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THE MARINE OBSERVER

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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.

LARGE HAILSTONES

Ionian Sea

s.s. *British Bombardier*. Captain P. Richards, M.B.E. Trieste to Tripoli. Observers, Mr. R. N. C. Stevens, 2nd Officer and Mr. E. A. McGuran, Radio Officer.

30th December 1971. At 1400 GMT the vessel was off the west coast of Zante Island in the Ionian Islands chain. The wind was E'S, force 4 gusting to force 6, and a heavy build-up of stratus was observed ahead. The vessel steamed into moderate to heavy rain, followed at 1430 by heavy hail lasting 5 min. Hailstones up to 21 mm were taken off the bridge wings when precipitation ceased. Pressure 1020·2 mb, steady. Course 148°T at 14·2 kt.

Position of ship: 37° 49′N, 20° 36′E.

Note. The vigorous convection required to produce large hailstones of the size reported was produced by a trough which extended eastwards into the Ionian Sea.

UNUSUAL CLOUD FORMATION

off Western Australia

m.v. *Dongara*. Captain L. MacEwan. (Coastal trade.) Observer, Mr. R. Floyd, 3rd Officer.

14th December 1971. At 1020 GMT an unusual cloud was seen to the south, about 20 miles distant, extending all across the horizon. It looked like the vapour trail of an enormous jet aircraft but had a grey base at a height of 1,500 ft, vertical distance 1,000 ft and horizontal diameter of 1,000 ft. The sky was otherwise clear except for a small Cb cloud in the distance. At 1035 the line of cloud was about 10 miles off and the barograph showed a steep climb. By 1050 the cloud was directly overhead, accompanied by a very cool breeze of 12 kt in the direction of its passage, 340°T, and it only took a moment to pass over. This was the time of the maximum pressure reading of 1008·6 mb, a rise of 2 mb in 15 min. Air temp. 25·2°C, wet bulb 24·6°. (The cloud beyond was a mixture of C_M7 and C_M8 with slight

precipitation not reaching the sea.) From the time the line of cloud appeared in the south to its disappearance in the north was about 1 hr, with an estimated speed of 40 kt.

Position of ship at 1020: 20° 09′S, 117° 38′E.

Note 1. The phenomenon reported by the *Dongara* is a 'roll-cloud'—a characteristic feature of any squall, whether it be a Southerly Buster or, as in this case, a very mild and dry squall. The speed of the line, reported as 40 kt, would normally lead to a much more substantial gust as the 'roll-cloud' passed overhead.

Note 2. At the time of this report the *Dongara* was an Australian Selected Ship.

CURRENT RIPS

Indian Ocean

m.v. *Manora*. Captain F. Bell. Trincomalee to Port Pirie. Observers, the Master and 3rd Officer.

21st October 1971. At 0830 GMT a distinct demarcation line was seen on the sea, running approx. 055°/235°T. The distinction was between the smooth water to the north and the rougher water to the south. The vessel's wake had a sharp break-point where it appeared suddenly offset and at this point the helmsman had to apply considerable helm to maintain course. Within a minute or so the two wakes were considerably separated though it was impossible to say which had moved in relation to the other. There was a change in sea temperature between the two parts: 20·0°C to the north and 17·8° to the south. Course 156°T at 16 kt.

Position of ship: 30° 25′S, 112° 31′E.

Note 1. Current rips are most frequently reported at the boundaries between major currents but they also occur, as in this case, well away from these boundaries. The factors causing them are not fully understood; perhaps short-period current observations from satellite fixes may, one day, provide the answer.

Note 2. The *Manora* is an Australian Selected Ship.

DISCOLOURED WATER

Australian waters

m.v. *Eigamoiya*. (Captain not named.) Lae, New Guinea to Melbourne. Observers, Mr. J. Brunton, Chief Officer, Mr. R. A. Ridsdale, 3rd Officer, Mr. H. MacAdie, Cadet and Mr. M. Kofe, Cadet.

13th November 1971. Between 0800 and 1130 SMT three browny-yellow patches were observed on the sea surface. At first they looked like particles of pollen but, on closer examination of the sample we obtained, they could be some form of marine creature. These patches were arranged in a kind of well-ordered streak-like form extending NNE to SSW. At the time the vessel was running south along the 100-fm line about 10 miles off the coast between Cape Byron and Wooli Head. The water sample was obtained from the middle of one of the patches. Air temp. 25·0°C, sea 22·2°. Wind NE, force 2. Moderate SSE'ly swell. Few clouds, fine and clear.

Position of ship (approx.): 29° 00′S, 153° 40′E.

Note 1. Dr. G. T. Boalch of The Laboratory, Citadel Hill, Plymouth, comments:

"This sample contained a large number of colonies of what I think is a blue-green alga but of a form completely unfamiliar to me. They appear as small green pellets and float on the surface. The samples do not appear to be preserved and, as the plants appear to be quite healthy, we are trying to grow them for further investigation. The material is the same as that collected by the *Tekoa* in January 1971 at 24°S, 175°E. At first I thought this material may have been washed out to sea by flood water but as the same material was found far out at sea by the *Tekoa* I do not now think this is so."

Note 2. The *Eigamoiya* is an Australian Selected Ship.

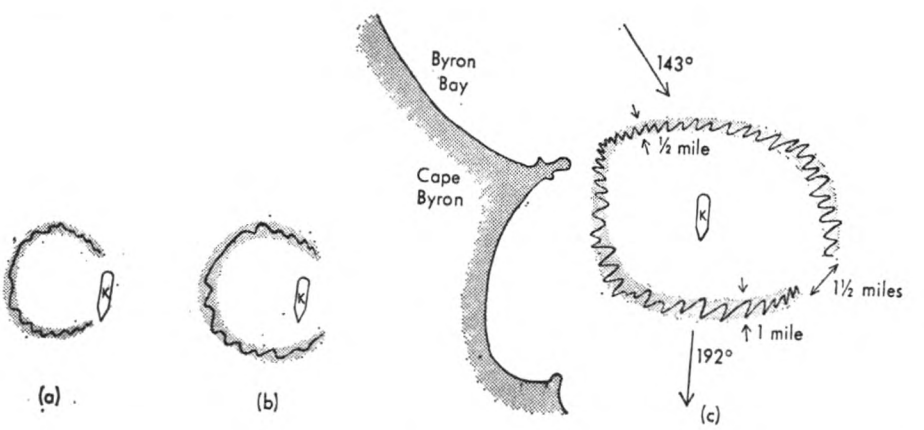
RADAR ECHOES

Australian waters

m.v. *Kooringa.* (Captain not named.) Brisbane to Sydney. Observer, Mr. N. Moir, Radio Officer.

18th November 1971. When leaving port at 1400 SMT there was a strong s'ly wind, a heavily overcast sky and rain squalls with lightning and thunderstorms building up to the west. At 2200 the vessel was approaching Cape Byron on course 143°T at 16·5 kt. The wind had dropped to force 2. It was then observed on the radar that a bank of fog or mist was lying inland of the Cape. At 2252 Cape Byron was bearing 255°T with the ship now altered to steer 192°T.

At 2307 the Cape was abeam, bearing 282°T at a distance of 10 miles, and at this point the SW'ly wind suddenly veered to NW'ly, blowing quite fresh. On the radar an open-ended ring of mist was seen to drift across to the east, passing over the Cape and 'scooping up' the ship, as shown in the sketches.



The size of this ring was approx. 10 miles in diameter, thickness being ½–1 mile and the open end was about 1½ miles across. Being thus 'netted' we did not steam through the first part of the ring. It became quite humid; I was unable to obtain our wet-bulb reading but the dry bulb was 24°C. Pressure was 1001·9 mb, cloud ⅛, fine and clear. The vessels to the south and east of us were seen quite clearly; at no time did they become hidden, their steaming lights always remaining clear.

The ship later passed through the southern part of the radar mist, but I was unable to check on this as I was, by then, receiving local weather reports but, from the office, I noted that there was no visual evidence of this ring of moist air as we passed through it. This is the first time I have noted this type of reaction in this latitude and I put it down to the effects of a trough which at 1900 was lying NNW of Cape Byron and moving east at 20 kt. This was causing fresh to strong NW'ly winds and thunderstorms on and to the east of the trough.

The 1100 GMT (2200 SMT) weather reports from the Cape itself was "N'ly 4, haze, baro. 968, vis. 06, temp. 71°F". This barometer reading was received on the routine Brisbane Radio report but whether it was a transposition and should have read 986 I cannot say. But other barometer readings for other localities at the same time were all down to around 1000 mb. At midnight (1300 GMT) the wind was again SW, force 5 with a moderate head sea and low swell. Fine and clear.

The only other time I have struck anything like this was on m.v. *Windarra* (VKZL) in 1962. This was off Newcastle N.S.W. and the effect was a normal band being mainly due to what we now term 'industrial pollution'.

Position of ship at 2300 (approx.): 28° 36'S, 153° 48'E.

Note 1. Mr. R. L. Birch of the Commonwealth Bureau of Meteorology, Melbourne, comments:

"The observations reported by Mr. Moir appear consistent with land- and sea-backscatter

via a layer of air of high refractive index gradient. Observations of circular echoes around a ship have been previously reported, for example by R. H. Blackmer in the *Proceedings of the 8th Weather Radar Conference, 1960.*

"Speculatively, at 2200 a refractive layer, probably at the top of a radiation inversion, was situated only over the relatively low, gently undulating land behind Cape Byron, and back-scatter from land via this layer was observed. (The Cape itself is a more elevated headland some 300 feet high.) Around 2300 the cold layer was advected out to sea with the freshening wind. Before surrounding the ship, the early ring shape of the echo may have been due to the form of the easterly edge and to distortion of the layer as it moved out to sea. The refractive layer would have been at a height of only 100 feet or so—this sort of refraction appears to occur at grazing angles less than half a degree—and the open end of the echo could be due to break up of that part of the layer passing over the Cape. Increased humidity would be expected within the advected air but, as this is likely to be due to a fall in temperature, it is perhaps surprising that it was subjectively noticed. It is probable that the cold layer would not last more than a few tens of minutes over the sea with changing winds and heating from the sea surface."

Note 2. At the time of this report the *Kooringa* was an Australian Selected Ship.

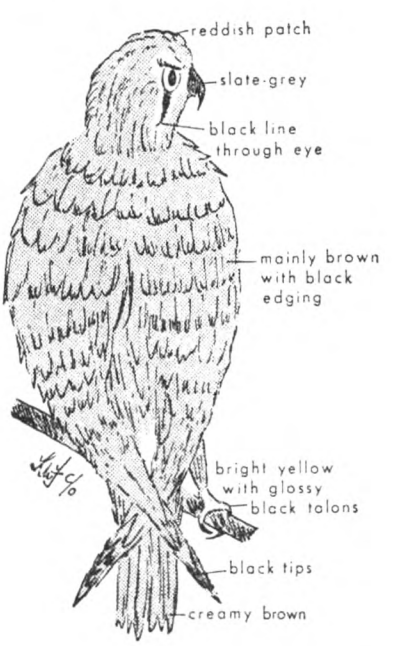
BIRDS

Southern North Atlantic

m.v. *Duhallow.* Captain J. Murray. Tubarão, Brazil to Emden. Observers, Mr. K. W. Fulker, Chief Officer, Mr. J. J. Sharp, 3rd Officer and Mr. D. English, Radio Officer.

10th October 1971. A small hawk landed on the bridge wing; it was easily frightened by the radio officer who did not have his glasses on and had to get closer in order to see it! Later that day the hawk returned and for the next few days haunted the vessel; it was later joined by another of the same kind.

Position of ship: 7° 00'N, 21° 38'W.

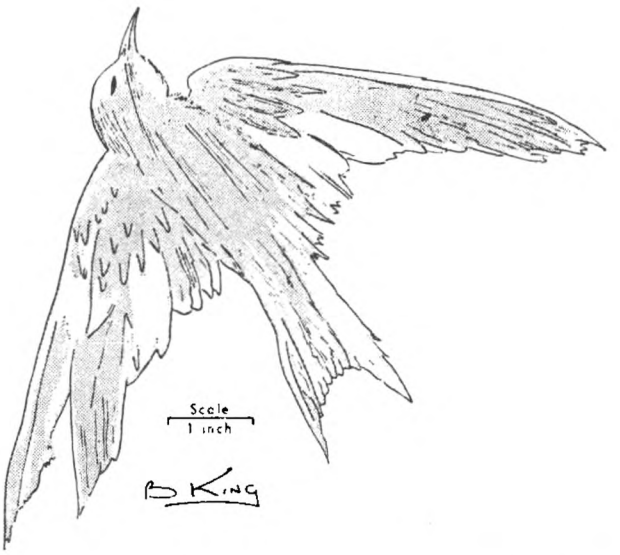


Note. Captain G. S. Tuck, Chairman of the Royal Naval Birdwatching Society, comments:

"This was a Red-necked Falcon (*Falco chicquera*). It belongs to the northern quarter of southern Africa and West Africa and was a long way out at sea."

s.s. *Platidia.* Captain J. G. Cormack. Port Harcourt to Curaçao. Observers, Mr. M. Rich, 2nd Officer and Mr. R. W. Birch, 3rd Officer.

7th November 1971. During the morning the body of a dead bird was found on the main deck in a roll of mats. It was mainly dark brown but had an orange



throat and breast. Wing span (fully extended) 11 inches; body length 5¼ inches. The bird had been noticed the previous day alighting on the ship, apparently exhausted.

Position of ship: 1° 29′N, 35° 00′W.

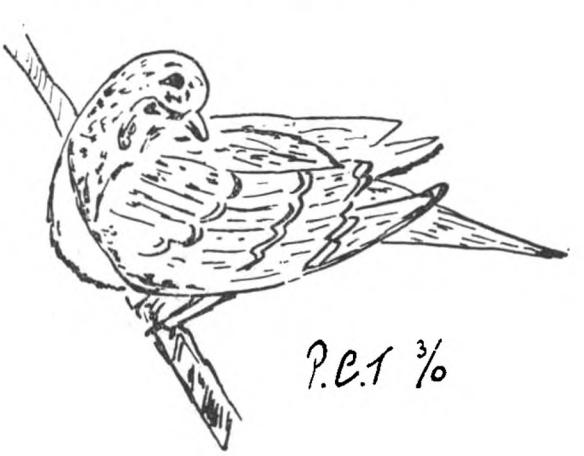
Note. Captain G. S. Tuck identified this bird as a Cave Swallow (*Petrochelidon fulva*) which breeds in the West Indies and wanders south in winter to South America.

Eastern North Atlantic

m.v. *Devon City*. Captain D. B. Jack. Cape Town to U.K. Observer, Mr. P. C. Thompson, 3rd Officer.

25th October 1971. For most of the morning the weather had been overcast with heavy continuous rain and an E'ly wind, force 4, but by noon the rain had stopped and the wind had dropped to force 2. At 1700 GMT a bird was observed on a topping lift wire just forward of the bridge. It was about the size of a small wood-pigeon and appeared to be exhausted. It had a light-grey head, a long black beak, a white underside and light-fawn breast. Reddish-pink scaly feet, not webbed, each having four toes. The wing feathers were generally a darkish browny-grey becoming lighter towards the fawn tips, the tail feathers being brownish-black with off-white tips. The bird remained on the vessel for about an hour and then flew off in a SW'ly direction.

Position of ship at 1700: 8° 16′N, 16° 47′W.



Note. Captain G. S. Tuck identified this bird as a Turtle Dove.

South Atlantic Ocean

m.v. *Astyanax*. Captain J. K. Winn. Durban to Hamburg. Observers, the Master and Mr. R. M. Maclure, 3rd Officer.

6th October 1971. At 0920 GMT a Wandering Albatross was seen flying around the ship and it also landed on the water but was unfortunately out of sight when it took off again. The bird had still a lot of brown on the wings and was quite large. Latitude 12°S is possibly a bit far north for albatross to be seen but the SE Trades, which had been quite strong for the previous four days, may have had some effect.

Position of ship: 12° 22′S, 0° 04′E.

Note. Captain G. S. Tuck comments:

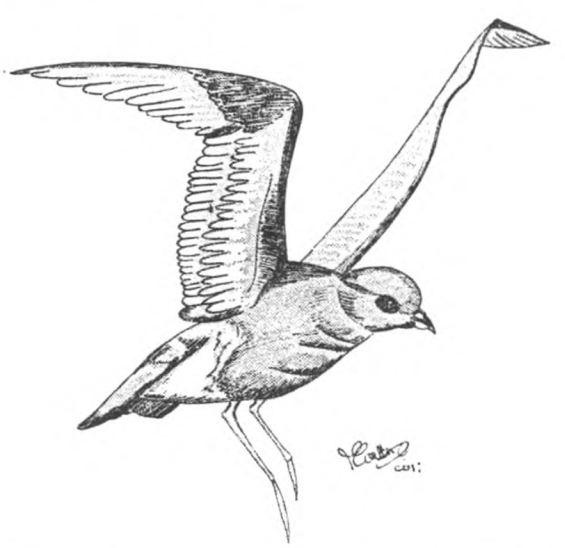
"This was an immature Wandering Albatross—not fully adult. We have only once had one reported as far north as 12°S."

North Pacific Ocean

s.s. *Pando Sound*. Captain G. C. Barrett. Panama to Yokohama. Observer, Mr. J. Carlton, Cadet.

29th October 1971. At 1800 GMT a bird, later identified as a Storm Petrel, was found on deck, apparently tired and in need of rest. The bird showed no signs of fear towards humans and drank freely when placed in fresh water. After sleeping for about an hour it showed signs of improvement and commenced flying round the cabin. The bird was identified by its white rump, square tail and sooty plumage. It had a slight protrusion on top of its beak.

Position of ship: 25° 35′N, 146° 40′W.



Note. Captain G. S. Tuck identified this bird as a Madeiran Storm Petrel (*Oceanodroma castro*), known to breed on the Hawaiian Islands. The 'slight protrusion' on its beak is the tubular construction of its nostrils, a feature common to birds of the order Procellariiformes to which the petrels belong.

