adult plumage can be distinguished from the large Blue-faced Booby by showing only dark-brown wing-tips and white tail, while the latter shows a complete chocolate-brown band of flight feathers and a brown tail. The adult Brown Booby is entirely chocolate-brown except for its white lower breast and underparts sharply divided from its brown upper breast. The Blue-footed Booby has cinnamon-brown speckled upper parts, whitish underparts and bright-blue legs and feet. Some of the latter species also tend to perch on ships.

In the second category—those which come on board unwittingly—the most frequent sea-birds which come to grief are the Tropic-birds or Bos'n Birds (Fig. 2) and, to a lesser extent, the highly oceanic Sooty Tern (Fig. 3). Both species tend to follow ships at night, searching for squids churned up in the wake. Attracted by ships' lights, they may collide with the rigging and crash on deck, unable to take off again. The Tropic-birds with their generally white plumage and, in adults only, with their extremely elongated central tail feathers are often confused.

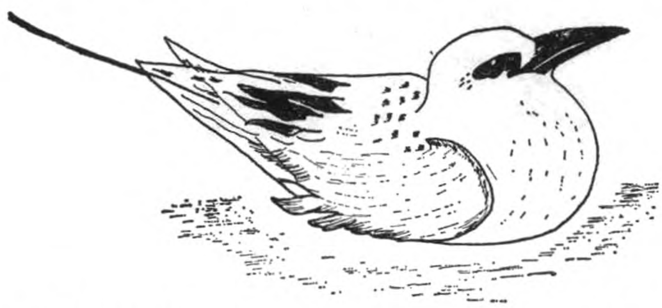


Fig. 2. The Red-billed Tropic-bird; length, including elongated tail feathers, 24–30 in.

Briefly, the points between the Red-billed, White-tailed and Red-tailed Tropic-birds are as follows. All three species show a black crescentic band before, above and behind the eye. The White-tailed species shows no black barring on its upper parts and only a solid black patch across the wings and back. It has a small black patch near the edge of its leading flight feathers and the bill is yellowish-orange. The Red-billed species shows black barring across the back in addition to the black band on the wings. The Red-tailed species is uniformly silky-white but showing a few dark lines due to black quills; the beak is red with a black streak through the nostrils. The first two species have long, white, central tail feathers; the Red-tailed species has blood-red central tail feathers. In all three species the immature birds show considerable black barring and the long tail feathers are absent; thus they are not easy to distinguish.

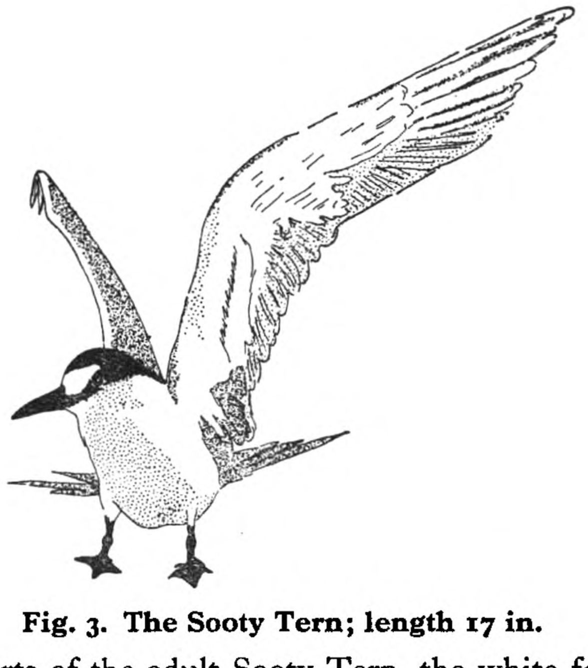


Fig. 3. The Sooty Tern; length 17 in.

The dark upper parts of the adult Sooty Tern, the white forehead, black band from bill to eye and central, black, deeply-forked tail feathers, set off against its white underparts, are distinctive.

Apart from the species quoted, it is the little Storm Petrels (Fig. 4) which are not uncommonly discovered on ships, usually drifted on board in high winds, many species showing only small differences in characteristics which make identification a matter of considerable difficulty.

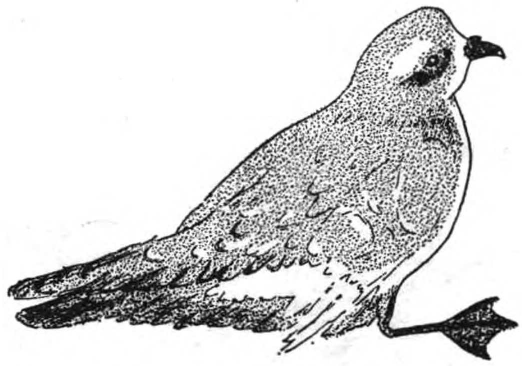


Fig. 4. The White-faced Storm Petrel; length 8 in.

There have been instances in the southern oceans of Southern Great Skuas alighting on the rigging of ships and of Blue-eyed Shags invading ships in sub-Antarctic waters. No doubt other examples could be quoted but the occasions are rare.

595:629.12

Hints for Collectors of Insects

(Extracts from *Instructions for Collectors, No. 4A: Insects* are included by kind permission of the Trustees of the British Museum (Natural History).)

The main difficulty in writing about insects is that there are so many species: over 800,000 according to one reference book; another stopped counting at 700,000. Whatever the true figure we shall have to ignore most of them and concentrate on those most likely to be seen by marine observers. But, first, it would be useful to have a clear definition. Most people use the term 'Insect' for any small creeping animal with the body usually visibly divided into segments and provided with several pairs of legs. In Zoology, however, the term is used for a clearly-defined group of organisms. Insects belong to the great Phylum (or sub-kingdom) of the Animal Kingdom—Arthropoda, i.e. animals with jointed legs but no backbone. As they have no internal skeleton the muscles are attached to the skin of the body which is thickened and stiffened for their support. The Phylum Arthropoda is divided into a number of Classes including:

Crustacea—Crabs, Wood-lice, Lobsters, Shrimps, etc.
Arachnida—Spiders, Scorpions, Ticks, Mites, etc.
Insecta—Insects
Myriapoda—Millipedes, Centipedes, etc.

The Insects, as the name implies, are characterized by the body being divided into sections (or segments). These fall into three groups: (*a*) the head, bearing the antennae, eyes and mouth-parts; (*b*) the thorax, composed of 3 segments more or less closely united, each with its pair of legs and the 2nd and 3rd usually each with a pair of wings; and (*c*) the abdomen, usually without appendages.

Classification of Insects

The Insect Class is divided into three groups, according to the changes that take place as the individual insect passes through its growing stages to the reproducing stage. These groups are then divided into Orders, and the insects within an order fall into a series of families. Within a family are one or more genera (groups of closely related species); the genus consists of one or more species (groups of closely related individuals). As an example, the Common House-fly (English name), *Musca domestica* L. (scientific name), belongs to the species *domestica* L. of the genus *Musca*, Family Muscidae, Order DIPTERA. The 'L' stands for Linnaeus, the original author of the specific name. It was Carl von Linné (latinized to Linnaeus), 1707–78, Swedish doctor and naturalist, who was the first to expound the true principles for defining genera and species, both for animals and plants.

The 'additional remarks' pages of meteorological logbooks report a wide variety of animal life but the insects mainly fall into the five Orders given below.

LEPIDOPTERA—butterflies and moths—are probably the most popular order of insects. They are characterized by their scaly wings and it is to these scales that they owe their beauty of colour and pattern. When the scales are removed by rubbing, the wing underneath is a colourless membrane which is supported by a number of conspicuous 'veins'. Butterflies have clubbed antennae (see Fig. 1) while moths have antennae of various types but not clubbed (see Fig. 2).

