Different classes of ships are provided for by the tables, and to arrive at an exact freeboard is a matter for an expert; but these few remarks will help the learner to understand in some degree the tables which have been published for his guidance by the Load Line Committee.

SECTION XLVIII.

WINDS, WEATHER, AND BAROMETER; AND HOW TO FORETELL WEATHER.

WEATHER AT SEA.

With a first-class modern steamer, in good trim, it matters little what the weather is under ordinary circumstances, so long as it keeps clear. But put even such a vessel in a hurricane district during the season and it will matter very considerably; and as this work appeals to all classes in sail and steam, an article on weather would not appear to be out of place.

There is much truth in the old doggrel weather rhymes, and an experienced seaman will often detect signs of a coming gale some time beforehand.

A red sky in the morning
Is the sailor's warning;
A red sky at night
Is the sailor's delight.

Read a *rainbow* for a red sky, and the same rhyme holds good.

In squalls—

When the rain's before the wind,
Topsail halliards you must mind.
When the wind's before the rain,
Soon you may make sail again.

At sea, with low and falling glass,
Soundly sleeps the careless ass,
Only when it's high and rising
Safely rests the careful wise 'un.

Mackerel sky and mares' tails
Make lofty ships carry low sails.

"The wind will blow hard when the gull comes ashore."

Seagull, seagull, sit on the sand!
It's never good weather when you're on the land.

Evening red and morning grey,
Are very good signs of a very fine day.

For the barometer—

First rise after low
Foretells stronger below.

Long foretold, long last;
Short notice, soon past.

Hard-edged, oily (or greasy) looking clouds, tell of wind (called in some parts "pig's-eye sky").

Soft looking clouds—fine weather.

High upper clouds, crossing the sun or moon, in an opposite direction to the wind blowing, foretell a change to their direction.

A high dawn (that is, when the first streaks of light appear over a bank of clouds instead of near the horizon) foretells wind.

A low dawn—fine weather.

In the Northern Hemisphere turn your *back* to the wind, and the low barometer or storm centre is on your *left* hand. In S. lats. the opposite. This natural law is named, after its promulgator, Buys Ballot's law.

In the Atlantic, and about our own coasts, Bay of Biscay, North Sea, &c., the light mare's tail or brush-head cloud (*cirrus*), moving from N.W. on a fine day, is an almost infallible sign of the approach of a depression or storm system. High clouds such as this and the mackerel sky should always receive careful attention from the seaman who wishes to be able to foretell the weather.

This fore-mentioned *cirrus*, when seen lying at rest in faint cross lines, is a good sign of settled weather.

A mackerel sky moving fast (from the westward), or long feathers of *cirrus* radiating from the west, as is sometimes seen at sunset, are both signs of an approaching westerly gale.

After a considerable period of very low barometer, accompanied by moderate or quiet weather, expect a gale from the north.

An *extremely* low barometer is sometimes followed by strong N.E. gales.

After running with strong westerly winds and a *slowly* falling or steady glass towards the channel, it sometimes happens that the wind flies to the W.N.W., and *afterwards* comes to N. and N.N.E. with a rapidly falling barometer. When this occurs, strong N.E. gales of some duration are likely to follow, especially if it be early spring. Fourteen days of hard gales from E.N.E. to N. have been known to follow a change of this kind in the chops of the channel, with a glass down as far as 28·40 during the first day.

If the barometer has been at about an ordinary height, and is steady or rising, while the thermometer falls and the air gets drier, N.W.-N. or N.E. wind, or a decrease of wind may be looked for. On the contrary, if the glass fall, and the thermometer rises and the air becomes damper, S.E.-S. or S.W. wind may be expected with rain, or, in winter, perhaps snow.

An exception occasionally occurs to these rules when rain or snow from N.E. is approaching, before which the barometer will sometimes rise (on account of the *direction* of the coming wind).

If the barometer has been below the ordinary height, say about 29½ inches (29·5), a rise will foretell less wind, *or* a change towards the northward, *or* less wet.

If the barometer has been *low*, say about 29·0, then the first rise usually foretells a gale or heavy squalls from N.W.-N., or N.E. After such a gale has burst, if the glass still rise, *better weather is probable if it becomes colder;* but if it continues the same temperature or gets warmer, it is probable the wind will back, and that a S. or S.W. wind will follow.

The most dangerous shifts and the heaviest northerly gales come after the first rise of the barometer from a very low point.

A rapid rise of the barometer means unsettled weather.

A slow rise or a steady glass—fair weather.

Alternate rise and fall means unsettled weather.

A *rapid* fall—look out for a gale and rain.

If the glass falls for a northerly wind it will be wet and violent.

The great westerly gales of the Atlantic usually begin at S. or even S.S.E. hauling gradually to S.W. and W.S.W., blowing hard from that quarter with a falling glass and rain, the weather getting gradually thicker. Presently the glass stops falling, there is often a slight lull, with rain heavier than before, there is a lift to the westward, perhaps lightning, then away comes the wind in a heavy squall from W.N.W. The weather then generally clears, and the gale becomes squally with rain and hail from N.W.