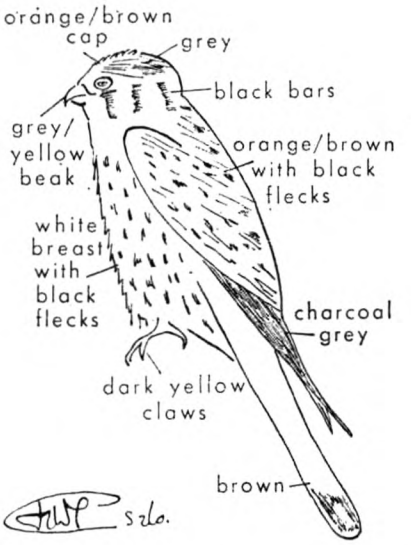
Eastern North Pacific

s.s. *Patroclus*. Captain L. H. Pound. Balboa to Yokohama. Observer, Mr. H. W. Simmonds, Snr. 2nd Officer.

20th–23rd October 1971. A kestrel-like bird was observed to follow the ship for three days between the following two positions. It was about 12 inches long. Details of its colouring are given in the sketch.

Position of ship on 20th: 16° 30′N, 111° 30′W.

Position of ship on 23rd: 20° 30′N, 134° 30′W.



Note. Captain G. S. Tuck identified this bird as an American Kestrel (*Falco sparverius*) which breeds from Mexico northwards through U.S.A. and Canada.

Indian Ocean

m.v. *Rhexenor.* Captain W. E. Bellamy. Singapore to Adelaide. Observers, Mr. E. J. Wood, 3rd Officer, Mr. J. A. Robertson, 2nd Engineer and Mr. R. Moore, 5th Engineer.

11th December 1971. At 1630 GMT, when 14 miles due east of Christmas Island, a fairly large bird (which was presumed to be a sea-bird by its webbed feet) was found on the boat deck suffering from exhaustion. It was taken inside to have a closer look at it in the light. During this time it made no effort to resist. On inspection it was found to be a brilliant shade of light yellow with black oval shapes round the eyes. Also it had a black line running down each wing and across its back. However, the most striking thing about its appearance was two large, thin feathers about 18 inches long which protruded from the main tail feathers. After a few minutes attempts were made to measure it but the bird became restless and so measurements given are not too accurate. Over-all length 16 inches and two 18-inch tail feathers. Wing span 3 feet, wings 7 inches, tail 4 inches, fan-shaped, beak $2\frac{1}{2}$ inches, slightly lighter in colour than feathers. Course 162° at $15\frac{1}{2}$ kt.

Position of ship (approx.): 10° 25′S, 105° 57′E.

Note 1. The ship's officers forwarded the above observation to the Australian Fisheries and Wild Life Department and received the following comment:

"The bird found on deck in the vicinity of Christmas Island was a White-tailed Tropic-bird. The reference to the brilliant shade of yellow on the body indicates that it was of the Christmas Island race. This species elsewhere, and its near relative the Red-tailed Tropic-bird, is normally white suffused with pink but those which breed on Christmas Island are strongly tinted in shades variously described in reference texts as salmon pink or apricot."

Note 2. The *Rhexenor* is an Australian Selected Ship.

Eastern South Pacific

m.v. *Hertford.* Captain J. M. Burn. Bluff, N.Z. to Balboa. Observers, Mr. J. W. Gill, Chief Officer, Mr. G. A. Bridge, 3rd Officer, Mr. H. M. Close, 2nd Officer, Mrs. Gill and children.

25th December 1971. At about 0200 SMT the look-out, keeping his watch on the monkey island, came down and asked if we would like some Christmas turkey 'on the wing'. He had almost been hit by one, he said, which subsequently landed on the bridge wing. Closer investigation revealed a Red-tailed Tropic-bird resting in

the corner of the port bridge wing. It appeared to be a young member of the species, having a black band through its eyes and numerous greyish feathers round its head. The bird remained on the bridge wing until the morning when at 0810 the Chief Officer, protected with working gloves, attempted to pick it up. On close approach the bird gave characteristic screeches and sat open-billed ready to defend itself. A flag was lightly placed over the bird and this quietened it sufficiently for it to be picked up and launched successfully. Flight was a little troubled at first but soon improved and the bird flew off in a NW'ly direction. The titbits of bread appeared untouched and there was a small amount of vomit on the deck containing a flying-fish fin.

Position of ship at 0200: 13° 15′S, 96° 10′W.

Indian Ocean

m.v. *Achilles*. Captain D. R. Hayward. Singapore to Cape Town. Observers, the Master, Mr. J. C. Cox, Chief Officer and Mr. D. Lancaster, Radio Officer.

15th December 1971. At 1530 GMT a bird was observed on board, approx. 11–12 inches long from the head to the tip of its folded wings. It was mainly grey in colour with a white breast and a white flash on its head. The grey wing feathers were large and well defined, each having white edges, and the wing primaries were black. Its hooked beak was yellowish with a black tip. Wind N'ly, force 2–3.

Position of ship: 26° 42′S, 43° 18′E.

Note. Captain G. S. Tuck identified this bird as a Red-necked Falcon (*Falco chicquera*).

BIRD'S NEST

Indian Ocean

m.v. *Clan Macleod*. Captain F. W. Moss. Colombo to Madras. Observer, Mr. A. J. Blackler, Chief Officer.

24th November 1971. After sailing from Colombo, straw was observed hanging from the bulkhead ventilator to the chartroom. On investigation a nest was found inside the ventilator with two eggs in it; one broke during detection.

The nest was built of straw, cotton and other pieces of waste material which are found lying about on docksides and on ships in port. The nest was put in a box with the remaining egg for forwarding to interested authorities. [It was later forwarded to the Natural History Museum.]

Position of ship at 1200 GMT: 06° 06′N, 79° 54′E.

Note. Mr. C. J. O. Harrison of the Sub-department of Ornithology, Natural History Museum, Tring, Herts., comments:

"From the nest and fragments of egg it would appear to have been that of a sparrow, probably the local race of the House Sparrow, *Passer domesticus*, and could well have been built, and the partial clutch laid, while the ship was in port in Colombo."

CRICKETS
off West Africa

s.s. *City of Leeds*. Captain M. W. Hartley. Walvis Bay to Belfast. Observer, Mr. G. D. Taylor, 3rd Officer.

14th October 1971. Between 0350 and 0410 GMT, about 35 miles due south of Dakar, a violent line squall was experienced from an easterly direction, bringing with it very heavy rain and high winds. By 0410 the worst had passed but intermittent rain continued until about 0800.

At daybreak it became apparent that the vessel was covered with an assortment of insects including hundreds of crickets, all presumably at the mercy of the storm. Many of the crickets were found to be dead around the decks though few appeared to have any external injuries. Those that survived soon recovered and it was not long before the ship was overwhelmed by their characteristic chorus. There appeared to be two types in evidence: one coloured black with creamish patches at the back of the head and one coloured brown with a black head and neck. The blacks outnumbered the browns by about 100 to 1. Various specimens have been collected but, regrettably, no brown males were found.

Both species seemed identical in size and shape and the brown females were by no means short of attention from the blacks! The female differed from the male in that its wing cases were mottled compared with the male's more definitely lined. The male also had what seemed to be an extra tail with a form of bulb at the end; this tail was split down the centre. All the crickets appeared adults, though could it be that the brown ones are the young? The familiar 'chirruping' was caused by friction when the wing cases were rubbed together; both sexes seemed to produce the same sounds, though the 'clucking' was more characteristic of the female.

Various reports of sightings of these creatures were read with interest (*The Marine Observer*, October 1970) and it was not too long before the *Longstone*'s report of cannibalistic tendencies was verified. A pair of black crickets was observed courting in the corner of the wheelhouse. Much exotic parading was undertaken by the female, accompanied by intense rubbing together of the wings causing a whirring sound with an occasional 'chirrup'. After much cavorting and provoking, the female (it is assumed) turned and stalked backwards, still whirring, until it was against the male, whereupon he mounted her. Unfortunately it was not possible to observe closer without disturbing them; once frightened they scuttled off in opposite directions. The male cricket suddenly stopped in its tracks and approached the corpse of another cricket (killed several hours before) and at once commenced to devour it. After a while it was joined by its mate and between them they consumed all but the wing cases. During this time the female made unsuccessful attempts to gain the other's interest but, typically, the male's stomach came before all else! They were captured and put down shortly afterwards. (It was noted that the male had one of its hind legs missing.)

Later in the day, attempts were made to collect a pair of brown crickets and also a black male with both legs intact. Whilst disturbing a colony of several dozen amongst some wooden gratings on the boat deck, some unfortunate crickets were crushed or had their heads severed from their bodies. Despite the panic induced by this disturbance, many of the crickets were seen to attack the mutilated bodies and headless corpses (some of which still fought back despite missing heads) and devoured them with untold ferocity. Others were observed to drag their kills away

with them, hindering their progress of escape, but once more the stomach came first.

A brown specimen was collected together with two black males. Both the black ones had their right hind legs missing. Eventually a male with two legs was found and has been included in the collection of specimens.

It would appear that these creatures were swept out to sea by the severe weather conditions prevailing. Dr. Ragge refers in *The Marine Observer*, October 1970, to "migrating crickets" but shows surprise at the apparent distances covered by these creatures. On a westerly heading the only place they could have been making for would be the Cape Verde Islands, a further 300 miles to the west. Perhaps it is usual for these West African crickets to take to the air at this time of the year, a time when the line squalls are most prevalent, thus accounting for the numerous sightings reported during October. Judging by the activities of those crickets on board it would appear that it was the mating season of these species, perhaps accounting for their numbers, behaviour and cannibalistic tendencies?

Position of ship (approx.) at 0400: 14° 12′N, 17° 42′W.

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

"The crickets landing on the *City of Leeds* are *Gryllus bimaculatus*, and seem to represent a recurrence of the cricket migrations of 1969. The differences in colour noted are simply individual variation. The 3rd Officer has confused the two sexes, perhaps because of the way in which these crickets mate. The 'extra tail' of the 'male' is actually the egg-laying instrument of the female."

m.v. *Clan Menzies*. Captain T. L. Kirby. Tenerife to Ascension Island. Observers, the Master and ship's company.

10th November 1971. Between 0430 and 0500 GMT a large swarm of crickets descended upon the vessel and the upper decks rapidly became infested. They appeared to be greatly agitated and moved around at high speed, leaping about 2–3 inches off the deck when a torch was suddenly switched on to them. They were also in full chorus which they kept up till well after sunrise. The insects' head, thorax and abdomen were a shining jet-black in colour, encased in a hard, protective outer shell, whilst the wings were a light brown, although the wing colour tended to vary between insects. Fortunately they did not invade the accommodation but preferred to remain outside. The nearest land was Portuguese Guinea, 85 miles to the east. Various other flying insects had been observed on the previous day as well as one or two land birds, including what appeared to be a young kestrel. Wind N'ly, force 2. Overcast, fine and clear.

Position of ship: 12° 25′N, 18° 15′W.

Note. Dr. D. R. Ragge comments:

"The swarm of crickets landing on the *Clan Menzies* was naturally of particular interest to me as this seems to have been a repetition of the migrating swarms of 1969. From the description it is almost certain that the species was *Gryllus bimaculatus*."

m.v. *Devon City*. Captain F. J. Johns. Las Palmas to Cape Town. Observer, Mr. P. G. Thompson, 3rd Officer.

18th December 1971. When in the vicinity of Cape Verde and Dakar, crickets were heard from various places aboard the vessel from midnight until dawn. During the morning several were observed on the boat deck in the shady recesses of the deck service-line hydrants and scupper pipes. In the evening two were heard in the inside alley-way adjacent to the Master's accommodation. They were located and killed with an aerosol insecticide spray. These perfect specimens were preserved in alcohol for forwarding to the interested authority. At 0001 GMT: Air temp. 23·1°C. Wind variable, force 1.

Position of ship at 0001: 13° 48′N, 17° 42′W.

Note. Dr. D. R. Ragge comments:

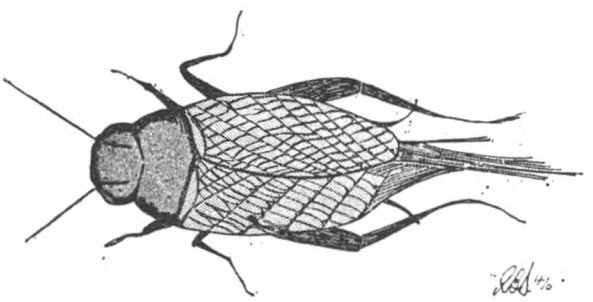
"The crickets found aboard the *Devon City* were *Gryllus bimaculatus*. Although they were not actually seen to land it seem quite likely from the 3rd Officer's report that they had migrated during the night from Cape Verde."

South Atlantic Ocean

m.v. *Strathconon*. Captain R. N. Firth. London to Cape Town. Observers, Mr. M. Read, 2nd Officer and Mr. R. B. Dunn, 4th Officer.

24th November 1971. At 0800 GMT a cricket was captured on the starboard bridge wing. The nearest land on the African mainland was Cape Palmas, Liberia, bearing N'W at a distance of approx. 440 miles. The surface wind was SSE, force 5 when the cricket was found and had been varying between S and SSE, force 3–5 for most of the previous day. The winds for the previous three or four days, however, had been N–NE, force 3–5. Judging by the very detailed account sent by Mr. Ward, 3rd Officer of the *Rothesay Castle* (*The Marine Observer*, October 1970) this particular specimen would appear to have all the characteristics of the male. This find was particularly interesting in view of the fact that it was the only cricket located on board and also that at the time of capture we were such a distance from the nearest land. Air temp. 23·4°C, wet bulb 20·3°. Course 143° at 21½ kt.

Position of ship: 2° 55'S, 6° 10'W.



Note. Dr. D. R. Ragge comments:

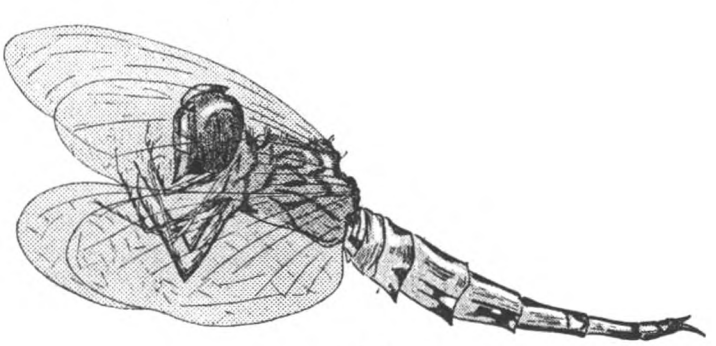
"There is little doubt from Mr. Dunn's detailed drawings that the cricket found on the *Strathconon* was *Gryllus bimaculatus*. However, in this case it cannot be established whether the insect had reached the ship by a migratory flight."

DRAGON-FLIES
off West Africa

s.s. *Benvannoch*. Captain J. R. Rodger. Amsterdam to Durban. Observers, Mr. W. Sinclair, 2nd Officer and Mr. A. Morrison, Cadet.

12th November 1971. At 1600 GMT the insect shown in sketch (drawn by Cadet R. Lawrie) was caught on the bridge and placed in a box; it died several hours later. Its over-all body length was 3 cm, wing span 5 cm. The head was brown with blue spots. The overlapping body scales were dark brown and green with a bluish tinge. The wings were transparent. It had six legs with spikes down the front.

Position of ship: 13° 08'N, 17° 49'W.



Note. Dr. Theresa Clay of the Department of Entomology, Natural History Museum comments:

"The sketch of the insect shows that it is a dragon-fly (order Odonata) of the family Libellulidae; without the specimen it is not possible to give a more exact determination."

Indian Ocean

m.v. *Clan Macleod.* Captain F. W. Moss. Port Louis, Mauritius to Colombo. Observers, Mr. A. J. Blackler, Chief Officer, Mr. D. A. Skarstein, Radio Officer and Mr. K. Thibbotumunuwe, 5th Engineer.

12th November 1971. At 1430 GMT a large dragon-fly was observed knocking around the officer's lounge near the draught-beer tap, apparently begging for ale. When no ale was forthcoming it became frantic and started to attack us. It was finally exterminated with a high-speed jet of double acting aerosol on account of its shocking behaviour unbecoming of a seaman. The remains of the victim now lie in a cigar box to be forwarded to the proper authority.

Position of ship (approx.): 00° 18′S, 76° 48′E.

Note. Mr. P. H. Ward of the Department of Entomology, Natural History Museum comments:

"I have identified the specimen as a female *Anax indicus*, Lieft, a species of which the Museum possesses a mere seven examples—the lack of material may be due to the average individual's early demise through alcoholism! I should therefore be grateful if we may retain the specimen for our collections, despite its previous unpardonable behaviour."

LOCUSTS

off West Africa

m.v. *Gorjistan.* Captain D. M. Foster. Durban to Gijon via Las Palmas. Observers, Mr. J. G. Jackson, 2nd Officer, Mr. E. D. J. Brown, 3rd Officer, Mr. R. Milne, Senior Radio Officer and Mr. J. Whamond, Electrician and intrepid hunter.

28th October 1971. At 0835 GMT, while the vessel was stopped, it was noticed that a few isolated yellow and grey locusts had appeared on board. Firstly, we must make it clear that none of us have ever seen a locust or been on such intimate terms with one as to be able to look him in the eye unabashed. However, having read all the information available (which is surprisingly sparse), we came to the conclusion that they may well be of such a species and duly sent an anti-locust report by radio with the hope that positive identification may be made when these remarks are read.

The time these insects ventured on board is not known exactly but they were first noticed at 0835 (wind E'N, force 4) when several isolated specimens were seen flying round the ship. When they alighted, Mr. Whamond delegated himself head of the safari expedition and with remarkable dexterity and animal cunning managed to capture three of the large grey and six of the smaller yellow varieties, sustaining, in the effort, a hefty kick from one indignant and most reluctant specimen which actually drew blood from his finger. Mr. Whamond expressed fervent thanks that they were not mule-sized.

The smaller insects were $1\frac{1}{4}$–$1\frac{1}{2}$ inches long, measured from the head to the end of the abdomen, and had a wing span of $2\frac{1}{2}$–3 inches. They had an over-all yellowish appearance with indications of light-brown shading on the legs, thorax and head, and darker shading on the wings. Their hind legs had four dark-brown marks on the tops when viewed from above and were coloured bright red on the lower insides. Their eyes displayed noticeable fine vertical brown and yellow stripes with a central dark spot indicating the iris. The undersides and abdomen were all yellow.

