

the National Institute (U.S.) April 1844, says:—‘A geodetic examination as to the course of the Gulf Stream does not render it by any means certain that it is turned aside by the Grand Banks of Newfoundland at all, but that in its route from the coast of Georgia, as far towards the shores of Europe as its path has been distinctly ascertained, it describes the arc of a great circle as nearly as may be. Following the line of direction given to it after clearing the straits of Florida, its course would be nearly on a great circle, passing through the poles of the earth. That it should be turned from this, and forced along one inclining more to the east, requires after it leaves these straits the presence of a new force to give it this eastward tendency. And have we not precisely such a force in the rate at which different parallels perform their daily rounds about their axis? In consequence of this the stream, when it first enters the Atlantic from the Gulf, is carried with the earth around its axis at the rate of about two miles and a half a minute faster towards the east than it is when it sweeps by the Grand Banks of Newfoundland.

“‘That this explanation as to its eastward tendency should hold good, a current setting from the north towards the south should have a westward tendency. Accordingly, and in obedience to the propelling power derived from the rate at which different parallels are whirled around in diurnal motion, we find the current from the north which meets the Gulf Stream on the Grand Banks taking a south-westerly direction, as already described. It runs down to the Tropics by the side of the Gulf Stream, and stretches as far to the west as our shores will allow.’

“That this theory of rotative influence may or may not be correct, it is not my province to discuss; but I was forcibly struck with these coincidences of recurvation when the tracks of the Gulf Stream and Kuro-Siwo, together with the paths of the hurricanes, were traced upon the same chart; and I have made these quotations to show what hypotheses are entertained by some of the eminent men who have given much attention and study to the subject, and from a conviction that they are in some measure, at least, sustained by the results of our observations upon the Kuro-Siwo; for, notwithstanding the configuration of the eastern shores of the continents of America and Asia are undoubtedly the original cause of the deflection to the northward of the whole of the Equatorial Current of the Atlantic by the Gulf Stream, and of a portion of that of the Pacific by the Kuro-Siwo, or Japan Stream, yet were no influences, such as MR. REDFIELD and CAPTAIN MAURY refer to, operating upon these streams, would not their natural inclination from the inertia of their westward flow be to hug the coast and wash their whole length to the Arctic Sea, or until that inertia was overcome by their friction against the continents? Yet this is not the case in either instance, for it has been well established by MR. BACHE that a counter current flowing to the southward and westward intervenes between the Gulf Stream and the coast of the United States as far as the peninsula of Florida; and, as I have before stated, as far as our observations extend, they prove conclusively that there is a very important counter current intervening between the Kuro-Siwo and the main coast of Asia.

“The influence of the Kuro-Siwo upon the climate of Japan and the west coast of North America is, as might be expected, as striking as that of the Gulf Stream

on the coasts bordering the North Atlantic. From the insular position of Japan, with the intervening sea between it and the continent of Asia, it has a more equable climate than we enjoy in the United States; and since the counter current of the Kuro-Siwo does not make its appearance on the eastern shores of the islands south of the straits of Sangar, and as these islands, in their geographical position, have a more eastwardly direction than our coast, the Kuro-Siwo, unlike the Gulf Stream, sweeps close along this shore, giving a milder climate to that portion of the empire than is enjoyed in corresponding latitudes in the United States.

"The softening influence of the Kuro-Siwo is felt on the coasts of Oregon and California, but in a less degree, perhaps, than that of the Gulf Stream on the coasts of Europe, owing to the greater width of the Pacific Ocean over the Atlantic.

"Still, the winters are so mild in Puget's Sound, in latitude 48° N., that snow rarely falls there, and the inhabitants are never enabled to fill their ice-houses for the summer; and vessels trading to Petropaulowski and the coast of Kamtschatka, when becoming unwieldy from accumulation of ice on their hulls and rigging, run over to a higher latitude on the American coast and thaw out, in the same manner that vessels frozen up on our own coast retreat again into the Gulf Stream until favoured by an easterly wind.

"And in a late address before the American Geographical Society, by Dr. HAWKS, when speaking of the routes for a railroad to connect the Atlantic States with the Pacific coast, he cites the remarks of Mr. JOHNSON and other eminent surveyors, to show that the precipitation of moisture to the westward of the Rocky Mountains, in Oregon territory, is, with rare exceptions, in the form of rain throughout the year, and seldom as snow; and as the prevailing winds on that coast are from the westward, they are unquestionably ameliorated by the warm waters of the Kuro-Siwo, which, impinging upon the Aleutian islands, are thence thrown against the shores of Oregon and California, and form the southerly current on those coasts, to again fall into the great Equatorial Current of the Pacific.

"The whole of the Kuro-Siwo is not, however, obstructed by the Aleutian islands, for experience shows that there is a current flowing to the northward through Behrings Straits, which is no doubt derived from this stream. This is, perhaps, underlaid by an Arctic Current flowing to the southward, which, rising to the surface after passing the narrow defile of the Straits, supplies the counter current to the Kuro-Siwo before spoken of.

"In studying this subject, in connexion with others having a bearing upon it, the hypothesis has forced itself upon my mind that that portion of the Kuro-Siwo which finds an outlet into the Arctic Ocean through Behring's Straits, continues its course to the northward and eastward, after clearing Icy Cape, and is the cause of that open sea, with its high temperature, seen to the northward of Greenland by Dr. KANE; and from the unity of its flow in a given path, it leaves the vast fields of ice lying to the southward and eastward, between that path and the north coast of America and west coast of Melville Island, in a great measure unaffected by its dissolving influence; for it is in that direction that our enterprising whalers who resort to those seas find their most open cruising-ground, and I have heard of no instance in which that open water has been explored to its limits in

a north-east direction from Behring's Straits. The same physical laws operating upon the Gulf Stream produce similar results upon it after passing Spitzbergen, and the mass of water from these two streams thus accumulated about the pole (after parting with their warmth) find no outlets except those to the southward, between Spitzbergen and the east coast of Greenland, and through the passages among the islands leading into Baffin's Bay, and thus form the streams known as the Greenland and Labrador currents; these, uniting in the North Atlantic, become the counter-current to the Gulf Stream after passing Newfoundland.

"In the passage of the United States' steam frigate *Mississippi* from Simoda, Japan, to the Sandwich Islands, in October 1854, the thermometer manifested a cold aqueous space between the meridians of 155° E. and 170° W., and the parallels of 30° and 35° N., which bears a general correspondence, in the Pacific Ocean, to the position of the Sargossa Sea in the Atlantic."

Current near Japan:—Captain D. SCOTT, (p. 17) from whom we have already quoted says—"we invariably found the current in the offing setting between E.N.E. and N.N.E., from clearing the coast of China to 40° N., beyond which it branches off—one to the North towards Saghalin and the strait of La Perouse, and the other trending towards the strait of Tsugar. Through Korea strait, during the S.W. Monsoon, it will sometimes exceed 3 miles an hour; while through the strait of Tsugar, with strong westerly winds, it often attains a rate of 5 miles an hour. The only place where we had anything like a southerly current, was in the bight between Sado and the Oki islands, and along the coast to the southward of the latter islands,—where we at times experienced, during northerly winds, a light indraught, which never exceeded 15 miles a day. I am quite sure we never had any southerly current in the offing at all. This is to be looked for from the high temperature of the water throughout the year;—it was as high as 89° in the strait of Korea, during August and September,—while it was only 82° in the strait of Tsugar, during the same months.

TYPHOONS AND GALES IN THE CHINA SEA.

The general subject of Hurricanes and Cyclones is fully discussed and explained in "Short Notes and Sailing Directions" for the North Atlantic p. 18-29, and for the Indian Ocean p. 25-33; it is unnecessary therefore to recapitulate in this place what has already been given in considerable detail. These rotatory storms are known as Typhoons in the China Sea.

The following cautions however may be useful:—

1. RULE FOR DETERMINING THE BEARING OF THE CENTRE OF THE STORM FROM THE SHIP—Look to the wind's eye and set its bearing by compass, the *eight* point to the *right* thereof, when in the NORTHERN HEMISPHERE, but to the *left* of the wind's direction when in the SOUTHERN HEMISPHERE, will be the bearing of the storm's centre.

2. The BAROMETER often stands unusually high before the commencement of a cyclone, and frequently (if not always) just *around* the storm; and conceiving

the cyclone to be divided into two parts by a diameter at right-angles to its path, it may be noted that—

- (a) The barometer always *falls* during the passage of the *advancing* semicircle of a revolving storm.
- (b) The barometer always *rises* during the passage of the *receding* semicircle of a revolving storm.

3. As regards the SEASON of Typhoons in the China Sea, the following record showing their frequency in the different months, will be the best guide as to keeping a look out for such unwelcome visitors:—

CHINA SEA, AND W. PART OF NORTH PACIFIC:—February 1; May 2; June 2; July 12; August 5; September 18; October 14; November 12; December 1.

JAVA SEA AND N.W. COAST OF AUSTRALIA:—December 2; January 3; February 5; March 1; April 1; May 2.

4. The LOCALITIES in which Typhoons are most frequent are;—the Northern part of the Philippines; in the Bashi channel; in the channel between Formosa and Japan; and generally off the east coast of China excepting in the Formosa channel,—the high land of Formosa seeming to influence the direction of the path of the storm, and determine it so as to pass north or south of the island, *not across it*. Typhoons are also by no means infrequent in the Western part of the N. Pacific.

Harbours of Refuge during a Typhoon:—Vessels overtaken by a Typhoon, when near the east coast of China, will find secure anchorage in the following places:—Tam-tu island; Mirsbay; Ty-sami inlet (E. $\frac{3}{4}$ N. 9 miles from Hong-hai island)—if the vessels draft is not over 12 feet; Namoa island—abreast Stewart's house; Tongsang harbour; Amoy harbour; Quemoy island; Makung harbour (at the S.W. part of Ponghou, the largest of the Pescadores); Chin-chu harbour—within the Boot sand; Hungwha sound; Haetan strait—southern entrance; Pih-quan harbour; Bullock harbour; Ke-lung harbour (N. end of Formosa); Ting-hai, inner and outer harbours (S. side of Chusan); Chinkeamun harbour (S.E. end of Chusan); Chin-Keang harbour (W. side of Chusan); Chang-pih or Fisher island (off the N. end of Chusan); and Ta-outse harbour (N.W. of Kintang).

Severe Gales are not unusual at particular seasons in the China Sea.

In September or October, a steady gale from the N.E.-ward has been known to last for several days near the south coast of China. During the same months, but off the west coast of Luzon, strong gales of short duration from N.W. veering to S.W. with heavy rain, may be expected; these raise a heavy cross sea.

During the S.W. Monsoon, strong N.E. gales, with very hard squalls, have been occasionally but not often experienced off the coast of China; at this season, however, but especially in May, June, July and August, when in the vicinity of the opening to the Gulf of Tong King, it is necessary to be on the look out for the severe gales which, commencing at N.W. veer to S.W. in this vicinity, accompanied with dark gloomy weather and a perfect deluge of rain,

ON MAKING PASSAGES, TO AND FROM CHINA, THROUGH THE CHINA SEA.

[N.B.—Mariners are cautioned that the remarks “on making passages” are merely notes on the best routes for the different seasons, and do not include a *description* of the rocks, shoals, and dangers.]

The CHINA SEA may be entered from the Indian ocean by the straits of Sunda, Bali, Lombok, Allass, Sapie, Floris, Alloo, Pantar, or Ombay, each of which has its special advantage *according to the season and the port of destination*. Thence there are two principal routes separated from each other by the island of Borneo; that to the westward of Borneo is known as the WESTERN ROUTE, and is the shortest, but it can only be taken *during the S.W. Monsoon*, in which case a vessel having entered the China sea by Sunda strait, subsequently proceeds northward, either by Banka, or Gaspar strait; the other is the EASTERN ROUTE, and lies through some of the many straits and passages eastward of Borneo—the vessel having previously taken one of the straits eastward of Java; the *eastern route* is adopted during that part of the year *when the N.E. Monsoon prevails* in the China Sea.

Sunda strait leads into the Java sea, and whether bound through Banka, Gaspar, or Carimata strait to China, the dangers of the Thousand islands, and those in the vicinity of the North Watcher,* can be easily avoided, if the navigator exercises ordinary prudence and has a good chart. It is never wise to make too free with the S.E. coast of Sumatra, and in order to avoid the banks off the coast do not stand into less than 9 fathoms water. The Lucipara passage will not be used so long as the advantages of Stanton channel are known.

Directions for **Stanton Channel** have been published by the Admiralty; and that part relating to the passage through is here reprinted:—

GENERAL OBSERVATIONS.—The advantages which a navigable channel along the coast of Banka island would offer to vessels passing through Banka strait having

* Commander BULLOCK, of Her Majesty's steam-vessel *Serpent*, has recently (1866) examined the positions of various dangers, which were supposed to lie in the track of vessels from Sunda strait and Batavia to Singapore; he reports that the Dolphin, Antelope, Jason, Banterer and Anna Paulowna shoals, were searched for, but not found; their names are therefore expunged from the Chart of the Western part of the Java Sea.

The position of Lynn bank, which uncovers at low water; as well as that of the Coventry reef, which also dries at low water, and on which the sea always breaks, has been accurately determined. The positions of several other dangers in this locality have also been rectified.

A shoal has recently (May 1866) been reported by Captain R. L. Sands of the *Glencoe*, who, when coming down the Java Sea, passed close to the wreck of a barque lying in the fairway; its position was, N. Watcher N. 62° E. 4½ miles, North island S. 20° E. 12½ miles, S. island of the Two Brothers N. 74° W. 18½ miles: this has since been corroborated by two other ship masters, who have reported the wreck near the N. Watcher without giving the position.

been long felt by seamen, H.M.S. *Saracen* was ordered in the early part of 1859, to survey the southern portion of the strait, from the Dapur islands to Parmassang point. During the survey, an excellent passage, now named Stanton channel, nearly 3 miles wide in its narrowest part, and with a depth varying from 7 to 20 fathoms, was found between Lucipara and Banka.