The Southern Ocean gales act in a similar manner, except that they usually begin at N.W. or W.N.W. with thick weather, and shift to S.W. with clear weather and squalls, the glass falling during the time the wind is W.N.W.'ly, and usually beginning to rise just before the shift to S.W. These gales, though often very heavy, especially in the N. Atlantic during winter, very seldom if ever reach the *extreme* force of a severe tropical hurricane, though their force is often recorded in Logs as 12 in Beaufort's scale—which is here given, as are also the letters which are in these days very generally used to indicate the state of the weather in a Log.

WIND.

0. Calm.
1. Light air = steerage way.
2. Light breeze = 1 to 2 knots clean full in smooth water.
3. Gentle breeze = 3 to 4 knots "
4. Moderate breeze = 5 to 6 knots "
5. Fresh breeze = to which royals could be carried.
6. Strong breeze = to which topgallant sails could be carried.
7. Moderate gale = to which topsails, jib, &c. could be carried.
8. Fresh gale = to which reefed upper topsails and courses could be carried.
9. Strong gale = to which lower topsails and courses could be carried.
10. Whole gale = to which lower main topsail and reefed foresail could be carried.
11. Storm = to which storm staysails could be carried.
12. Hurricane = which no canvas could withstand.

WEATHER.

b = Blue sky.
c = Clouds (detached).
d = Drizzling rain.
f = Fog.
g = Gloomy.
h = Hail.
l = Lightning.
m = Misty (hazy).
o = Overcast.
p = Passing showers.
q = Squally.
r = Rain.
s = Snow.
t = Thunder.
u = Ugly (threatening appearances).
v = Visibility (objects at a distance very clear).
w = Dew.

A line under a letter = heavy; a double line = very heavy, thus—$\underline{r}$ heavy rain; $\underline{\underline{r}}$ very heavy rain.

SEA.

0 = Calm.
1 = Very smooth.
2 = Smooth.
3 = Slight.
4 = Moderate.
5. Rather rough.
6. Rough.
7. High.
8. Very high.
9. Tremendous.

CLOUDS

Are of four principal classes (which are subdivided into other classes of less importance).

1. The cirrus = mares' tail, and cirro-cumulus, mackerel sky.
2. The stratus = cloud lying in lines or layers (*strata*).
3. The cumulus = large massy cloud in different forms.
4. The nimbus or rain cloud.

Of these the first-class, cirrus, has already been mentioned.

The stratus is usually a sign of quiet weather, with perhaps fog or dullness.

The cumulus generally accompanies a polar wind, with moderately dry weather.

The nimbus, as a rule, accompanies a southerly or wet wind.

By far the most important for the seaman to observe are the *upper* clouds, namely, the cirrus and cirro-cumulus.

In high latitudes it is to be remembered that in lying-to in heavy weather, or head reaching, on *one* tack the glass will rise, on the other it will fall.

In the Northern hemisphere the glass will rise when on the starboard tack and fall on the port tack. In the Southern hemisphere it will fall on the starboard tack and rise on the port tack. Buys Ballot's law explains this thus:—

When your back is turned to the wind in the N. hemisphere, the low barometer is on your left hand; and as, when you are thus placed, a ship on the starboard tack is advancing towards your right, she goes towards the higher barometer. This is reversed in the S. hemisphere. It *may*, however, happen that a high pressure towards which a vessel is sailing is receding from her faster than she sails, in which case this rule would not strictly apply. Still, on the whole, it may be said that *in the Northern hemisphere a rising barometer on the starboard tack is not sufficient indication of improving weather*, and other signs should be looked for before trusting it. On the other hand, a rising barometer on the port tack is a valuable indication of improving weather, while a falling barometer on the starboard tack is an important warning in the other direction. This order will be reversed in the Southern hemisphere.

In the N. Atlantic, if hove to, or standing to the westward in a southerly gale, the glass will fall more rapidly than if running to the eastward, and worse weather may from this cause be expected than what is really coming.

In a weak or over-laden vessel bound to the westward, heave to on the starboard tack. Reverse this in the Southern hemisphere.

In the tropics the barometer, generally, moves much less than in high latitudes. In all places the glass has a daily range like a tide, being higher at about 8 or 9 A.M. and P.M. than it is from 3 to 4 A.M. and P.M.; and in high latitudes this is usually easily noticed; so much so that if the barometer remains steady from 3 o'clock to 10 or thereabouts it is equal to a fall, or if steady from 12 to 4 it is equal to a rise. Now, in the tropics this range is very small, and, unless careful readings are taken, will scarcely be noticed. Therefore, in these latitudes it is necessary to take more notice of slight movements in the barometer than is necessary in high latitudes, more especially when in hurricane districts during the season.

The theory of hurricanes (cyclones, or circular storms) is pretty generally known to seamen of the present day, but for young seamen a few general remarks on the subject will be useful, more especially as a knowledge of it is now required by the Board of Trade.

Tropical cyclones generally originate in about lat. 10° N. or S.