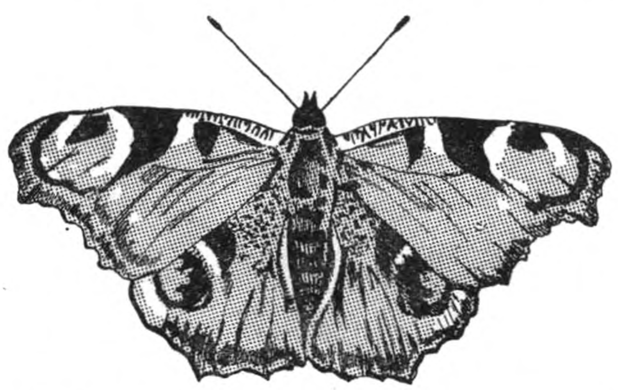


Fig. 1. A Peacock butterfly, showing the knobbed antennae common to all butterflies.

ORTHOPTERA include, amongst others, the following main families. The Acrididae (Locusts, Grasshoppers, etc.) include the well-known Migratory Locusts (illustrated on page 166). Some of the grasshoppers are quite small but others are large, heavy insects. The hind legs are modified for jumping and the males make a stridulating noise in the sunshine by rubbing the hind legs against the wings. All have short antennae.

The Tettigoniidae (Bush-crickets, Long-horned Grasshoppers, Katydids) have a much more fragile appearance than the Acrididae and very long slender antennae. Many of the males stridulate, most often at night, by rubbing specially modified areas of their wings together. Some species have the wings shaped like leaves, and green is the common colour.

The Gryllidae (Crickets, Tree-crickets) are, in general appearance, similar to grasshoppers, with long antennae. The family includes the cricket *Gryllus bimaculatus*, described and illustrated on pages 167–169. The Tree-cricket, an extremely

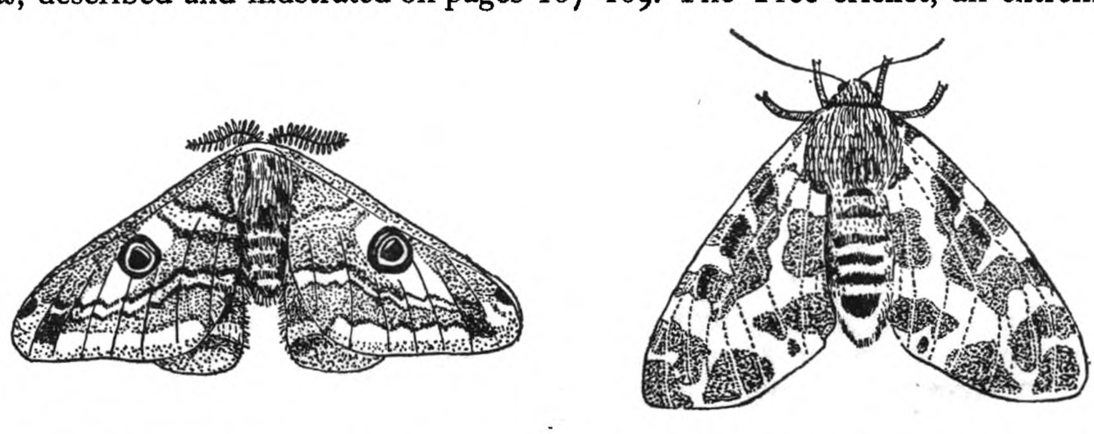


Fig. 2. The Emperor moth and the Garden Tiger-moth, showing two of the variations in moths' antennae.

delicate creature, has one of the most shrill and persistent songs of all insects, a repetitive 'trill' that goes on endlessly.

HEMIPTERA are divided into two sub-orders: the Heteroptera (Plant-bugs, Stink-bugs, Water-bugs, etc.) and Homoptera (Green-fly, Scale-insects, Cicada, etc.). The Water-bugs may be divided into free-swimming and surface-walking groups, one of the latter containing the family Gerridae, the familiar 'pond-skaters' with long middle and hind legs. *Halobates* is a genus of Gerridae found on the surface of the sea in sub-tropical and tropical regions. It lives on plankton and is one of the very truly marine insects. It can often be collected around ships in harbours. However, the majority of Water-bugs should be handled with care as a 'bite' can be very painful.

Most of the Homoptera (Green-fly, etc.) need not concern us as they seldom travel far from their food-plants but it may be of interest to say something about one family, the Cicadae. When you hear or read about Cicadas you may have imagined, as I did, that they looked somewhat like a cricket or grasshopper and that their 'song' was similarly produced by their legs and/or wings. On the contrary, cicadas are large insects with stout bodies, blunt heads and strong, pointed wings which are often transparent, though in a few cicadas they are highly-coloured (see Fig. 3).

Fig. 3. A cicada.

The sound organs in the male are small pits on either side of the abdomen, just under the wings, covered by two large plates which can be raised or lowered to control the volume. The drumheads, or timbals, are in these cavities together with the amplifier (a so-called mirror or sounding board) and a pipe that lets in the air to be trembled. The muscles vibrate the timbrals slowly and shake the air inside the cavity. The vibrations expand within the folded membrane and then bounce off the mirror for more intense magnification. Meanwhile the plates are opening, letting out a sound that rises to an ear-splitting climax.

ODONATA—Dragon-flies and Damsel-flies—are relatively large insects with a wing span of 1–9 inches, though some are very delicate in structure. It is essential to get them dried as quickly as possible as their colour deteriorates very badly. The best results are obtained by papering them (see Preservation below) and allowing them to die slowly.

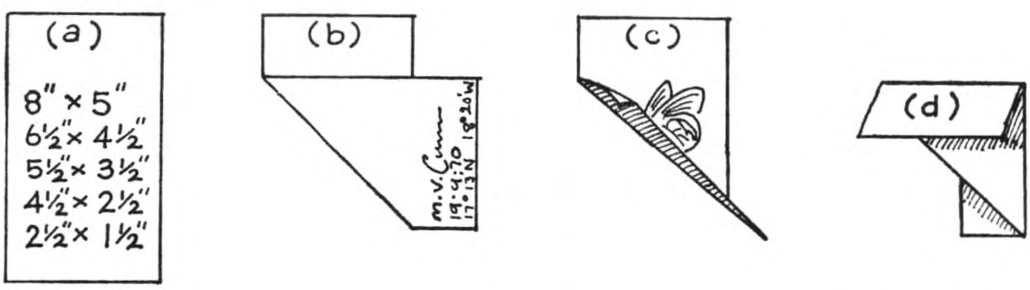
COLEOPTERA—Beetles—the largest order of insects in respect of the number of described species and also one of the most versatile in the variety of habitat. Their principal characteristic is the hardness of their chitinous skins, especially of the front pair of wings. These are of no use as organs of flight but serve as a protection for the hind wings and abdomen above which they are folded. In the great majority of beetles these hardened fore wings (elytra) fit the abdomen closely and cover it exactly. Sometimes, the real wings having become atrophied, the elytra are actually fused together.

While this article was being written and one's mind was full of insects, death and preservation, a large Stag-beetle, rather unwisely, came to rest outside our editorial office in Bracknell. He looked a fine specimen, 2½ inches to the tip of his antler-like mandibles, so he was popped into a plastic bag with some wadding sprinkled with Trichlorethane (supplied by the Instruments laboratory). When he had expired he was posted to the Natural History Museum where he arrived "still relaxed and in perfect condition for mounting". Having read in logbooks of all the interesting insects reported by marine observers, it was rather satisfying to have a modest specimen of our own to contribute.

Preservation and packing

All the insects mentioned above should be preserved dry—with the exception of the Water-bug which should be put straight into alcohol. The killing agents recommended are fumes from chloroform, benzine, carbon tetrachloride, ethyl acetate or petrol. Fluid ammonia could also be used but it affects the colours, turning green insects yellow. There are, of course, proprietary insecticides. These noxious fluids can be sprinkled on some wadding and placed apart from the insect in the same temporary receptacle. Once the insect is dead it should be carefully packed while its body is still flexible and before any great amount of drying has taken place.

Coleoptera and Orthoptera can be screwed up in toilet- or tissue-paper, rather like a toffee. For insects with large and delicate wings, butterflies, dragon-flies, etc., the best method consists of folding up the insect in a piece of paper. The paper should be softish, not hard and polished; newspaper is very suitable. The paper is cut into a rectangle and folded as shown in Fig. 4. The smallest size of paper that



(a) Paper representing various possible sizes; (b) paper of the size suited to the butterfly, folded, with data added; (c) butterfly placed in the fold of the paper; (d) paper closed with the ends folded over to secure contents.