Stanton channel will be found to possess many advantages over that of Lucipara, for—it is a mile wider, the approaches to it are marked by well defined hills on Banka island, and a vessel of the largest draught may pass through it at any time of tide: whereas, vessels frequently get on shore in using the Lucipara channel—for the coast of Sumatra, consisting of low muddy mangrove shores about 50 or 60 feet in height, is unmarked by a single conspicuous object to assist the seaman to clear the mud flat bordering its entire length, and which a few miles southward of Lucipara point extends 11 miles from the land. The island of Lucipara also is small, about half a mile in length and 164 feet high, and no marks can be given to avoid the rocks extending a considerable distance to the southward and eastward of it.

The water also in the Stanton channel being much deeper than in the Lucipara, causes the banks, which are mostly of sand, to be more easily recognised by the light colour of the water on them. The tide also ebbs and flows more regularly in this channel, and sets directly through it, which enables vessels, even in calms, to drop through; whereas they are often, in light winds and calms, set over amongst the dangerous banks whilst rounding First point in endeavouring to get through the Lucipara.*

The wind in the N.W. Monsoon blows off the Banka coast, and throughout the year land breezes generally occur during the night. A strong land wind from the N.E. has been experienced in the Stanton channel during the S.E. Monsoon, when the wind was blowing directly through the Lucipara from the S.W.

There is also but little variation in the depth of water between the Sumatra coast and the Lucipara shoals: and it is stated that during the months of January, February, and March, when the N.W. Monsoon is at its full strength, the southern current continues from 14 to 18 hours successively with a velocity of 2 to 2½ knots, which would make it almost impossible for an indifferent sailor to make any progress against it. It is also said that, during the latter part of the S.E. Monsoon, it frequently blows hard from the S.W., accompanied with much rain; this would considerably retard vessels going to the southward through the Lucipara, and offer a fair wind to the Stanton channel.

Stanton Channel.—This channel lying along the south-western coast of Banka, is 19 miles long, and nearly 3 miles wide at its narrowest part, with a depth, in mid-channel, increasing gradually from 7 fathoms at its south-eastern entrance to 20 fathoms near the other extreme. The approaches to it from the southward are marked by the well defined mountain of St. Paul, and the conical hills of Gadong and Toboe Ali Lama,†—and in fine clear weather by the more distant range of Padang, 2217 feet high; these cannot fail to point out the entrance, and

* Lucipara, said to be corrupted from Pulo Sippah, Betel-quid Isle.

† Lama, Old, former.

the water being deep within half a mile of the Dapur islands, will give strangers confidence in steering for the land. Prominent points and hills will also be seen along the Banka coast, bearings of which will enable a vessel at any time to ascertain her position.

The channel is bounded by narrow banks extending in a N.W. by W. and S.E. by E. direction, and all partaking of the same formation (sand) in their shoalest parts, with a mixture of mud and sand between; the two marking the western boundary of the channel are named Smits and Melville banks.

Directions for Stanton Channel from the Southward:—Vessels bound through the Stanton channel into Banka strait from the southward, should, after recognising Mount St. Paul, and Toboe Ali Lama peak, approach the latter on a northerly bearing, and when about 3 miles to the southward of the Dapur islands, steer N.W. by W., which will lead nearly mid-channel to abreast Banka point; a course may then be shaped along the Banka shore, passing Lalarie point at a distance not within $1\frac{1}{4}$ miles, and from thence to Second point. When Pulo Dahun bears north, extreme care must be taken to avoid the spit, which extends in a south-easterly direction from the shore mud flat, between the above island and Banka point. Mamelon or Hummock, N.W. $\frac{3}{4}$ N., well open to the westward of Pulo Besar, clears this spit and the whole mud bank along the Banka shore; from the latter spit to the Tambaga rocks the bank may be avoided by not approaching it under a depth of 10 fathoms.

Working through.—Vessels in beating through Stanton channel may stand towards the south extreme of the Dapur islands to a distance of half a mile, as these islands have deep water at four cables' lengths from them. Between this and Toboe Ali the shore mud flat may be approached until Pulo Dapur bears S.E. by E. $\frac{1}{4}$ E., and Lucipara to a distance of 5 miles from it; but when Gadong peak bears N.E. $\frac{1}{4}$ N., or comes in line with Toboe Ali fort, Pulo Dapur must not be brought southward of S.E. by E. $\frac{3}{4}$ E. to clear the south-western part of the Eastern bank.

By not bringing Parmassang peak more open to the westward of Banka hill than to bear N.W. $\frac{3}{4}$ N., will clear the Melville bank, and when Laboh point bears N.E. $\frac{1}{4}$ N., by keeping over a depth of 10 fathoms, all the banks on both sides will be cleared. Lalarie point N.W. by W. will also clear the north-east part of Smits bank.

The shoal patches on the Nemesis bank should not be approached under a depth of 10 fathoms until Casuarina point comes open of Lalarie point; and in rounding the latter point, great care must be taken not to come into a less depth than 10 fathoms, as the bank is here steep-to. The Tambaga rocks may also be avoided by following the same precaution, and from thence it is recommended, until a more complete examination of the Banka shore is made, to work up from Second point along the Sumatra coast.

The land is low on the Sumatra coast of Banka strait, and, with the exception of the points, no objects which a stranger can recognise are visible. The points must be passed very carefully, as the bank extending from them is, by the action of the current, worn steep-to; the lead therefore is no guide, and vessels should

be cautious in approaching them nearer than a distance of $1\frac{1}{2}$ miles, and not within the depth of 10 fathoms.

Between the points, with the exception of a horn projecting from the main bank, $6\frac{1}{2}$ miles to the northward of Second point, and also between Fourth and Bata-karang points, the soundings decrease gradually to 5 fathoms, which is generally close to the dry mud bank from the shore.

The spit or horn, to the northward of Second point, extends $1\frac{1}{2}$ miles from the shore mud flat, and then in a south-easterly direction for 2 miles, with a depth from $2\frac{1}{2}$ to 3 fathoms, mud, on it.—and from 4 to 5 fathoms between it and the flat; from its northern extreme, Second point bears S.S.E. 8 miles, and Parmassang peak E. by S. $12\frac{1}{2}$ miles; therefore in passing this spit, Second point should not be brought to the eastward of S. by E. $\frac{1}{2}$ E. until Parmassang peak bears E.S.E.

After passing Fourth point, vessels should be very careful and not bring it to the eastward of S.E. $\frac{1}{2}$ S., as the bank here is steep-to, 9 and 10 fathoms close to the mud, but when Monopin bears N. by E. $\frac{1}{2}$ E., a more southerly course may be taken.

Directions for Stanton Channel from the Westward.—In sailing through Stanton channel from the westward, when abreast of Lalarie point, and $1\frac{1}{2}$ miles distant, an E.S.E. course will lead nearly mid-channel between the Nemesis bank and the bank extending from the Banka shore, but when Panjang hill bears N.E. a more southerly course must be shaped to pass mid-channel. When Dahun point bears north, Mamelon or Hummock, N.W. $\frac{1}{2}$ N., open of Pulo Besar (the clearing mark for the spit off Pulo Dahun) also leads directly through the channel.

Working through.—In working through Stanton channel from the westward in the S.E. monsoon, the same precaution must be taken as already mentioned to avoid the shoalest part of the Nemesis bank, which will be passed when the Mamelon bears N. by E. $\frac{1}{2}$ E.; and should a strong flood tide be then running, it would be advisable to anchor in 8 or 9 fathoms, sand, on the Nemesis bank, as the water on both sides of it is deep, and wait for a change of tide, or the chance of the land breeze, which blows generally either during the night or early in the morning from the Banka shore. When Panjang hill bears N.E., Lalarie point must not be brought to the northward of N.W. by W. to avoid Smits bank, and the same directions as already given in not approaching the banks under 10 fathoms until Laboh point bears N.E. $\frac{1}{2}$ N., will be quite sufficient to enable any vessel to work through.

Anchorage may be found anywhere in the Stanton channel; but ships bringing up with their kedge or stream anchor, must always be prepared to let go the bower anchor, as there will be experienced, particularly during the change of the monsoons, very dangerous squalls, with heavy rain, thunder, and lightning, which generally last for about an hour.

TO CHINA DURING THE S.W. MONSOON.

Proceeding up the China sea during the S.W. Monsoon, *two routes* are open to the navigator: one, the *inner*, lies along the coast of Cochin China, and thus to the westward of Pulo Sapata and the Paracels; the other, or *outer route*, lies eastward of those islands. The choice of the two routes depends upon how far the Monsoon is advanced; but during February, March, and the beginning of April both are equally tedious, and a beating passage may be expected.

Leaving Singapore or Banka in March, April, or the beginning of May, the *inner route* will probably be found the most expeditious; but by the end of May the season is too far advanced, for by the time the S.E. coast of Hainan island is reached, the easterly winds which prevail there are adverse for making Hong Kong.

Speaking, however, in general terms, it will be found that during the S.W. Monsoon owing to the variable winds and weather that may be expected between Cape Padaran and the gulf of Tong King, and the uncertain, gloomy weather, with occasional sudden squalls from the N.W. and West in and near that gulf, driving vessels over to the Paracels, the *inner route* is not preferable to the *outer* one for a good ship; but in the case of a weak and leaky vessel, the water near the coast is generally smoother, and shelter and anchorage may be had if necessary.

The Inner Route.—On leaving Banka strait, pass between Pulo Taya and the Toejo (or Seven) islands, and make for the equator so as to cross it in Long. $105^{\circ} 30' \text{E.}$; or, leaving Gaspar strait, cross in the same position. Thence steer for Pulo Aor, keeping a good look out for Frederick bank, passing 10 miles to the eastward of it, in 25 fathoms; and further to the north avoid the banks on the east side of Bintang island. From Pulo Aor, steer along the coast of the Malay peninsula to the Redang islands, and thence across the gulf of Siam, in which locality squalls from the westward may, perhaps, be experienced; from Pulo Obi, keep along the coasts of Cambodia and Cochin China, as far as Cape Touron; then make for the S.W. part of Hainan, coasting along the island, and passing between it and the Taya islands; thence cross towards the south coast of China, making it about Tien Pak, or near Hailing island, and proceed along the islands to Hong Kong. The channels among these islands afford good shelter on an emergency.

The Outer Route.—Having passed 5 or 6 miles eastward of Pulo Aor, make for Pulo Sapata, allowing for the easterly current from the gulf of Siam that may be expected, in the run between these islands, to set the vessel several miles eastward of her reckoning. A little northing may be made on leaving Pulo Aor, to avoid the Charlotte bank (Lat. $7^{\circ} 8' \text{N.}$, Long. $107^{\circ} 36' \text{E.}$), and so as not to make easting until the latitude of this bank is passed; then steer so as to sight Pulo Sapata.

If the weather has been such as to preclude the possibility of making observations, it will be necessary, when approaching Pulo Condore and Pulo Sapata, to attend to the lead,—so also when nearing the Catwicks.

Having passed about 20 miles eastward of Pulo Sapata, a course should be steered to strike soundings on the eastern part of the Macclesfield bank, allowance being made for the easterly currents generally prevalent during the S.W. Monsoon. The position having been ascertained by the soundings, shape a course for the Grand Ladrone, so as to make it bearing N., especially at the height of the Monsoon., when the wind is fresh from S.E. to S.W.: then pass between it and the Kypong islands, and between Singting and the Lema islands, for the West Lamma channel. After the middle of August, when easterly winds may be expected, make the N.E. head of the Lema isles, and enter the West Lamma channel by the Lema channel. The East Lamma channel is considered safe in both Monsoons, for though deep there is still anchorage if the wind fails,—with but little tide.

There can be little question that for a good well found ship, the *outer route* is always preferable, because the winds are stronger and more regular out at sea than near the coast.

Leaving Pulo Sapata towards the middle of September, keep well to the eastward as soon as the parallel of 12° or 13° is reached, and you are clear of the banks in the southern part of the China sea; for on going to the northward it is possible the wind may be from N.E. or E.N.E.: in which case you will be in a better position to make your port than if you were nearer the coast.

The *outer route* must always be uncertain for a sailing vessel if Pulo Sapata is not reached before the beginning of October, and there will be great difficulty in making direct for Hong Kong, on account of the strong southerly currents and the prevailing light northerly winds alternating with calms. In this case the best route is to stand to the eastward, and make the west coast of Luzon, and not steer for the coast of China until well north of Cape Bolinao, keeping a good look out when approaching the parallel of the Pratas.

The passage to the northward may be made at any time of the year along the west coast of Mindoro and Luzon, and thence there will be no difficulty in making Hong Kong; but keep as near the coast as may be prudent, so as to make the most of the land and sea breezes, as well as to take advantage of the light southerly airs then prevalent in the southern part of the China sea.

By the **Palawan Route**, which may be taken with advantage at the close of the S.W., or the beginning of the N.E. Monsoon, steer for the South Anambas, leaving those islands, as well as Low island and the great Natunas to the northward; then proceed to the N.E.-ward, and if not certain of the longitude,* endeavour to make the Royal Charlotte or Louisa shoal, whichever is the weather-most, by running it down in latitude: and as the currents appear to be influenced by the prevailing winds, they should be prepared to anticipate a set in the direction in which it is blowing, the velocity of the current being proportionate to the force of the wind.

* "Directions for Sailing through the Palawan Passage." By Commander W. T. BATE, R. N.

Having made either the Royal Charlotte or Louisa shoals, or passing mid-channel between them, an E.N.E. course should be steered for about Lat. 8° N., Long. $116^{\circ} 10'$ E., and having run 160 miles on it, a good look-out should be kept for Balabac peak, in Lat. $7^{\circ} 55' 23''$ N., Long. $117^{\circ} 1' 52''$ E., which will then probably be seen bearing about east southerly, and making like a rather flat-topped island, with a small peak rising in the centre.

This course may be continued until the island is clearly recognised, and when about 18 leagues distant from it, the low hills will be seen on either side of the peak, having at first the appearance of detached islands.

Having brought Balabac peak to bear about E.S.E. at the above distance, a N.N.E. $\frac{1}{4}$ E. course should be steered, when the high land of Boolanhow will soon be discernible, bearing about N.E. by E. $\frac{1}{4}$ E. This course will take you mid-way between the Royal Captain shoal and the edge of the bank (the most dangerous part of the channel), and 10 miles clear of the Elbow, which lies W. 15° N., $21\frac{1}{4}$ miles from the south point of Palawan, and bears from Balabac peak N. 22° W. and from Boolanhow mountain S. $47\frac{1}{4}^{\circ}$ W. When Boolanhow mountain bears S.E. by E. $\frac{1}{4}$ E., you are in a line with it and the Royal Captain shoal, and in the narrowest part of the channel, which is $27\frac{1}{4}$ miles wide, and the high land of Mantaleengahan will then bear E. $\frac{1}{4}$ S.