The larger specimens, which had a body length of $2\frac{1}{2}$ inches and a wing span of 5 inches, had a grey abdomen, grey underside of thorax and brownish mottled wings. The tops and insides of their hind legs were similarly marked to those of the smaller variety but the outsides were shaded yellow and grey. The lower limbs had a row of red, yellow and brown spikes which explained Mr. Whamond's injury. The head,

sides of thorax and protective plating of the neck had yellow, brown and grey stripes whilst the after part of the neck plating was grey and marked with a number of small white spots. The mandibles of both types had four tiny exterior 'feelers' which were used for feeding; they had a voracious appetite for lettuce.

Two of the smaller specimens were sealed in a bottle of surgical spirit in an attempt to preserve them, no formalin being available, and we hope to keep one large and two small specimens alive until the vessel reaches the U.K. If they fail to survive we shall probably deep-freeze them until they can be forwarded to the Anti-Locust Research Centre. We hope that even if they are not locusts they will be of some interest and that more information, which will make locust identification easier, will be forthcoming.

Position of ship: 16° 47'N, 17° 45'W.

Note. Mr. I. B. Jones of the Desert Locust Information Service wrote to the ship:

"Thank you for the tin and bottle containing specimens and for the vivid account of the capture, together with the comprehensive description of the insects.

"The smaller are specimens of a grasshopper, *Catantops axillaris*, and the larger specimen is a tree locust, *Anacridium melanorhodon*. Both of these species are of economic importance.

"I am sending you a copy of the Desert Locust recognition handbook and sincerely hope you will find it both interesting and helpful."

MARINE LIFE

Eastern South Atlantic

s.s. *City of Leeds*. Captain M. W. Hartley, Walvis Bay to Belfast. Principal observer, Mrs. M. W. Hartley.

8th October 1971. Between 0900 and 1200 GMT the vessel was stopped for engine-room requirements and lay beam on to the wind and swell, heading approx. 250°T. During the period many 'by-the-wind sailors' were observed floating past the starboard (leeward) side of the vessel. It was duly agreed that these creatures were sailing on the 'starboard tack' in a NE'ly direction. Several specimens were kindly obtained by the Master's wife and, after examination, were put into a solution of formalin. No striking difference was apparent between our sample and the species sketched on page 65 of the April 1970 edition of *The Marine Observer*. Wind SE'S, force 3. Sea temp. 22·1°C.

Position of ship: 9° 17'S, 1° 16'E.

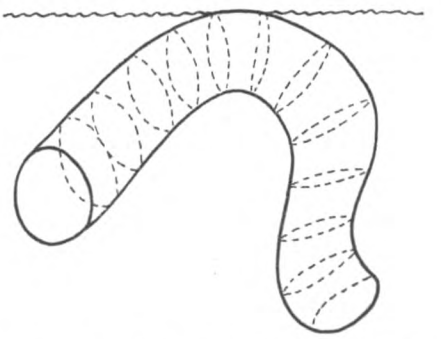
Note. The sample from the *City of Leeds* (which looked like 'discoloured water') was forwarded, in error, to Dr. G. T. Boalch, The Laboratory, Citadel Hill, Plymouth, who comments:

"The sample contains four very good specimens of *Velella velella*, commonly known as Jack sail-by-the-wind, by-the-wind sailors or salle man. *Velella* is described and illustrated in *Nature Adrift*, by James Fraser (G. T. Foulis & Co., London, 1962) and *The Open Sea: the World of Plankton*, by Sir Alister Hardy (Collins, 1964). It is a type of jelly-fish which has a series of air-filled chambers to keep it afloat. The upper surface is drawn up to form a membraneous wing or sail by which the animal is blown along. The sail is not set true fore and aft but is offset to one side so the animals are said to be left- or right-handed. When alive the animals are 1–3 inches long and coloured a deep purplish-blue. They are quite common in the warmer parts of the Atlantic and in some summers are washed up in fair numbers on our south-western shores. It is said that it is mainly the left-handed ones which reach our coast."

at Bridgetown, Barbados

m.v. *Geestbay*. Captain J. Milner. In harbour. Observers, Mr. J. R. Durnford, 2nd Officer and Mr. B. Avril, A.B.

14th December 1971. During the morning the animal shown in the sketch was seen floating off the ship while berthed in the new harbour at Bridgetown. It was observed at a distance of about 30 ft. Its body was transparent with fine black 'ribs'. When viewed at certain angles a turquoise/speckled-red colour could be seen. Its general appearance was like a hollow tube about 6 inches in diameter and 3–4 ft long.



It appeared to be of a substance similar to a jellyfish. While under observation the top end was just below the surface and the other end was twisting and turning, mainly facing the harbour bottom. Several local people were asked about it, but they all said they had not seen anything like it before.

Position of ship: 13° 05′N, 59° 37′W.

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

"The tubular, jelly-like object is most likely to have been a colony of *Pyrosoma*, related to salps but not strictly one, though coming within the Tunicata. These are usually seen in the open ocean but may be washed inshore and colonies up to 30 ft in length have been reported from New Zealand waters."

ABNORMAL REFRACTION

Mediterranean Sea

m.v. *Port Townsville.* Captain J. McManus. Cape Town to Genoa. Observer, Mr. G. H. R. Duff.

12th November 1971. At 1400 GMT, as the vessel left the Strait of Gibraltar, several examples of mirage were seen off the port bow. The sharply-defined outline of the superstructure of a naval ship was observed at a considerable height above the horizon; this lasted for several minutes and the complete ship was never seen (no radar echo).

A few minutes later a coaster was observed with only bow and stern visible. This, too, appeared at quite some height above the horizon. The lines of the ship were discontinued with no superstructure visible but 20 min later the entire ship was seen on the horizon at roughly the same bearing. Air temp. 13·8°C, wet bulb 11·2°, sea 13·1°.

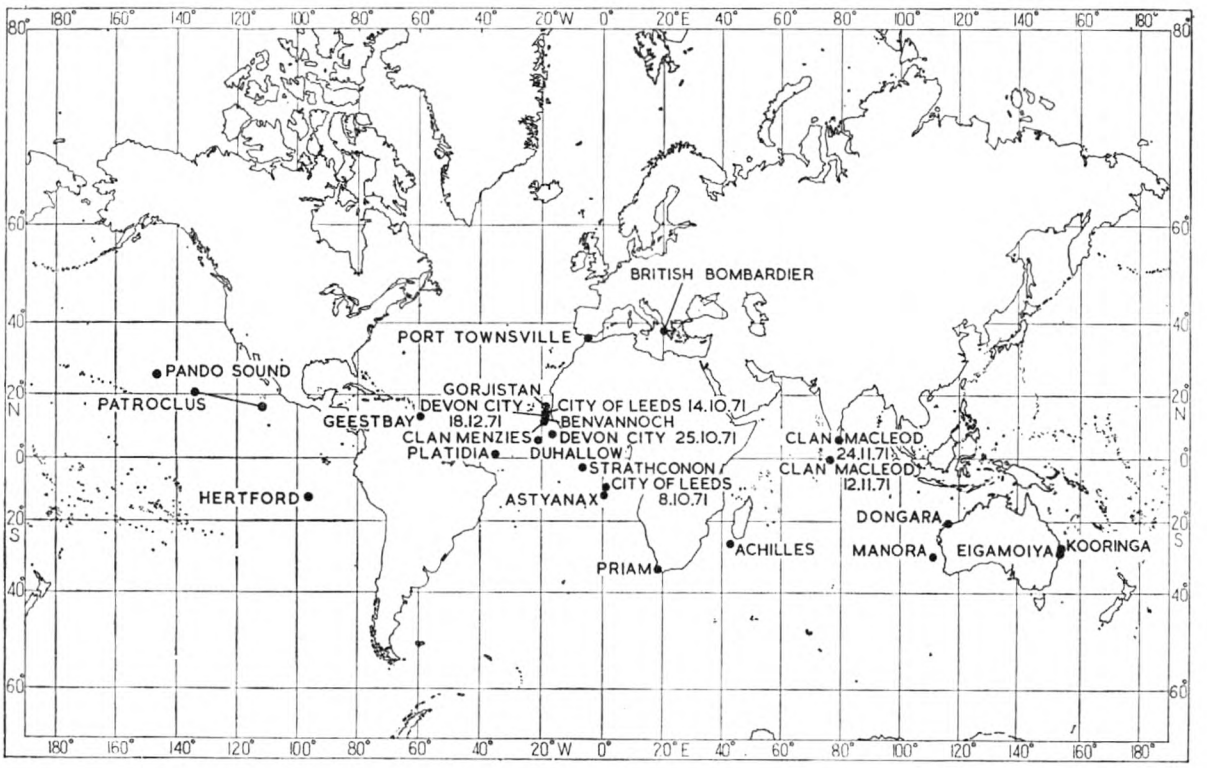
Position of ship: 35° 58′N, 5° 15′W.

Note. A ridge of high pressure provided a low-level inversion which accounted for the abnormal refraction reported above.

off Cape Town

m.v. *Priam.* Captain J. Bentley. Rotterdam to Singapore. Observers, the Master, Mr. R. H. Henry, Snr. 2nd Officer, Mrs. Bentley and Mrs. 2nd Engineer.

23rd November 1971. The vessel was making Cape Town during the afternoon 12–4 watch. Visibility was about 7 miles with haze when the vessel was about 40 miles from port but on approaching Cape Town the general visibility improved but we could see a low bank of what appeared to be fog. When we were 15 miles from port we could see that the 'fog' was in fact an inversion with warm air trapped



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

in a belt about 150 ft deep. The radiant heat waves could be seen shimmering as the vessel entered the bank and total distortion of ships and landmarks made approach difficult as the depth of field could not be judged accurately. Ships at anchor became enlarged box-shaped objects, then, as we approached, the images split along the horizontal axis and inverted so that we could see two images, one above the other, the upper one being upside-down. When $2\frac{1}{2}$ miles off Robben Island the cliffs had the appearance of being flat on top and 100 ft high. Air temp. prior to arrival at Cape Town, 17°C, sea temp. 17·2°. At Cape Town, air temp. 21°, sea 18°. Wind SSE, force 3.

Position of ship (in port): 33° 54′S, 18° 26′E.

Note. The distortion was due to abnormal refraction associated with a well-marked inversion of temperature. This was caused by warm air (about 30°C), brought off shore by E'ly winds, being cooled from below as it passed over a relatively cool sea (17°C). A change to SSE'ly winds on the final approaches to the harbour cut off the warm air supply, thus destroying the inversion.

AURORA

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

"The accompanying list shows briefly the aurora reported by British ships during October–December 1971 and forwarded to the Balfour Stewart Auroral Laboratory of Edinburgh University by the Marine Division of the Meteorological Office and the O.W.S. Base.

"During the first two weeks of October the recordings of geomagnetic activity fluctuated around levels which led to expectations of aurora, but many regions were cloud covered and the charts remain almost bare apart from sightings at Station 'India'.

"A period of sustained above-average geomagnetic activity occurred between 21st and 26th November. Sketches by an observer in the *Weather Monitor* of aurora visible soon after midnight of 21st/22nd November at 'India' convey clearly a multiplicity of forms which would be difficult to transmit accurately in narrative form. The display was seen from the *Weather Adviser* further to the north-west. On the second night of the period (22nd November) an active display of all forms, and for a time multi-coloured, was seen from the trawler *Northern Reward* when steaming southwards near the Norwegian coast. Flaming rays up to the observer's zenith were reported in the early morning of 25th November from *C.P. Ambassador*

(*Opposite page 172*)

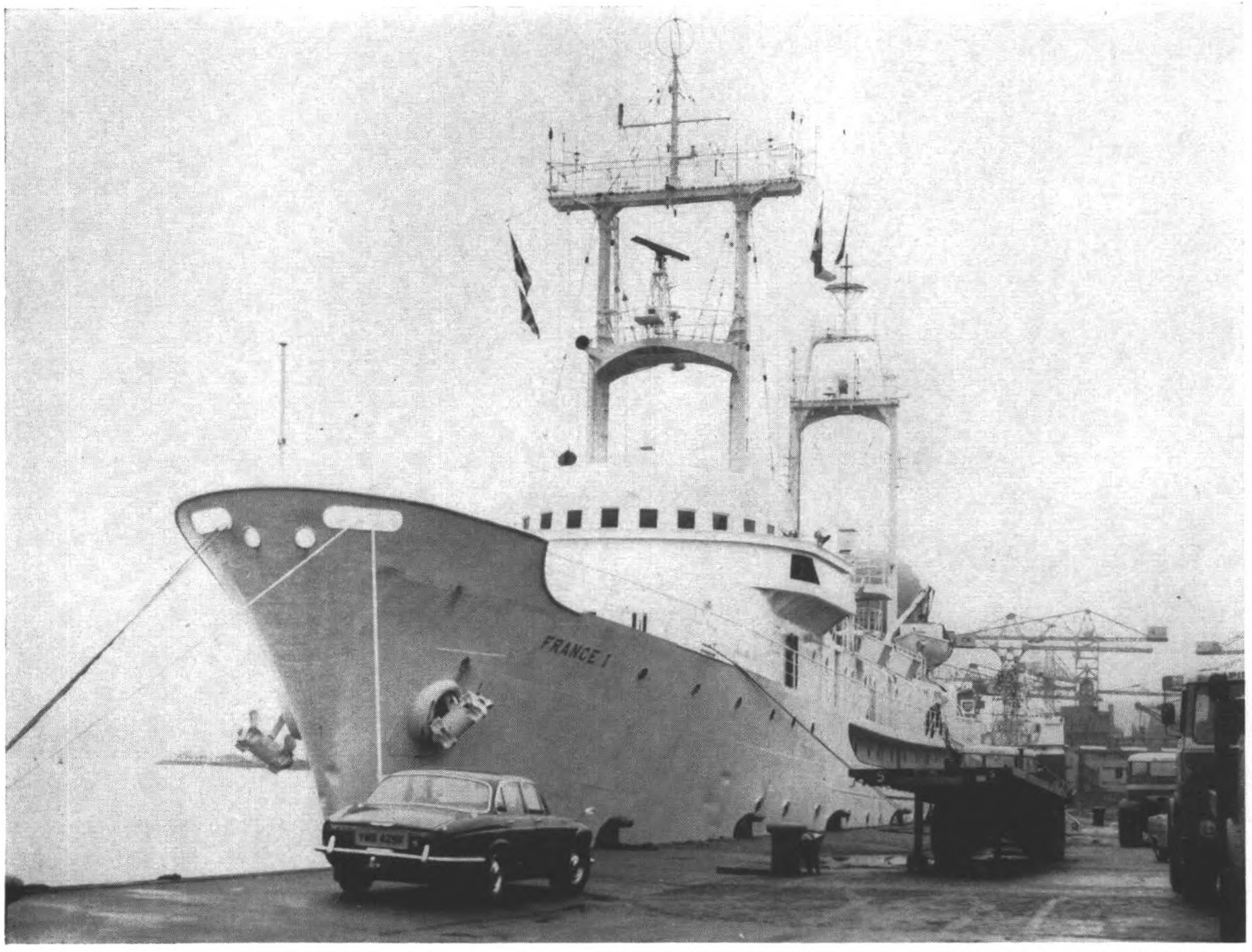
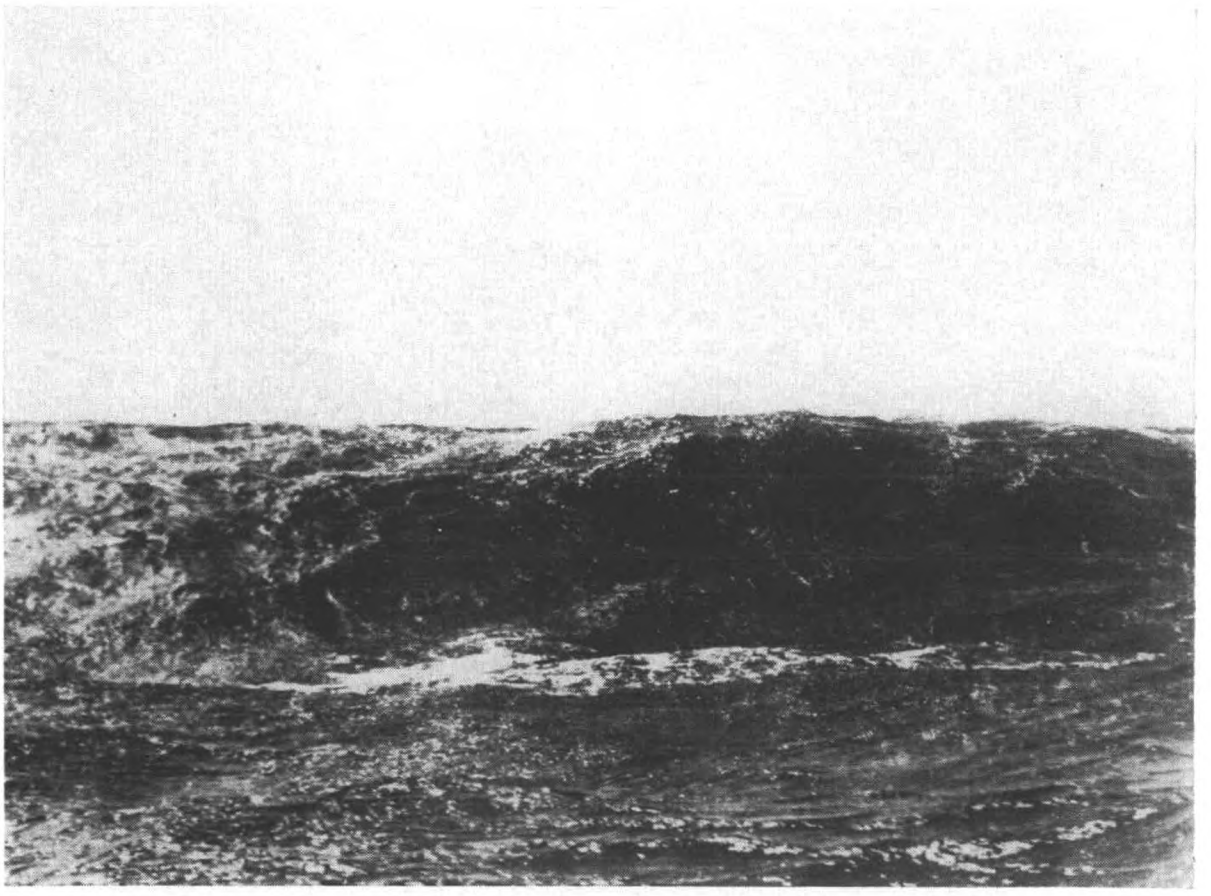