Fig. 4. 'Papering' Lepidoptera, etc.

will accommodate the insects should be used. The date of capture and other relevant data, or a cross-reference to the appropriate logbook entry, should be written on the paper in pencil. The papered insects can then be packed in an empty cigarette packet or other convenient receptable without any pressure upon them, with some cotton wool added, if necessary, to prevent movement. They should not be packed in a tin box or other airtight receptacle because the insects will go mouldy as the moisture given off from their bodies in drying cannot escape.

PRESENTATION OF BAROGRAPHS

Of all the events which brighten our lives in the rural surroundings of Bracknell none are more pleasant than the days when certain shipmasters come down here to be presented with a barograph in recognition of their long and zealous voluntary service for us. Four such awards are made annually but, such are the vagaries of shipping, it has been fifteen years since we were able to get all four shipmasters in the one place at the one time.

The long-service awards for 1969 were announced in the October 1969 number of *The Marine Observer* and on 13th January 1970 two of them were made: to Captain A. J. F. Colquhoun of the Anchor Line and to Captain J. Hogg of the Cairn Line. Unfortunately the day selected coincided with a Board Meeting of the

Anchor Line so no member of the Board, nor their Marine Superintendent, was able to be present but we were very glad to welcome also Mrs. Colquhoun. Captain Hogg was accompanied by Captain J. Baird, Nautical Adviser to the Furness Withy Group and Mr. B. P. Shaw of the Management.

In the absence of the Director-General abroad, the presentations were made by Mr. P. J. Meade, Director of Services. In making the presentations, Mr. Meade mentioned that Captain Colquhoun's record of voluntary observing for us went right back to 1925 when he was a cadet in the *Olympia*; he was the second Anchor Line shipmaster to receive a special award and our association with the company went right back to 1903. Captain Hogg, likewise, was the second Cairn Line shipmaster to receive a special award; this Company's ships, though comparative newcomers to the voluntary observing fleet with a record going back only to 1937, had also rendered inestimable service to the Meteorological Office, all of their ships being employed on the North Atlantic run. Captain Hogg himself had been observing for us consistently since the end of World War II.

After the presentations the party had lunch with Mr. Meade and the senior officers of the Meteorological Office concerned with ships' observations.

It was not until early June that we were able to bring the other two Captains together but on the 4th Captain J. D. Bennett of Container Fleets Ltd. and Captain H. J. D. Sladen of the New Zealand Shipping Company came down for the second ceremony. Captain Bennett was accompanied by Captain P. A. Ogden, Operating Manager of Container Fleets. With Captain Sladen we were glad to welcome Mrs. Sladen, together with Captain A. C. Davies, Assistant Marine Superintendent of the New Zealand Shipping Company and Mr. G. W. Weston from the Management.

This time the presentations were made by Dr. B. J. Mason, Director-General of the Meteorological Office. Dr. Mason mentioned that in these changing times, with meteorological satellites, etc., the importance of surface observations made in a ship had not lessened at all. The New Zealand Shipping Company, from which both shipmasters had come, had a record of voluntary observing for us going right back to 1855, the very earliest days of the Meteorological Office itself and the standard of their work was well brought out by the fact that in only 4 of the 22 years since we have been giving these special awards the New Zealand Shipping Company had not been represented. Captain Bennett had been observing for us ever since 1935 when he was in the *Tekoa* whilst Captain Sladen's record went back to 1947.

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

Photographs taken at the presentations are opposite pages 192 and 193.

L. B. P.

NOTES ON ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM APRIL TO JUNE 1970

APRIL

Pressure remained low in a belt from south-east Canada to Scandinavia while high pressure became re-established over the Arctic Basin. The resultant wind pattern was basically easterly over the whole region. Thus the large ice deficits in the Barents and north Greenland Seas persisted.

Canadian Arctic Archipelago, Foxe Basin, Baffin Bay, Hudson Bay and Strait. Apart from some shore and flaw leads these areas, as normal, remained ice-covered.

Davis Strait and Labrador Sea. East to north-east winds caused the ice edge to recede westwards in the strait, maintaining a slight deficit. Further south the ice edge was near to its normal position.

Great Bank, South Newfoundland, River and Gulf of St. Lawrence. Sea temperature remained near normal and the ice deficit of the past few months continued.

Greenland Sea. Due largely to persistent winds from an easterly point the edge of close pack-ice, northward of Jan Mayen, was about 120 miles back from its normal position. The excessive field north-east of Jan Mayen broke up to very open pack-ice by the end of the month. Easterly winds off north Iceland drove the ice edge westwards during the month thus reducing the excess. Further south-west, conditions were near normal around south Greenland except that the Cape Farewell pack-ice extended further north-west than usual.

Barents Sea. Though air temperatures dropped just below normal, sea temperatures remained around 3 degC above average. A large deficit persisted but conditions had now recovered to come within the known minimum extreme. There was a slight excess to the south of and a slight deficit to the north-west of Spitsbergen.

White Sea. South-easterly winds broke up the ice in the eastern part of this region, establishing a deficit.

Baltic. Air temperatures remained around 1 degC below and sea temperatures about 2 degC below normal, despite the incursion of westerly winds into the area. Though there were large areas of open water in the Gulfs of Bothnia, Finland and Riga, ice conditions remained excessive over these regions and also in the Baltic Sea west and north of Gotland.

MAY

Pressure remained low to the south-west of Iceland and high over the Beaufort Sea. A second high pressure area became established over Scandinavia. The resultant winds maintained large ice deficits over the Greenland and Barents Seas.

Canadian Arctic Archipelago, Foxe Basin, Baffin Bay, Hudson Bay and Strait. Wide leads and polynyas appeared in these areas heralding the beginning of the melting season. The polynyas in the extreme south-east of the Beaufort Sea and the North Water at the head of Baffin Bay were larger than usual. Leads on the north and north-western coasts of Foxe Basin, Hudson Bay and Strait were wider than usual; otherwise close pack-ice and fast-ice covered the whole region.

Davis Strait. Winds were light and variable and, although air temperature fell to a few degrees below, sea temperature remained about 2 degC above normal. At the end of the month the edge of close pack-ice lay from Disko Island, south-south-westwards through the middle of the Strait and thence south-west to a point about 10 miles south-east of Resolution Island—close to its normal position.

Labrador Sea and Great Bank. Ice conditions were a little excessive due largely to cool north-westerly or westerly winds. The ice edge lay from near Resolution Island to 52½°N, 51°W (though in the vicinity of this point the close pack had broken to very open pack-ice). From this point the edge meandered south-westwards to Fogo Island where it turned north-westwards to meet the coast of Newfoundland at 51°N.

Gulf of St. Lawrence. Apart from a narrow strip of ice on the north-western side of the Belle Isle Strait the area was entirely clear of ice. Normally some ice remains in the south-west of the Gulf at this time.

Greenland Sea. Though winds were variable there was an over-all tendency for easterly directions to prevail, especially through and to the north of the Denmark Strait where the ice edge receded even further westwards. The edge of close pack-ice lay from the coast of Nordaustlandet at 20°E, westwards to 5°E, thence south-west to 75°N, 15°W and later south-south-west to 70°N, 20°W. At this point it trended south-west once more through the centre of the Denmark Strait. At about 63°N, 70°W the edge again headed south-south-west enclosing a belt of close pack-ice about 40 miles wide, terminating at 59°N. From the southern end of this belt an area of very open pack-ice extended westwards and later north-westwards to 62°N, 52°W. Southward of Denmark Strait ice conditions were near normal. To the north, particularly south of 76°N, there was an extreme deficit. Ice conditions were normal near Spitsbergen.

Barents Sea. From south Spitsbergen the edge of close pack-ice extended southwards to 75½°N, thence it meandered eastwards to 51°E before turning south-south-east to meet the coast at Mys Sukhoy Nos. A broad belt of close pack-ice covered the south-eastern part of the area, eastwards of Ostrov Kolguyev. Break-up was occurring about one week ahead of normal in the south-east; in the north-east a large deficit persisted but in the north-west conditions returned to normal.