Their form has till late years been taken as circular, although there is no doubt that they are more of an elliptical form, with probably the area of greatest force round the calm centre, at the hindermost focus of the ellipse. This was first suggested by the writer in a letter to the *Nautical Magazine* in 1881, and is now becoming generally received as correct. The accompanying sketch *(Plate No. 128)* will show the

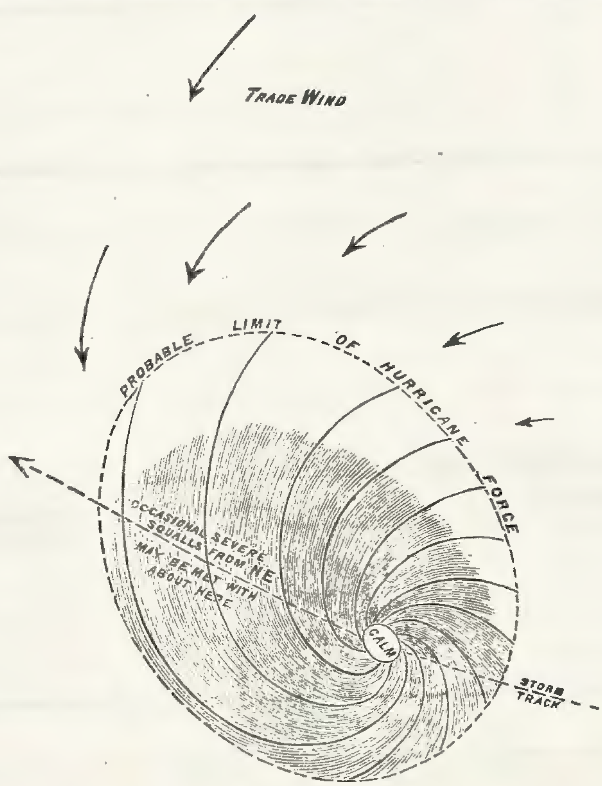
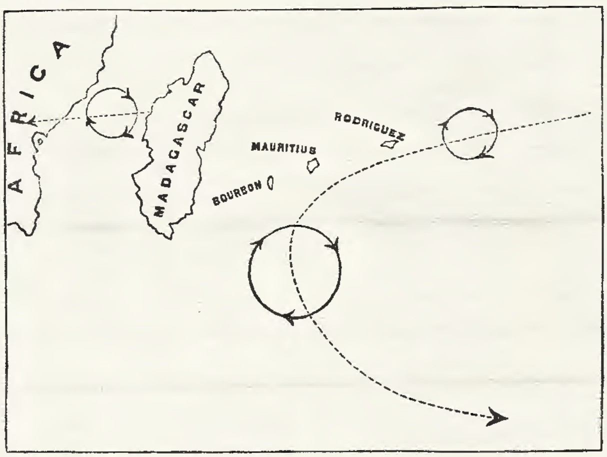


Plate No. 128.

A West India Cyclone travelling to the W.N.W. in the N.E. Trade district.

elliptical theory as far as shape goes. The old and generally received idea was, that the wind in the limits of the storm blew in *a circle* round a centre spot of calm. The more modern, and now unanimous, opinion is, that the wind blows in spirals as shewn in the diagram, and that though blowing to some extent round the centre, it also blows in some degree *towards* that centre as well.

Generally these storms do not remain in one place, but move along bodily in a westerly direction. There are, however, exceptions to this



rule, notably in the case of Mauritius hurricanes (*Plate No. 129*), which, moving S. W.'ly till near that island, often re-curve and go off in a S.E.

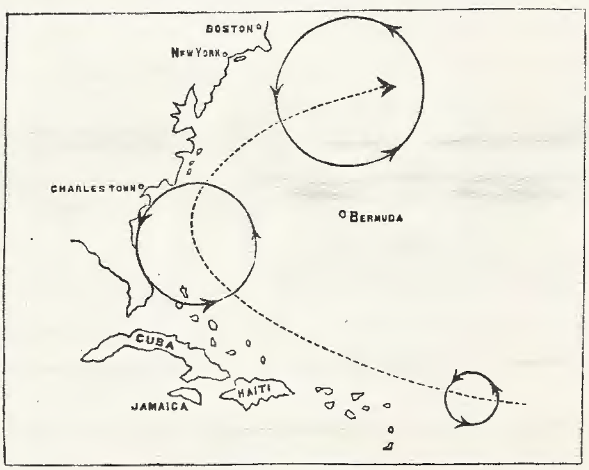


Plate No. 130.

direction. The W. India hurricanes also often re-curve when reaching the American coast and proceed coastwise (*Plate No. 130*), sometimes reaching Nova Scotia, or even across the Atlantic. The cyclones of the Bay of Bengal also move in uncertain tracks, especially up at the head of the bay. And so also the typhoons of the China Seas.

Usually, however, the storm, after beginning in about 10° N. or S., moves off to the westward, and at the same time increases its distance from the Equator (that is, in N. latitude the direction is W.N.W.'ly; in S. lat. W.S.W.'ly).

As the storm moves forward it gradually increases in volume and in rate of progression.

Now, in dealing with these storms for the purpose of avoiding them at sea, the cyclone is considered as divided into two halves, called the RIGHT hand and LEFT hand semicircles. Supposing yourself behind the storm, in its track, the half of the storm on your right hand is called the RIGHT hand semicircle, the one on your left hand the LEFT.

Now in Northern latitudes the wind in a cyclone blows spirally towards the centre against the hands of a watch, or against the sun. In South latitudes the opposite way.