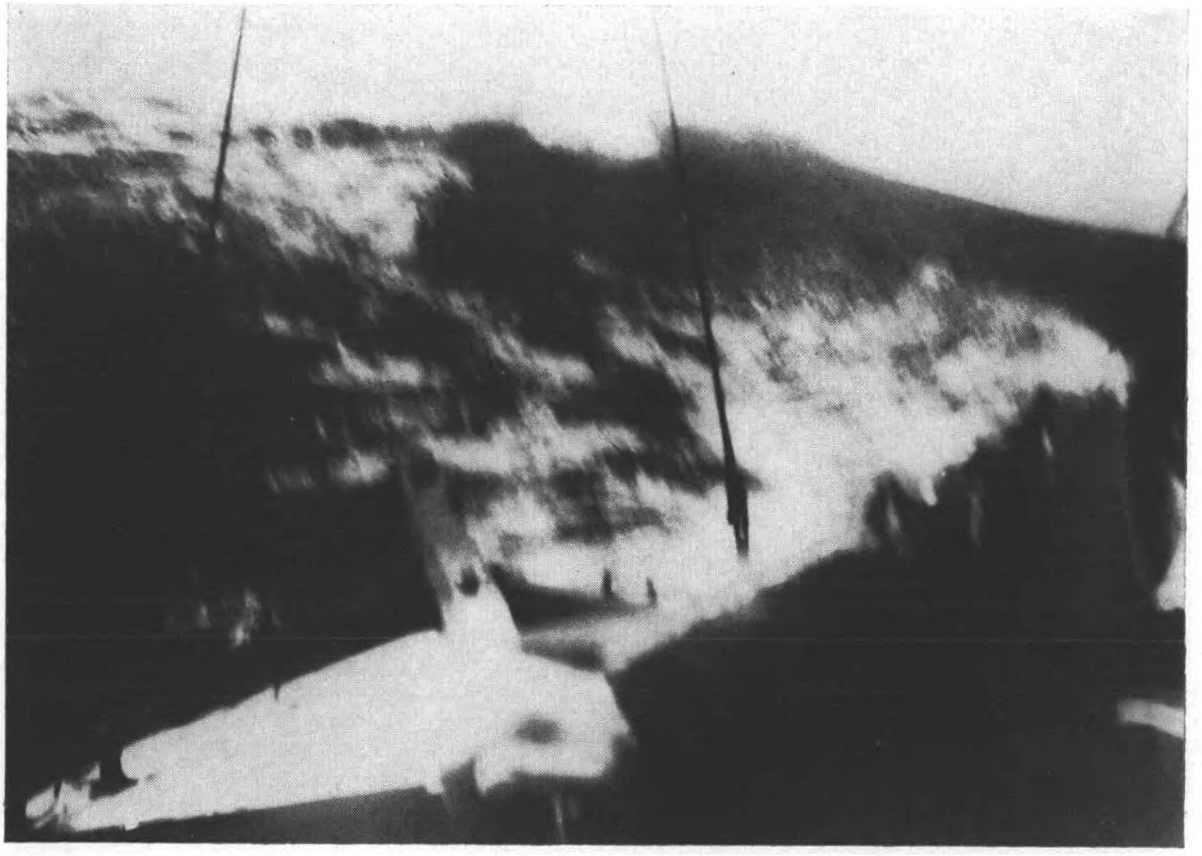
Photo by James Hall Ltd., Greenock

The French O.W.S. *France I* during an official visit to the Ocean Weather Ship Base, Greenock, 24th–26th July 1972.

(*Opposite page* 173)



A typical following sea, 5 miles off Portland, seen from *Cohoe II* (*see* page 176).



Mid-Atlantic, wind force 6, sea disturbance 6. Note the strain on the tiller (*see* page 176).

when near Belle Isle, and in the early morning of 26th November observers in the *Weather Adviser* reported rayed bands in all sectors of the sky.

"Many reports from aircraft and ships' observers provided good coverage of the Atlantic region for the large-scale auroral display of 27th/28th December. Data have been received to date enabling the plotting of the display from Western Atlantic to Norway, though unfortunately the display, which for once might have been visible to observers in Southern England, was tantalizingly hidden by cloud over Britain. Observers in an aircraft which landed in Northern Ireland reported bright forms overhead, completely obscured by cloud from ground observers.

"In 1971 as a whole there were fewer periods of sustained geomagnetic and associated auroral activity than during 1970 and the sunspot activity chartline moves gradually and relentlessly downward towards another minimum in the solar cycle, during which time aurora will be seen mainly in the 'auroral zone', but will still every so often extend southwards in a sudden burst. This zone, in the northern hemisphere, is roughly centred on the geomagnetic pole and runs through Alaska, Hudson Bay, south of Greenland and Iceland, across the north of Norway and along the north coast of the U.S.S.R. Much of this is ocean and we depend on reports from observers in ships and aircraft. We hope you will continue the rather unrewarding task of keeping watch on our behalf and help us to avoid having to give the answer "no evidence available" to enquiries for auroral data."

Date (1971)	Ship	Geographic Position		Λ	Φ	I	Time (GMT)	Forms
21st Sept.	*Silksworth*	58°20′N	49°00′W	030	69	+75	0001	V
1st Oct.	*Weather Surveyor*	59°03′N	18°47′W	070	65	+72	2220–2400	RA, RR, N
2nd	*Weather Surveyor*	59°04′N	18°47′W	070	65	+72	0145–0400	N
3rd	*Manchester Crusade*	—	—	—	—	—	—	N
7th	*Weather Surveyor*	57°40′N	14°50′W	070	63	+70	2245	N
12th	*Weather Adviser*	58°55′N	19°07′W	070	65	+72	2300–0400	HA, V, P
21st	*Weather Adviser*	59°00′N	18°40′W	070	65	+72	2150–2250	N
24th	*Weather Adviser*	58°55′N	19°25′W	070	65	+72	0001–0630	N
	Northern Reward	65°11′N	11°50′W	080	69	+76	2200–2400	P
25th	*Northern Reward*	65°11′N	11°50′W	080	69	+76	1930–2400	All forms
8th Nov.	*Weather Monitor*	58°53′N	18°34′W	070	65	+72	2250	RR, N
11th	*Weather Monitor*	59°06′N	18°23′W	070	65	+72	0110–0500	HA, N
	Weather Monitor	59°00′N	19°40′W	070	65	+72	2350–0300	N
12th	*Weather Monitor*	59°14′N	19°26′W	070	65	+72	1945–2200	N
13th	*Weather Monitor*	59°10′N	19°09′W	070	65	+72	0001–0200	N
14th	*Weather Monitor*	59°26′N	18°56′W	070	65	+72	2345	N
15th	*Weather Monitor*	59°08′N	19°02′W	070	65	+72	2347–0300	N
							0451	N
17th	*Weather Monitor*	58°47′N	18°13′W	070	65	+72	2138	N
18th	*Weather Monitor*	58°47′N	18°33′W	070	65	+72	2347	N
	C.P. Ambassador	49°59′N	62°03′W	010	61	+76	2400	HA
20th	*Weather Monitor*	59°14′N	19°00′W	070	65	+72	2045–0200	N
21st	*Weather Adviser*	62°00′N	32°50′W	060	70	+76	0430–0540	RA, RR
	Weather Monitor	59°07′N	18°39′W	070	65	+72	1845	N
	Weather Adviser	62°14′N	32°50′W	060	70	+76	2000–2200	All forms
22nd	*Weather Monitor*	59°06′N	18°21′W	070	65	+72	0001–0200	HA, RB, RR, P, N
	Northern Reward	65°00′N	08°00′E	100	65	+75	1700–2400	All forms
	Weather Monitor	59°03′N	18°24′W	070	65	+72	2050–0600	RR, N
	Mabel Warwick	51°15′N	27°40′W	050	59	+69	2200–0100	N
25th	*C.P. Ambassador*	51°57′N	55°00′W	020	63	+75	0700–0900	RR
26th	*Weather Adviser*	62°02′N	33°20′W	060	70	+76	0200–0500	RB, V, N
	Weather Reporter	59°00′N	19°10′W	070	65	+72	0650–0750	N
3rd Dec.	*Northern Reward*	66°07′N	25°36′W	070	73	+77	1925–2000	RA, P
10th	*Weather Adviser*	62°05′N	32°50′W	060	70	+76	0200	N
							0400, 0500	RB
11th	*Weather Reporter*	59°05′N	18°50′W	070	65	+72	0050	N
12th	*Weather Reporter*	58°40′N	19°30′W	070	65	+72	2250, 2350	N
13th	*Weather Adviser*	61°58′N	32°52′W	060	70	+76	0340–0515	RB
							2035–2155	RB
14th	*Weather Adviser*	61°55′N	32°10′W	060	70	+76	0400–0515	RR, N
16th	*Weather Adviser*	59°35′N	21°35′W	070	65	+72	0100	N
	Northern Reward	66°40′N	14°00′W	080	71	+77	2030–0130	All forms
17th	*Northern Reward*	66°40′N	14°00′W	080	71	+77	1600–0100	P
	Weather Surveyor	57°55′N	15°10′W	070	63	+70	1835–2400	RB, P, N
	Weather Reporter	58°00′N	15°50′W	070	63	+70	1845–2300	RA, RB, RR, P
	St. Margaret	46°54′N	38°45′W	040	56	+68	2020–2100	N
	Weather Monitor	52°37′N	19°23′W	060	59	+69	2150–0200	N
18th	*Weather Surveyor*	58°19′N	16°42′W	070	64	+72	0245–0500	N
20th	*Weather Surveyor*	58°55′N	19°25′W	070	65	+72	2000	N
21st	*Miranda*	—	—	070	73	+78	1825–1830	HB, RB, V
22nd	*Miranda*	66°40′N	23°10′W	070	73	+78	1750–1800	RB
23rd	*Miranda*	66°42′N	22°30′W	070	72	+78	2210–2225	HB, RB

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.

551.553.8:629.12

Small Craft in Gales*

By K. Adlard Coles

Introduction

Before turning attention to the problems of heavy weather sailing in yachts it is useful to attempt to define what a yachtsman considers to be a gale.

When I first took up 'going foreign' in my own boats, cones were hoisted at signal stations when winds of Force 7 or above were anticipated. Thus it may be said that gales started at Force 7, but skippers of commercial craft such as Brixham trawlers (in which I occasionally sailed), barges and other coasters did their own forecasting and used their own judgment of what constituted a gale without bothering too much about the Beaufort notation. Amateurs followed suit in this matter and when wind or sea rose too high for their own particular yachts they would describe the conditions as a gale. It was not until the radio became a commonplace in yachts that a more scientific approach came to be made. Of recent years few yachtsmen will make even a cross-Channel passage without first receiving a weather forecast and the tendency is to rely entirely on forecasts. In passing, I would comment that the vagaries of the weather are such that some of the severest gales have occurred with only very short warning. On the other hand, gales by no means always follow gale warnings. I suspect, perhaps wrongly, that the authorities are inclined to cry wolf because of the bitter outcry which follows an unheralded severe gale, whereas if they issue a warning and no gale develops there are few complaints. More recently the Meteorological Office appear to be adopting more ambiguous wording such as 'winds Force 5 or Force 6 to 7, perhaps gale Force 8 at times' which often seems more appropriate.

Despite the meteorological facilities and increasing use of anemometers, there remains the natural inclination of a yachtsman to assess a gale in the light of the individual circumstances. This will vary according to the type and size of the yacht and more so upon the condition of hull, spars, sails and equipment, since simple breakages such as tearing a sail or breaking a stay can start a chain of trouble. The over-riding factor will be the human element depending upon experience, physical fitness and the degree of susceptibility to seasickness of skipper and crew. Even among ocean racing men with well-found and fully manned yachts, reports of the force of the wind may vary between novices and old hands by as much as two grades in the Beaufort notation.

After considerable research into gales occurring in ocean races since the war for my book *Heavy Weather Sailing*, aided by the hind-sight conferred by synoptic charts and records of the Meteorological Office, together with occasional reports from passing ships, I have come to the conclusion that over-estimates of wind forces in published accounts arise principally from two causes. The first occurs when a yacht passes through a sea area (especially when beating against head winds) for which Force 8 has been forecast. The wind is then nearly always logged at Force 8 in published accounts regardless of whether a gale followed the warning. The second source of error is the inability of skippers, whether novices or experienced, to distinguish between the velocity of the gusts and the mean force which must be adopted for the Beaufort notation. This is not illogical because it is not the mean wind force that causes trouble but the violent gusts which may cause damage and even dismasting. They certainly register more than anything else on the minds of skipper and crew.

Fig. 1, for example, shows the anemometer trace at the Lizard in the Fastnet

* Reproduced with permission from the *Journal* of the Royal Institute of Navigation, Vol. 24, No. 3, with an additional photograph kindly supplied by the author.

Race of 1961 when the ocean racing fleet was caught out between the Lizard and the Scillies. It was caused by a vigorous secondary (996 mb) developing off the Bay of Biscay and moving rapidly across the Scillies, intensifying as it went. Sitting by the fireside with a glass of whisky in one hand and a cigarette in the other it is quite easy to estimate the wind force by the diagram. The wind was in fact recorded at the Lizard at 0300 at Force 8, at 0400 Force 9 and at 0500 Force 8. Highest gust 63 knots. However, the wind at sea would be different. The Lizard meteorological station is 240 feet above sea level so a deduction of about 25 per cent should be made to arrive at the force on the Beaufort notation, 33 feet above sea level. However, the mean wind force at sea is usually greater than at a shore meteorological station. Alan Watts (a professional meteorologist and yachtsman who contributed to *Heavy Weather Sailing*) has devised a formula for this, applying a multiplication factor which varies in relation to the direction of the wind relative to the land and whether day or night. Applying the appropriate factor, the wind at sea off the Lizard averaged 48 knots (bottom of Force 10) for 3 hours and at Scilly, which was nearer to the leading yachts, at 44 knots which is about mid Force 9. A fair assessment, therefore, might be 'the top of Force 9', which is not inconsistent with the only record from the Seven Stones light-vessel which was Force 8 three hours after the worst was over.

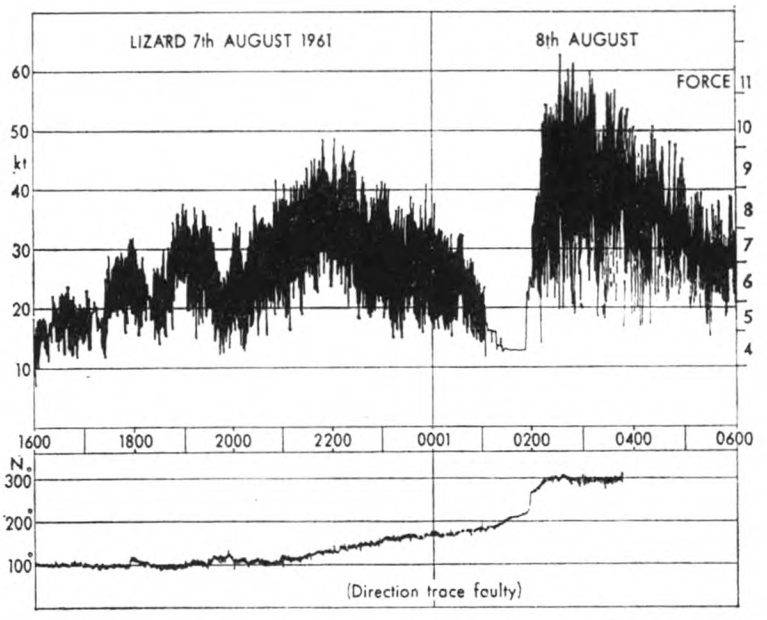


Fig. 1. Anemogram trace at the Lizard during Fastnet Race 1961.

I do not know of any exaggeration in the reports of this particular gale, but the anemogram trace serves to show the scope for error on the practical side when a skipper in the cockpit of a yacht little above the breaking seas in a gale endeavours to log the mean force of the wind. He will be foxed by the gusts which, although usually lower at sea than over the land, are nevertheless far above the wind on Beaufort notation. My own recollections of this gale are of an exceptionally high wind, little sea, but appalling visibility in driving rain so that we did not sight the lights of the Longships or the Seven Stones although we passed close to the latter. It was worse still in St. George's Channel during violent hail when the cold front passed over.

If it be agreed that yachtsmen often tend to over-estimate wind forces I think we can accept Alan Watt's definition of a yachtsman's gale as 'a wind of mean speed of 25–30 knots gusting regularly (i.e. every few minutes) up to 40 knots'. That is colloquially 'Force 6–7, gusting 8'. However, many experienced yachtsmen are well able to judge winds up to Force 8 more accurately than this, but stronger winds are difficult to assess as they occur so rarely during summer months in home waters.

Waves

It seems there is a tendency for the height of moderate waves to be understated and the height of high waves to be exaggerated. Unlike winds, the force of which may be evidenced by Meteorological Office records, it is often difficult to obtain corroboration of heights of waves at sea. In yachts it may be possible to estimate the height of big seas in relation to the known height of cross-trees and the mast and taking the true height to be two-thirds the height thus observed visually.

Perhaps fortunately, yachtsmen sailing at week-ends and on vacation do not often see waves of sufficient height to be measured in this way in their home waters where the fetch is often not long enough and the duration (especially of secondaries) is too short. High seas are experienced more frequently on the ocean or when crossing bays directly open to the ocean such as the Bay of Biscay. However, the force of the wind and the height of the waves are not necessarily the most important points because a small yacht may experience little trouble from relatively steady high winds if accompanied by regular high seas. It is the state of the sea that matters and this does not depend upon the force of wind alone.

For example, the photograph opposite page 173 shows a typical following sea 5 miles off Portland. This was taken from *Cohoe II* in a south-westerly gale in 1954 which was due to a fairly deep depression (980 mb) which slowed down and became stationary over the north of Scotland. Gale warnings covering many sea areas, including those which we crossed, Sole, North Biscay, Plymouth, Portland and Wight, had been repeatedly given over the previous 24 hours. The wind was probably Force 7 when the picture was taken and must have risen to gale Force 8 later when we were off St. Alban's Head and lowered the mainsail to reduce speed to 6 knots. The height of the sea may not show well in the reproduction and cannot be estimated anyway, but close examination shows the curious formation which was a wall-like swell with no breaking crest, although there was plenty of white water on some of the other seas. Wind and the stream were both fair so that in this particular state of sea the 8-tonner could surf happily with the speed indicator registering up to 9 knots. But had we been off Portland at the wrong time, running against a strong weather-going stream against the south-westerly gale, the state of the sea would have been very different, with steep, breaking, chaotic seas, possibly even dangerous.