If the wind be well to the *southward*, and the weather thick, Balabac island may be approached nearer, in order to get "well hold" of the land, but extreme caution should be taken not to go within 12 miles of the shore, as soundings of 26 and 20 fathoms extend that distance westerly from the peak, having shoal patches immediately inside them.

If the wind be to the westward, with thick cloudy weather, Balabac island should not be approached nearer than 12 leagues, for these winds usually force a strong current through the straits to the eastward, and when off the S.W. end of Palawan, it is not unusual for them, particularly in squalls, to veer to W.N.W., and sometimes N.W., blowing with great violence, and placing the ship on a lee shore with respect to the shoals inside the edge of the bank. It generally so happens, that about the time, September and October, when vessels adopt the Palawan route, this weather prevails off the S.W. end of Palawan, rendering it uncertain and difficult to hit the narrowest part of the channel, owing to the land being obscured, especially if neither the Royal Charlotte nor the Louisa shoal has been made, and the longitude corrected.

Under these circumstances, it is advisable to advance with caution, regulating the speed of the vessel so as to be in the fairway (viz Lat. 8° N., Long. $116^{\circ} 15'$ E.) for making the channel at daylight. HORSBURN recommends Lat. $8^{\circ} 30'$ N., and Long. $116^{\circ} 30'$ E., but this may be running too close at night, unless confident of the accuracy of your reckoning.

If not certain of your position, endeavour to get soundings on the edge of the bank to the N.W. of Balabac island, and the safest part to approach for this purpose is that about the elbow, or immediately to the southward of it, for we believe the portion of the bank which is embraced by the bearings N. 22° W., and N. 62° W. from Balabac peak, comprising a distance of 25 miles, to be free from danger. If the peak be obscured, the same bearings from the body of the island will, if taken with care, answer. Or should the north extreme of the

island be discernible (showing like a hillock, with a low double hill to the southward), the part of no danger will be included within the lines of bearing N. 30° W., and west from it.

In the thickest weather, our experience leads us to believe the land is seldom totally obscured for any length of time, but generally shows a well defined outline between the squalls.

Having obtained soundings, which will be about 90 fathoms, if close to the edge of the bank, and from 45 to 55 fathoms, sand, if inside, haul off to the N.W., to give the edge a berth of about 10 miles, then steer the channel course N. 30° E. When Boolanhow mountain bears to the eastward of N. 74° E., you are past the Elbow, from which the bank then trends N. 35° E., and it is between this point and the parallel of 9° 15' N. (a distance of 60 miles) *on the east*, and the Half Moon, Royal Captain, and Bombay shoals *on the west*, that the most dangerous part of the Palawan passage lies.

The Half Moon shoal is distant from the S.W. point of Palawan 57 miles, and from the elbow of the bank 39 miles, in a N. 42° W. direction.

When Mantaleengahan mountain bears S. 50° E., or the Pagoda cliff (which is generally seen when the more elevated land is obscured) S. 38° E., you are on a line with the Bombay shoal, where the channel is 28 miles broad.

Having passed the Bombay shoal, abreast of which the bank trends N. 40° E., a course parallel with its edge may be steered, preserving a distance of 8 or 12 miles from it, and 9 or 10 leagues from the land, or nearer, if convenient, and the peaks on Palawan are sufficiently distinct to get good cross bearings. It is, however, not desirable to get too close, as the edge of the bank is about the parallel of 9° 30' and 10° N., is not uniform in its outline, and several rocky patches lie within a mile, and in some places only 3 cables from the 100 fathom line.

This course, viz., N. 40° E., edging a little more to the northward when abreast of Ooloogan bay, where the bank extends 28 miles from the shore, will take a vessel through the passage clear of every known danger.

Ships *working* through the Palawan passage, having conformed to the directions given for making the S.W. end of Palawan, should, in fine weather, endeavour to make their "*inshore boards*" in the afternoon, for the sun being then astern of the vessel, the patches lying near the edge of the bank will generally be distinguished by the man at the masthead in ample time to tack off.

In squally weather also, during heavy rains, these patches have been observed imparting a yellowish hue to the surface of the water very distinctly.

It is almost needless to remind the seamen (when the land is obscured) of the desirableness of getting hold of the edge of the bank before dark, in order that he may have a good departure for the night, and on making his "*inshore board*," it must also be borne in mind, that the probability of coming *suddenly into soundings* is great, as the approach of this "*tack*" will generally be at right angles to the edge of the bank. He should therefore be prepared to "*go round*" immediately on getting the first indication of soundings.

ROUTES TO CHINA DURING THE N.E. MONSOON.

During October and November, the winds are sufficiently favourable for making a good passage by the Strait of Macassar; this is the *First Eastern Route*. Later in the season, but especially from the middle of December until February, it is better to adopt the route by Pitts passage, which is the *Second Eastern Route*.

The First Eastern Route from the Indian Ocean.—On reaching the *Eastern Straits* from the Indian Ocean in the latter part of January, or, during February, vessels generally take LOMBOK STRAIT, passing east of Pandita island, since the channel west of this island is very narrow; keep in mid-channel between Lombok and Pandita, and afterwards take the eastern side of the strait; thence steer for the strait of Macassar, passing east of Pulo Sakalla or Hastings island, and the Little Pulo Laut, and make the coast of Celebes on entering the strait.

If **Ball Strait** is adopted, with the view of entering the strait of Macassar, pass through Sapoe die strait between Sapoe die and Galiang islands, then well to the westward of the islands and banks off Kangeang, giving them a good berth; and subsequently passing Little Pulo Laut on either side, according to circumstances.

Taking **Allas Strait**, steer for the east side of Pulo Sakalla or Hastings island, as on coming from Lombok strait.

Taking **Sapie Strait**, in September and October, a vessel may, according to the prevailing winds, pass east or west of the Postillion islands, then proceed north between Tannakeke island and the Tonym isles; she would thus be able to give a good berth to the islands and banks of Spermonde, N.W. of the bay of Macassar, and would enter Macassar strait towards the coast of Celebes.

On clearing Macassar strait, from off Cape Dondo, cross the Celebes sea and steer for the eastern end of Basilan. On shaping your course for the channel between Basilan and the west point of Mindanao island, be careful to keep well to the eastward if the wind will permit, to avoid, if possible, being drifted by westerly currents among the Sulu islands. Should you, however, find yourself to leeward, there are good channels between the islands of the Sulus; you would then cross the Mindoro sea, keeping as near as possible to the coast of the Philippines—Mindanao, Negros, Panay, Mindoro, and Luzon. At the entrance of the channel between Mindanao and Negros, as also between Panay and Mindoro, strong N.E. winds with westerly currents are generally prevalent; shape your course, therefore, when running from one island to another, so as to be set to leeward as little as possible.

If, on leaving Basilan strait, the wind is steady from S.W. to South, steer direct for Nogas island (S.W. point of Panay),—or a little east of its meridian: if the wind is variable and uncertain, keep along Mindanao until Point Garda is reached,

and then cross to Nogas island, endeavouring to coast along Negros island in making from one point to the other.

From Nogas island steer to the northward along the west coast of Panay, guarding against the outlying dangers; when past the islands off the south point of Mindoro, take the channel either east or west of the Appo shoal: by the eastern channel, if the wind is easterly, keep about 6 miles from the coast of Mindoro—avoiding a shoal patch in mid-channel; but with a westerly wind, about 12 miles, until north of the Appo reefs; thus being clear of Mindoro strait, and after doubling Point Calavite, as well as Luban and Cabra islands, follow the coast of Luzon as far as Cape Bolinao: thence you may be pretty certain of passing east of the Pratas, and reaching Hong-Kong; but perhaps it would be prudent to steer north as far as Cape Bojeador before crossing for the coast of China.

At this season, also, when the sea of Celebes is reached, a vessel may, if it appears preferable, enter the Pacific Ocean by passing south of Mindanao; for which purpose, if the wind permit, steer direct for the Serangani islands, afterwards pass between them and Mindanao, if compelled to do so, but otherwise to the southward of the Serangani: thence you would have to pass between the Meangia islands and Karekelang, one of the Tulur isles, so as to double the north of Morty island, with the wind at N.E.: or should there be any difficulty in taking this route, the channel formed by the islands of Tulur and Sanguir may be adopted.

Bound from a northern part of the Bay of Bengal for China, when the season obliges you to take the *Eastern route*, you may either go through the strait of Malacca and the Carimata channel, or pass west of Sumatra, as circumstances require; but at the beginning of the N.E. Monsoon, the strait of Malacca and the *Palawan route* will be better than the long circuit by the *Eastern route*. From the coast of Malabar or of Ceylon, or from any port on the south part of the Coromandel coast, a vessel can easily pass south of Java, and take one of the straits east of that island; Sunda strait might also be adopted, and then she must make her easting in the Java sea towards the strait of Macassar.

The Second Eastern Route is by the way of Pitts Passage. This route, which leads into the Pacific Ocean by either the Gillolo passage, or Dampier strait, and is to be preferred to Macassar strait during December, January, and February.

A vessel intending to use Pitts passage, may take any of the eastern straits, as that of Bali, Lombok, Allas, or Sapie, and having passed through, make the strait of Salayer, crossing the eastern part of the Java sea. But for a vessel from the Cape of Good Hope, the Ombay channel is preferable not only as being the most direct, but from being larger than those further to the westward, and the wind there being generally less variable.

To make for Ombay channel, pass either north or south of Sumba (or Sandalwood) island,—better south of it—and then between Ombay and Timor; having rounded the east end of Ombay, steer north, keeping to windward, so as to pass west of Boeroe island. If this cannot be done, pass east of Boeroe, between it and Manipa, and thus enter Pitts passage. The west entrance to Pitts passage is between Xulla Bessey and Boeroe islands. When near the meridian of the east point of Obie Major, and intending to take Dampier strait, a vessel should continue to run eastward; this strait seems favourable for good sailing vessels,

especially in January and February, when the N.E. Monsoon is getting more easterly. In March, when the N.E. winds become weak, the strait of Gillolo appears the best for entering the Pacific Ocean; this strait is also wider, and a ship may work both night and day in it, besides which the currents there are seldom strong. On leaving Pitt or Dampier strait, great caution should be used so as not to be set on the north coast of New Guinea; a vessel should therefore manage so as to round Point Pigot close to, keeping a good look-out for Buccleuch bank to the east of Waygieo island.

Pitt Strait should not be adopted from choice, but only when it is compulsory to do so. A vessel should keep in mid-channel to avoid being set on either shore by the tides, and should therefore make short boards, not approaching the coast on either hand. On reaching Jackson island, pass about five miles north of it, and having doubled the reef eastward of the island of Battanta, steer north for Point Pigot.

Dampier Strait.—To enter Dampier strait, on passing the meridian of the east point of Obie Major, steer to the N.E.-ward, and go between Pulo Popa and the Canary isles. Vessels sometimes pass between the Boe islands and Pulo Popa, which is an advantageous route with N.W. winds; in this case run on for Fisher island or Cape Mabou, and thence pass between Pigeon (the eastern Duiven island), and Foul islands, keeping a good look-out; on leaving the strait, keep closer to Pigeon than to Foul island, and steer so as to sight Pigot point, in order not to be set down to the coast of New Guinea by the northerly swell which prevails out at sea. The *tides* in Dampier strait are very strong and the currents very irregular, varying from 1 to 5 miles an hour. In the height of the N.W. Monsoon, in the narrow part of the strait, between Pigeon and Foul islands, the ebb, at full and change of the moon, runs between 4 and 5 miles to the E.N.E. for six or eight hours—and between 1 and 3 miles at neaps; the flood sets S.W. for three or four hours, but is weak. During the height of the S.E. Monsoon the flood sets west for eight or ten consecutive hours, turning successively W.S.W., S.W. and S.W. by S.; it then attains its greatest velocity, which at springs sometimes exceeds 5 miles an hour, and at neaps 4 miles. The ebb at this season runs E.N.E. or N.E., and is neither strong nor of long duration.

On entering the Pacific Ocean, from Dampier strait, make easting as quickly as possible between the parallels of $1^{\circ} 30'$ and 3° N.; this can be done even in December and January, since on this track an easterly current is found. A vessel having thus made good her easting may pass either east or west of the Pelew islands, according to her sailing qualities and the strength of the N.E. Monsoon. In any case, however, she would not go so far east as the Caroline islands, near which in November and December, heavy squalls from the westward may be expected. From the Pelew islands steer for the Bashees, allowing for a westerly current, setting about 12 or 15 miles a day. From December to the middle of February it is generally better to pass east of the Pelew islands, so as to be well to windward.

Leaving Dampier strait towards the end of the N.W. Monsoon, there is no necessity to go so far east into the Pacific. At the end of February and March pass west of the Pelew islands, as the winds in these months are often variable and veer to E.N.E.

Having reached the north part of Luzon, enter the China Sea by either of the main channels, between Formosa and Luzon. However, with the wind at N.E. at the beginning of the Monsoon, it will be necessary to pass *north* of the Bashee islands, and either north or south of the Cambrian rock. Approaching the south point of Formosa, if during daylight and with fine weather, you may pass between this point and the Vele Rete rock; but, during the night, or with bad weather, your route will lie nearer the Bashees: whichever may be the channel by which the China sea is entered, a course should subsequently be adopted to sight Pedro Blanco, and then enter the Canton river by the Lema channel.

Gillolo Strait.—Geby island divides the strait of Gillolo into two parts; the channel between that island and Gillolo takes the name of the Gillolo passage; that between Geby and Waygieo islands is known as the strait of Bougainville.