Knowing these two facts, the first thing to be done if a cyclone is approaching, is to find the bearing of the centre. One of the first rules in foretelling weather (see beginning of this article) is: turn your *back* to the wind and the low barometer and storm centre is on your *left hand* in North latitude. In South latitudes the opposite. This rule applies in the same way to cyclones. Now, if the circular theory were correct, the centre would bear *square off* on your left hand or 8 points from the wind, but as the spiral theory is without doubt more correct, this old rule will not absolutely hold good; and it is nearer truth that *when actually in the storm area* the centre will bear *11 or 12 points* from the wind instead of 8. Thus if the wind were N. the centre would bear about S.E. by E. This rule will hold good throughout the area of hurricane force, except, perhaps, in the immediate rear of the storm, where the centre may possibly bear as much as 13 or 14 points from the wind. Thus, supposing a vessel to be sailing after (and into) a slowly travelling cyclone, it is doubtful if any rule will help her, so that great caution is necessary, and with cyclonic indications, in a district *where storm tracks are westerly*, if your wind is anywhere from E.N.E. to E.S.E. in either latitude it is *most unsafe* to run, and the wise course is to heave-to on the right tack, or if possible make easting. Many vessels having stood to sea from Port Louis, Mauritius, by the port-warden's order, have found an easterly wind outside, and sailed into the hurricane they left port to avoid.

But if the ship's position in the storm has been found as well as can be judged, then the proper rules are:—

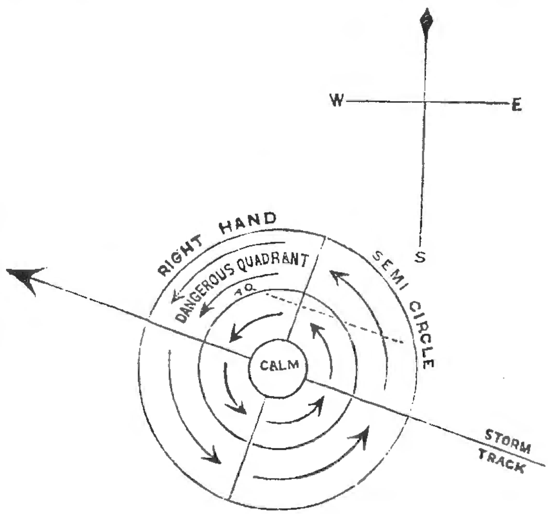
In North latitude—*If in the right hand semicircle of the advancing storm, with the wind shifting to the right hand, heave-to on the starboard tack. If in the left hand semicircle, run (unless the wind is between the points mentioned above), but in any case keep the wind on the starboard quarter. Then if the glass rises you may heave-to on the port tack if you are running out of your course.*

In South latitude—*If in the right hand semicircle, run with the wind on the port quarter, except with the wind in the aforementioned limits; then if the glass rises, heave-to on starboard tack. If in the left hand semicircle, heave-to on the port tack.*

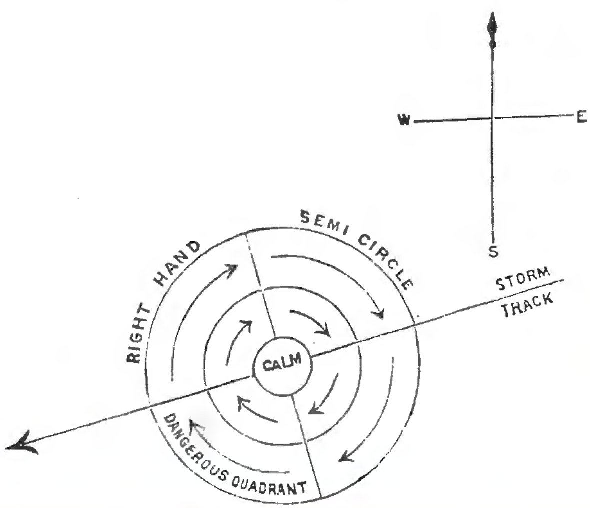
If you judge your position to be in the *direct line* of the advancing storm, *run,* but be sure before you do this that you are not in the dangerous quadrant.

If in the direct line of advance, the wind will be steady from one point; but if it is eastward of North in the Northern hemisphere, or eastward of South in the Southern hemisphere, in districts where storm tracks are westerly, it will show you that the ship is at present in the dangerous quadrant; and, therefore, it will not do in such a case to act hurriedly, even though the wind may appear to be steady. (*Occasional* severe *squalls* from N.E. or S.E. may be experienced in such a position, but the *prevailing* direction of the wind is now being spoken of.)

Now, to know whether you are in this most dangerous part of a storm—*i.e.*, the danger quadrant—it is necessary to note particularly the direction of the wind, how it is shifting or acting, and how the barometer is moving. The directions under the old circular theory were as follows:—If not possessed of one, make a transparent storm card thus:—Draw on a sheet of thin note paper a diagram, similar to the one here shewn; dip the paper in spirits of turpentine or oil, and dry it. Then place this paper over your position on the chart, and you will have a fair representation of the storm considered as circular. Now move it until the direction of the wind by the card corresponds to the wind you have, and your place on the chart will then shew your position in the storm. Suppose you were North of the Line, and you made the wind to be N.E., and decided your position was at *A*, it would not do to run the ship, for, remembering that the storm is advancing in the direction of the arrow through its centre, it will be seen that this proceeding would be nothing more than approaching the centre of the storm, and unless the vessel could run *across* the track in front, she would stand a great chance of being caught in the dangerous centre, which is of all things to be avoided. In such a position it would be more judicious to heave-to, and being in the *Right* hand semicircle, to heave-to on the *Starboard* tack; in which case the part of the storm shewn by the dotted line