The other photograph opposite page 173 shows quite different conditions. It was taken in *Cohoe I* during the Transatlantic Race of 1950. The wind was strong but the sea was puzzling as it was irregular and out of all proportion to the wind. I made the mistake of shortening sail as the seas grew more awkward until eventually we were running under bare poles when the picture was taken. It shows clearly the strain bending the strong oak tiller in order to hold the yacht stern to the seas. In the afternoon the Italian liner *Saturnia* passed fairly close at speed on a reciprocal course and her wash crossing the already irregular following seas caused two 'big-uns' which severely pooped *Cohoe I* and knocked her flat in the water, apparently cracking two timbers aft on the port side. After the race was over the captain of the liner kindly sent me the extract from his log, which was 'Sea Disturbance No. 6, Beaufort Wind Force 6'. From this it is clear that the wind was no more than a yachtsman's gale, but Sea Disturbance No. 6 is 'high' which produces waves of mean height of 19 ft. In fact there are only two grades above this, No. 7 and No. 8, the latter being 'precipitous'.* The following day in much the same wind force but a more regular sea we carried every stitch of canvas, including the spinnaker, and we achieved a noon-to-noon run of 176 miles, which is a lot for a boat of 3½ tons designed displacement.

These examples illustrate the point that it is not the force of the wind so much as the state of the sea which determines what a yacht can or cannot do. Many factors

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* *Editor's note.* The Sea Disturbance code is not used by ships of the British Voluntary Observing Fleet.

influence the sea, so much so that only professional oceanographers can determine the pattern. In the first place a wind with violent gusts creates a far more dangerous sea than a steady one, as also does a sudden shift of wind. Then there are wave trains. These may be simple trains travelling in the same direction which create bigger waves when the components of the faster and the slower coincide. Equally they may be complex with trains travelling diagonally and at different speeds across the principal trains. Such combinations cause 'pyramid' waves which stand on their own base and other strange formations. Last of all there are local conditions such as a strong weather-going tidal stream or current which can cause very steep breaking tops. I have observed that patches of overfalls exist in many areas too small to be marked on the chart. Rocks and wrecks on the bottom and shoal water and other factors also influence the pattern or lack of pattern of the seas.

Damage to yachts

Evidence suggests that structural damage to yachts is rarely caused by the regular run of high seas, but generally by a 'freak' wave. By this I mean an abnormal wave which may be exceptionally high due to the synchronization of waves in different wave trains or arise from any combination of several factors which influence the state of the sea. The damage comes from the shape, steepness and formation of the breaking crest and the angle at which it strikes the yacht, 'catching her on the wrong foot' so to speak.

Contrary to what might be expected the damage caused by impact with a sea is not usually on the weather side (as it would be in a ship) but on the lee side. This occurs if the yacht is picked up by a sea and thrown down striking the water, which is almost as hard as a pavement. This may burst the big windows in the dog house or split the coach-roof and cockpit coamings. It takes a very big wave to pick up and damage a yacht in this manner and hence accidents of this kind are rare in home waters such as the English Channel but do occur more often on the ocean.

I have little personal experience of gales in the ocean, except of an extra-tropical cyclone north of Bermuda for which I received a track from the U.S. Weather Bureau. It was inconsiderate enough to do an anti-clockwise loop round *Cohoe I* and three other British yachts. I have also been involved in heavy weather of the Force 7 gusting 9 variety in the Bay of Biscay and on one occasion in a short-lived Force 11 in the English Channel Approaches, but the seas were not comparable with those occurring, I imagine, in a hurricane or a storm in the Southern Ocean. The waves can then attain such dimensions that there are several authenticated cases of yachts being rolled over through 360°. [A further illustration showed] some of the damage to the American 39-foot centre-board yawl *Doubloon* after twice being rolled over through 360° in an extra-tropical cyclone similar to the one mentioned north of Bermuda, accompanied by no dramatic fall recorded on the yacht's barometer and a central pressure of 996 mb. The fundamental difference between the seas in the two storms was due to *Doubloon* being on the axis of the Gulf Stream with a weather-going current.

Even more damage may occur if a yacht is pitch-poled stern over stem. To do this the freak wave must be of immense height and pitch-poling is happily very rare. Miles Smeeton in his 46-foot ketch *Tzu Hang* may be the only living yachtsman to have survived both pitch-poling and a 360° roll over.

Gale tactics

It is difficult to summarize gale tactics because the action to be taken depends on the particular circumstances, not least of which is the crew.

Lying-to a sea-anchor may be considered first as opinion is tending to discount its value. The modern yacht with a relatively short keel rides uneasily tethered to a sea-anchor without the aid of riding sail aft. The principal use of a sea-anchor for a

deep-keeled yacht is to reduce drift towards a lee shore. On the other hand a sea-anchor may remain practical for shallow draught, long-keeled craft and boats offering little windage aloft.

Heaving-to is the traditional method of coping with gales and the Bristol Channel cutters were past-masters in the art. A long keel and sea-kindly hull are ideal for the purpose though success depends also on sail balance, so most yachts with keels of moderate length can also be made to heave-to after a fashion by experiment with sails and by trial and error. However, I fancy that the ultra-modern yacht, with a minimum of wetted surface and a narrow fin keel, will be found to be an unwilling horse on which to ride out a gale hove-to, as also will some of the small standard yachts which cannot sail much better than 80° to 90° to the wind even in Force 6.

I have hove-to on several occasions, but it seems to me there is a limit to the conditions in which it can be done successfully. It is necessary to preserve sail balance and the correct angle to the wind. This may prove difficult in the severe gale with a chaotic sea and a turbulent wind when sails may split or disintegrate if they are allowed to flog even for a few moments.

The simplest method of dealing with a gale is to lie 'a-hull' under bare poles, allowing the yacht to take her own position in the seas, giving rather than standing up to them. Safety then depends upon the buoyancy of the yacht which is usually remarkably high. The skipper must remain alert and ready to go on deck to run the yacht off if he finds seas becoming too much for the boat, or in event of emergency. It is a good tactic, especially with a small or seasick crew, but there is an element of risk in severe gales of the boat receiving a knock down by a freak sea causing damage on the lee side. Fortunately, damage of this kind rarely seems to lead to the loss of the yacht.

There remains the method of running off with warps streamed aft to steady the boat before the seas. It is necessary to determine the amount of drag required to run at the speed which allows best control. This tactic has the disadvantage of presenting the weakest end of the boat and the cockpit to the seas and requires plenty of sea room, but most experienced yachtsmen regard it as the best tactic of all as a last resort.

In this outline of the conventional methods of coping with gales I have omitted mention of 'survival' storms such as can occur in the oceans which yachts have survived through their skippers adopting the actions which they considered best at the time.

For the ordinary cruising man I can only reiterate the findings of the Royal Ocean Racing Club sub-committee after research into the experiences of the ocean-racing yachts caught out in the exceptionally severe Channel storm of 1956. That was a long time ago, but the principles still hold good for well-found yachts of 24 feet L.W.L. and over. The italics are mine. "The basic lesson to be learned from this occasion is that in severe conditions it is *far better to be out at sea in open water away from land influences*, where, provided the vessel is well found and not hampered by the human element, she has the best chance of coming through without serious trouble. In general, the reports *show the remarkable qualities of the modern sailing yacht* in being able to look after herself, in spite of human error. . . . The experience of these yachts does not help to show any preference for heaving to, lying to a sea anchor from the bow or stern, lying a-hull, or streaming warps ahead or astern. . . ."

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Traffic Separation

By Captain G. A. White, Extra Master

(Marine Superintendent, Meteorological Office)

The English Channel Traffic Separation Scheme has been in operation, on a non-statutory basis, for a number of years but on 1st September 1972 it became mandatory for British ships passing through the English Channel to follow certain specified routes. The passing of the necessary legislation through Parliament resulted from many detailed investigations and lengthy discussions at national and international level on the merits of separation schemes and how such a scheme could operate in the English Channel.

Mariners are well aware of the navigational hazards and dangers of collisions in our home waters with the heavy traffic density, frequent gales and poor visibility. Added to these are the problems of the very deep draught vessels with their restricted sea room and poor manœuvrability. It is also appreciated by mariners of well-established maritime nations that many large vessels are being navigated in potential danger areas by insufficiently experienced personnel. A number of these problems are by no means new. Recognized routes for east- and west-bound shipping on the North Atlantic have been followed for long enough and in fact the text of the relevant article in the 1929 International Convention for the Safety of Life at Sea differs little from that in the 1960 Convention. This system of traffic separation has stood the test of time but that is not to say there were no collisions in the Atlantic during the period that the ships followed the recommended routes.

Many ships are now weather routed across the Atlantic and the old recommended routes are no longer recognized but it is interesting to refer to the records written during the early days of steam, and as far back as 1855, when consideration was first given to laying down North Atlantic steamship routes in order to separate east- and west-bound ships. Lieutenant M. F. Maury, U.S.N. was no doubt amongst the first to write in detail on the subject and the following is an extract of his answer to a letter requesting him to prepare a chart exhibiting suggested routes for ships in order to lessen the liability of collision, without materially lengthening the passage. Unfortunately the chart he prepared showing steamship lanes, and the climatological table giving frequencies of gales and fogs experienced in the lanes to and from Europe cannot be included here but the positions, distances and courses to follow in the lanes are included towards the end of the extract.

Letter of 15th February 1855

Gentlemen: I duly received your communication of the 8th ult. requesting me to carry out the proposition contained in my letter of the 8th November last . . . by projecting the two steam lanes across the Atlantic, viz: one for the steamers to go in, and the other for them to come in.

I at once addressed myself to the task, and after a careful examination of the somewhat ample materials afforded by this office, I have at length the pleasure to submit charts with the lanes projected on them, together with other matter bearing upon the subject.

I have examined a number of the logs both of the Collins and the Cunard lines. The part of the ocean used by them in their voyage to and fro, between the meridians of 15° and 65° west, is, for the American, 300 miles broad, and for the English 150 miles broad. The American road-way overlaps and includes the English. Consequently there is a breadth of ocean 300 miles wide, in any part of which, a sailing vessel by night or in the fog, is now liable to be brought into collision with the steamers.

Now suppose we take this same breadth of ocean and lay off a lane 20 or 25 miles

broad near its northern border, and another, 15 or 20 miles broad near its southern border, and recommend the steamers, when coming westwardly, to use the former, and when going eastwardly, to take the latter; would not the adoption of the recommendation contribute to the safety both of steam and sailing vessels, of passengers and crews? I think so.

I do not mean to create the impression, by anything I say or do, that the adoption of these lanes would *do away* with collisions, or call for less vigilance, or relieve in any manner the shipmaster from his obligations to look closely to the navigation of his vessel, to be watchful, prudent, cautious, and careful. On the contrary, he must never relax his attention to the seaman's three L's, nor slight his water thermometer. The adoption of the lanes will simply lessen the *liabilities*, by diminishing the *chances* of collision, and to that extent make the navigation of the Atlantic *less* dangerous. So far from relaxing attention to the log, lead, and look-out, these lanes call for increased diligence on the part of the master, for that breadth only is given to them which will just make them broad enough to cover the probable errors in latitude of a good, careful navigator, after he has been two or three days without an observation. A narrower lane would be forbidding, from the difficulties of keeping in it; a broader lane would be mischievous by relaxing its calls upon the attention of the master to keep his steamer in it, and by occupying so much of the ocean that sailing vessels would not so willingly, because they could not so conveniently, give it up to the steamers.

If these lanes be adopted by the steamship companies, and engraved on the general charts of the Atlantic that are used by the vessels of the different nations, . . . I have very little doubt that sailing vessels would, in the process of time, make it a rule to edge off from the lanes, especially at night and in thick weather. In the first place, the lanes are so narrow that if the sailing vessel has to cross them, as in head winds, and in the progress of her voyage she not unfrequently will, she will be but a little while in them, and her master will then know on which side to watch for the danger. In the next place, if his course lie along the lane, and the winds be fair, he will, as night comes on, or as the weather grow thick, begin to think of the steamers and collision, and his own responsibilities, and then feel much more comfortable by edging off to one side and leaving the steam-track clear.

The average route of the steamers coming, as determined by the abstract logs on file here, crosses the meridians of 40°, 45°, and 50°, from forty-five to sixty miles north of the lane to America, and joins it on the meridian of 55°, and then runs nearly along with it to Sandy Hook.

The lane coming is, therefore, a better road than the average route at present used, and for these reasons, viz: It is thirty miles shorter; it runs so far south of Cape Race and the Virgin Rocks, that no time need ever be lost in turning aside, when fogs prevail, to avoid these dangers, for it passes one hundred miles south of Cape Race.

This statement, without any explanation, might appear paradoxical, for the nearer to Cape Race, the shorter the distance; yet, practically, it has not proved so, because vessels, especially in the fog, as they near this cape, have frequently to run one, two, three, or more hours to the southward to be sure of clearing it. When they are so running, they are not making much headway towards their port. So, on the long run, the attempt to shave Cape Race makes the average distance practically greater than it is by the lane. Indeed, it is greater than the statement above implies, for the distance which I have taken as the average by present routes is measured by straight lines from position to position, at noon.

Congress has given the Secretary of the Navy authority to employ three vessels in assisting me in my researches, by testing new routes, and perfecting discoveries. They can be very usefully employed just at this time. Perhaps he may find it convenient in the spring to detail one or two of them for this service. If so, I shall urge upon his attention the importance of completing the deep-sea soundings across this part of the Atlantic, and also ask for an examination of the Virgin Rocks, with the

(*Opposite page* 180)

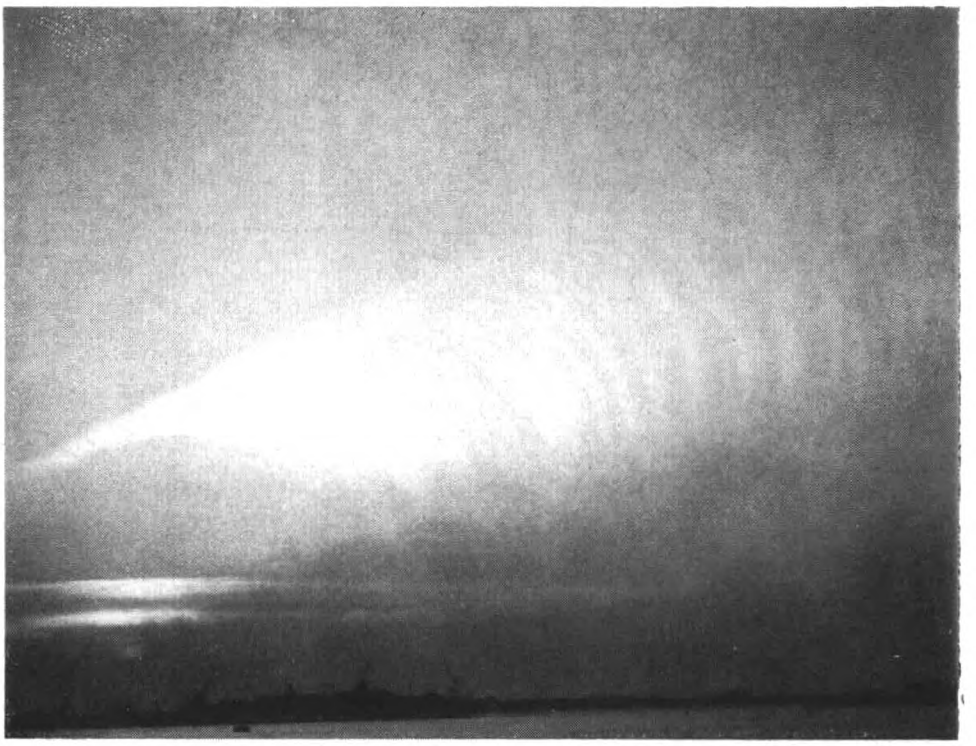


Photo by River Patrol Officer L. Plumb

Unusual cloud formation seen at 2015 BST on 26th June 1972 from Gravesend Reach, Kent, looking north-west (*see* page 185).

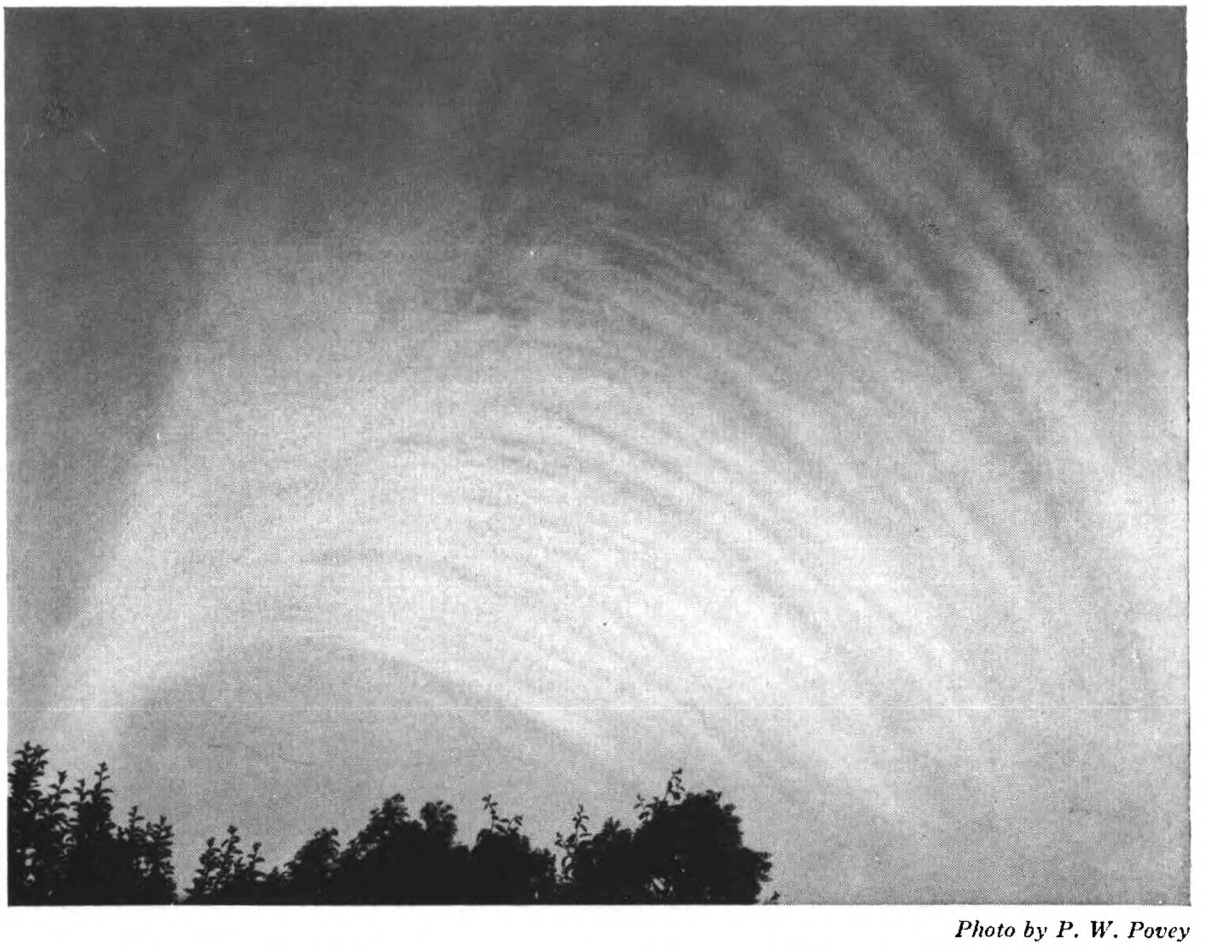


Photo by P. W. Povey

The same cloud formation as seen from Brentwood, Essex (*see* page 185).