The channels leading from Pitts passage to the strait of Gillolo are tolerably free from danger. In the N.W. Monsoon, however, that between Pulo Gass and Kekik island is preferred, as being the largest; while the channel between Pulo Pisang and the Boe isles is, at this season, too much to leeward. A vessel entering the Gillolo passage by passing between Pulo Gass and Kekik, should round the southern point of the former island closely, to avoid missing the channel as a strong easterly current often prevails there. However, whether going East or West of Pulo Gass, continue on so as to pass between Cape Tabo and Geby island; but if by night, give the Fairway bank and Weeda islands a good berth. Should the wind be light keep as close as possible to the islands on the West coast of the strait, on account of the N.E. and easterly current.

If the wind be foul, no time should be lost in trying to get to the North of Geby island, in which case pass between it and Gagy island, and enter the Pacific by one of the channels near Syang island. But, whenever it can be done, one of the more westerly channels is preferable, because, then, with a northerly wind a ship can pass to windward of the Aiou and Asia islands. Should there be any difficulty in passing West of the Asia isles, the channel between them and the Aiou, or even that between the latter and the North coast of Waygieo must, of necessity, be adopted.

Having gained the Pacific, endeavour, as soon as possible, to attain and keep between the parallels of $1^{\circ} 30'$ and 3° N., and make easting there, as before directed.

If a ship from the Gulf of Bengal takes the Strait of Sunda instead of passing along the South coast of Java, on entering the Java sea she should pass North of the Thousand islands, and then make to the eastward (leaving the Watcher islands to the North), on her way to the Strait of Salayer. If she has touched at Batavia, when clear of Edam island, steer so as to pass to the northward of the Boompjes, and then make to the eastward for Salayer strait. The best course through this strait with a N.W. wind is to pass South of Mansfield shoal; but at night, or when the wind is not steady, it is better to keep to the northward of it, and along the coast of Celebes. From the Strait of Salayer make for Bouton strait,—or, what would be still better, if the wind is West, pass South of Bouton island; then, having passed along the S.E. coast of this island, and, having reached the N.E. end of it, if the wind is fresh from N.W., make to the northward for the island of Weywaungy, and thence for the island of Xulla

Bessey,—which is especially necessary for dull sailing vessels, in December and the beginning of January, because the winds are variable about this period, and haul to N.N.W., producing a strong southerly current. But although the winds and currents are generally variable in Pitts passage, so that it may be made almost anywhere, it is, nevertheless, prudent to keep the weather shore when northerly winds prevail. Should a vessel fall to leeward of the N.W. point of the island of Boeroe she should endeavour to pass it as quickly as possible, not by working to windward, but by running to the southward of the island and then pass to the eastward of it into Pitts passage. Vessels leaving Amboyna in the N.W. Monsoon invariably make to the northward along the east coast of Boeroe, where the wind is variable and off the land; while in the channel between Manipa and Ceram, southerly currents prevail at that season.

The following remarks by Commander P. J. BLAKE, H.M.S. *Larne*, on the **Passage up and down the China Sea**, though written many years ago, deserve careful consideration.

“Although the passage up and down the China Sea, against either Monsoon is now constantly performed, it may be useful to state a few remarks derived from my own observation, as well as from the experience of several captains of ‘opium clippers,’ whose constant practice has given them a tolerably perfect knowledge as to the best method of effecting the passage up and down the China Sea, between Singapore and Macao in either Monsoon.

“In beating *against*, or running *with* the strength of the Monsoon *up or down* the China Sea, ships should always pass to leeward of the Paracels, as well as of the Pratas, should they be near them, on account of the invariable set of the current to leeward. An exception may be made in beating up against the N.E. Monsoon, after reaching near Lat. 14° N., as there is an extent of sea room, and a ship must get well eastward towards the coast of Luzon before she can fetch Macao.

“In running down the China Sea with the N.E. Monsoon, the direct line mostly adopted is nearly mid-channel between Hainan and the Paracels, holding rather to the latter where a southerly current of 30, 40, and 50 miles a day is usual, and between 14° and 11° N., I have known it reach to 60 miles in twenty-four hours. Thence making the coast of Cochin China, about Varela, and shaping a course southward, so as to pass 30 or 40 miles outside of Pulo Sapata, from whence the course to Singapore is clear, giving the Anambas a berth of about 40 miles, and always, if possible, sighting Pulo Aor to ensure the reckoning,—more especially should the weather be thick, when the lead should be constantly attended to.

“In running up the China Sea *with* the S.W. Monsoon, there can be no doubt but the *outer* passage by the Macclesfield bank is the best, thus passing to leeward of the Paracels with a clear sea. This Monsoon generally hangs very southerly during June and July, viz., from S.S.E. to S.S.W., the current always setting in the opposite direction with a velocity proportioned to the strength of the wind. Although the *inner* passage by the coast of Cochin China is recommended by HORSBURN, for weak or leaky ships, I think, on his own showing, it is to

be avoided, he having adopted that passage, and very narrowly escaped being wrecked on the North shoal of the Paracels in July,—on which, in the same gale, a Portuguese ship was lost. This was during a gale blowing severely at N.W., out of the gulf of Tong-King, which is not unusual to happen at this period of the year, while a steady S.W. wind is blowing in the middle of the China sea. Owing to the strength of the southerly current, both his own and the Portuguese ship were set down towards the N.W. part of the Paracels, when trying to weather them, and this same circumstance has since happened to other ships. In running with the S.W. Monsoon by this *inner* passage in thick weather, the current varying as it does in velocity and direction, must render it precarious as to shaping a course with precision or safety.

“On leaving Macao to proceed down the China Sea *against* the S.W. Monsoon, it is advisable to make the best of your way southward for the Macclesfield bank, keeping in from $113^{\circ} 30'$ to $116^{\circ} 30'$ E., and taking every advantage of the least veering of the wind.

“The *Larne* sailed on the 30th of May, 1839, from Macao roads for Singapore, Penang, and Madras. Had moderate breezes at E. and S.E. for forty-eight hours; when having made nearly a due south course from the Ladrões about 250 miles, the wind drew to southward, and blew very hard with heavy squalls. This obliged us to stand eastward under close reefed topsails, and reefed courses. It moderated P.M. 2nd June, having found by our observed latitude and chronometer at noon, that the current had set us N.E. 28° 51 miles in twenty-four hours! With the wind at S.S.E., S.E. by S., we had recovered our lost ground on the 4th, from which day until the 11th we made a course, to south-eastward, the wind invariably being S.S.W. and S. by E. On this day at noon, in Latitude observed $14^{\circ} 13'$ N., Longitude by chronometer $116^{\circ} 25'$ E.,—tacked to westward. By standing a few hours to S.E. each day, in order to make up for the northerly current, we made nearly a due west course for the coast of Cochin China until the 16th, when we made the land about cape Varely, which is very high with a curious conical hill inland. We here felt the additional strength of the current northward, which we found at noon the 17th had set us N., 46° W., 43 miles. We at once stood away again to S.E., the wind still sticking S. and S.S.W., and on the 20th at noon, we were within 10 miles, by the reckoning, of the Investigator shoal, but perceived nothing, the wind being light and a perfectly smooth sea. Tacked to N.W. for twenty-four hours, and on the 23rd had grappled slowly to S.W., about 60 miles.

“We were now nearly in what I termed the turnpike-gate of the China Sea, viz., the narrowest part between Pulo Sapata and the West London shoals. Here a fine easterly breeze sprung up, not more to our surprise than our gratification, with which we made way to S.W., and on the 25th had reached $7^{\circ} 34'$ N., and $108^{\circ} 14'$ E. Here the wind again became southerly and light for a day, but opening as we now did, the Gulf of Siam, we had light breezes W., W.N.W., and N.W., until the 1st of July, which left us nearly 150 miles to the southward. Here, having again shut in the Gulf of Siam, the winds became southerly, light and variable, as before. On the 2nd of July saw Pulo Timoan S.S.W., 17 or 18 leagues. From this day to the 8th we were beating to the southward, in sight of these islands, harrassed by very light southerly winds, and a daily current to the

northward, of from 20 to 25 miles, retarding our progress. I thought we were doomed to a perpetual view of Pulo Tioman, Pulo Aor, and Pulo Pisang, nor was it until daylight of the 9th, that they had disappeared to northward, though we could distinguish the peak of Pulo Tingy to N.W. that day at noon. After noon we made out Bintang hill, Barbukit, and False Barbukit, a joyous sign of approaching Singapore. Working to southward, wind still light and southerly, and holding on by the stream anchor when calm,—current $2\frac{1}{2}$ knots N. by E. On the evening of the 10th anchored in 24 fathoms, Barbukit hill W.S.W.; and at 3 A.M. the 11th, started with a fresh breeze off the land at north-west, and stood for Singapore straits. At noon passed Pedro Branca, and at 5 P.M. anchored in Singapore roads in 10 fathoms, 42 days from Macao.

"I conceive we had thrown away at least eight or nine days in our passage from Macao, for want of experience in making it. We should not have approached the coast of Cochin China as we did, nor have stood over so far eastward as the Investigator shoal. Had we made shorter tacks hereabouts, keeping the middle passage between the coast of Cochin China and the eastern shoals, we should undoubtedly have gained several days by it. The increased strength of the current in with the coast, we found spoke for itself, and after tacking to north-west from the Investigator shoal, we *could only* stand on the port tack, on account of the shoals to the southward, with the wind sticking dead at south-west. We ought also to have made the North Natunas, and then got to south-westward, as the winds out there are much fresher and steadier than towards the Malay coast, where we experienced them so directly southward, light and variable.

"I gathered the foregoing information by comparing the abstract of reckonings with an opium vessel, whose captain had had much experience, and which arrived at Singapore from Macao the same day as ourselves, although she left *ten days after us*; and the advantage gained by the track she pursued as above described, in contradistinction to our own, was obviously manifest.

"The passage down the China Sea, against the S.W. Monsoon, I conceive to be more tedious than difficult. With the exception of the *blow* we had 48 hours after leaving Macao, we had nothing to call a breeze.

"The direct course from Macao to Singapore is, nearly as possible, S.S.W. (true), distance 1350 miles.

"Of the *forty-two* days' passage from Macao to Singapore, we had the wind dead on end for about *thirty-eight* days, and the aggregate amount of the currents was 580 miles against us during the passage."

FROM CHINA, BOUND FOR INDIA OR FOR EUROPE.

During the N.E. Monsoon and a part of the S.W. Monsoon, the course through the China sea to the strait of Singapore, Banka, or Gaspar is direct, either by the Inner or Outer Route, already described; but in May, June, July, and August, when the S.W. Monsoon is at its height, one of the Eastern Routes must be adopted; in every case, when bound to Europe, it is desirable to enter the region

of the S.E. trade-wind as speedily as possible, and then stretch away to pass well to the southward of Madagascar. Having taken the Inner or Outer Route, the Indian Ocean must of course be entered by Sunda strait; but by the Eastern Routes that ocean will be entered by the strait of Ombay, Sapie, or Allas, according to circumstances.

During the N.E. Monsoon.—Bound southwards, the Inner Route is generally the better of the two, and the coast of Cochin China should be made off cape Varela; thence the course will be towards Pulo Aor; and, if bound through Banka strait, cross the equator in about Long. $105\frac{1}{4}^{\circ}$ E.; or if through Gaspar strait, from Pulo Aor steer to pass Toty island, about 15 or 18 miles to the eastward, and thence make for the strait.

But in March and April the Outer Route is preferable, since the weather is finer and the winds more favourable than by the former route; in this case from Macclesfield bank steer towards Pulo Sapata, being well to the eastward of it on the parallel of 10° N., after which approach it cautiously if uncertain as to your position; intending to take Gaspar strait during these two months, you will pass between the Natunas and Anambas islands.

During the S.W. Monsoon.—Bound for the Bay of Bengal, a good sailer would probably beat down the China Sea by the Inner or Outer Route, and arrive at her port quicker than by taking one of the Eastern Routes; but the latter are preferable when bound for Europe, or the west coast of India.

The First Eastern Route is by the way of Mindoro strait, passing E. or W. of Appo shoal according to the wind, thence through Basilan strait,—and by the Molucca passage or by the strait of Gillolo, according to circumstances; bad sailers must generally take the latter, and probably during the height of the Monsoon it is the best for any ship; thence by Pitts passage make for the Ombay passage, and so into the Indian Ocean.

The Second Eastern Route is adopted from the middle of May to the end of July; it lies to the eastward of the Philippines; thence make for Pitts passage by either Dampier strait or the Gillolo passage; then by passing between Boeroe and Ceram, the Ombay passage leads directly into the Indian Ocean; but if Salayer strait is taken, then pass through either Sapie or Allas strait, and so across the Indian Ocean,—or for the west coast of India.

The *Great Eastern Route* to China, round the south of Tasmania or through Bass strait, is very rarely if ever adopted at the present day.

THE PASSAGE BETWEEN HONG KONG AND SHANGHAI.

Vessels from Hong Kong bound for Shanghai, in the N.E. Monsoon, should be in good condition for contending with rough weather, and for carrying sail. Either the Lyemun pass, or the Lamma channel can be taken, the latter being preferable

for a large vessel ; when clear of the islands the wind will generally be found to be about E.N.E., or as the line of the coast trends, and when the Monsoon is not heavy, periodical changes of wind occur : at such times vessels should be close in with the land early in the morning, and tack off shore at about 8 A.M. standing off till about 2 P.M., and on the in-shore tack standing boldly into the coast, making such arrangements during the night as will bring the vessel in a position in-shore again in the morning. When the Monsoon is moderate, vessels should not stand far into the bays, as they will, by so doing, experience light winds and oftentimes calms ; and, on the contrary, when the Monsoon is strong, they should stand in as far as possible into the bays, and then not stand farther off than is actually necessary, especially as the changes of wind above alluded to seldom occur at such times ; it must also be borne in mind that vessels almost always go faster in-shore than they do off, as there is a ground-swell heaving after them when in with the land.