White Sea. The ice cover in this region broke to very open pack except in the north-west where a small area of close pack-ice remained. There was about half as much ice as normal in this region due to winds of westerly origin raising air temperatures to around 3 degC above normal.

Baltic. As a result of the severe ice season in this area a little very open pack-ice remained along most of the Swedish coast of the Gulf of Bothnia. Ice remaining at the end of May in the south of the Gulf happens only in severe ice seasons and last occurred in early 1966.

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

(This does not include growlers or radar targets)

Limits of Latitude and Longitude		Degrees North and West												
		66	64	62	60	58	56	54	52	50	48	46	44	42
Number of bergs reported south of limit	April	> 141	> 99	> 58	> 19	> 19	> 19	> 19	0	0	0	0	0	0
	May	> 182	> 178	> 101	> 6	> 3	> 3	> 2	> 2	0	0	0	0	0
	June	> 252	> 249	> 180	> 163	> 153	> 152	> 145	82	2	0	0	0	0
	Total	> 575	> 526	> 339	> 188	> 175	> 174	> 166	> 84	2	0	0	0	0
Number of bergs reported east of limit	April	> 141	> 141	> 141	> 141	> 141	> 141	> 128	> 33	18	18	18	18	18
	May	> 182	> 182	> 182	> 182	> 182	> 182	> 178	> 152	> 37	> 13	> 1	0	0
	June	> 252	> 252	> 252	> 252	> 252	> 245	> 193	> 66	> 18	8	0	0	0
	Total	> 575	> 575	> 575	> 575	> 575	> 568	> 499	> 251	> 73	> 39	> 19	18	18
Extreme southern limit	April	52° 12′N, 52° 12′W on 1.4.70												
	May	51° 24′N, 49° 30′W on 19.5.70												
	June	48° 30′N, 51° 06′W on 12.6.70												
Extreme eastern limit	April	62° 30′N, 40° 24′W on 17.4.70												
	May	58° 54′N, 45° 42′W on 25.5.70												
	June	58° 54′N, 47° 36′W on 19.6.70												

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

JUNE

The polar anticyclone was replaced by a depression centred near the pole, resulting in winds from a westerly point over almost all areas. The Greenland and Barents Seas deficits were maintained and a small excess developed over eastern Canada.

Canadian Arctic Archipelago. Mild south-westerly winds prevailed in the west and cold north-westerly winds in the east. As a result the polynya to the south and south-west of Banks Island was larger than usual though, abnormally, Lancaster Sound remained covered by fast-ice. Break-up had begun in the south-west where the ice in Dolphin and Union Strait broke to very open pack.

Foxe Basin, Hudson Bay and Strait. Air temperatures were generally around 2 degC below normal due to north-westerly winds. These winds opened up wide leads along north and north-west coasts; in Hudson Bay the lead to the west of Southampton Island was 150 miles wide. Despite the cool air temperatures the ice situation was near normal in these areas.

Baffin Bay, Labrador Sea and Great Bank. A slack, mainly westerly pressure gradient persisted between Baffin Island and Greenland, resulting in light and variable winds in the north where temperatures were about 1 degC below normal, gradually freshening southwards to become strong south-westerly to the east of Newfoundland where temperatures were near normal. After a winter of relatively warm water in southern regions sea temperatures fell to around 1 degC below normal. The combined effects of cold sea and strong south-westerly winds developed a sea-ice excess over the Labrador Sea and Great Bank; the situation to the northward was normal. By the end of the month the North Water had extended southwards to the coast of Bylot Island. The main ice edge, beginning near Nugssuaq as the western side of a 10–20-mile-wide lead to the latitude of Disko Island, meandered south-south-westwards to $61\frac{1}{2}$°N, $62\frac{1}{2}$°W and then south-south-eastwards to 54°N, 52°W where it recurved through 51°N to meet the coast of Labrador about 50 miles north-north west of Belle Isle. Though that strait was clear of ice by mid-June, the normal time, it was effectively closed by pack-ice in the offing which receded later to the position already described, allowing access to the Belle Isle Strait towards the end of the month. Southward of 51°N the area was clear of sea-ice. However, the limit of icebergs was 46°N in the south and $43\frac{1}{2}$°W in the east; the number of icebergs north and west of these limits indicates that this will probably be a very bad year for bergs over the Great Bank.

Greenland Sea. Mainly south-westerly winds prevailed over the whole area and although conditions were near normal in the south an ice deficit persisted through and to the northward of the Denmark Strait. To the north of 70°N the ice edge remained further west than the known minimum extreme. At the end of the month there were two distinct regions of close pack-ice separated by a broad area of mainly very open pack-ice at about the latitude

Table 2. Baltic Ice Summary: April–June 1970

No ice was reported at the following stations during the period: Mantyluoto, Göteborg, Tönning, Husum, Emden, Lübeck, Gluckstadt, Bremerhaven, Kiel, Flensburg, Stettin, Aarhus, Copenhagen, Oslo, Kristiansandfjord. No ice was reported at any of the stations during June.

Station	April									May								
	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days	Length of Season		Ice Days			Navigation Conditions			Accumulated Degree Days
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Leningrad ..	1	14	14	0	0	8	0	0	—	0	0	0	0	0	0	0	0	—
Riga ..	9	16	8	0	3	3	0	0	—	0	0	0	0	0	0	0	0	—
Pyarnu ..	1	30	30	21	9	2	28	0	795	1	6	6	0	0	3	0	0	—
Viborg ..	1	30	30	30	0	0	2	28	—	1	6	6	4	0	1	3	0	—
Klaipeda ..	2	19	11	0	3	5	0	0	—	0	0	0	0	0	0	0	0	—
Ventspils ..	13	14	2	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—
Tallin ..	1	30	30	0	26	17	12	0	—	0	0	0	0	0	0	0	0	—
Helsinki ..	1	27	27	1	0	14	10	0	—	0	0	0	0	0	0	0	0	—
Mariehamn	1	30	30	12	3	29	1	0	—	1	4	4	0	0	1	0	0	—
W. Norrskar	1	30	30	0	0	4	6	0	—	1	18	18	0	0	0	0	0	—
Turku ..	1	14	14	0	0	4	10	0	—	0	0	0	0	0	0	0	0	—
Vaasa ..	1	30	30	18	0	0	30	0	—	0	0	0	0	0	0	0	0	—
Oulu ..	1	30	30	30	0	0	0	30	—	1	18	18	18	0	0	13	5	—
Roytaa ..	1	30	30	21	9	0	0	30	—	1	28	28	23	2	2	14	11	—
Lulea ..	1	30	30	30	0	0	0	30	1599	1	21	21	18	0	2	7	10	—
Bredskar ..	1	28	28	28	0	17	9	0	—	0	0	0	0	0	0	0	0	—
Alnosund ..	1	30	30	30	0	0	30	0	—	1	7	7	5	0	0	5	0	—
Stockholm ..	1	30	30	26	0	29	0	0	—	1	10	10	0	0	0	0	0	—
Kalmar ..	1	14	14	9	1	14	0	0	—	0	0	0	0	0	0	0	0	—
Skellefteå ..	1	30	30	30	0	0	0	30	—	1	18	18	18	0	4	4	10	—
Visby ..	1	30	15	0	9	14	0	0	—	1	3	3	0	0	3	0	0	—
Gdansk ..	1	4	4	0	0	1	0	0	—	0	0	0	0	0	0	0	0	—