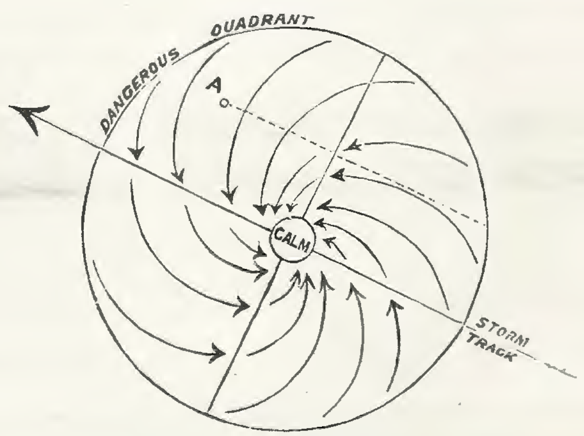
A storm card for the Northern Hemisphere. Old circular theory.
Plate No. 131.



A storm card for the Southern Hemisphere. Old circular theory
Plate No. 132.

would pass over the vessel, and she would find the wind gradually hauling to the E. and S.E. When the wind got this far (S.E.), but not before, it would shew that the centre of the storm was past, and it would then be safe to run with the wind on the *starboard* quarter if the sea would allow, and if it would expedite the voyage. But if after starting to run, the glass stops rising, heave-to again, as the storm might be re-curving. To show the reason for heaving-to on the proper tack. If this vessel had been hove-to on the *port* tack, the wind would have kept *heading* her and breaking her off; whilst as it is she "comes up" as the wind changes, and will not be caught aback. The reason for running with the wind on the *quarter* is that the vessel thus increases her distance from the centre, and this is especially necessary if the spiral theory is accepted; in fact it will be sometimes found that though the ship is running with the wind quarterly, the glass still falls, shewing she is *not* decreasing her distance from the centre. In such a case the wind must be brought more quarterly, and if she will not stand this, prepare for the worst—heave-to. If possible, get the upper yards down, and see everything secured as far as possible, for fear the centre of the storm may overtake and pass over the vessel.

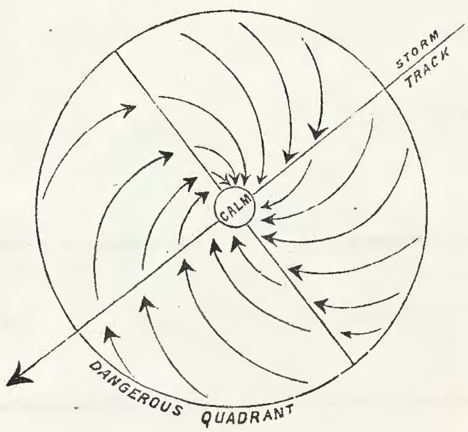
But as the spiral theory is undoubtedly nearer truth than the circular, it will be still better to make a storm card which will suit that theory. Such a card is here shewn, from which it will be seen



Storm card for Northern Hemisphere. New spiral theory. Centre bears 11 points from the wind throughout the storm.

Plate No. 133.

that the vessel at *A* will not have the wind at N.E., but at about North, or perhaps N. by E., and by the time the wind had reached N.E., the centre of the storm would be abreast of her; so that, though under the old law of storms it was permissible, in a storm travelling about W.N.W., to run the ship with the wind N.N.E., the new theory shews that this is not a safe thing to do.



Storm card for Southern Hemisphere. New spiral theory. Centre bears 11 points from the wind throughout the storm.

Plate No. 134.