During the severe Monsoon gales, which last about three days, vessels should seek shelter in one of the numerous good anchorages to the westward of Breaker point, when, upon the breaking up of the gale, they can make a fresh start, and perhaps get round Formosa before encountering another, especially after the month of November. Having reached Breaker point, stretch over for the south end of Formosa, and upon getting to the eastward, the wind will be found to veer northerly, or more as the coast of Formosa trends, and a good sailing vessel will be almost sure to fetch the South cape, or Lambay island to windward. Upon getting in with the land, light variable winds or calms are often met with ; but the strong S.W. currents will very soon drift a vessel down, when she will find the breeze coming on fresh again. In passing the South cape in the day-time, keep close in to the land, and the nearer the shore the stronger the favorable current—there being no hidden dangers. In going round in the night, however, and when there is no moon, it will be advisable to pass to the southward of the Vele Rete rocks, and tacking to the N.W. when nearly in the longitude of Gadd's reef, or sooner if it is daylight, as the South cape of Formosa is very low and rather unsafe to approach in a dark night ; and again when a gale comes on and a vessel is obliged to heave-to, being to the westward of the cape, and near it, a strict look out should be kept during the night, as several vessels under these circumstances have found themselves to the eastward of the cape in the morning, having been drifted to windward during the night and passed probably within a dangerous proximity of the Vele Rete rocks. The current sometimes sets with incredible velocity round the cape, and then up northward along the coast, and the stronger the gale the stronger the weather current, gradually diminishing in strength towards the north end of Formosa. After rounding the cape vessels should work short tacks along the east coast of Formosa, keeping close in-shore to get the benefit of the current.

Having weathered the north-east end of Formosa (the wind not having veered to the eastward, as may be sometimes the case) keep between the meridians of the Barren islands and the islands off the north-east of Formosa, not stretching in for the coast of China until able to make a lead in for Video or Leuconna island.

Regarding the passage to or from Shanghai in a fair Monsoon, little can be said, excepting that coasting vessels, when without observations, are in the habit of sighting the land to verify their reckoning. In the N.E. Monsoon there is a constant current down the coast, running with more or less velocity according to the strength of the wind, and the wind generally blows along the line of coast, i.e., E.N.E. from Hong Kong to Breaker point; N.E. in the Formosa channel; and N.N.E. from Formosa northwards. The first part of the Monsoon is very strong, and frequently in the month of October it is almost an incessant gale; at a later stage, from January to May, S.E. winds are not uncommon, and they become more frequent as the season advances: there is also much thick weather in the latter part of the Monsoon; and a S.E. wind to the northward of Formosa almost invariably brings a dense fog with it.

The passage from Shanghai to Hong Kong in the S.W. Monsoon is very tedious from the frequent alternate calms and squalls, with a constant strong current up: coasting vessels generally use their kedge when there is not sufficient wind to make any progress. In working down it is well to keep in with the coast, stretching into bays and by headlands, to get out of the current, if there is sufficient wind to preclude the possibility of getting becalmed.

Captain JAMES TURNBULL, of the *Glen Clune*, a frequent contributor to the *Mercantile Marine Magazine*, beat up the China Sea in September 1864, against the N.E. Monsoon, and then worked from the S.W. cape of Formosa to Shanghai in 10 days, by following the great Japan current; this, he states, may be a sufficient reason for giving a detailed account of the latter portion of his passage.

"The object of nearing Formosa, is to get into an easterly set, in-shore, working round and joining the permanent great stream from the Pacific on the east side near Botel Tobago. This set is found as soon as the N.E. Monsoon has set down the Formosa channel, impelling the water and thus making it perform the entire circuit of the island, down the west and up the east coast. While working off the south coast, wind northing, stood right for the Bashees, there tacked and fetched Botel Tobago, when we were fairly in the Japan current; temperature of water 83°, average daily set 30 to 36 miles N.N.E., and made 70 to 80 miles per diem. From the East cape, too many vessels still commit the mistake of working to the northward, direct for Shanghai, whereas the current sets N.E. ly over towards the Hoa-pin-su group. Follow it, drawing for its western edge a curve line from the East cape to 30 miles west of Hoa-pin-su, and on to the east side of the Linschoten or Cecille group; its eastern edge cannot be so well defined, but draw a line from Kumi to the east of Raleigh rock, and then past Sulphur island and west of Lu-chu group. The reason the western edge is better defined, is that it follows a sudden rise of the bottom, from ocean depth to about 50 fathoms. If you have an atlas on board, you will find the Japan stream placed 2° and 3° further S.E. ly, that is just where a vessel would get the back eddies southwards,—any representation that I have seen of it being merely from the guesswork of general

isation, not from actual observation. When the winter has set in, the temperature is a good guide on its N.W. side; but in summer and fall, the heat of the water right up to the inshore set of the China coast is nearly the same, 81° to 82° . From Botel Tobago to off Sulpher island I beat up in six days, then tacked, heading N.W. by W., and in two days fetched the light-ship.

"On making the Barren islands, as nearly the whole flood tide sets S.W., keep to windward and do not be tempted to seek shelter under the Saddle islands. Either work in the open sea under a press of sail; or if possible, stand on until near the Amherst rocks, when, if dark, anchor. You will have rough riding, but the pilot boats and coasters do so at all times in preference to seeking shelter to leeward, as in spite of the sailing directions it is difficult to get back."

On Making Passages between China and Japan:—Captain D. SCOTT says:—As regards the passage to and fro, our usual plan, after leaving the light-vessel at the mouth of the Yang-tze Kiang, with the wind favourable, was to pass close on either side of the Amherst rocks, thence shaping a course for Tsu-sima in the strait of Korea; and having passed that island on the port hand, to steer so as to go midway between the Hornet and Oki islands, as by so doing we kept in the strength of the current; but, sometimes—owing to the wind keeping well to the eastward—we were forced to the northward of this track, and had to go between the island of Quelpart and the Korea coast,—which passage we found quite safe, with a rattling current in our favour. After getting beyond the Hornet rocks, steer for the coast of Nipon about cape Gamaley, behind which is a very high peaked mountain, visible in clear weather fully 60 miles off; and in order to make your course good, it is necessary to allow half a point to the eastward, for the set of the current, until you get as high as $39^{\circ} 30'$, north of which a whole point wont be too much; for the current then begins to set N.N.W., which, with strong southerly winds, will, in the course of 24 hours, set a vessel from 40 to 50 miles off her position, by dead reckoning.

It is very necessary to guard against the current in cloudy or hazy weather, when good observations cannot be taken, before making the land; for, notwithstanding the allowances we always made for this set, we invariably found our vessel to the northward, generally coming in towards the islands of U-Sima and Ku-Sima, although steering a course for the western shore of Japan.

The above-named islands are an excellent mark for the entrance of the strait of Tsugar, and can be seen from 25 to 30 miles off, in clear weather; a vessel can pass on either side, or go between them, as they are clear all round; but it is best always to leave them on the port hand, or to the northward, as they are nearly due east from Matsumae point, which forms the north-western boundary of the strait.

We think a stranger ought not to enter this strait at night, if bound to Hakodadi, because, should the wind fail (as it often does), or were he to mistake the different points of the land, his vessel is almost certain, in either case, to be driven through, into the Pacific, and a week may be lost in endeavouring to get back again.

On making the land in the day time, the best way is to stand close up to cape Tsiuka, about 18 miles from Hakodadi, on the northern side of the strait, from

thence keeping the northern shore aboard, till, getting up towards Mussel point, you will have an eddy current in your favour, and will be able to bring up, should the wind fail, so as to hold on till a breeze springs up again,

There were two *buoys* placed off the end of the reef when we left (in January 1862), both painted *red*, and bearing from each other S. $\frac{1}{4}$ E. and N. $\frac{1}{4}$ W. nearly, distant about $\frac{3}{4}$ of a mile; but in October 1865 a light-vessel was moored in the port of Hakodadi. The vessel exhibits a *fixed white* light, at an elevation of 21 feet above the sea, visible in clear weather from a distance of 5 miles.

The vessel has one mast, carries a red ball during the day, and is moored in 6 fathoms water, at the extremity of the bank extending in a northerly direction from the peninsula of Hakodadi.

The approximate position is given in Lat. $41^{\circ} 47' 30''$ N., Long. $140^{\circ} 44' 39''$ E. of Greenwich.

A vessel leaving Hakodadi for Shanghai, will have some difficulty at times in getting through the strait, owing to the prevailing westerly winds; we are inclined to think it advisable, nevertheless, to go that way always, in preference to taking the passage outside of the Japan islands; for besides a difference of 300 miles in the distance,—by Van Diemen strait, more stormy weather may be looked for, and the currents are much stronger against you: certain it is, that all the ships which have taken the latter route, either way, have made long passages.

Our plan on leaving Hakodadi, with the wind between west and S.W., was to stand over towards Mussel point, on the opposite side of the bay, and after rounding it as close as we could with safety, work close in along the bay, making as short tacks as we could, so as to keep in the eddy current; by so doing, we generally managed to reach close up under cape Tsiuka before nightfall, where there is very good anchorage, in from 6 to 12 fathoms water, abreast of a little village,—the cape being to the southward, rather less than a mile distant. We found this the only safe anchorage in the bay, because a vessel can easily get under way from there, should the wind happen to chop round to the eastward suddenly, and you lie with very little strain on the cable, on account of the eddy which sets out to the S.E. round the cape; but, where the anchorage is marked on the Admiralty chart of the strait, should a vessel be caught with an easterly breeze, she would have some difficulty in working out and would stand a fair chance of driving ashore, as the bottom is hard sand, while at the other place it is a kind of mud, being the debris of the adjoining mountains. Should the wind continue westerly till the following day, by starting at daybreak, and working along the northern shore as far as Matsumae point, you will from there be able to clear cape Greig, on the south side, by standing out on the starboard tack:—the wind is likely to favour you a point or two on opening out the mouth of the strait, so as to give you a chance to make a clear offing. The northern shore of the strait, between cape Tsiuka and Matsumae point is rather foul, but a vessel has no need to stand too close in there, as the current slackens considerably after getting round cape Tsiuka. Having cleared the strait—and your vessel is as far south as 37° —should the wind still be on the southern cant, it is advisable to keep in towards the Japan shore, so as to pass inside of the Oki islands, as by so doing, a vessel is out of the prevailing current, and is likely to have a slight set

in her favour, all along shore, as far as the Hirado channel; we worked along that shore several times, passing inside of Mino-sima, Colnet and Obree islands, and found the coast clear of dangers, until close to the last-named island (Obree)—between which, and the land there is a small rock, with a considerable reef round it; the rock itself stands from 8 to 10 feet above the water, and bears from Obree E.S.E.; during the night it might be taken for a small vessel or a junk. It is not laid down on the old charts; but is noticed in the China Pilot, in the narrative of Her Majesty's ship *Saracen*, from Hakodadi to Nagasaki in 1855.

After passing this place, a vessel will have to stand into the strait of Korea; but as there is a survey of this coast going on at present, we may hope that when the new chart comes out, there will be a good channel laid down for vessels inside of the Goto islands, so as to avoid the strong current in the Korea strait, when the wind is westerly.

Once clear of this strait, the passage across to the coast of China is seldom tedious, as the Monsoons, in general, blow northerly and southerly,—from 3 to 5 days is about the average passage; but it is often made in 36 hours, when bound northwards.

The best landfall in either Monsoon, is Shaweishan island, or the Amherst rocks, near which you can anchor in from 6 to 7 fathoms, should the wind fail,—and thus you may sometimes save a tide or two. A vessel coming in towards the Saddles, during the northerly Monsoon, will find a much stronger tide and current setting to the southward, than another which gets close up to the Amherst rocks.

We found the passage from Shanghai to Hakodadi shorter and easier to make, than the return one,—as might be expected from the current in our favour. Our quickest run to the northward, was 9 days in May; the longest, 16 in October; the best downwards was 11 days in November,—whilst our worst was 29 days in June; but a passage has been made in 6 or 7 days. (See *Mer. Mar. Mag.* Vol. X, 1863).

ROUTES FROM SINGAPORE TO NEW CALEDONIA AND THE N.E. COAST OF AUSTRALIA.

*November to March inclusive.**

Southern Route:—Vessels bound to the south-eastern Colonies of Australia almost invariably adopt the Southern Route at all seasons of the year, entering the Indian Ocean by the strait of Sunda. The passage to Sydney, under very favourable circumstances, has been made in seven weeks, and that to Melbourne in a few days less; but the average is between nine and ten weeks. The passage to Port Curtis or New Caledonia will occupy ten days or a fortnight more, if no intermediate port is touched at. None but staunch and well-found vessels should attempt the passage.

* These remarks by a practical seaman originally appeared in the *Singapore Free Press*, and subsequently in the *Nautical Magazine* for 1859.

Vessels leaving Singapore during the season from November to March will carry northerly or N.W. winds to the southward of Banka and Billiton; after which West and W.S.W. winds may be expected, and if these should prove strong and steady, it would be advisable to bear up at once for Bali strait, as much loss of time is experienced by attempting to beat out through the strait of Sunda during the spurts of westerly wind, which sometimes hang at S.W. for days together. Indeed, commanders who have had opportunities of testing both straits at this season will be disposed to run at once for that of Bali on leaving this port.

Bali strait has latterly come to be much used by the homeward bound Dutch ships from Java,—even vessels that have loaded at Batavia running down nearly the whole length of the island to avoid a dead beat out of the strait of Sunda. Pilot cutters are always cruising during the season under the lee of the land to the northward of Bali strait, as the commanders of the Dutch Indiamen are under instructions not to pass through without a pilot; but his assistance is scarcely necessary, as there are no hidden dangers in the narrow part of the strait. All Dutch ships anchor at Banjoewangie for live stock and fresh water; the latter is particularly good, and easy of access, as it is led down from the spring in the mountain by an aqueduct, which is carried out into the sea beyond low water mark. As good water is scarcely attainable by shipping on the north coast of Java, this convenience may have something to do with the popularity of the strait. There is never any difficulty in getting out of the strait to the southward at this season, even with a S.W. wind, as the strait opens to the S.E.

The S.E. Trade will be met with in from 10° to 16° S. Sometimes there is only an interval of a few hours between the cessation of the Monsoon and the setting in of the Trade wind. But there is more generally a week or ten days of calms, light airs, and occasional squalls from the southward before getting the regular Trade. It extends at this season as far as 32° S., and S.E. winds are often experienced as far as 40° S., when it will be advisable to stand on into the westerly variables, which prevail about that parallel.

Vessels bound to Port Curtis or New Caledonia should pass to the southward of Tasmania, as easterly winds prevail in Bass strait during the summer season. In those high latitudes the winds are sharp and bracing, but a native crew will not suffer much if well clad. After passing Tasmania, a vessel bound to Port Curtis should not approach the east coast of Australia nearer than 300 miles until near the parallel of Sandy Cape ($24^{\circ} 40'$ S.), as N.E. winds prevail along shore. A direct course may be made to New Caledonia after rounding Tasmania. Should supplies be required before the passage is completed, Hobart Town is the most convenient port to touch at.