Captain W. J. Law (right) receiving his barograph from Dr. B. J. Mason (*see* page 186).

(*Opposite page* 181)

view of planting on them, or just under their lee, a bell buoy. In that case, this lane might be lifted up so as to shorten the distance and save time by bringing this buoy on the edge of it, and thus provide a landmark that would be very useful in all weather and to all classes of vessels.

The shortest distance possible for a steamer between Liverpool and Sandy Hook is 3,009 miles; the average distance actually accomplished is 3,069 miles, and the distance by the middle of the lane coming is 3,038. There is also another recommendation in favor of this lane to the west, which is this: It lies along the northern edge of the Gulf Stream, where there is an eddy setting to the westward often at the rate of a knot an hour. On the average, I assume that the set of this eddy will amount to twelve miles a day for three days and a half, or, say forty miles. This makes the distance by the lane coming practically about 2,998 miles; or, allowing twenty miles for detour, we shall have 3,018 miles, which will shorten the average time of the passage this way three or four hours, with less risk of collision, and less danger from Cape Race by the way.

It may be urged against this lane that it cannot always be followed on account of the ice, and that inasmuch as it crosses the Grand Banks, the steamers that ply in it may now and then run down a fishing vessel. The reply is, that as far as the fishermen are concerned, they are now liable to be run down by the steamers both going and coming. Whereas, with the lane, that liability is incident to the steamers alone that are westwardly bound, and the fishermen will have the advantage of knowing pretty nearly where the steamer will pass, and which way she will be coming. And as for its being obstructed by ice, so as to compel the steamers, as it occasionally will, especially in May and June, to turn out of it now and then, the Erie Canal, of New York, is obstructed by ice the whole of every winter, but that does not prove it to be of no value; it only shows that it, like this lane, would be of more value to commerce if it were never obstructed by ice, or anything at all.

You will observe by looking at this lane [upon the chart] that the Grand Banks afford a pretty good landmark which can be used in the thickest weather. Generally the water thermometer is found to fall as soon as you near these Banks: it is generally a good landmark for them. The eastern edge runs north and south, and, therefore, affords an excellent correction for longitude. Having ascertained, by the lead, when the vessel first strikes this edge, then noting the soundings and the distance run before clearing the Grand Banks, the latitude will also be known with accuracy sufficient to enable the navigator to decide whether he be in or out of the lane, and if out, on which side. The lane crosses the Banks near their greatest width, 275 miles. If a steamer be crossing there in a fog, and in doubt as to her position, she can judge, by their breadth and the soundings, pretty nearly as to latitude. For instance, if the breadth of the Banks when crossed be less than 275 miles, but the soundings not less than forty fathoms, the vessel has crossed the Bank to the north of the lane; but if she find herself in less than thirty fathoms, then she has crossed to the south of it. Should she, however, find herself in water that suddenly shoals to less than twenty fathoms, and as suddenly deepens again, then she is near the Virgin Rocks, or the rock and Nine-fathom Bank to the east of them, and her position is immediately known.

It should be recollected, however, that these lanes are not channel-ways in which steamers must keep or be lost. Gales of wind, ice, and other things, will now and then force a steamer out of them, and in such cases she will actually be where she is now, for she will then be in no more danger than she is now; only when she gets back into the lane she will be in less.

You will doubtless observe the advantageous position of the fork to Halifax, in the lane from Europe. As this lane approaches Newfoundland, it edges off to the south, in such a manner as to render it impossible for a vessel so to miss her way as to get ashore. Suppose a steamer attempting this lane to be, when she nears the Grand Banks, 100 miles out in position (a most extravagent case), and that she be out on the Newfoundland side, she would, if behaving properly, be steering parallel

with the lane, and if bound to New York, she would go clear of Cape Race. But she might be bound for Halifax, and by steering west too soon, might run upon the land; but recollect that the lane to Halifax turns off *on soundings*, and a west course from where the lane from England strikes soundings on the Grand Banks will take you clear of everything. So without the most gross neglect of the lead and all the proper precautions, which it is the duty of the shipmaster to take, it would seem impossible for him to run his steamer into danger here.

In the longitude of the Grand Banks, the lane to Europe is 200 miles south of the lane to America. As a rule, this lane for the eastern bound steamers can be followed always, admitting that an exception now and then in practice will make the rule general. It will be observed, that this lane runs E 15° S from Sandy Hook to the meridian of 70°, where it takes a course E 12° N, towards its junction with the arc of a great circle, south of the Grand Banks. Though the distance by this lane, from Sandy Hook to this junction, is a few miles longer than the direct line, yet on account of the Gulf Stream it is in *time* the shortest distance that a steamer can take. From the Capes of Delaware it is obviously the shortest.

The distance from Sandy Hook to Liverpool, by this lane, is 106 miles greater than it is by the lane coming. But the lane going is in the Gulf Stream, which of itself will nearly, if not quite, make up for this difference. The *San Francisco* steamer was wrecked in the Gulf Stream, and from the time she was disabled till she was abandoned, she drifted at the rate of two knots an hour. When the *Great Western* steamship first came over, she stemmed the Gulf Stream, and was set back in it 175 miles during the voyage. Now, from the Grand Banks west, the track of the *Great Western* was not as much in the strength of the stream as this lane is, for she passed to the north of it. This trip, too, was in April, when the middle of the stream is well south.*

I may be excused for mentioning, in this connection, an incident relating to the early history of ocean steam navigation. After this passage of the *Great Western*, I wrote a paper on the achievements of the New York packet ships, and pointed out on a chart the great circle route from New York to England, and commended it to the attention of those concerned in this new navigation. The paper, with the chart was published in the *Southern Literary Messenger* (Richmond, Va.), for January, 1839. The editor sent a copy to Captain Hoskins, and he ever afterward went by the route recommended on that chart. His competitors stuck to the old rhumb-line route, and from that time, Hoskins generally beat them, this way, about a day: and here is the explanation. They were set back, in the Gulf Stream, 150 or more miles; he was set forward 40 or more, by the eddy, and gained some 50 or 60 additional, by the great circle, which made altogether about one good day's sail in his favor. The great circle, or Cape Race route, was not generally adopted, however, even when he left the line; and it has been mischievous by tempting navigators to shave the cape too closely.

The current of the Gulf Stream is not only in favor of the lane going, but the gales are more favorable, and the fogs less frequent than they would be by a more northerly route.

In order to enable you to judge knowingly as to the relative merits of these two lanes in this respect, I have, with the help of the most willing, zealous, and able corps of assistants that one ever had, and such as can be formed only of navy officers, examined and discussed abstract logs containing observations for no less than 46,000 days, on the winds, weather, the sea, and the currents, in the parts of the ocean through which these lanes pass. . . .

I will close this report with a recapitulation as to distances and courses by each lane, between New York, Halifax, and Philadelphia on one side, and Cape Clear

* The thread or axis of the Gulf Stream moves up and down in declination as the sun does, being farthest north in September, farthest south in March. Its limits are not accurately described on any general chart that I have seen.

and the Scilly Isles on the other; first begging leave to say that, according to my computation, founded on such statistics as I have touching the velocity of the Gulf Stream, if two steamers bound for Cape Clear, and of exactly equal speed, were to start from Halifax, to see which should first get into the great circle part of the lane to Europe from New York, and if one were to go straight for it by steering east, and the other were to follow the European lane from Halifax as projected on the Chart, this one would reach the point of destination quite as soon as the other, the drift of the Gulf Stream compensating for the greater distance.

DISTANCE BY LANE TO AMERICA

			By Great Circle
From Scilly Isles	to Halifax	2,351	2,305
	to Capes of Delaware..	2,948	2,909
	to Sandy Hook	2,882	2,840
From Cape Clear	to Halifax	2,192	2,170
	to Capes of Delaware..	2,789	2,765
	to Sandy Hook	2,723	2,695
	to Sandy Hook by actual average ..		2,754

This statement shows that by the lane to America the distance is actually shorter, both to Sandy Hook and, we may infer also, to the Delaware, than the average distance by present route; for the route actually pursued by the steamers now, both to Sandy Hook and the Delaware, may be considered the same from Cape Clear or the Scilly Isles, as far west as long. 70°.

DISTANCE BY LANE TO EUROPE

	To Scilly Isles	To Cape Clear
From: Halifax	2,436	2,285
Capes of Delaware ..	3,024	2,873
Sandy Hook	2,980	2,829

Besides the detour from the great circle which a vessel from New York, Halifax, Boston, or Philadelphia would necessarily make by following the European lane to Cape Clear, it would require an *additional* detour of only 15 miles for vessels bound into the English Channel to use it also as far as Cape Clear. This lane, therefore, will, in consequence of the favorable currents of the Gulf Stream, put a vessel into Southampton quite as soon as she could reach that port from New York or Philadelphia by the great circle route. Vessels from Halifax will have to make the greatest detour of any by adopting the lane to Europe; but for them it is less than 100 miles out of their way as they now go, and it will prolong their average passage eastwards, perhaps, two or three hours. I say *perhaps*, because I am not sure but that the steamers from Halifax and New England are set back by the cold current 20 or 30 miles on the route now used for the eastern passage. The Gulf Stream, even from where they will join it by this lane, will set them forward, on an average 40 or 50 miles at the least. It seems, therefore, that the attractions of this lane as it regards safety should more than outweigh the *probable* loss of an hour or two during the passage. When I speak of distances by the lanes, it should be recollected that the *middle* of the lane is meant, as per following table of courses and distances.

Thus it appears that one lane will practically shorten the distance from Cape Clear to Sandy Hook and the Delaware, by 30 miles, while the other prolongs the distance going to Europe 75 miles, which prolonged distance, when measured not by safety, but *in time* alone, the Gulf Stream, better weather, and diminished frequency of fogs, will more than compensate. In my judgment, these lanes, if properly followed, will make the average length of passage, as determined by the mean of all

Lane to America

								Course	Distance
From Scilly Isles to Cape Clear*								W 33°·7′ N†	159 miles
,, Cape Clear to lat. 51°·23′, long. 15°·0′								1°·55′	187 ,,
,, lat. 51°·23′, long. 15°·0′	to lat.	51°·16′,	long.	20°·0′				W 2°·17′ S	187 ,,
,, ,, 51·16	,,	20·0	,,	50·56	,,	25·0		6·5	189 ,,
,, ,, 50·56	,,	25·0	,,	50·23	,,	30·0		9·50	193 ,,
,, ,, 50·23	,,	30·0	,,	49·36	,,	35·0		13·41	199 ,,
,, ,, 49·36	,,	35·0	,,	48·33	,,	40·0		17·45	207 ,,
,, ,, 48·33	,,	40·0	,,	47·15	,,	45·0		21·8	216 ,,
,, ,, 47·15	,,	45·0	,,	45·38	,,	50·0		25·10	228 ,,
,, ,, 45·38	,,	50·0	,,	45·00	,,	51·45		27·13	83 ,,
,, ,,(*a*)45·00	,,	51·45	,,	44·10	,,	55·0		19·45	148 ,,
,, ,, 44·10	,,	55·0	,,	42·40	,,	60·0		22·27	236 ,,
,, ,, 42·40	,,	60·0	,,	41·42	,,	65·0		14·34	231 ,,
,, ,, 41·42	,,	65·0	,,	40·30	,,	70·0		17·45	236 ,,
,, ,, 40·30	,,	70·0 to Sandy Hook						0·43	183 ,,
,, ,, 40·30	,,	70·0 to Capes of Delaware						22·8	249 ,,
,, ,,(*a*)45·00	,,	51·45 to Halifax						W 3·53 S	503 ,,

Lane to Europe

								Course	Distance
From Capes of Delaware to lat. 39°·40′, long. 70°·0′								E 10°·46′N	236 miles
Sandy Hook to lat. 39°·40′, long. 70°·0′								E 14·29 S	192 ,,
,, lat. 39°·40′, long. 70°·0′	to lat.	40°·31′,	long.	65°·0′				E 12·24 N	237 ,,
,, ,, 40·31	,,	65·0	,,	41·9	,,	60·0		9·39	227 ,,
,, ,, 41·09	,,	60·0	,,	41·33	,,	55·0		6·5	225 ,,
,, ,, 41·33	,,	55·0	,,	41·53	,,	50·0		4·57	232 ,,
,, ,,(*b*)41·53	,,	50·0	,,	43·55	,,	45·0		29·6	251 ,,
,, ,, 43·55	,,	45·0	,,	45·46	,,	40·00		27·28	241 ,,
,, ,, 45·46	,,	40·0	,,	47·18	,,	35·0		24·4	226 ,,
,, ,, 47·18	,,	35·0	,,	48·32	,,	30·0		20·18	212 ,,
,, ,, 48·32	,,	30·0	,,	49·30	,,	25·0		16·21	206 ,,
,, ,, 49·30	,,	25·0	,,	50·14	,,	20·0		12·46	199 ,,
,, ,, 50·14	,,	20·0	,,	50·45	,,	15·0		9·17	192 ,,
,, ,, 50·45	,,	15·0 to Cape Clear						E 4·34 N	189 ,,
,, Cape Clear to Scilly Isles								E 27·39 S	151 ,,
,,(*b*) Halifax to lat. 43°·30′, long. 60°·0′								20·7	163 ,,
,, lat 43°·30′, long. 60°·0′	to lat.	42°·30′,	long.	55°·0′				15·17	181 ,,
,, ,, 42·30	,,	55·0	,,	41·53	,,	50·0		E 9·28 S	225 ,,

for the year, probably less each way, certainly not more than an hour or two longer than it now is. Individual passages coming will perhaps not be made so quickly as they have been, but on the average, trips will be shortened. . . .

I have the honor to be, gentlemen,

Yours respectfully,

M. F. MAURY

Lieut. U.S. Navy

* The courses and distances are for the *middle* of the lanes.

† *Editor's note.* It was the practice at this time for mariners of some nations to measure certain courses in degrees from East or West.

UNUSUAL CLOUD FORMATION OVER SOUTH-EAST ENGLAND

The photographs opposite page 180 show an unusual cloud formation on 26th July 1972 which was seen by observers in Gravesend, Brentwood and Bracknell.

The first one was taken at 2015 BST by River Patrol Officer L. Plumb on the Port of London Authority's patrol launch *Benfleet* at the Royal Terrace Pier, Gravesend, Kent. The other observers from the Thames Navigation Centre were Captain T. Bull, Captain L. Williams and Radio Officers Mr. D. L. Woollard, Mr. D. Chidley and Mr. Pearce. They reported as follows:

"The cloud was observed from the Thames Navigation Centre, Gravesend at 2015 BST at an elevation of about 45° in a north-west direction from the building. The phenomenon consisted of cirrus cloud which was so formed to give the impression of being the curved ceiling of a vast hall. The sun was low down behind a heavy bank of cloud but there was no other cloud in the vicinity of the cirrus. It persisted until after sunset at 2122 BST."

The second photograph was taken at about the same time by Mr. P. W. Povey from his garden in Brentwood, Essex. Both of these photographs were shown to Mr. R. K. Pilsbury, F.R.P.S., a senior officer at the Meteorological Office, Bracknell, well known for his cloud photographs (some of which appear in the *Marine Observer's Handbook*). He commented as follows:

"Thank you for letting me see the cloud photograph sent by officers of the Thames Navigation Centre, Gravesend. We also have a photograph of this cloud as seen from Brentwood, Essex. It so happens that I saw this 'cloud' develop. I have a photograph of it in its early stages lying to the north-east of Bracknell and timed at around 2000 BST. It began as an aircraft condensation trail which formed at around 25,000 feet above sea level, from which shortly afterwards a shower of fine ice crystals began to fall. This shower is called 'virga'. The wind at the level of the trail was very light south-south-west but just below this altitude the speed of the wind increased from 20–25 knots and so the ice crystals were carried away to the north of the trail as they fell. However, as they descended further, they reached the region where the wind was decreasing to around 10–15 knots, thus the lines of ice crystal showers are arched as shown in the photographs. Unfortunately I was too far to the west to get a good photograph of it at this stage because the sun had set on it from my position. It is, however, very nice to see the photograph taken by the officers at Gravesend. The picture conveys the real beauty of the 'cloud' formation and I am very pleased to see that others look at the clouds as well as me and appreciate their beauty and unusual formations."

INDIAN EXCELLENT AWARDS

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

During the year ended 31st March 1971 the Indian Voluntary Observing Fleet (consisting of 44 Selected, 107 Supplementary and 8 Auxiliary ships) rendered commendable service to the Meteorological Department, and to world meteorology in general, by recording and transmitting valuable meteorological observations purely on a voluntary basis. During the year 1,934 logs consisting of 22,805 meteorological observations were received in the Department from ships.