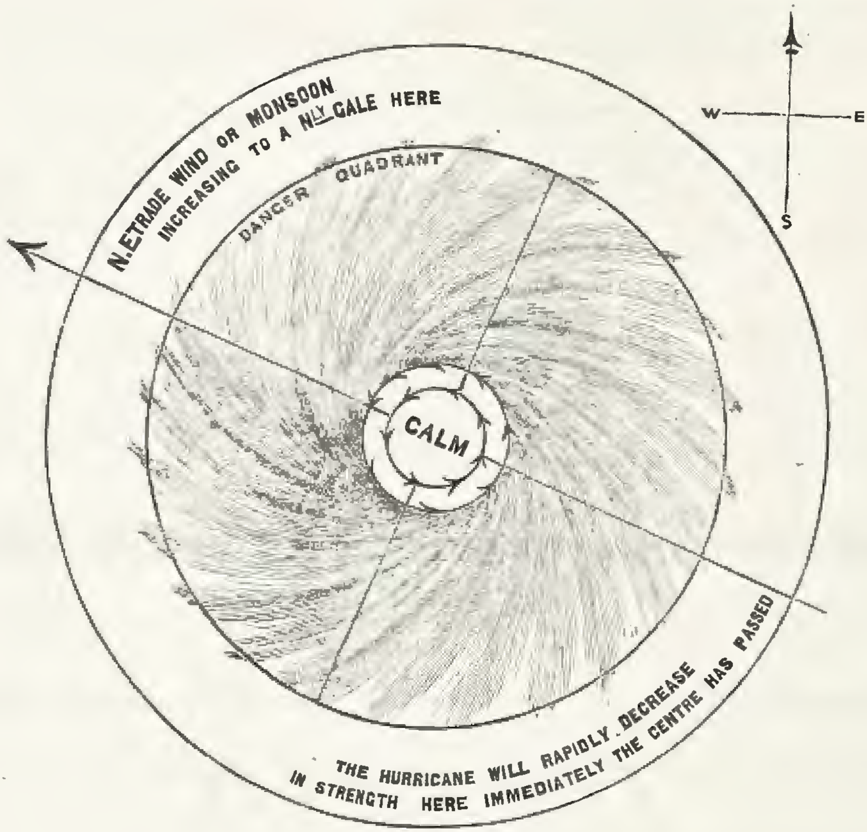


Plate No. 135.

IN THE DANGER QUADRANT.

In N. lat. Turn your back to the wind = scudding with wind dead aft, and the storm centre will bear about 4 points on port bow. Probably, however, this rule will not exactly hold good in the Left Hand Semicircle, where the curvature will be greater—(*see Plate No. 138*)—and where a ship might be running with the wind, say, at N. by W., and within half an hour find it round to S.W.; and in this part of the storm it would be possible to have the centre bearing 6 points on the bow with the N. by W. wind, and, if still scudding, only 2 points on the bow with the wind S.W. In the immediate rear of the storm the wind may be found blowing nearly straight for the centre; the centre thus bearing, say, 2 points on the bow, with the wind aft.

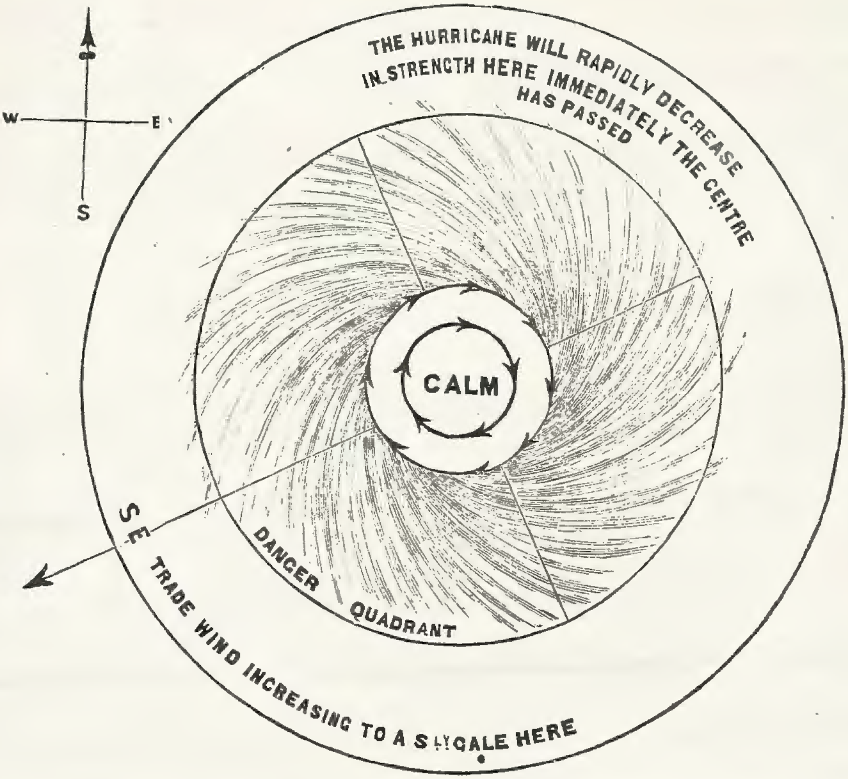


Plate No. 136.

In the Danger Quadrant.

In S. lat. Turn your back to the wind = scudding with wind dead aft, and the storm centre will bear about 4 points on starboard bow. Probably, however, this rule will not exactly hold good in the Right Hand Semicircle, where the curvature will be greater—(*see Plate No. 137*)—and where a ship might be running with the wind, say, at S. by W., and within half an hour find it round to N.W.; and in this part of the storm it would be possible to have the centre bearing 6 points on the bow with the S. by W. wind, and, if still scudding, only 2 points on the bow with the wind N.W. In the immediate rear of the storm the wind may be found blowing nearly straight for the centre; the centre thus bearing, say, 2 points on the bow, with the wind aft.

The foregoing remarks principally apply to sailing vessels. A wellequipped steamer can always get out of a cyclone if acting *in time* by steering with the wind well on the starboard *side* in North latitude; on the port *side* in South latitude, unless in the dangerous quadrant.

It may be that a vessel is in a position where she cannot get out of the way of an approaching storm; every care that experience can suggest will of course in such a case be taken to prepare for the worst. In most Indian anchorages, and at Mauritius, the vessels are warned by the port-warden, and have to make best use of that warning of getting to sea, and, if possible, keeping clear of the track of the approaching storm. Steamers in Port Louis have sometimes run themselves on the mud, opened their sea-cocks and run their ballast tanks full, and in this position weathered a cyclone in safety. In bringing up to ride out a hurricane it is perhaps best to trust to *one* anchor with the full scope of cable; with both down they may foul with the shifting wind, and perhaps trip each other out of the ground, and cause the ship to drive.