Eastern Routes:—The Eastern or more direct Routes to Port Curtis and New Caledonia can only be adopted between the middle of November and the middle of February—when there is a tolerable certainty of meeting with favourable winds throughout the passage. The route to the north of New Guinea, which, from the first half being identical with that followed by ships bound to China by the Eastern Passage, may be called the "Eastern Passage Route," is best suited for vessels over 150 tons burthen. Smaller vessels, more especially if the number

of people on board is so great as to render supplies of wood and water necessary during the voyage, should take the Torres Strait Route, which, indeed, is the only one that can be adopted with ordinary safety by vessels under 80 tons burthen.

EASTERN PASSAGE ROUTE BETWEEN SINGAPORE AND N.E. AUSTRALIA:—The first half of this route is so well known, from its being frequented by vessels bound to China during the westerly Monsoon, that it will only be necessary to notice the ports on this portion of the route that are most convenient for obtaining supplies, should they be required. These are Bonthain, at the south extreme of Celebes; and Geby, an island in the Gillolo passage. The former has a secure and convenient anchorage during the westerly Monsoon; and fresh water, wood, fruits, vegetables, and live stock can be obtained on very moderate terms. The water is particularly good as it is supplied by springs from the mountain range, at the foot of which Bonthain is situated. Geby also has an excellent anchorage, and the water is of the best quality; but in other respects it is not so good a refreshment port as Bonthain, besides which, it is a little out of the way if the most direct route (through either Dampier or Pitt strait) is taken. But it is the last port on the route at which it will be advisable for small vessels to touch, as Port Dory is not convenient, and the natives of the islands further to the eastward, although extremely anxious to trade, are a formidable race, and intercourse with them had better be avoided.

The passage to the eastward along the North coast of New Guinea is well known to the whalers of the Pacific, who, when they have been drifted off their fishing ground by easterly winds, recover their position by taking advantage of the westerly winds that prevail at this season near the Line, and which extend far into the Pacific. But these experienced navigators rarely publish their notes, being satisfied with making their passages in the quickest possible time,—not caring whether others adopt their routes. It will therefore be necessary to look up other sources of information for those details which will naturally be expected under the circumstances.

The first navigator that passed along New Guinea from West to East was the celebrated Dampier, who became aware of the existence of a westerly Monsoon in these seas while cruising with the buccaneers: on their return to Europe from the West coast of America, in the year 1687, they touched on the coast of Celebes, and, departing in the month of November, met with westerly winds, which obliged them to stand to the south, past Timor, until they reached the N.W. coast of Australia. Twelve years afterwards, Dampier returned in a king's ship, the *Roebeck*, for purposes of discovery, and leaving Timor on the 12th of December, sailed for the coast of New Guinea with westerly winds, and passing through the strait that bears his name, reached the north coast, along which he ran as far as New Britain. The westerly Monsoon was very strong in that year (1699) often amounting to a "fresh gale," and they were unable to commence the return voyage until near the end of March. The westerly winds, however, did not cease until a month afterwards, but they found a current setting in the opposite direction at the rate of 1 mile an hour.

The next authority for the winds during this season is Captain Thomas Forrest, who sailed from Balambangan for the north coast of New Guinea in November 1775, in the *Tartar*, galley, belonging to the East India Company; he was on the coast or in its neighbourhood during the five following months. As Captain Forrest seems to have published his journal as it was written, the details respecting the winds are very full and satisfactory. The following is an abstract:—

Day.	Winds.	Strength and Weather.	Remarks.	Day.	Winds.	Strength and Weather.	Remarks.
Nov. 9	S.W.	Fresh.	Left Balambangan	Jan 24		Gale ended.	
10	N.W.	Calm, lt. br.		25—26	N.W.	Fresh.	
11	S.W.	Fresh.		28	"	Squally.	
13	N.N.W.	"	Left Cagayan	29	"	Rain.	
			Sulu	30	"	Fine.	
14	North.	Moderate fine.	Arr. at Sulu	Feb. 2	"	Moderate.	
17				5	"	"	
18	S.W.	Squally,		6	"	Fine.	
19	N.W.	Fresh.	Left Sulu	7—10	Sy.	"	
20	N.N.W.	"		10—17	E.&S.E.	"	
21	E.N.E.	"		19	Wy.	Squall, rain.	
22	N.E.	"		20	Land &	sea breezes.	
23	West.	Moderate.		23	N.E.	"	
25	"	"		24	N.W.	Fine.	
28			Passed Ternate	Mar. 1	Var.	Fine since	24th.
30	West.	Moderate.		3	N.E.	"	
Dec. 2	N.W.	Fresh.		4	N.N.E.	"	
4		Squally, rain		5	W.S.W.	"	
6	W.N.W.	Squally.		6	North.	"	
7	West.	Fresh.		7	S.W.	"	
8	S.W.	"		9	Calm.	"	
9—10	N.W.	"		10	S.W.	"	
14	N.E.		Arr. on coast of New Guinea	11	N.W.	"	
			Arr. at Salwatty	12	"	"	
16—18	N.W.	Fresh.		16	From W.N.W.	12th Wy.	Squalls. Heavy sea at entr. of harb. Efte on Mysol.
19	"	Hard Gale.					
20	Var.	Rn., cm. fine		17	West.	Squall, rain.	
22	N.W.	Squally.		19—23	"	Fine, light.	
23	West.	"		25	S.E.	Squally.	
24	N.W.	Rain.		28—29	South.	"	
25—26	West.	"		30	East.	"	
27	Var.	"		Apr. 1	Calm.	Rain.	
28	E. & N.	"		3—5	West.	"	
29	N.W., E.	"		6—8	Calm.	Rain.	
30	N.N.W.	Fresh gales.		9—10	S.W.	"	
Jan. 1	North.	Gales.		11	N.N.W.	Fine.	
2	Var.	Light rain.		13	N.W.	"	
4	"	Fair.		14	S.E.	Rain.	
5				15	East.	Squally.	
8	West.		Left Salwatty, Current E.	16	E.N.E.	Hard gales.	
12	N.N.W.	Fresh gales.	Night fine	17—27	Var.	"	
17	W.N., E.	Rain.		27	West.	"	
18		Fine.		28	N.W.	"	
20	N.W.	Moderate.		29	"	Fresh.	
21	"	Squally.		30	"	"	
22	"	Mod., squally	Heavy sea	May 1	South.	Fine.	
23	"	Gale.					

The variable winds here recorded are partly accounted for by Captain Forrest being in harbour a great part of the time he was on the coast; but from notices that appear in his journal, it is evident that he supposed a strong Monsoon to be blowing in the offing.

The next authority is Captain (now Admiral) Keppel, of H.M.S. *Meander*, who left Port Essington on the 1st December 1849—with the garrison and remains of the establishment—with the express object of proceeding to Sidney round the

north side of New Guinea, and of putting the practicability of the route to a test. He touched at Banda, and afterwards had to beat to the westward between Ceram and the S.W. coast of New Guinea against a strong breeze with a proportionate sea, in order to get sufficiently to windward to enter Pitt strait, formerly much used by ships making the "Eastern Passage" to China, but latterly the Gillolo passage seems to be preferred.

The *Meander* entered Pitt strait on the 21st of December, and passed through during a single tide. "On emerging from the straits, we found the wind still blowing fresh from the westward, with a following swell, and a strong easterly set; but as our course now lay in that direction, before the following morning we were many miles on our voyage, and thereby missed seeing a large portion of the northern coast of New Guinea." *

December 24th.—"We passed Point D'Urville. It had been our intention to visit Humboldt bay, as laid down in the chart, that we might see something more of that country and its people; but to our disappointment, the strong current carried us past in the night."† The *Meander* reached the Admiralty islands on the 29th of December, and remained at this and the neighbouring group, New Ireland, until the 12th of January, wooding and watering, and carrying on a great barter for curiosities with the natives. This impairs the utility of the voyage as a test of the route, or rather of the rapidity with which the voyage can be made. And unfortunately no details are given of the passage from New Ireland to Sydney; but from the track chart it appears that she must have met with easterly winds in about 10° S., as she could not weather the east end of the Louisiade group without tacking, and her course after getting round is laid down as S.S.E. for the few miles that remain before the margin of the chart is crossed. She arrived at Sydney on the 7th of February 1850, so that the run from Pitt strait may be estimated at 34 days. Of this 27 days were occupied by the portion of the voyage from the Louisiade to Sydney; and as Port Curtis is only half way, and so far to leeward that a ship leaving cape Deliverance with the wind at S.E. by E., can fetch the port without tacking, 14 days will be a liberal estimate of the time that would have been occupied in making the passage to Port Curtis.

The deficiency in the *Meander's* journal is partially supplied by that of H.M.S. *Rattlesnake*, which left the Louisiade group for Sydney on January 8th 1850, while the *Meander* was at New Ireland. For the first few days the wind varied from N.E. round by the northward to S.W., and they did not get the Trade wind until they reached 20° S., when it blew a steady breeze between E.S.E. and S.S.E., enabling them to fetch Sandy Cape, about 120 miles to the southward of the parallel of Port Curtis. The *Rattlesnake* made the passage from the Louisiade group to Sydney in 28 days; but the date at which she made Sandy Cape is not given. It is evident that the sea which lies between the Barrier Reefs and New Caledonia must be considered a region of variable winds during the period in which the S.E. Trade wind is held in abeyance by the westerly Monsoon.

* Keppel's Voyage of the *Meander*, Vol. II, p. 190.

† Ibid, p. 201.

The following paragraph on the winds in this neighbourhood is extracted from a paper "on the Steam Route through Torres Strait," in the *Indian Archipelago Journal* for 1851, p. 493. Several additional passages from West to East by sailing vessels have been made since that time, but the additional experience has not rendered any correction necessary.

"Hitherto Torres Strait has only been navigated generally by ships passing from East to West; but on three or four occasions vessels have sailed through in the opposite direction. This passage, however, has always been attended with great delay, as it was found that the westerly Monsoon, which prevails from November to March (inclusive) in the seas of the Indian Archipelago, does not blow steadily within Torres Strait, where it only appears in spurts of eight or ten days duration about the change of the moon. Occasionally these westerly winds blow with considerable strength; but they are usually unsteady, in fact mere interruptions of the S.E. Trade wind. These spurts may be expected in November and in the following months until March. Sometimes, but rarely, they are encountered as late as April. In this month of 1844, the writer, while *en route* from Sydney to Port Essington by the 'Middle Passage,' met with a spurt of N.W. wind when in Lat. 19° S., which lasted from the 24th to the 29th of the month. It blew a steady six-knot breeze throughout this period, and the writer was subsequently able to trace it to Port Essington, the Arrou islands, and Macassar, where it blew with some strength, and was remarked as an unusual occurrence so late in the season. This period appears to be the fine season in Torres Strait, (as is the case in the Moluccas,) at least to the south of Cape York, as this is the time chosen by the Murray and Darnley islanders for making their annual excursions to the islets which lie off the N.E. coast of Australia. The question of winds is, however, of little importance when steam routes are under consideration, especially on the present occasion, as parties interested will be satisfied on learning that no winds have ever yet been experienced in Torres Strait which are calculated in the slightest degree to interfere with the progress of steamers in either direction."

We have another authority for the winds and currents on the north coast of New Guinea in Lieutenant DE BRUIJN-KORS, of the Dutch Navy, who visited the coast in the Government schooner *Circe* during the same season as the *Meander's* visit, but much later, and the details are not without interest. The object of the voyage was to examine Humboldt bay with a view to settlement. The *Circe* ran down from Java to Amboyna with the West Monsoon, and left the latter place on the 16th December 1849, for Ternate, where they were to receive their instructions; but, meeting with strong N.W. winds (the same spurt that the *Meander* experienced in that neighbourhood) and a strong current setting to the eastward, they were forced to put into Wahai, a port on the north side of Ceram, where they heard of the *Meander* having passed. This was on the 24th of December, and they lay wind-bound until the 13th February, when they put to sea, and reached Ternate on the 25th. It was not until the 15th of March that they finally sailed for New Guinea, and arrived at Geby, an island in the Gillolo passage, on the 19th. Here they were joined by a fleet of Molucca prahus, belonging to the Sultan of Tidore, which accompanied them for the remainder of the voyage. Leaving Geby on the 26th March, they passed through Dampier strait, were abreast of Cape

Good Hope on the 29th, and entered the Great bay on the 31st, where they anchored at Port Dory. The direction of the wind from leaving Ternate is not given, but it must have been favourable throughout.

The *Circe* remained at anchor at Port Dory until the 25th April waiting for the flotilla of prahus, which did not join until the 20th. The winds during their stay are stated as follows:—"From the 1st to the 22nd April the wind for the most part was S.E. and N.E., which towards evening was often alternated with N.W., seldom with S.W. winds." Weather fair, but occasional showers. On the 25th, left Port Dory with light westerly winds, and stood into the Great bay, where several trading stations were visited, and on the 11th of May they anchored at the N.E. point of the bay. During this period, regular land and sea breezes were experienced, the first at S.E. and the latter at N.W., but an adverse current was found in the offing, setting W.N.W. On the 24th of May a strong breeze set in from S.S.W., which in four days carried them up to Humboldt bay; but as they were about to enter, the wind shifted to S.E. and E.S.E., with a chopping sea, and the *Circe*, being a slow and far from weatherly vessel, was forced to bear up and return to Amboyna.

The details of the latter portion of the voyage given above will not be of much use to navigators, who are supposed to adopt this route during December, January, February, and part of March, the only period in which westerly winds can reasonably be expected to remain steady; but they are interesting as showing the possibility of fast and weatherly vessels being able to make the passage even late in the season.