The weather observations recorded and transmitted by these ships were of great value in the day-to-day forecasting work of the Department and, in particular, for issuing warnings to ships. The Department wishes to convey its thanks to all Captains and Officers of the Voluntary Observing Fleet and the respective shipowners who have co-operated during the year.

As in the past, the log sheets received from these ships have been scrutinized and

an annual assessment made in respect of accuracy of observations recorded (making due allowance for the number of days at sea by individual ships). Consideration was also given to the transmission of observations and to the general upkeep of meteorological instruments on board. On the basis of these assessments, the work of the following ships, in order of merit, has been adjudged the best for the year 1970–71:

Name of Vessel	Owner
Lok Sevak	Mogul Line Ltd.
State of Haryana ..	Shipping Corporation of India Ltd.
Mohammedi ..	Mogul Line Ltd.
Dwarka	British India S.N. Co. Ltd.
Jal Jawahar ..	Scindia S.N. Co. Ltd.
Jag Kisan	Great Eastern Shipping Co. Ltd.
Kampala	British India S.N. Co. Ltd.
Karanja	British India S.N. Co. Ltd.
Saudi	Mogul Line Ltd.
Vishva Kaushal ..	Shipping Corporation of India Ltd.
Jagat Neta	Dempo S.S. Co. Ltd.
Jalapankhi	Scindia 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.

Jala Durga
Jala Vishnu
Jalapalaka
Mozaffari
Rajula
Sagar Sudha
Sirdhana
State of West Bengal
Vishva Chetana
Vishva Jyoti
Vishva Kanti
Vishva Sudha
Vishva Vibhuti

PRESENTATION OF BAROGRAPH

When reporting in the April 1972 edition of *The Marine Observer* on the presentation of barographs, mention was made of the difficulty of getting four shipmasters together in one place at the one time and that although three of the four 1971 barographs had been presented, Captain W. J. Law, the fourth recipient, had remained obstinately at sea in the new cruise liner *Cunard Adventurer* based on New York. Happily, however, he made a landfall on this side during the early summer when he brought the *Queen Elizabeth 2* into Southampton and on 2nd June we were able to have him down to Bracknell to receive his barograph. We were sorry that neither the Marine Superintendent nor any representative of the Management of the Cunard Line could also attend.

Dr. B. J. Mason, Director-General of the Meteorological Office, made the presentation, again stressing the great value which ships' observations had always been, mentioning that the ships of the Cunard Line had been observing for us ever since 1867 when instruments were put aboard their last paddle-steamer on the North Atlantic run, the *Scotia*. Captain Law himself had been observing since 1934 when he was serving in the Silver Line.

After lunching with the Director-General and the senior officers principally concerned with ships' observations, Captain Law was shown the working of the Office and was thus one of the first shipmasters to see the new IBM computer (one of the largest in the world) at work.

A photograph taken at the ceremony is reproduced opposite page 181.

L. B. P.

ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM APRIL TO JUNE 1972

The charts on pages 188 to 190 display the actual and normal ice edges (4/10 cover), sea-surface and air temperatures and surface-pressure anomalies (departures from the mean) so that the abnormality of any month may be readily observed. (The wind anomaly bears the same relationship to lines of equal pressure anomaly as wind does to isobars. Buys-Ballot's law can therefore be applied to determine the direction of the wind anomaly.) The summary of iceberg sightings has been discontinued and is replaced during the iceberg season (roughly February to July) by southern and eastern iceberg limits. In any month when sightings have been abnormally frequent (or infrequent) this will be discussed briefly in the text.

The periods used for the normals are as follows. Ice: Eurasian sector, all data up to 1956,[1] North American sector, 1952–56 (for north of 68°N)[1] and all data up to 1963 (for south of 68°N).[2] Surface pressure: 1951–66.[3] Air temperature, 1951–60.[4] Sea-surface temperature: area north of 68°N, 1854–1914 and 1920–50,[5] area south of 68°N, 1854–1958.[2]

April

Extremely excessive conditions persisted off eastern Canada where, as a result of continued northerly winds, mean air temperatures ranged from 2 to 4 degC below normal. Over the Greenland Sea conditions were similar to last month, but cold northerly winds established an excess over the northern Barents Sea. Light winds and above-average temperatures maintained a considerable deficit in the south-eastern Barents Sea.

The iceberg limit, as shown on the pressure/air-temperature chart, defined an area which contained many more icebergs than normal. At times more than 600 icebergs were estimated to have passed southward of 48°N on the Grand Banks of Newfoundland.

May

Though there was a recovery towards normal in the Davis Strait, extreme conditions further south were maintained by persistent cold north-westerly winds. The effect of the Labrador Current is clearly seen in carrying a tongue of ice south-eastwards around the Grand Banks. South-easterly winds, south of 71°N, were chiefly responsible for the deficit shown over the central and southern Greenland Sea, while the shape of the ice edge in the Barents Sea conformed to the wind anomaly pattern. Once again an exceptionally large number of icebergs drifted south of 48°N off Newfoundland.

June

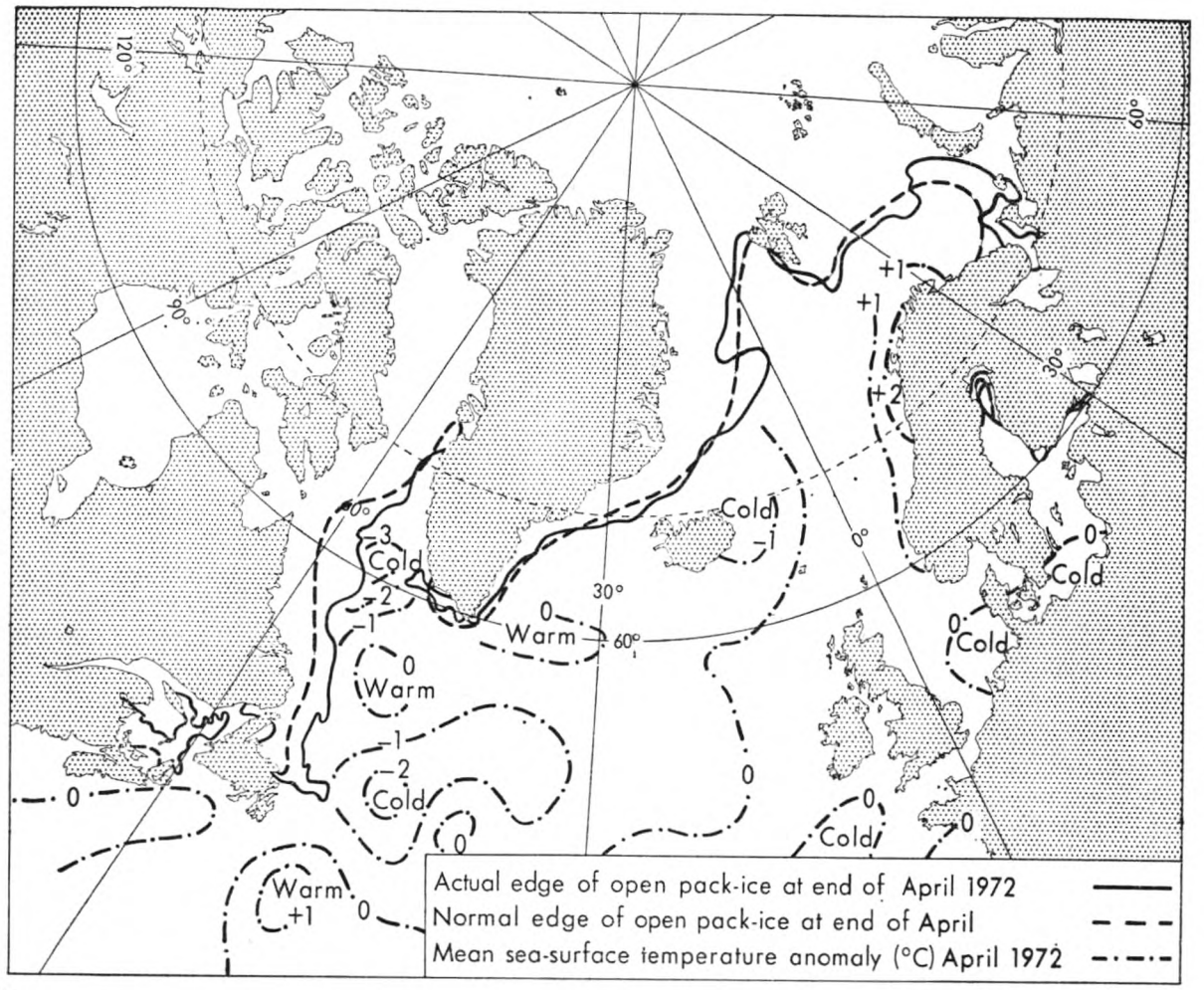
For the sixth consecutive month a considerable excess, maintained by cold north-westerly winds, prevailed over the sea area off Labrador. The severe season experienced in eastern Canada has contributed towards the cold sea-temperature anomaly over the mid-latitude belt of the North Atlantic, which in turn led to an exceptionally cold early summer over most parts of the U.K. This severe season over eastern Canada has also led to an exceptional iceberg season. The limits at the end of this month are not only further south and east, but they enclose a greater number of bergs than usual. At this stage it is impossible to quantify the 1971/72 iceberg season but it has all the appearances of being the worst on record.

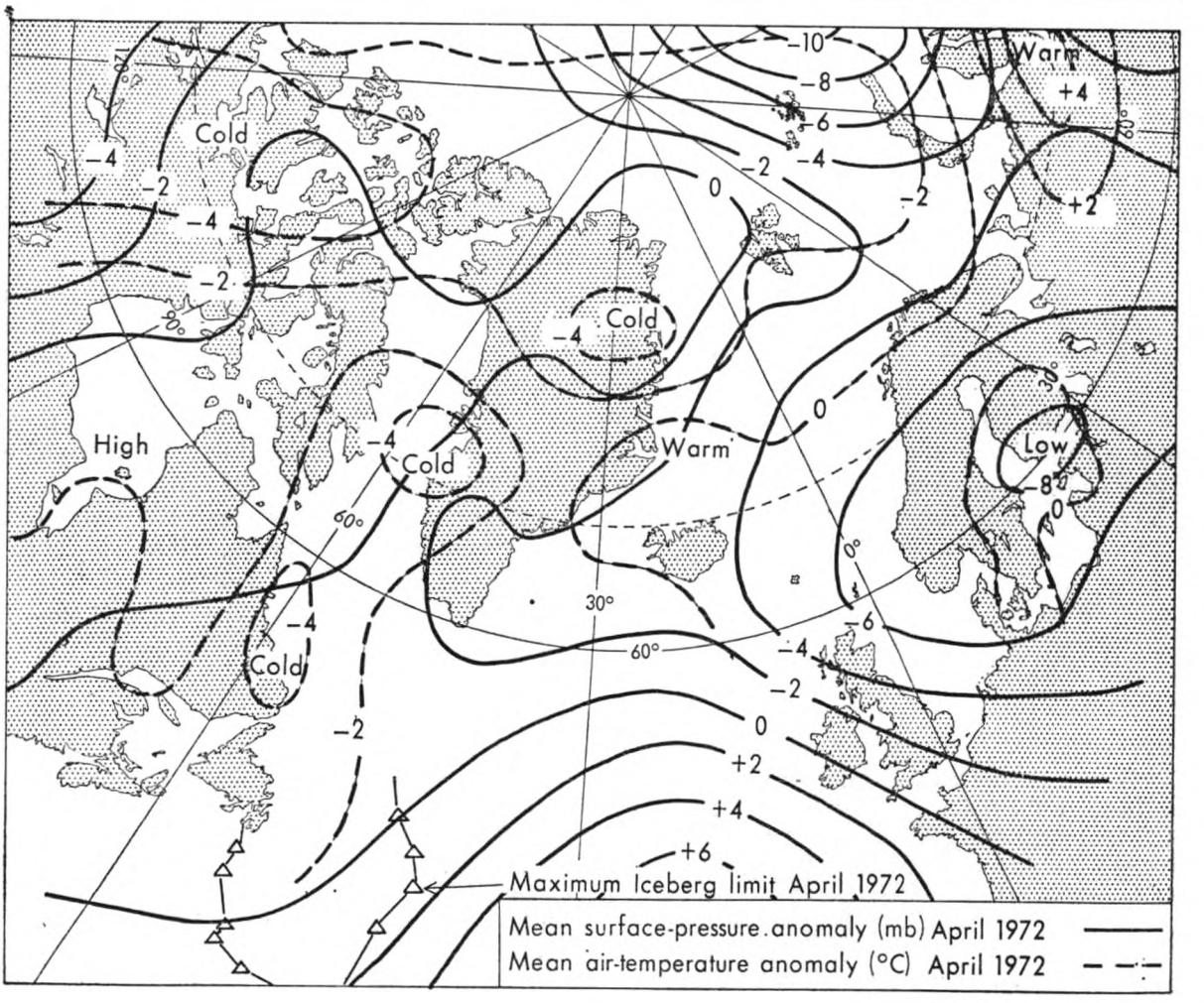
The deficit in the Greenland Sea was further increased by a warm south-easterly wind anomaly, while the Barents Sea excess from May was converted to a deficit by warm southerly winds.

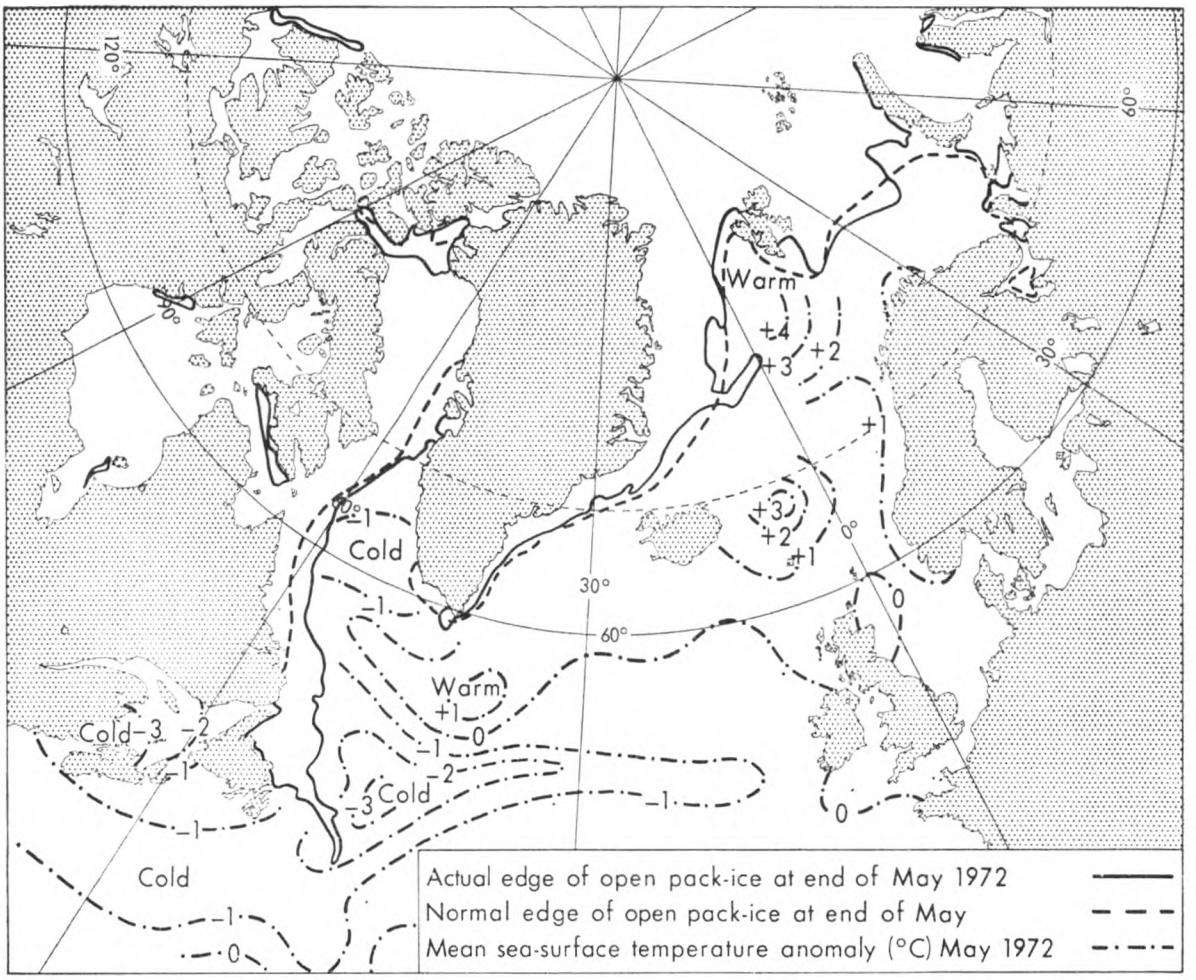
R.M.S.