A ship rode out in safety a severe cyclone at the Sandheads, with one anchor down and the cable out to the clench, the master, a most experienced man, preferring to chance one anchor to dropping the other also. The topgallant and royal yards were got on deck before the worst of the gale; but when the heaviest came (a severe shift to S.W.) she lay over as if under a heavy press of canvas, and the three bare topgallant masts blew clean out of her. A ship which was about a mile off at the time was attempting to clew up a close reefed main topsail, when her three topmasts went over the side, carrying the lower-mast heads with them. (This shews that with good ground tackle there is a reasonable probability of a vessel riding out one of the worst of these storms.) The wind in this gale began at E. by S., with torrents of rain; then shifted S., then S.W., afterwards to N.W. The heaviest was, as above stated, from S.W.; after the wind began to shift it was round to N.W. in little more than two hours; but a heavy sea from S.E. continued for some time. It was concluded that the east or right hand side of a cyclone, and very near the centre, passed over the vessel, the track of the storm being nearly due North, as in this part of the Bay they often are.

It may perhaps be useful to give a short account of another cyclone off Madras.

11 A.M.—wind N.N.W., in lower topsails, ship labouring terribly, and a frightful sea running. Hauled down fore topmast staysail, and brought her to the wind with a boat's sail in mizzen rigging.

Noon—blowing a hurricane, wind N.W., ship lying with lee side of main deck in the water.

Barometer, 1 P.M. = 29·40
" 2 " = 29·25
" 2.30 " = 28·96
" 3 " = 28·80
" 3.30 " = 29·2
" 4 " = 29·22

3.20 P.M.—a tremendous gust from W.S.W. laid the ship on her beam ends, washed away the lee boats, jib-boom went in the cap, taking with it fore topgallant mast, lee main rail all washed away, and mizzen stay parted. The wind then began to haul S.W., and decreased rapidly; by 4 P.M. it was S.S.W., and the hurricane was over. The gale was travelling nearly due W. Previous to the hurricane the wind had been from N. to N. by W., with dangerous squalls from N.E., the glass falling for twelve hours beforehand.

A case of a steamer may be useful.

S.S.——, in the month of May, lat. 19° N., long. 89° E., bound to the S.E.

Wind S.E. to E.S.E. and E. Went half speed. Wind changing E. by N., E.N.E., N.E., N.N.E. Barometer rapidly falling; hurricane increasing. Kept away S.W. by W., and more to the S. as wind hauled N. and N.W.

Finding great difficulty in keeping her from coming to, filled a double gunny bag with cocoa-nut oil and put it in the weather ash-shoot. This made a marked difference in her behaviour; and the sea, which before was coming aboard in tons, now ceased breaking, and the vessel was enabled to steer safely out of the centre of the storm.

The time when hurricanes are most prevalent is—in N. lats., from July to October; in S. lats., from December to April. In the Arabian Sea and Bay of Bengal the worst times are April to June, and October to the beginning of December.

The area of a cyclone varies from 20 to 30 miles diameter, to some hundreds of miles.

A TABLE OF RECORDED HURRICANES.

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	Total.
W. Indies (300 yrs.) ...	5	7	11	6	5	10	42	96	80	69	17	7	355
S. Indian Ocean (39 yrs.) ...	9	13	10	8	4	—	—	—	1	1	4	3	53
Bombay (25 yrs.)	1	1	1	5	9	2	4	5	8	12	9	5	62
Bay of Bengal (139 yrs.) ...	2	—	2	9	21	10	3	4	6	31	18	9	115
China Seas (85 yrs.) ...	5	1	5	5	11	10	22	40	58	35	16	6	214

The rate of progression of these storms (their usual tracks have already been mentioned) may be averaged at 300 m. per diem in the W. Indies; in the Arabian Sea, Bay of Bengal, and China Sea, 200 m. a day; in the S. Indian Ocean, from 50 to 200 m. a day.

The indications of an approaching hurricane are the usual ugly and threatening appearances which come before most severe storms, and the increasing number and severity of the *gusts* with the increasing wind. These signs are sometimes preceded by a long heavy swell and confused sea, which will come from the direction in which the hurricane is approaching.

In the trade wind districts, the earliest indication of a coming cyclone are a fresh breeze, and dry and transparent atmosphere. A long swell from the direction of the coming storm, and light feathery plumes of *cirrus* cloud, sometimes radiating from a point on the horizon where a whitish glare indicates the bearing of the storm. The cirrus gradually overspreads the sky, making halos round the sun and moon, and the falling glass gives indications of the storm's approach. The air becomes moist and heavy, with a freshening wind and squalls of misty rain, until it becomes evident to the most careless observer that bad weather is coming.

As to the bearing of the centre (before mentioned). The last instructions issued by authority say that at a considerable distance from the centre, and *before* the barometer shall have fallen much below normal, the centre may possibly bear 10 or 12 points from the direction of the wind. *But after the barometer has fallen five or six tenths of an inch,* it is probable that the bearing of the centre may be taken as *eight points* from the wind's direction.

As to the dangerous semicircle. In the Northern hemisphere the semicircle with veering winds is the dangerous one (the ship being hove-to). In the Southern hemisphere the semicircle with backing winds is the dangerous one.