The *Meander* lost the strong westerly wind and favourable current when she approached the Admiralty islands. It is therefore a question whether she would not have made a more rapid passage by running down her easting along the Line as far as Pleasant island, or even farther, if the wind held, when, by getting into the S.E. Trade, she would have had a free wind for the remainder of the passage. That the westerly winds blow thus far the writer of these notes is aware from his own experience, having crossed the Line at the latter end of December, 1847, with a westerly gale that had brought the ship under close reefed fore and main top-sails, and the squalls were so heavy that the fore top-sail had to be taken in twice during the night. We had left Sydney, bound for Hong-Kong, December 8th, and met with N.E. winds, which obliged us to stand off the land for about 200 miles, when we got S.E. winds, which carried us to 14° S., when the wind came to the westward, light at first, but gradually increasing as we approached the line. We made Pleasant island on the 31st December, passed to leeward of it, crossed the Line the same night, and lost the westerly wind between 6° and 7° N., getting the N.E. Trade almost immediately after.

NEW CALEDONIA.—As regards vessels bound to the French settlements in New Caledonia by the Eastern Passage Route, there can be no doubt that it would be advisable to run down their easting along the line, even as far as the meridian of 150° if the wind holds, as the Trade will be met with at this season, when well to the eastward, in about 10° S., blowing steadily between East and E.S.E. as far as 20° S.; this will enable them to lay to windward of the New Hebrides group, which, with New Caledonia, seems to be the barrier between the trade wind of the South Pacific and the variables of the Papuan Sea.

TORRES STRAIT ROUTE.—The Torres Strait Route to Port Curtis is the most direct, the distance being 3,400 nautical miles. This route is better suited for small than for large vessels, for although the depth of water is sufficient for the largest ships, and the navigation is no where more difficult than that of the straits of Malacca between Pedra Branca and the North Sands, still commanders who have been chiefly accustomed to open sea navigation often feel uncomfortable. But, on the other hand, it is the only route that can be adopted with safety by vessels under 80 tons burthen, unless they carry a much larger supply of water than is usually the case, for there is no place near the Eastern Passage Route, after passing Port Dory, where a small vessel can with safety obtain water, —owing to the formidable numbers and character of the natives, who, although friendly enough towards large vessels, might be tempted to lay violent hands on small craft.

The track as far as Bonthain will be the same as that of the Eastern Passage Route, but after passing through Salayer strait a south-easterly course has to be followed towards the north side of Timor, along which the track passes. If supplies are required, Manatuti, a Portuguese settlement about 80 miles east of Dilli, is the best place to touch at, as the road is sheltered from the westward by a point of land; but if the breeze is fresh from any point to the northward of West, it will not be safe to approach the coast very close. In that case, the bay on the west side of Kissa, or the south coast of Moa, will be the best place to visit, as small vessels can lie close to the shore, and the anchorage is perfectly safe at this season. Fresh water, poultry, fruits, and vegetables, including excellent yams and sweet potatoes, can be obtained here in any quantities that may be required on very easy terms, as cash is almost unknown and the natives gladly exchange their produce for small cutlery, calico, pieces of bar iron of the size required for a parang, empty bottles, old cloths, buttons, and other trifles. At Kissa there will be a slight delay, as the chief villages are on the east side of the island, and two guns should be fired as a signal for trade. At Moa, the best place to touch is a bay on the south coast, about four miles beyond the S.W. point, where there are four villages close to the shore— of which Patti is the most important—and an old Dutch fort. The chiefs and principal inhabitants of Kissa and Moa are Protestant Christians; Dutch missionaries resided at both places during the existence of the establishment at port Essington,—when intercourse was frequent,—the natives proving particularly friendly towards Europeans.

The Macassar prahus employed in the trepang fishery in the Gulf of Carpentaria (high-sterned vessels, with the tripod mast) always adopt this route. They leave Macassar about Christmas, and generally touch at Dilli or Manatuti to fill up water and dispose of some native cloths, and also occasionally at Kissa, Letti, and Moa; but those that leave later in the season make one run of it, and sometimes complete the passage from Macassar to the Gulf in ten days.

Endeavour Strait seems to be the best entrance to Torres Strait from the westward, now that the survey has been completed. The following directions, which are extracted from the fifth volume of the *Journal of the Indian Archipelago*, will carry a vessel in,—by that channel where the least depth is $4\frac{1}{2}$ fathoms at low water:—

"The western entrance of Endeavour strait is easy to make. At a distance of 120 miles to the westward the soundings begin to decrease from 36 fathoms, the usual depth across the mouth of the Gulf of Carpentaria, to 30, 20, and 9 fathoms as the strait is approached. The only precaution necessary to be taken when running for the strait is to avoid going to the north of the parallel of Booby island, as there are some shoals to the W.N.W. which have not been well examined, from being out of the usual track. South of this parallel the sea is believed to be clear of danger as it has been well explored. In clear weather Prince of Wales island, which may be seen from a distance of 30 miles, will probably be made before Booby or Wallis islands, which, although moderately elevated, are not visible from a ship's deck much more than 15 miles. There are several channels into the strait through the sand-banks which project from Prince of Wales and Wallis islands, and from the mainland, but the widest and most available is that which lies immediately to the north of Red Wallis island. By bringing Booby island to bear N. by E., mag., distant 11 miles, when Red Wallis will bear E. by S. $\frac{1}{2}$ S., a direct course steered for the latter will lead clear into the strait between the spits which project from cape Cornwall and the Wallis islands, and will also clear two patches of 3 fathoms which lie in the channel. The depth is from $4\frac{1}{2}$ to 8 fathoms. The strait is perfectly clear within, with the exception of the Heroine and Eagle rocks, which may easily be avoided; and, as it has been repeatedly examined and sounded in the course of the last eight years by Captains BLACKWOOD, STANLEY, and YULE, Endeavour strait may be considered as one of the best surveyed spots in the Eastern seas."

Nearly a dozen passages have been made from India to Sydney by way of Torres Strait, mostly at long intervals, with the exception of three voyages of the brig *Heroine*, Mackenzie, in 1844-5-6, but although no accident took place, the results were not sufficiently favourable to lead to a more general adoption of the route. All these vessels passed through the Barrier into the open sea as soon as possible, and were delayed by the variable winds, which are now known to prevail at a distance from the land. It was not until 1847 and 1848 that the inner passage along the land came to be tested by the vessel employed in attending Mr. KENNEDY's overland expedition from Rockingham bay to cape York, when it was found that the Easterly winds often experienced outside the Barrier very rarely blow home on the land, and that N.W.-ly winds occasionally blow along the coast for days in succession. The Monsoon, however, more generally appeared in the form of a land wind, rising about midnight and blowing through the greater part of the following day, when it would fall calm until midnight. This *inner route*, too, has the advantage of having been accurately surveyed by the late Captain KING, and of being perfectly free from coral, which is attributed to the fresh water from the rivers being carried along the coast by the tides. The navigation of the *inner route* is comparatively easy, owing to the landmarks being always in sight during the day, and often during the night also, for the weather is remarkably clear, this being the fine season. Showers are often experienced, particularly during the night, when the land breeze comes off, and much rain falls on the high land of the interior, as is shown by the volumes of fresh water poured out by the rivers.

Nevertheless, the passage along the coast from cape York to port Curtis will

occupy more time than might be expected from the distance—a little more than 900 miles—for it will be necessary to remain at anchor during dark nights for the first 500 miles after leaving cape York, and if the passage is made in twelve days it will be a favourable run.

NEW CALEDONIA.—Vessels bound to New Caledonia by the Torres Strait route should enter by Prince of Wales or Bligh channel, and take the wide northern passage discovered and surveyed by Captain BLACKWOOD, of H.M.S. *Fly*, the entrance of which from the Pacific is 40 miles wide, with regular soundings. Hence, along the south coast of New Guinea and the Louisiade, West and N.W. winds may be expected without interruption during December, January, and February, and probably much later, for the mass of high land produces a temperature which causes a rush of air towards the region of variables to the S.E.

The following memoranda are from the journal of H.M.S. *Rattlesnake* in December, 1849, and January, 1850, while completing the survey previous to sailing for Sydney:—

December 11th, 1849.—A light air from the N.W. (Darnley Island).

16th.—Since the 11th, light winds. This day “a strong N.W. breeze, which came on last night, and caused us to drag the stream anchor.”

19th.—Left Bramble Cay with a fine breeze from the N.W.

20th.—Wind N.W. At daylight abreast of cape Possession,

21st.—Light north-westerly breeze.

28th.—Since the 21st, at anchor in Redscar bay. During the week “the wind was usually from the westward, varying between N.W. and S.W., and on one occasion had a sudden and very violent squall from the westward.” This is the identical week during which the *Meander* made her longest runs on the north coast of New Guinea, with N.W. winds and a strong current in her favour.

January 6th. 1850.—“Our passage to the Duchateau islands (Louisiade group) a distance less than 400 miles, has been protracted [the *Rattlesnake* sailed from Redscar bay on the 31st December] by the prevalence of light winds, although these were generally favourable, or from the westward. Occasional calms, squalls, and rain occurred, but the weather generally was finer than during the S.E. Monsoon.”—(Vol. ii. p. 60.)

The *Rattlesnake* left the Louisiade for Sydney on the 8th of January. This part of her voyage has already been spoken of in the notes on the Eastern Passage Route, but the following remarks by the historian of the voyage may be added:—“Our daily average progress during the passage to Sydney (which occupied a period of 28 days) was less than 50 miles.* The winds for the first few days, or until beyond the influence of the land, were light and variable, shifting between S.W. and N.E. by the northward, and accompanied by occasional squalls and rain. It became a matter of difficulty to determine when we got into the S.E. Trade; it was not until we reached Lat. 20° S. that the wind, light as

* It should be mentioned that the *Rattlesnake* was a remarkably dull sailer. She was a frigate-built ship of 450 tons, and carried twenty-four carronades when a war vessel. She was rigged as a barque, and had a large poop built on her when she was fitted for the surveying service.

the preceding day. but on this strong, with squalls and rain, appeared steady between E.S.E. and S.S.E., and this carried us down to Sandy cape in Lat. $24^{\circ} 41\frac{1}{2}'$ S."

ROUTES FROM SINGAPORE TO NEW CALEDONIA AND THE N.E. COAST OF AUSTRALIA.

May to September inclusive.

DIRECT SOUTHERN ROUTE.—During this season the quickest passages have been made to the Australian colonies by the southern route; for although some delay is experienced in getting to the strait of Sunda against the S.E. winds, there is no difficulty in passing through the strait into the Indian Ocean, where the trade wind is usually strong and steady as far as 28° S.; after which the westerly winds which blow with great strength to the South of that parallel soon carry a ship to her destined port. And as these winds curve round Cape Howe, and blow from the southward and S.W. along the East coast of Australia as far as the tropic, no difficulty will be experienced in reaching Port Curtis and New Caledonia at this season.

The only disadvantages connected with the route are the foul winds that will be experienced at first starting, and the inclemency of the winter season in high southern latitudes; where the cross seas which get up when the wind chops suddenly from N.W. to S.W., which often happens, are of a peculiarly dangerous character. This route, however, is so well known, at least as far as Bass strait, that it is only noticed here for purposes of comparison.

NORTHERN ROUTE.—The passage from Singapore to the Australasian colonies by way of the North Pacific has never yet been tried, nor would it be advisable for any vessel bound to a settlement South of Moreton Bay to make the attempt, as great difficulty would be experienced in getting to the southward against the southerly and S.W. winds which prevail between the East coast of Australia and New Zealand, and which have much the character of the Monsoon that occurs at the same season in the Mozambique Channel.

Ships from China to the southern colonies by the Pacific route are often greatly retarded by these winds towards the conclusion of the voyage, which has made the route very unpopular of late, and it is not much used now except by vessels carrying native passengers, when it is an object to avoid the inclement weather of the winter season to the south of Australia. Ships carrying freight from China and Manila generally stand to the southward when they get the N.E. Trade, and enter the Indian Ocean by the Gilolo passage and Timor strait, after which the southern route is pursued.

During this season the N.E. and S.E. Trade winds of the Pacific blow with steadiness and regularity, and ships pass from one into the other, on crossing the line, without an interval of calms or variable winds. And as the S.W. Monsoon blows steadily between this port and the N.E. coast of China, the only point on which details are necessary is with respect to the facilities for running down

E.

sufficient easting in the northern variables to enable a ship to lay up across the Trades so as to fetch to windward of the destined port.

Log books however, show that the winds are at least as favourable for making easting as those experienced to the south of Australia during the summer season. Commodore PERRY, with the U.S. squadron left Shanghai for the Loo Choo and the Bonin group on the 23rd of May, 1853, and carried the S.W. Monsoon through-out the passage. He says—"as during the return voyage moderate breezes from S.S.W. to S.W. prevailed with warm weather, and as, in fact, the wind ever since the first departure from Napha (Loo Choo) had continued from the southward and westward, it may be inferred that the S.W. Monsoon extends as far north as the parallels of latitude in which the course of the ships laid."

The Kuro-Siwo or Japanese Gulf stream which is found in these latitudes will also materially aid a ship in making her easting. The entire report of Lieutenant BENT, the officer employed to observe the phenomena, is given on pp. 27-33. This singular current, with the water at a temperature of 86°, affords a clue to the mystery of the Bonin islands having an exclusively tropical vegetation, which has long been a puzzle to naturalists. It also accounts for the productiveness of the southern islands of the Japan group in sugar and other produce which is usually confined to intertropical regions. It will be well for a navigator making his easting to keep in this stream, which he may easily do with the aid of a thermometer, as it is supposed to curve to the southward after passing the Bonin group, and at the same time is likely to have an influence in producing favourable winds.

It is doubtful whether it would not be best to enter the Pacific by the Bashee channel to the south of Formosa, so as to get at once into the stream of current; it is also doubtful how far a ship ought to get to the eastward before entering the limits of the Trade winds. HORSBURGH, in a short paragraph which treats on the route of "ships from Macao to the N.W. coast of America, or to Australia," recommends getting into longitude 165° to 170° before standing to the southward of the parallel of 30° S., and in the case of heavy sailing ships this would probably be advisable; but fast and weatherly vessels may safely enter the Trades 10° to the westward of this point. It seems, too, that while the S.W. Monsoon prevails in the China Sea ships will make more easting by keeping between the parallels of 25° and 30°. This was the course adopted by the Spanish galleons, which made annual voyages from Manila to Acapulco, in South America, for upwards of a century, and they had the benefit of a long experience.