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

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

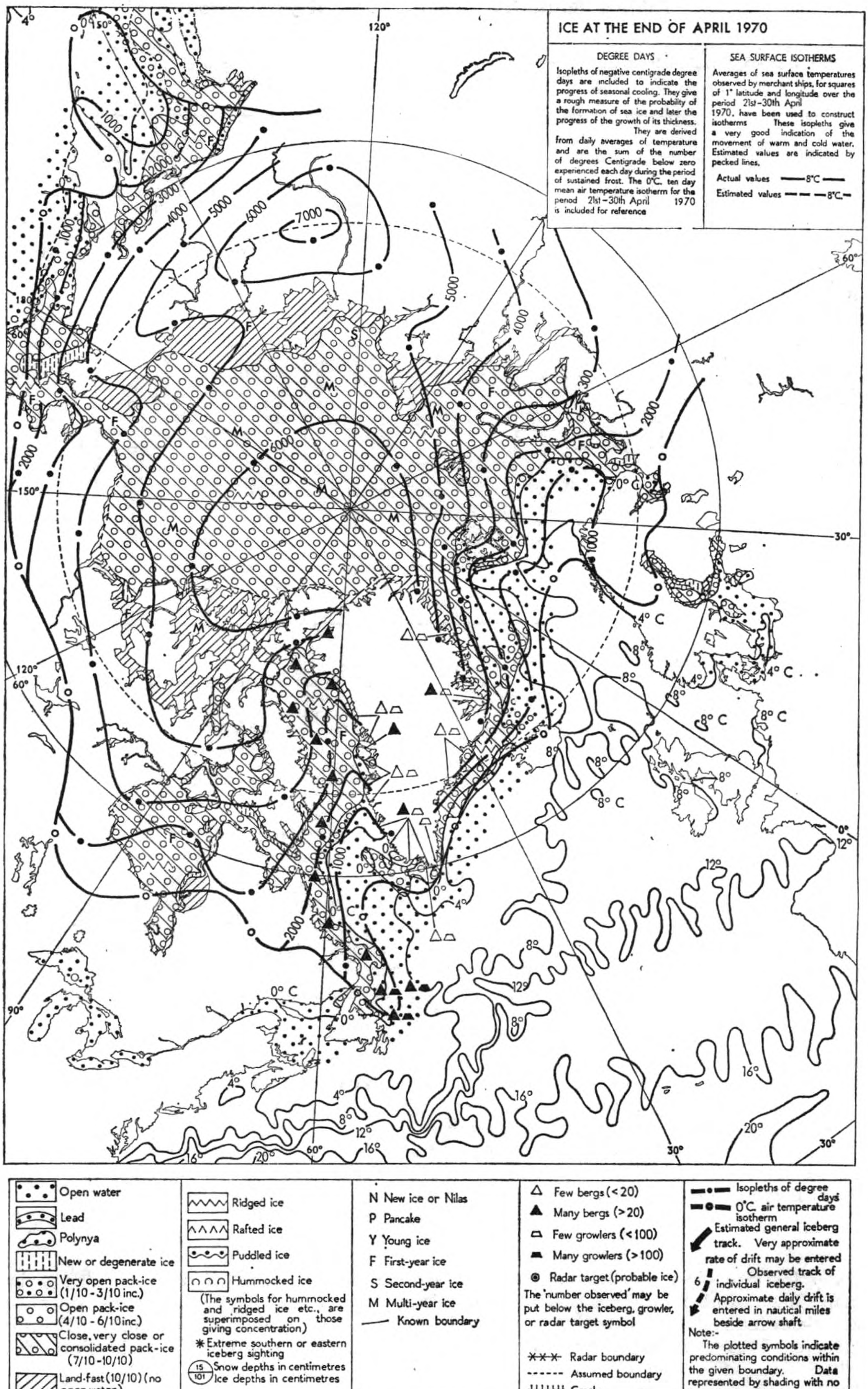
of Scoresby Sound. The edge of the northern area lay from the north-west point of Nordaustlandet westward to 5°E then meandered south-westward to 73°N, 18°W, there recurving north-westward to meet the coast near Shannon Island. The edge of the southern area followed the trend of the coastline south-westward from a point about 30 miles south-south-west of Cape Brewster to Cape Farewell, the area being about 100–150 miles wide in the north and 30–100 miles wide in the south. Linking these regions there was a broad area of mainly very open pack-ice extending seawards for about 200 miles. A belt of mainly open pack-ice about 20–50 miles wide rounded Cape Farewell to terminate on the south-west coast of Greenland near 63°N.

Barents Sea. From Edgeoya in south-east Spitsbergen the ice edge rippled east-south-eastwards to Poluostrov Admiralteystva; this edge was in its normal position near Spitsbergen but lay about 50 miles north of normal in the east. Pechorskaya Guba remained closed by a coastal belt of close pack-ice stretching from Ostrov Kolguyev eastwards to Mys Belyy Nos. In this area there was a slight excess of sea-ice.

White Sea and Baltic. Both areas soon became ice-free as temperatures rose above normal due to westerly winds. The White Sea cleared earlier than usual but the clearance in the north Baltic was later than normal.

R. M. S.

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


ICE AT THE END OF APRIL 1970
DEGREE DAYS
Isopleths of negative centigrade degree days are included to indicate the progress of seasonal cooling. They give a rough measure of the probability of the formation of sea ice and later the progress of the growth of its thickness. They are derived from daily averages of temperature and are the sum of the number of degrees Centigrade below zero experienced each day during the period of sustained frost. The 0°C. ten day mean air temperature isotherm for the period 21st–30th April 1970 is included for reference
SEA SURFACE ISOTHERMS
Averages of sea surface temperatures observed by merchant ships, for squares of 1° latitude and longitude over the period 21st–30th April 1970, have been used to construct isotherms. These isopleths give a very good indication of the movement of warm and cold water. Estimated values are indicated by pecked lines.
Actual values —8°C—
Estimated values — — 8°C —
120°
150°
180°
90°
60°
30°
0°
7000
6000
5000
4000
3000
2000
1000
4° C
8° C
0° C
12°
16°
20°
Open water
Lead
Polynya
New or degenerate ice
Very open pack-ice (1/10 - 3/10 inc.)
Open pack-ice (4/10 - 6/10 inc.)
Close, very close or consolidated pack-ice (7/10 - 10/10)
Land-fast (10/10) (no open water)
Ridged ice
Rafted ice
Puddled ice
Hummocked ice
(The symbols for hummocked and ridged ice etc., are superimposed on those giving concentration)
✱ Extreme southern or eastern iceberg sighting
Snow depths in centimetres
Ice depths in centimetres
N New ice or Nilas
P Pancake
Y Young ice
F First-year ice
S Second-year ice
M Multi-year ice
Known boundary
Few bergs (< 20)
Many bergs (> 20)
Few growlers (< 100)
Many growlers (> 100)
Radar target (probable ice)
The 'number observed' may be put below the iceberg, growler, or radar target symbol
Radar boundary
Assumed boundary
Cracks
Isopleths of degree days
0°C. air temperature isotherm
Estimated general iceberg track. Very approximate rate of drift may be entered
Observed track of individual iceberg. Approximate daily drift is entered in nautical miles beside arrow shaft
Note:-
The plotted symbols indicate predominating conditions within the given boundary. Data represented by shading with no boundary are estimated.

SPECIAL LONG-SERVICE AWARDS

Each year since 1948 the Director-General of the Meteorological Office has made a special award to four voluntary marine observers whose long and meritorious work at sea, on behalf of the Meteorological Office, is considered as deserving special recognition. The basic qualification for this award is a minimum of 15 years during which meteorological records have been received from the observer and, to ensure that the award is made fairly, considerable care is taken in the Marine Division to check the records, both as regards actual years of observing and the quality of the individual logbooks. This is all done from the personal record cards, one of which is started for every officer as soon as the first meteorological logbook bearing his name is received. A mathematical formula giving credit for the number of years in which records have been received and the classes into which the records have been assessed effectually places the observers with the basic qualifications in an order of merit.

This year there were 79 officers in the zone: the formula was applied to each one of their cards with the result that this year the Director-General is pleased to make special awards to following shipmasters:

CAPTAIN A. N. WILLIAMSON (Bibby Line), who sent us his first meteorological logbook in 1931 when he was serving in the *Ruapehu*, belonging to the New Zealand Shipping Co. In 22 years he has sent us 32 meteorological logbooks, 19 of which have been classed 'Excellent'.

CAPTAIN R. G. HOLLINGDALE (New Zealand Shipping Co.) a voluntary observer since 1938 when he was in the *Hertford*. He has 19 years of voluntary observing to his credit during which he has sent us 40 meteorological logbooks, 34 of which have been classed 'Excellent'.