The re-curvature of the hurricane path always takes place towards the side on which the dangerous semicircle is situated, namely, to the right in the Northern, to the left in the Southern hemisphere.

Thus, taking a W. India hurricane. So long as it is travelling to the Westward, the wind in front of the advancing centre is Northerly (N.N.W. to N.N.E.). As it turns to the North the wind in front is E.'ly, and after turning to the East the wind in front is S.E.'ly. (A S.E. gale in winter in the N. Atlantic, with ugly appearances and falling glass, will generally turn into one of the *dangerous* and terrific cyclonic gales sometimes met with at that season.)

A similar sequence will arise in the case of a re-curving hurricane off the Mauritius, but in the opposite order.

Now taking these storms as re-curving in about lat. 30° N. or 26° S. The following are the most dangerous wind directions, because, if steady from that point with a fast falling glass, the ship is on the path of the storm, and directly in front of it, thus in the position of greatest peril.

N. Hemisphere.		S. Hemisphere.	
Between Equator and 30° N. Lat. - - -	N.N.W. to N.N.E.	Between Equator and 26° S. Lat. - - -	S.S.W. to S.S.E.
About 30° N. - -	E.N.E. to E.	About 26° S. - - -	E.S.E. to E.
Northward of 30° N. - -	S.E.	Southward of 26° S. - -	N.E.

When in regions and seasons of cyclones, watch the weather, and constantly and carefully *observe and record* the Barometer.

When there are indications of a cyclone, heave-to, and carefully *observe and record* the movement of the barometer and changes of wind, so as to find the bearing of the centre, and ascertain which semicircle the ship is in. *Everything depends on heaving-to in time.*

The proper rules as to running and heaving-to have already been given.

In the case of Mauritius hurricanes, a vessel approaching a cyclone on its southern side always encounters a strong trade wind, freshening to a gale. It is difficult to tell when the trade forms part of the storm circle, consequently the bearing of the centre can seldom in this position be inferred from the direction of the wind; it is therefore recommended in such circumstances to heave-to and watch. When the wind has decidedly shifted to the East or South, the passage of the centre with respect to the ship's position may be approximately inferred; then *when the glass has fallen six-tenths of an inch from its height at the commencement of the gale,* the bearing of the centre may be taken as nearly at right angles to the direction of the wind. *(Plate No. 137.)*

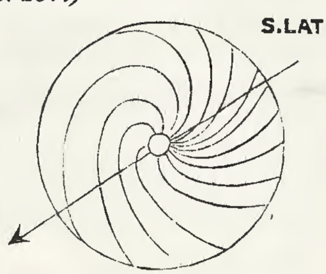


Plate No. 137.

Diagram shewing probable extreme curvature in the right hand semicircle, and wind blowing nearly direct for centre in rear of storm.

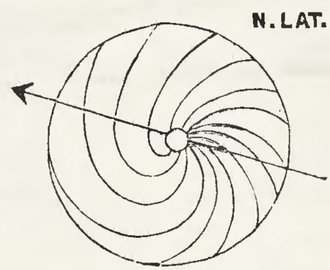


Plate No. 138.

Diagram shewing probable extreme curvature in the left hand semicircle, and wind blowing nearly direct for centre in rear of storm.

In these cyclones it is nearly always the case, as before mentioned, that winds at N.E. and E. are, until the storm re-curves, blowing almost directly towards the centre, so with those winds make what easting you can,—*be sure not to run;* and in this district, with a freshening N. or N.E. wind, or falling glass and ugly appearances, *look out and heave-to in time. (Plate No. 138.)*

In approaching a W. Indian hurricane (*before* it reaches the islands) on its northern side, you will probably have a strong trade wind, and it will raise a similar difficulty to that of the Mauritius hurricane and the S.E. trade.

In approaching the Bay of Bengal from the southward, between June and September, if the weather gives cyclonic indications, it is almost certain that the storm centre is to the northward of 16° N. In the months of July and August the storm will probably be still further north, and not further south than 19° N. The tracks are *usually* N.W.'ly, but this cannot be depended upon. In the worst hurricane months, however, that is, May, October, and November, the cyclones may be met anywhere in the Bay to the northward of 8° N.

In the China Seas hurricane tracks are, unfortunately, very variable; they are *mostly* S.W.'ly or N.W.'ly, but cannot be depended upon. Along the China coast proper, S. of Formosa, the track is generally W.S.W.'ly; between Formosa and Luzon, a little more W.'ly; whilst from 12° to 15° N. lat. the chances are it will be about W.N.W. But in all these districts variations occur, and occasional typhoons will have tracks as far as N. by W., or S. by W., so that in these seas much care must be taken in determining in which direction a storm is travelling; possibly (taking the average) S.W. is the most common direction below Formosa; north of that N.W.

In conclusion, the chief thing to be done, if at sea with all indications of an approaching cyclone, is to consider the state of things calmly and quietly, and to give sound judgment the best chance of arriving at a correct estimate of the bearing of the storm's centre, and the direction of the storm's track; then, having decided the matter, *act at once,* and watch the barometer very carefully, and also any change in the direction of the wind. If this does not shift as you were expecting, reconsider your position, for remember that a sailing ship, once drawn into the vertex or storm centre, is helpless, and in a position of great danger.
