

# NOTE ON THE APPEARANCE OF CORAL REEFS AND NAVIGATION AMONGST THEM

by

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In fine weather — a slight ruffle of breeze, a clear sky, and a high sun — reefs can be seen as they are described in the *Pilot Book*. Surface reefs, reefs almost awash, are a brilliant yellow brown; those covered by about 2 fathoms, a bright green; and I have seen shoals as deep as 8 fathoms as a blue green easily contrasting with the indigo of the deep water. A completely inexpert observer would have no difficulty in conning his ship with absolute safety under these conditions. Even the purple shadow of an occasional cloud, which can be so confusing at other times, could not deceive him.

It should never be taken for granted, however, that reefs are going to be seen without difficulty; that they are so obvious under ideal conditions is to a certain extent misleading. Reefs occur in those parts of the world where there are also calms and Trade winds. On account of its false sense of security, a glassy calm is a highly dangerous condition; the glare on the water makes it impossible to see coral, be it ever so close to the ship, and it is consistently difficult to convince oneself of this fact. With the Trade, however, there is a complete change of conditions. There is nearly always much cloud, and this has three important effects. There may not be direct sunlight shining onto the reef, there is much cloud reflection on the water, and the sea is strewn with cloud shadows. Given a rough sea and turbid water (a wind of more than force 4 will stir up the bottom from 20 fathoms) to complete the change and it will be hardly surprising that the appearance of coral is entirely different.

There may be a good line of breakers marking the outer edge of some reef systems, but in the protected waters there will be nothing but a confused interplay of light and colour. The lighter cloud reflections can generally be distinguished at once. There is so much reflected light that reef tends to appear darker than the surrounding water. Under these conditions it is frequently difficult to distinguish between heavy cloud shadow and reef, and in any case of doubt one must assume danger and put the ship about. The motion relative to the ship is the best criterion; the cloud shadow will probably be moving at about 20 knots over the sea (It is advisable not to wear tinted glasses). With a little experience one becomes able to pick out the stationary reef-patches even though they can hardly be seen by any colour contrast. But given much cloud, a normal Trade wind, and a full tide over the reefs, and any indications apart from the break are very slight and every conceivable precaution must be taken.

Generally speaking, a look-out is continuously necessary in the vicinity of reefs; and the masthead, though it can be very uncomfortable in small craft, is the place for him. "The commander..... must not, however, be one who throws his ship's head round in a hurry, so soon as breakers are announced from aloft; if he do not feel his nerves strong enough to thread the needle, as it is called, among the reefs, whilst he directs steerage from the masthead, I would strongly advise him not to approach this part of New South Wales." (\*) Quite small increases in the height of the eye make large differences to the facility with which reefs may be seen. Mr BUTLER could often see a break 3 miles distant from as low a position as 25 feet above the water-line. It is naturally very important to have simple methods of communication between look-out and helmsman; easily grasped signs with the hand are better than any attempt to sing out orders. One cannot work towards a low sun; this must be remembered in planning out a day's work. When the sun has reached about 45° of altitude a practised eye can take a vessel within 4 points of the glare.

When working among reefs one rarely has a chart as authoritative as familiar coastal sheets. Difficult sea conditions and inadequate marks in the neighbourhood make

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(\*) FLINDERS, M., *A Voyage to Terra Australis*, London 1814, Vol. II, p. 104.

reefs awkward to survey. Especially is the shape of a reef likely to be charted in a misleading way. The reef convention is variously interpreted by hydrographers. Some extend it to cover the zone of detached portions of a reef, for instance, where others would use a sign for rocks at low water. Small craft cannot rely on the charted shape for indication as to where anchorage or shelter may be obtained. Particularly are the occasional anchor signs valueless; they seem merely to indicate that the survey vessel found such a place to be a tolerable anchorage, so they fixed it.

In the Barrier Reef region the mainland was high and well charted. Visibilities of as much as 50 miles were obtained quite frequently, but the Trade wind is almost always accompanied by what seems to be a dust-haze, which usually reduced visibility to about 10 miles, sometimes more, sometimes less. On one exceptional occasion, when quantities of dust were deposited on decks and riggings, visibility was cut down to a mile or less and several meteorological stations made their first record of fog.

In this kind of work, positions when they are needed will probably be for points of departure, successive reefs being used as departures later on. A fix made from mainland observations will be of little use among reefs except it be precise, for if a wrong departure be taken, a sequence of reefs consistently incorrectly identified may be misleading enough to put the vessel into danger before the error is discovered. In small craft, sailing boats, launches, etc., compass bearings hardly ever give a good enough position. Even if small compasses have no errors in their operation, the motion makes it impossible to use them properly. A sextant and station pointer, however, can be employed under quite disagreeable conditions. Particularly, it is well to have some idea of the drift or errors of a course before losing the land on a run out to sea; neglect to take this precaution was once the cause of a vessel having to approach a reef from a bad angle, and actually touching coral.

Moreover, compass courses in small craft are at the best only roughly accurate. It would be unreasonable, for instance, to expect to "make" a passage opening, say half a mile wide, at the end of a run of six miles, absurd as it may appear to the navigator of larger craft. It is better to steer deliberately for the reef, either so that the break on the weather side be visible, or the sun be well-placed behind the look-out, so that the vessel can be worked along the reef edge. Otherwise one may not know on which side of the opening one has erred at the end of the inaccurate compass course.

When steering amongst dangers the general rule, always to keep danger in sight — in other words to work with short departures — is strongly to be stressed. It is rash in the extreme to steer broadly down the middle of a channel, hopefully thinking that all is safe. A mast-head man, carefully following close to the edge of a reef, can tell at once if the visibility of reefs changes and coral tends to become dangerously invisible. If courses are made from reef to reef, the navigator always has a good idea of his position and a mast-head man of the conditions.

It is not difficult to acquire a sense of security in working amongst coral. Once acquired, a district unsurveyed and marked as full of dangers is attempted with as much confidence as more familiar waters. In fact, what has to be remembered is that the familiar area must always be navigated with as much care as if it were being entered for the first time. Though coral is rightly regarded as a danger, it need not be inferred that the occurrence of reefs implies dangerous conditions. With skill, the reverse is true. The reefs are magnificent break-waters, and in hard weather, making use of the shelter they provide, passages can be made in comfort and safety, dodging from reef to reef, that would be miserable, or even impracticable, for a small vessel in the open water away from the reefs.