CAPTAIN L. W. CADY (Port Line), whose first meteorological logbook came here from the *Port Denison* in 1928. In 19 observing years, he has sent us 33 meteorological logbooks, 27 of which have been classed 'Excellent'.

CAPTAIN J. S. LAIDLAW (New Zealand Shipping Co.) who first observed for us in 1946 when he was in the *Andes* belonging to the Royal Mail Lines. He has been observing for us for 19 years and has sent us 34 meteorological logbooks, 22 of which have been assessed 'Excellent'.

The award, as in past years, will be in the form of an inscribed barograph. We congratulate these Captains on this recognition of their voluntary work over many years; they will each be personally notified of the award and of the arrangements which will be made for its presentation.

L. B. P.

CANADIAN EXCELLENT AWARDS

(The following statement has been received from the Director of the Canadian Meteorological Service.)

The winners of the annual Canadian Excellent Awards for voluntary marine weather observing in 1969 have been announced and are listed on pages 193 to 194.

Sixty-seven awards in the form of suitably inscribed books, detailed below, have been presented to the Captains, Principal Observing Officers and Radio Officers of voluntary observing vessels.

Thirty-seven books were presented as 'Ship Awards' to vessels which have returned the best logbooks in regard to both quality and quantity in 1968. The book chosen for this award was *Canada—A Year of the Land*. This award was for group achievement and is placed in the ship's library for all to enjoy.

For excellent individual efforts the best fifteen Principal Observing Officers received the book *Darwin and the Beagle*, by Alan Moorehead.

Fifteen Radio Officers received the book *Canada—This Land, These People* for transmitting the greatest number of weather observations.

We are indeed grateful for the efforts shown by all who participated in the voluntary observing programme under the sponsorship of the Canadian Meteorological Service.

INDIAN EXCELLENT AWARDS

(From the Deputy Director-General of Observatories (Forecasting), India)

During the year ending 31st March 1969 India's Meteorological Department had 47 Selected, 82 Supplementary and 2 Auxiliary ships in their Voluntary Observing Fleet. These ships rendered invaluable service to the Department, and to world meteorology in general, by recording and transmitting their meteorological observations. A notable feature of the year was the marked increase in the number of those observations, from 19,500 in 1967–8 to 22,170 in 1968–9.

Observations from sea areas are of immense importance to meteorological services for their day-to-day weather forecasting activities and the issue of storm warnings to ships. The Department wishes to convey its thanks to all the officers and shipowners concerned who have assisted in this important work.

Awards are offered in the form of books to the Captains, Observing Officers and Radio Officers of the ships whose meteorological work has been adjudged 'excellent' and the following ships, in order of merit, have been selected for such Excellent Awards for the year 1968–9:

Name of Vessel	Owner
Kampala	British India S.N. Co. Ltd.
State of Haryana ..	Shipping Corporation of India Ltd.
Jag Kisan	Great Eastern Shipping Co. Ltd.
Mozaffari	Mogul Line Ltd.
Jalamanjari ..	Scindia S.N. Co. Ltd.
Saudi	Mogul Line Ltd.
Maharaja	South East Asia Shipping Co. Ltd.
Mahavikram ..	South East Asia Shipping Co. Ltd.
Jaladhan	Scindia S.N. Co. Ltd.
Karanja	British India S.N. Co. Ltd.
Vishva Sudha ..	Shipping Corporation of India Ltd.
Rajula	British India S.N. Co. Ltd.
Sirdhana	British India S.N. Co. Ltd.
Ranee	Asiatic S.N. Co. Ltd.

In addition to the ships mentioned above, the following have been awarded a Certificate of Merit for commendable work done during the same year:

State of Punjab	*State of Bombay*	*Jalakendra*
Indian Trader	*Vishva Usha*	*Dumra*
Vishva Vijay	*Vishva Vibhuti*	*Ratna Usha*
State of Andhra	*Jalakrishna*	*Desh Bandhu*
Bahadur	*State of Assam*	*State of Madras*
APJ Sushma	*Rama Jayanti*	*Krishna Jayanti*

(*Opposite page* 192)

Presentation of barographs at Bracknell on 13th January 1970; left to right: Captain J. Baird, Captain A. J. F. Colquhoun, M.B.E., Mr. P. J. Meade, Captain J. Hogg and Captain G. A. White (Marine Superintendent, Meteorological Office) (*see* page 185).

(*Opposite page* 193)

Presentation of barographs on 4th June 1970; left to right: Captain P. A. Ogden, Captain J. D. Bennett, Captain and Mrs. H. J. D. Sladen, Dr. B. J. Mason and Mr. G. W. Weston (*see* page 186).

Recipients of Canadian Excellent Awards—1969

Name of Vessel	Captain(s)	Principal Observing Officers	Radio Officers	Owner/Agent
Acadia	J. W. C. Taylor	F. W. Sheppard	N. G. Best	Government of Canada
Baie St. Paul	C. K. Stowe	—	—	Canada Steamship Lines Ltd.
Baffin	P. M. Brick, A. R. Turnbull	—	J. E. Furness	Government of Canada
Belblue	J. Svendsen, K. Hoversholm	—	—	Anglo Canadian Shipping Co. Ltd.
Bluenose	W. H. Crocker	D. Vail, H. Whitehead	—	Government of Canada
Bridgepool	E. A. Snaith, E. Dunn	I. R. Duncan	—	Sir R. Ropner & Co. Ltd.
Canberra	R. M. N. Godfrey, E. G. H. Riddelsdell	J. B. Kilner, R. W. L. Pocock	R. J. Hawkins	P. & O. Lines Management Ltd.
Derbyshire	R. Weir, P. Saunders	—	—	Bibby Line Ltd.
Droxford	W. A. Ross	A. R. Pope	W. J. Peat	Risdon Beazley Ltd.
Ephestos	C. N. Papapolizos	—	—	North Pacific Shipping Co. Ltd.
Frank A. Sherman	J. E. Fox	—	—	Upper Lakes Shipping Ltd.
French River	F. Fortin	—	—	Canada Steamship Lines Ltd.
Gypsum Countess	R. T. Luckey, R. Koppel	F. W. Schnare	T. E. Potts	Fundy Gypsum Co. Ltd.
Gypsum Empress	O. K. Langdon, R. C. Riley, E. S. Creaser	P. A. Heathcote	D. J. Oliver	Fundy Gypsum Co. Ltd.
Gypsum Prince	N. Crowe, R. A. Behnan	C. R. Coste	—	Fundy Gypsum Co. Ltd.
Gypsum Queen	J. A. Blinn, O. K. Langdon	—	—	Fundy Gypsum Co. Ltd.
H 1070	J. Hardine, M. Dixon, G. P. Blaney	—	D. Cruise	Kent Line Ltd.
Hollands Burcht	C. Tjebbes	—	—	Dingwall Cotts & Co. Ltd.
H. R. MacMillan	J. Richardson, P. Roberts, J. Walling, B. O. H. Brown	—	—	Canadian Pacific Steamships Ltd.
Hudson	M. Wagner, D. W. Butler	—	P. B. Rafuse	Government of Canada
Iberia	R. E. J. Fox, R. J. H. Cutler	—	—	P. & O. Lines Management Ltd.
Imperial St. Lawrence	J. C. Matthews, C. H. L. Ritcey	—	B. L. Saunders	Imperial Oil Ltd.
Inverleith	J. Rendall, S. Sutherland	—	—	Chr. Salveson & Co. Ltd.
John A. Macdonald	P. M. Fournier	—	N. T. Kristensen	Government of Canada
Kapuskasing	W. J. Vieau	G. K. Zinck	H. R. Ackerman	Government of Canada
Lake Manitoba	M. E. Scrutton	—	—	Carryore Ltd.
Limnos	D. W. Butler, T. Managan	—	—	Government of Canada
Manitoulin	R. Drummond, J. G. Smillie	—	—	Canada Steamship Lines Ltd.
Maritime Pioneer	Y. Y. Lun	—	—	Vanport Shipping Agency Ltd.
Martin Karlsen	H. Brandal	—	—	Government of Canada
Ontario Power	T. Brooks, G. H. Davies	—	—	Upper Lakes Shipping Ltd.