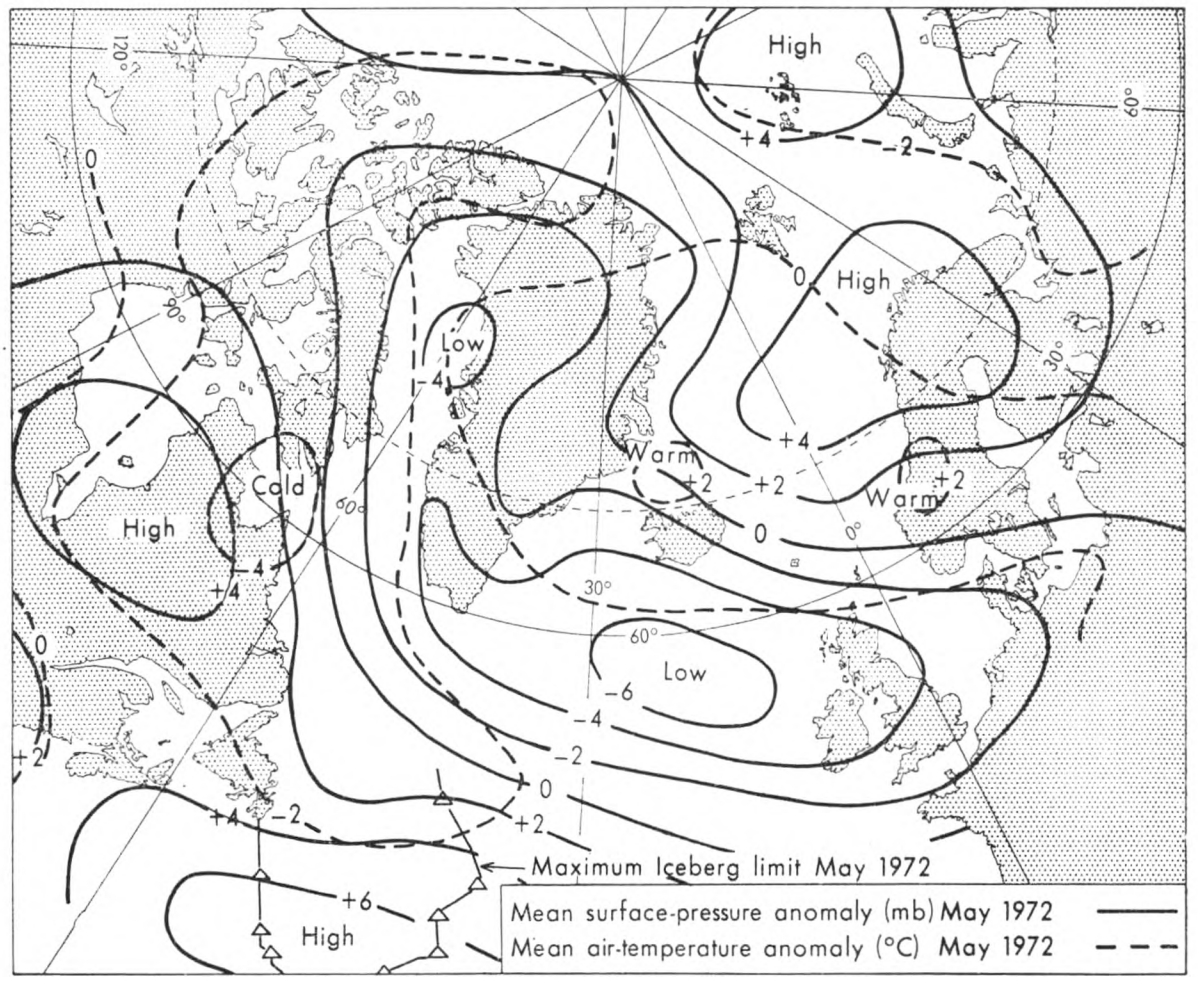
REFERENCES

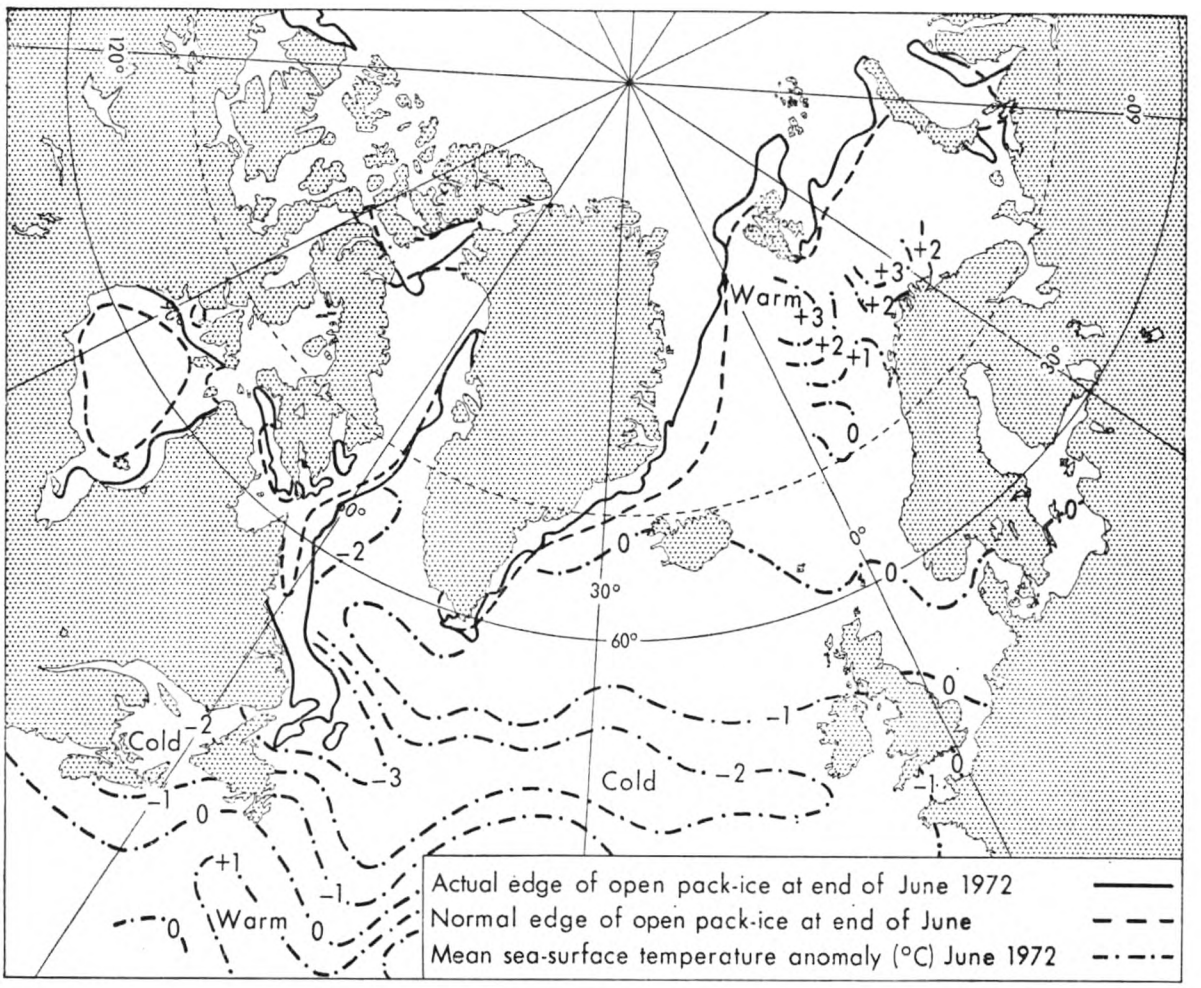
1. Washington, D.C., U.S. Navy Hydrographic Office. Oceanographic atlas of the Polar Seas. H.O. Pubn. No. 705, Part II: Arctic, 1958.
2. Washington, D.C., U.S. Naval Oceanographic Office. Oceanographic atlas of the North Atlantic Ocean. Pubn. No. 700, Section III: Ice, 1968.
3. London, Meteorological Office. Various publications.
4. Washington, D.C., U.S. Department of Commerce Weather Bureau. World weather records, 1951–60. Vol. 1: North America, 1965.
5. London, Meteorological Office. Monthly meteorological charts and sea surface current charts of the Greenland and Barents Seas. Met.O.575, 1966.

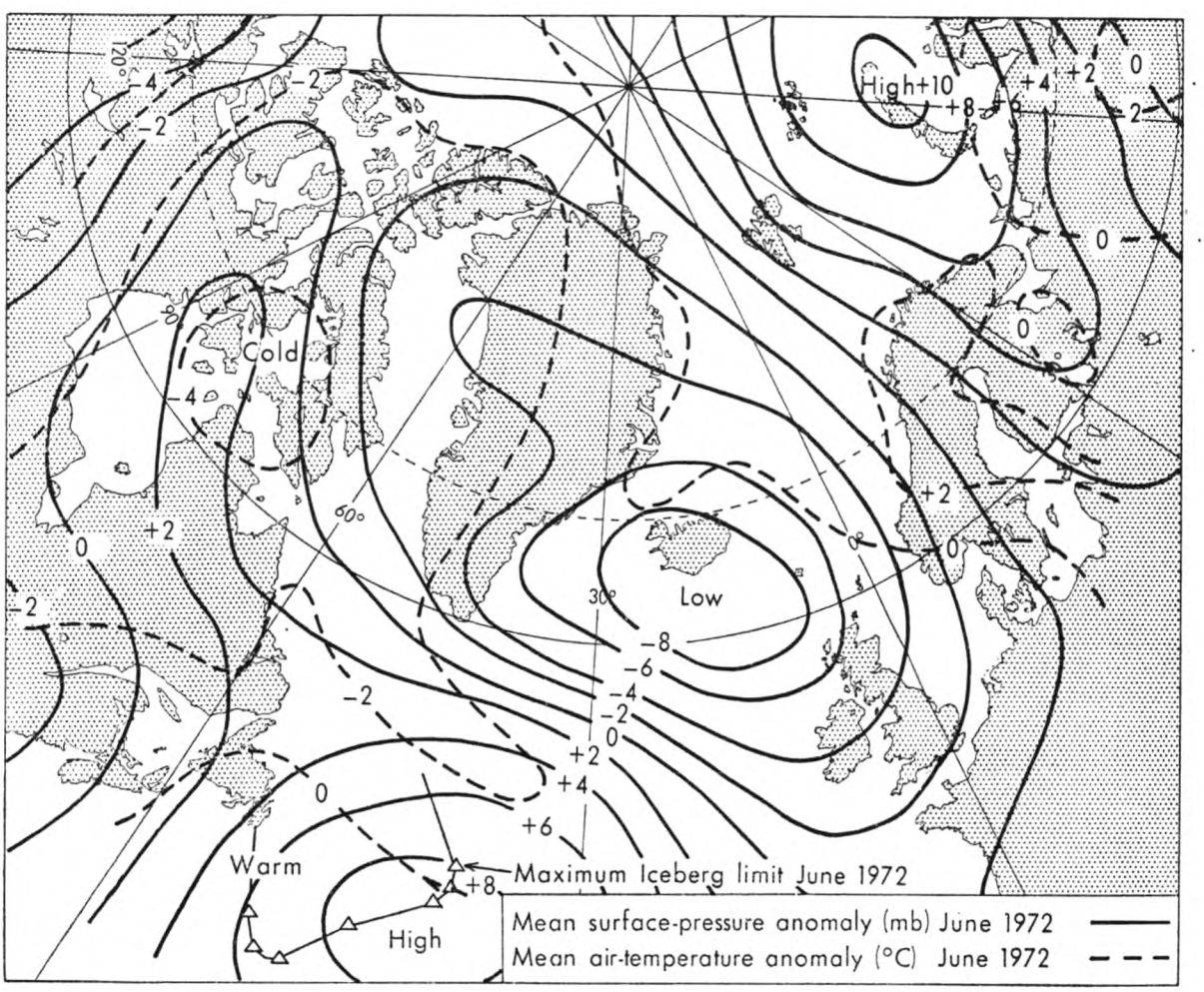

Actual edge of open pack-ice at end of April 1972
Normal edge of open pack-ice at end of April
Mean sea-surface temperature anomaly (°C) April 1972
Warm
Cold
120°
90°
60°
30°
0°


Maximum Iceberg limit April 1972
Mean surface-pressure anomaly (mb) April 1972
Mean air-temperature anomaly (°C) April 1972
High
Low
Warm
Cold
90°
60°
30°
0°


Warm
Cold
Warm
Cold
Cold
Actual edge of open pack-ice at end of May 1972
Normal edge of open pack-ice at end of May
Mean sea-surface temperature anomaly (°C) May 1972


High
High
Low
Warm
Warm
Cold
High
Low
High
Maximum Iceberg limit May 1972
Mean surface-pressure anomaly (mb) May 1972
Mean air-temperature anomaly (°C) May 1972


Actual edge of open pack-ice at end of June 1972
Normal edge of open pack-ice at end of June
Mean sea-surface temperature anomaly (°C) June 1972
Warm
Cold
Cold
Warm
120°
60°
30°
0°
30°
60°


Mean surface-pressure anomaly (mb) June 1972
Mean air-temperature anomaly (°C) June 1972
Maximum Iceberg limit June 1972
High
Low
Warm
Cold
120°
60°
30°
0°
30°
60°

Baltic Ice Summary: April–June 1972

No ice was reported at the following stations during the period: Riga, Klaipeda, Ventspils, Mantyluoto, Kalmar, Göteborg, Visby, Emden, Lubeck, Hamburg, Bremerhaven, Kiel, Flensburg, Stettin, Gdansk, Stralsund, Rostok, 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	26	9	0	0	8	0	0	809	0	0	0	0	0	0	0	0	—
Pyarnu ..	1	30	28	13	11	6	21	0	410	4	10	7	0	3	3	0	0	—
Viborg ..	1	30	30	28	0	2	0	28	—	1	1	1	0	0	0	0	0	—
Tallin ..	1	17	15	0	11	0	9	0	—	0	0	0	0	0	0	0	0	—
Helsinki ..	1	19	19	0	0	15	0	0	589	0	0	0	0	0	0	0	0	—
Mariehamn	1	3	3	0	3	3	0	0	201	0	0	0	0	0	0	0	0	—
Turku ..	1	10	10	0	0	0	0	0	474	0	0	0	0	0	0	0	0	—
Vaasa ..	1	27	21	20	0	0	20	0	769	0	0	0	0	0	0	0	0	—
Oulu ..	1	30	30	30	0	0	30	0	1026	1	11	11	5	0	0	5	0	—
Roytaa ..	1	29	29	24	0	0	24	5	—	6	6	1	0	0	0	0	0	—
Lulea ..	1	30	30	30	0	0	30	0	1163	1	18	18	11	0	0	14	0	—
Bredskar ..	5	11	7	0	0	7	0	0	—	0	0	0	0	0	0	0	0	—
Sundsvall ..	1	14	14	0	0	10	0	0	—	0	0	0	0	0	0	0	0	—
Stockholm ..	1	24	24	7	0	11	0	0	30	0	0	0	0	0	0	0	0	—
Skellefteå ..	1	30	30	28	0	0	30	0	—	1	14	9	0	3	0	9	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.

Book Reviews

The Sailing Ships of the New Zealand Shipping Company 1873–1900, by Alan Bott. 10 in × 7½ in, pp. 160, *illus.* B. T. Batsford Ltd., 4 Fitzhardinge Street, London, W1H 0AH, 1972. Price: £3·50.

Take-overs, amalgamations and containerization have changed many shipping companies. The name of one of the older, well-established and much respected companies, the New Zealand Shipping Company, has recently disappeared so perhaps this is not an inappropriate time to publish a book describing the formation of the Company in Christchurch, New Zealand during November 1872 to provide increased shipping facilities for the New Zealand trade, and the many fine sailing vessels owned by the Company until 1899 when it disposed of the last of these vessels.

The author, being a Director of the New Zealand Shipping Company, has made excellent use of many records, logbooks, diaries, documents, photographs and paintings held by the Company to produce an interesting and beautifully illustrated authoritative book.

Many of those interested in the days of square-rigged vessels could well consider purchasing this book for the illustrations alone as it contains over 80 plates, a large majority being of sailing ships at sea or in New Zealand harbours, but the purchaser would no doubt become further engrossed as the narrative on the history, sailing qualities and points of interest is produced for each ship of the fleet and makes good reading.

The lengthy introduction describes the setting up of the Company, the acquisition of the first ships and rapid expansion of trade. After the Company had been in

existence for only six years the Directors decided to set up a company cadet scheme, the object being "to get good steady lads who will make their way up in our service, and become in time efficient officers and commanders" of the Company's ships. This Company has ever since, I believe, had a fine reputation for the training of 'the young gentlemen'.

The 1870s had seen the first successful carriage by sea of frozen meat from Australia to Europe. The trade continued to develop until the New Zealand Company and Federal Steam Navigation Company owned the largest fleet for the carriage of refrigerated cargoes. They were also very active in the flourishing immigrant trade which existed between England and New Zealand. Although the conditions provided on board these ships were comparatively good, voyages were not without tragedy or humour and the author relates a number of the more interesting occurrences.

This well-produced book should be welcomed by those who have sailed in the New Zealand Shipping Company and by many who still take a real interest in the old days of square-riggers.

G. A. W.

Nelson The Commander, by Geoffrey Bennett. 9 in × 5¼ in, pp. 322, *illus.* B. T. Batsford Ltd., 4 Fitzhardinge Street, London W1H 0AH, 1972. Price: £3·90.

The bibliography at the end of this volume lists some 30 works whose titles include the name Nelson.

Captain Bennett's book is yet another biography of a man whose character must for ever remain something of an enigma. One has to wonder sometimes whether he really earned the fame and honour that history has heaped upon him. For, as is stated in the first chapter, Trafalgar was, after all, his only victory over an enemy fleet at sea: at Copenhagen and the Nile he destroyed ships at anchor. His passion for Emma Hamilton, his wholly un-British treatment of the defeated Neapolitan Commodore Caracciolo whom, though he had fought with him at the Battle of Genoa in 1795 and to whom he had been asked to grant an honourable death by shooting, Nelson condemned to the death of a felon at a yardarm, his disobedience of orders, sometimes so flagrant that he was once ordered to strike his flag, his non-co-operation with his Russian ally, Vice-Admiral Ushakóv, and finally his callous treatment of his own wife whose last written attempt at reconciliation was returned to her with a cryptic note "Opened in error by Lord Nelson but not read", are not characteristics which would normally go to the making of a national hero.

But the book has the merit of having been written by a professional Naval Officer, the first such biography since Mahan's classic *Life of Nelson* which was published in 1897. It thus has the stamp of authenticity and there can be few persons better qualified to describe the great age of fighting sail, its ships and weapons and how they were manned, and the strategy and tactics of the Napoleonic Wars. The author analyses Nelson's campaigns and battles, and sets his failures at Tenerife and Boulogne against his triumphs at Cape St. Vincent, The Nile, Copenhagen and Trafalgar. He does not gloss over the Admiral's failings nor yet minimize them and thus the book deserves to be read and studied.

L. B. P.

Notices to Marine Observers

PORT METEOROLOGICAL AGENT IN BRISBANE

Captain George Garrett has been appointed to the new post of Port Meteorological Agent for Brisbane and commenced his duties in May 1972.

Captain Garrett served for 31 years with the cable-ship fleet of Cable and Wireless Ltd. (London), the last 16 years in command. During this time he was connected with weather observing for which he received several awards. Three of the cable ships under his command, the *Norseman*, the *Mirror* and the *Mercury*, were in the U.K. Voluntary Observing Fleet and Captain Garrett's association with the British Meteorological Office covers the period from 1958 to 1966.

Ships' observing officers requiring assistance can contact Captain Garrett through the Queensland Regional Office, Bureau of Meteorology, Corner of Wickham Terrace and Edward Street, Brisbane; telephone 214511.

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

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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.)

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