Canadian Excellent Awards (*contd.*)

Name of Vessel	Captain(s)	Principal Observing Officers	Radio Officers	Owner/Agent
Oriana	C. Edgecombe, W. B. Vickers	D. E. Mullins	E. R. Le Gear	P. & O. Lines Management Ltd.
Ottercliffe Hall	A. MacMillan	—	—	Hall Corporation of Canada
Port Dauphine	A. A. F. Hodge	—	—	Great Lakes Institute
Princess of Acadia	J. A. Blinn	P. Petrovitch	W. E. Fontaine	Canadian Pacific Railways
Red Wing	L. E. Burden	—	—	Upper Lakes Shipping Ltd.
Saguenay	J. M. Coleman	—	—	Canada Steamship Lines Ltd.
Silvercape	A. N. Hirst, R. Safe	B. Park	J. D. Leahy	Silver Line Ltd.
Simandou	R. W. Jones, J. N. Gourie	—	—	Harrisons (Clyde) Ltd.
Sir Humphrey Gilbert	G. W. Brown, J. Rose	D. Daly	—	Government of Canada
Spume	R. McLean	—	—	Government of Canada
Star Taro	M. Torsvik	—	—	Starbulk Shipping Co. Ltd.
Texada	J. N. Hood	—	M. Hayata	Wingate International Shipping Co.
Wheat King	J. B. Hartford, H. Eespere	—	—	Upper Lakes Shipping Ltd.

Book Reviews

Choosing and Using Ship's Radar. A Brief Guide, by Captain F. J. Wylie, R.N. (Ret.). 10 in × 6¼ in, pp. 150, *illus.*, Hollis and Carter Ltd., 9 Bow Street, London, W.C.2. Price: 45*s*.

The purpose of this book is to examine the respects in which radar has not measured up to the future predicted for it when commercial radar was being developed after the war. There can be little doubt that few, if any, are more competent to undertake the task of writing this book than Captain Wylie who is well known for his knowledge and study of marine radar and its use in avoiding collisions at sea. It is with this particular use of radar in mind that the book has been written.

The author has been careful to avoid technicalities in describing the rudiments of radar and this is simply and effectively achieved by visual analogy and could be followed by those who have no previous knowledge of the subject. The eight chapters deal, in considerable detail, with many aspects such as design to meet operational needs, design for reliability, choice of equipment, installation and maintenance on board, recording of radar data and methods of plotting. Finally, assessing the risk of collision and considering the action needed.

Many ships are now equipped with expensive radars and plotting equipment and there can be little doubt that it would be helpful for many of those responsible for the purchase of such equipment to read this book before making a decision on the type or types to be provided for the safe navigation of ships.

Although much progress in the reliability of radar has been made during the past years I would have considered it unlikely that a competent and experienced navigator would commit himself to a piece of intricate navigation in narrow waters, or some anti-collision action, the success of which depended solely on radar. However, one of the Appendices in this book contains too many such cases which have proved to be unsuccessful. The masters and officers involved in the collisions which resulted no doubt considered themselves competent and experienced navigators, yet they made dangerous mistakes due, largely, to the fact that they had insufficient knowledge of the use of radar. It would therefore be worth while for those who do not have an opportunity to choose the type of radar to be provided in ships to also read carefully the Appendices of this most useful book as well as the chapter "Assessing the Risk of Collision and Considering Action Needed" as this is particularly helpful to the inexperienced bridge watch-keeping officer who often fails to realize that he may be becoming involved in a serious situation and how rapidly such situations develop.

Choosing and Using Ship's Radar could make a most useful contribution to any navigator's library.

G. A. W.

The Lure of the Sea, by D. H. Clarke. 8¾ in × 5¾ in, pp. 157, *illus.* Adlard Coles Ltd., 3 Upper James Street, Golden Square, London, W.1. 1970. Price: 36*s*.

An escapist guide to running away to sea in a boat of one's own: buying, equipping and manning her is what this book is mostly about.

The author begins by relating how he tried to run away to sea in his own boat. He failed, but in the process gathered invaluable information on the subject which he has since supplemented from many years in the business side of yachting. He surmises, and the reviewer agrees with him, that there must be many sailing enthusiasts whose fondest wish is to escape from the routine drudgery and frustration of civilization by facing the challenge of sailing a small boat on a long ocean voyage in the tradition of Slocum, Chichester, Rose, Knox-Johnson and others of lesser fame.

A fascinating account is given of some lesser-known feats of sailing small boats on long voyages for pleasure, as opposed to many great feats of endurance and skill performed from necessity by shipwrecked mariners, castaways and mutineers, some of which are fairly well known.

The author's research traced the beginning of blue-water sailing for pleasure to about the middle of the nineteenth century when one C. R. Webb, with a crew of two, sailed from New York to Liverpool in thirty-five days, one man being lost overboard on the first night at sea. Then in 1895 Joshua Slocum commenced his famous voyage around the world in *Spray* and completed the first recorded single-handed circumnavigation, covering a distance of 46,000 miles in three years and two months. Long ocean voyages have been made by determined 'escapists' in some very curious craft for such a purpose. One such sailed west about from Vancouver to England in an Indian dug-out canoe. Another sailed a 15-foot boat from Plymouth via Spain to the Azores, from where he crossed to Bermuda in sixty-seven days. The following year William Verity, an American, sailed from Florida to Tralee in Ireland in sixty-eight days in a 12-foot boat. A comprehensive list of books on the subject of voyages made in small boats up to the beginning of the sixties is provided for those who wish to study the exploits of those intrepid mariners as a preliminary to planning their own adventure.

Some very sound and useful advice is given on the important matter of acquiring a suitable boat for a long ocean voyage, ranging from the one-off, specially-built job to the D.I.Y. effort and, in between, the production boat and hunting in the second-hand market—the choice being largely governed by what one can afford.

Many books have been written in recent years about fitting out a small boat for an ocean voyage and there is no shortage of literature on the subject of off-shore sailing in a small boat. But this amusing and readable book presents, in a realistic manner, some of the hard and inescapable problems which must be faced, preferably at the 'pipe-dream' stage, by anyone planning to purchase a boat and sail away to freedom, if the plan is to stand any chance of success.

One piece of advice is worth noting by those who really want to find out if a girl is worth marrying: first take her on a fortnight's coastal cruise in a small boat. If you can both stand fourteen days of close proximity under the stresses which inevitably will occur, and still love each other after it is all over, then you undoubtedly should get a special licence and marry immediately because it is extremely unlikely you will ever find another wench as good. No one will doubt the wisdom of this counsel.

A. D. W.

Personalities

OBITUARY.—We regret to record the sudden death of CAPTAIN A. HARRISON at the end of March in his ship, the *Forthfield*, on passage from Lagos towards Curaçao.

Alan Harrison was born in 1923 at Darlington. He joined Hunting & Son Ltd. as an apprentice in 1938 and served with them throughout his sea-going career except for a brief period during 1956 as a Suez Canal pilot. He was appointed to his first command, the *Laganfield*, in May 1952 and in October 1969 went to his last command, the *Forthfield*.

Captain Harrison's first connection with the Meteorological Office was in 1946 when he was serving in the *Clydefield*.

He is survived by a widow, a son and a daughter to all of whom we extend our condolences.

C. J. D. S.

RETIREMENT.—COMMANDER W. P. GOODFELLOW, D.S.C., V.R.D., R.N.R., Port Meteorological Liaison Officer in Hong Kong since 1948, has retired.

William Pattisson Goodfellow was born at Lymington, Hants. in 1909 and educated at Parkstone Grammar School. In 1926 he signed indentures with Messrs.

Thos. & Jno. Brocklebank Ltd. being appointed to their *Makalla*; he subsequently served in the *Mahout* and *Malakuta*.

Goodfellow passed for Second Mate in 1930, the year in which the great shipping depression reached its very nadir; hundreds of certificated officers were forced to come ashore to follow unfamiliar and uncongenial occupations until the tide would turn. For many it never did. After a number of jobs in the building industry, in boat-building yards and in road transport Goodfellow joined the staff of the Bournemouth Gas and Water Company in 1933.

In 1937, when the war clouds were gathering over Europe, the Admiralty formed an entirely new body, the Royal Naval Volunteer Supplementary Reserve. This was a purely civilian body of men with a former connection with the sea, wearing no uniform and carrying no rank and obligated to nothing except to offer themselves for an R.N.V.R. commission should war break out. Goodfellow was a founder member of this 'club' (for its genesis and life was nothing if not club-like) and on 1st September 1939 was commissioned as Lieutenant R.N.V.R. and appointed to H.M.S. *Victory* for training. In November 1939 he was appointed to the destroyer *Ilex* and in June 1940 was appointed to command H.M.S. *Thasos*, a tug operating out of Alexandria and equipped to tow a magnetic sweep.

He was on the staff of the Senior Naval Officer of the landing party during the Dieppe raid of 1942 and subsequently, for the next three years, commanded the destroyer H.M.S. *Wensleydale*. During this period he was awarded the D.S.C. and twice mentioned in dispatches, his chief exploits being the sinking of two U-boats in the Channel and escorting many convoys to the Far Shore during the Allied return to Europe in 1944. Towards the end of the war he was appointed as spare destroyer Commanding Officer in the British Pacific Fleet and on one occasion in this capacity he had charge of a convoy of harbour craft from Sydney to Hong Kong. The north-east monsoon prevented many of the smaller vessels from making the final stage of the passage from Subic (Luzon) and they were brought across the China Sea in a heavy-lift ship, arriving in Hong Kong in March 1946 nearly six months after leaving Sydney. Until demobilization in December 1946 Goodfellow was serving on the staff of the Commodore-in-Charge, Hong Kong, his last appointment being as Acting Vice-Consul in the British Consulate-General in Canton during which time his main job was tracing British craft and machinery which had been brought to Canton from Hong Kong during the Japanese occupation of the Colony.

Goodfellow stayed out East after demobilization and joined the Hong Kong Government Service, serving as a temporary agricultural officer in the Government vegetable-marketing organization before transferring to the Royal Observatory in 1948. He joined the Hong Kong R.N.V.R. in 1949, was promoted to Commander in 1957 and appointed to command the division from which he retired in 1960.

During the 22 years that Goodfellow was Port Meteorological Liaison Officer in Hong Kong he must have become known to hundreds of officers in U.K. voluntary observing ships for, though he had a Hong Kong voluntary observing fleet to look after, he always had a soft spot for U.K. voluntary observing ships and many are the meteorological logbooks from ships on the Far Eastern run which have contained a complimentary remark about him or the service which he had rendered. It was he who first suggested that Commonwealth Port Meteorological Officers might be allowed to carry a stock of instruments for the replenishment of U.K. voluntary observing ships, an idea which has proved its worth in dozens of instances and which has since been adopted in many other Commonwealth ports. He always kept a watchful eye on the all-too-many ships which were sold whilst they were on passage to the Far East and whipped the instruments out of them before it was too late.

He is being succeeded in Hong Kong by Mr. Edmund W. K. Chu (see page 198).

Since he retired last January Goodfellow has not enjoyed the best of health though he tells us that he is now on the mend. We hope that this will continue and in wishing him a long, happy and healthy retirement may we also thank him for all the services which he has rendered us and the U.K. voluntary observing fleet over the past 22 years.

L. B. P.

Notices to Marine Observers

PORT METEOROLOGICAL LIAISON OFFICER IN HONG KONG

Mr. Edmund W. K. Chu has succeeded Commander W. P. Goodfellow as Port Meteorological Liaison Officer in Hong Kong. The address, telephone number and services available will, of course, be the same as they were before.

Mr. Chu graduated as a B.Sc.(Physics) at Dalhousie University, Nova Scotia in May 1961. In February 1962 he completed the Meteorological Officers' course in the Canadian Meteorological Service and in the next six months worked as an aviation forecaster at Calgary International Airport, Alberta.

From September 1962 until August 1963 he was a teacher in mathematics and physics in St. Clare's Girls' College, Hong Kong and from September 1963 until April 1964 he was lecturer in mathematics and physics in the Technical College, Hong Kong.

In February 1964 he joined the staff of the Royal Observatory, Hong Kong as Scientific Officer and from May 1964 until August 1968 he was Meteorological Officer-in-Charge at Kai Tak Airport. From September 1968 until May 1969 he was attending the M.Sc. course in the University of Hawaii, with particular emphasis on Advanced Tropical Meteorology.

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

Headquarters.—Captain G. A. White, Marine Superintendent, Meteorological Office (Met.O.1a), Eastern Road, Bracknell, Berks. RG12 2UR. (Telephone: Bracknell 20242, ext. 2456.)

Captain A. D. White, R.D., Lt.-Cdr. R.N.R., Deputy Marine Superintendent. (Telephone: Bracknell 20242, ext. 2543.)

Lieut.-Commander L. B. Philpott, D.S.C., R.D., R.N.R., Nautical Officer. (Telephone: Bracknell 20242, ext. 2461.)

Mersey.—Lieut.-Commander E. R. Pullan, R.D., R.N.R., Port Meteorological Officer, Room 709, Royal Liver Building, Liverpool L3 1HN. (Telephone: 051-236 6565.)

Thames.—Mr. J. C. Matheson, Master Mariner, Port Meteorological Officer, Movement Control Building, South Side, Victoria Dock, London, E16 1AS. (Telephone: 01-476 3931.)

Bristol Channel.—Captain F. G. C. Jones, Port Meteorological Officer, 2 Bute Crescent, Cardiff CF1 6AN. (Telephone: Cardiff 21423.)

Humber.—Mr. W. G. Cullen, Master Mariner, Port Meteorological Officer, c/o Principal Officer, Board of Trade, Trinity House Yard, Hull, HU1 2LN. (Telephone: Hull 36813, ext. 27.)

Clyde.—Captain R. Reid, Port Meteorological Officer, 118 Waterloo Street, Glasgow, C.2. (Telephone: 041-248 4379.)

Forth.—All enquiries to Captain Reid above.

Tyne.—Captain C. J. D. Sutherland, Merchant Navy Agent, c/o F. B. West & Co., Alex Mitchell (Services) Ltd., "A" Floor, Milburn House, Newcastle-upon-Tyne, NE1 3DE. (Telephone: Newcastle 23203.)

Southampton.—(*To be appointed*), Port Meteorological Officer, Southampton Weather Centre, 160 High Street below Bar, Southampton SO1 0BT. (Telephone: Southampton 20632 or 28844.)

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[*Subjects of* Book Reviews, Editorials, Notices to Marine Observers, Notices to Mariners, Photographs *and persons named in* Retirement *and* Obituary *notices, are indexed under these general headings.*]

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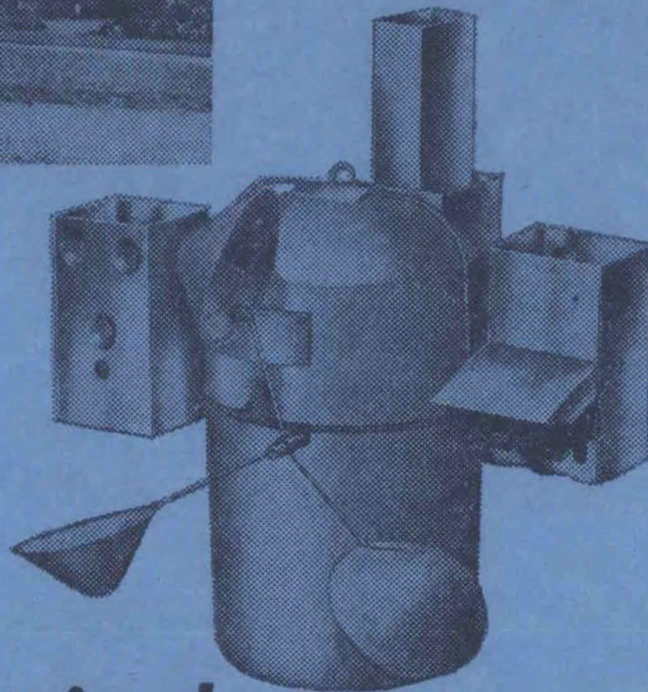

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