Should water and refreshments be required during the passage, they may be obtained at Peel island, in the Bonin group, where there is a secure port on the west side of the island, which is much frequented by whale ships. There is a population numbering about 100, consisting of a few Europeans and Americans, and the remainder Sandwich Islanders, who grow vegetables and rear stock to supply the ships that call for refreshments. Turtle are also abundant. Further on, near the line are the Kingsmill island and Pleasant island (the latter is in Lat. 0° 35' S., Long. 167° 10' E.,) both of which abound in refreshments and are much resorted to by whale ships.

The details given above will enable a reader to compare the routes and draw his own conclusions, as the distances to be traversed on both routes are exactly the same. Commanders of European vessels, when the crews are well provided

with warm clothing, will probably still prefer the southern route, where there is more sea room: but commanders of country ships, or vessels carrying native passengers, are likely to incline to the northern route, where no cold weather will be experienced throughout the passage. Perhaps at some future day, when a Trade comes to be established with Port Curtis and New Caledonia, two ships may leave this port on the same day, the one taking the northern and the other the southern route,—and this, after all, will be the only safe test of the comparative merits of the two routes with regard to the time occupied in making the passage.

The following paper contributed by Captain HUNTER to the *Nautical Magazine* in 1843, will form a fitting appendix to those just given, (pp. 55-67); it describes the WIND, WEATHER, and CURRENTS that may generally be expected in the WESTERN PACIFIC, and shows that the PASSAGE from SINGAPORE to SYDNEY *may be made at all times of the year* by TAKING THE NORTH COAST OF NEW GUINEA, by keeping northward of the Equatorial current and making easting between the two Trade Winds.

MR. HORSBURG briefly states that the West Monsoon, which blows regularly in the Indian Ocean, extends to New Guinea. This Monsoon blows as steadily, strongly, and regularly along the north side of New Guinea, at New Britain, New Ireland, and all contiguous islands south of the Equator, so far eastward as Malanta and the northern part of the new Hebrides, as in any part of the Indian Ocean whatever; and extending in a wind of gradually decreasing constancy and continuation from hence far eastward to the Society Islands and Marquesas. The limits in latitude appear similar to the Indian Ocean, from 1° to 15° S., occasionally to 19° S., and the period from the beginning of January until the end of March.

Having said thus much, as this is written principally with the idea of endeavouring to show the practicability of making passages to the eastward in the Pacific (instead of the circuitous route round New Holland), which I have never heard has been attempted by trading vessels, although performed by whalers continually, I proceed to state a few facts of such passages; and will first attempt to prove the practicability of making a passage to the eastward during the Easterly Monsoon in South latitude, or from April until December or January, by keeping to the northward of the equatorial current, and between the Trades or Monsoons.

In October, 1835, being off the Asia Islands, and wishing to make a passage to the eastward, winds light and variable and current running strongly to the westward, against which we could make no progress, stood to the northward, and on the 19th of October were in Lat. $2^{\circ} 6' N.$, Long. $134^{\circ} 11' E.$ Having lost the westerly current, pushed to the eastward between the parallels of $2^{\circ} 15'$ and $2^{\circ} 34' N.$ On the 27th were in Long. $147^{\circ} E.$ From hence stood to the south-eastward and made Matthias Island,—it being my object to cruise in this neighbourhood. On the 30th passed through St. George channel quickly, current favourable, and to the Treasury islands. Cruised here until 19th of December. Started with a westerly wind, which carried us to $169^{\circ} 36' E.$ on the 26th, having passed on the South side of Banks islands. Becalmed two or three days; then

with variable winds, chiefly from E.S.E., proceeded to the southward, and anchored in the Bay of Islands 15th January.

These passages were made at a season deemed impracticable, before the West Monsoon had set in steadily, by a southseaman of moderate sailing qualities, without using studding sails. The passage to the eastward may, I am convinced, be made at all seasons by pursuing the same plan; which is, as before stated, to keep to the northward of the Equatorial current, and between the Trades or Monsoons. Here you will have a variable wind, chiefly from the westward, with a drain of favourable current at times.

Further to corroborate this opinion,—June 23rd, in 1° S. and 149° E., having been drifted from Matthias island and New Hanover by a westerly current of $2\frac{1}{2}$ or 3 knots an hour, stood to the northward, got westerly winds on the Equator. With these made easting, and on the 27th reached 155° E. and $0^{\circ} 45'$ S. Made Bouka point soon afterwards; then found a current equal in strength to that at Matthias island. At this time the westerly current did not extend quite to the Equator.

Again, in September, 1840, being unable to hold on near the Admiralty islands, in consequence of strong westerly currents, stood to the northward, and when in $0^{\circ} 24'$ N. and in 146° E., proceeded to 2° N. before losing the current; then worked to the eastward, and stood to the southward on the East side of the Green islands, which are in about 156° E. The passage from Morty to Bouka has also been made in August by adopting the same plan. Although all these passages terminated in the longitude of the Salomon islands, it was not through inability to proceed farther to the eastward, but merely in consequence of this being the destination. More might be quoted tending to show that these line currents seldom extend northward of 2° N.

During the West Monsoon in South latitude it has been a common practice, the last fifteen years, for ships to make passages from Timor to the Salomon islands; some returning at the commencement of the Easterly Monsoon, and others spreading over the Pacific. Last year, 5 ships, which had been cruising in the Indian Ocean, proceeded eastward between January and April: one along the line to the eastward of the Kingsmill Group, another to the Salomon islands and New Zealand, and the remainder to New Ireland and elsewhere. From all which I wish it to be inferred that any ship leaving Manila between the beginning of December and the beginning of March, or any port from which she can reach the North end of the Molucca or Gillolo passages, or Dampier strait, between the middle of December and the middle of March, will make a speedy passage to any part of the Pacific Ocean in East longitude; and that during all other seasons the passage is practicable by keeping northward of the equatorial current and between the Monsoon winds.

In the period of the West Monsoon northerly and N.W. winds prevail to the Cape of Good Hope of New Guinea. Passing eastward of this point the westerly wind will generally be experienced fresh and steady, with a current of 2 or $2\frac{1}{2}$ knots running to the eastward, and extending from New Guinea shore to about 1° N. A ship may pass near the St. David islands without risk of losing this wind or current, and northward of Providence islands. From hence any of the passages may be chosen, according to discretion. That by the eastern Dampier

strait, although, perhaps, the most direct if bound to Sydney, I should not recommend until the islands northward of New Guinea are more correctly inserted. If St. George channel be adopted it may be preferable to steer along the line until in the longitude of the Admiralty islands; then pass to the south-eastward between these and Matthias island, thus avoiding the low islands and reefs to the southward. Sail could be carried during the night without fear. Keeping along the Equator there cannot be many undiscovered dangers, this track having been a good deal frequented of late years. The other route to the northward of the Salomon islands, when bound to New Zealand, the Feejee islands or anywhere to the eastward, appears to be the best. In the case of New Zealand, the tenth degree of South latitude should not be crossed until reaching Long. 171° or 172° E.; then steer to the southward on the west side of the Feejee islands, passing pretty near, as the easterly winds prevail far to the southward in January, February, and March; but by weathering the reefs near the south end of New Caledonia a passage may always be effected.

The westerly Monsoon in the Pacific, as in the Indian Ocean, is attended with cloudy overcast weather, squalls, and heavy rains. Some of these squalls are very severe, requiring all sail to be taken in when crossing the wind; even when running close reefs will be found enough. I have experienced several near New Ireland and New Guinea, which generally gave warning and commenced at W.S.W., blowing furiously the first hour, and continuing in a strong gale, veer to the N.W. for 5 or 6 hours.

From Lat. 10° S. to the southern tropic hurricanes are likely to be experienced from November until April agreeing also in this respect with the Indian Ocean; and I make no doubt that one of these occasioned the loss of La Prouse and his fellow voyagers. These scourges of the sea are more prevalent near the New Hebrides and New Caledonia than the Feejee group and Friendly islands. In fact, the liability to hurricanes appears in exact ratio to that of the S.W. Monsoon, or rather to the meridians in which the westerly Monsoon blows, differing in latitude; the Monsoon seldom extending beyond 17° or 18° S.,—indeed, at times 18° S. is the limit,—whereas hurricanes are experienced as far as the tropic.

From all that I can gather of these hurricanes of the South Pacific, having conversed with several masters who have encountered them, some of whom have had their ships dismasted, I scarcely think they are of that terrific description occasionally experienced elsewhere; and am almost inclined to believe them more often and more severely felt near the islands than well clear of the land, although aware of this disagreeing with the new theory; but future facts will be necessary to elucidate this subject.

They are still of unfrequent occurrence in the Pacific, several years intervening without any ship encountering one. I possess no facts which would be serviceable in pointing out their track or direction of rotation. They will, without doubt, be considered to agree with other places in the same latitude, yet a few more well authenticated descriptions as these southern hurricanes would not appear to encumber the evidence of their uniformity in these particulars.

Near the Friendly islands (and perhaps elsewhere) storms occasionally happen of extreme violence, blowing from one point and producing similar effects to hurricanes. In November 1835, 8 or 10 ships, English and American, encoun-

tered one of these near Tongataboo and Eooa from S.S.E., the heavy part of which lasted about 8 hours, causing more or less damage to all,—one or two were dismasted. It was described by the masters whom I saw, which included most of them, as being more severe than anything they had ever seen. Ashore at Eooa, it was most violent,—houses and trees blown down and all the crops destroyed. It likewise did great damage at Tongataboo, and was also felt very severely at the Hapai islands and Vavaoo. Here Mr. Thomas, the missionary, was obliged to shore his house up, although it was considered by the natives that a gradual decrease in strength had been experienced in proceeding northward. Still further North, the *Nassau* encountered it in 16° N., in the shape of a heavy gale. At all these places the wind was from the southward,—S.S.E. by the ships; ashore they had no compasses, but it certainly was from the southward, and without shifting. I have thus endeavoured to be explicit, through an impression that more is required to be known of hurricanes and gales in localities, and having a strong belief that many of the hurricanes, even those producing the most disastrous effects, will be found very local.

Reverting again to the N.W. Monsoon:—At the Salomon Archipelago it commences in December or January. In some years these months are tolerably fine. During February and March strong winds, with severe squalls and heavy rains, may be expected. April generally is a fine month, with variable winds; also in May there is a good deal of fine weather. The S.E. Monsoon sets in strongly in June, with heavy rains and squalls, and continues so until the end of August: in all these months, nevertheless, there are considerable intervals of fine weather. In September the strength of the Monsoon is spent, and the weather is more moderate from this time until the return of the north-wester.

Farther to the eastward, about the meridian of Rotumah, the westerly Monsoon is less constant, beginning generally in January, and blowing strongly about 17 or 18 days consecutively, then declining; and, the easterly wind returning in a fresh breeze for nearly the same period, the westerly wind again intervenes, usually commencing with a gale, and always continuing in a strong breeze, with squalls and rain;—the easterly and westerly winds thus alternating until the end of March, when the S.E. trade sets in steadily. Proceeding still further to the eastward the westerly Monsoon gradually becomes less constant and finally disappears, I think, somewhere about the meridian of the Marquesas islands.

Of currents I can only speak in very general terms, these being subject to great changes in many localities. From 1° or 2° N. to about 3° S., a current of 2 or 3 knots an hour prevails, taking its course from the wind, which is easterly during the greater part of the year: current, therefore, westerly. I have, however, experienced an exception to this. In July 1833, on the equator, in Long. 175° E. a current of about the strength already mentioned ran to the eastward for 14 or 15 days, although the wind was then fresh from the eastward; and I believe such changes have generally occurred once a year, probably induced by a strong S.W. or westerly Monsoon in North latitude reaching at this time near the line. They are fitful changes and not to be depended on, nor can I state their extent eastward.

In other parts of this ocean, well clear of the land, there appears to be very little current. Mr. Horsburgh speaks of a drain to leeward, and this seems to

express all there is. Indeed, I think the swell may almost account for it; therefore it is obviously not such a serious matter to fall to leeward in the Trades as may be imagined; almost any ship with perseverance may work to windward, the wind varying considerably, and veering at times far to the southward. For instance, in April I have worked up in a dull sailing and leewardly ship from the reefs off New Caledonia to the west side of the Feejee Group. From thence, in June, to the islands called by the natives Fotuna and Alloaffy, (marked in one as Alluffali in the chart,) and from thence to Wallis island. Moderate westerly winds of two or three days duration happen in nearly every month.

Off the islands, so far as my observation extends, the currents decrease in strength in proportion to the increase in latitude, that is, the nearer to the equator the stronger the current, and generally with the wind. There are no doubt many exceptions, but without an account of each island, which I am unable to give, no statement can embrace all the particulars, yet one or two instances of such deviation may be mentioned. Cruising to the southward of New Georgia and Bougainville islands throughout the S.E. Monsoon from May until October, in the years 1836 and 1840, the current ran strongly to the S.E. against a strong wind and heavy swell, although at the same time on the north side of these islands it was running as strongly to the westward. Off the north side of New Ireland, where a westerly current prevails, changes to the eastward occur for 10 or 12 days at all seasons.

In concluding these remarks, I may be permitted to hope that some of your readers will follow them up. The winds of the western part of the North Pacific seem very imperfectly known. No statement has appeared of the eastern limit of the S.W. Monsoon; it certainly enters this ocean. In June I have run to the northward, keeping about 3° eastward of the Philippines, with a fresh and steady breeze from S.W. The same wind prevailed until reaching 27° North, and 138° East.

Guajan and the other islands of the Ladrone Group are also understood to be subject to hurricanes, for which the inhabitants prepare by lashing down and securing their houses; yet the seasons at which these are most likely to be experienced are not generally known. Having only crossed this locality once or twice in making passages, I can merely give hearsay evidence. The present Governor of Lamboangan, who has resided in Guajan two years in the same capacity, informs me that in June, July, and August, also in December and January, they are expected. December 1832, the *Japan*, a new ship, encountered a severe hurricane in 13° North, and about 160° West, the meridian of some of the Sandwich islands, in which she was totally dismasted, and fears were entertained of her weathering it; this is the farthest to the eastward in the North Pacific of which I have heard.

In corroboration of Captain HUNTER's remarks we could introduce the experience of many masters, but it will be sufficient to notice the observations of Captain P. A. PALACK, of the Hamburg barque *Esmeralda*, who leaving Fu-

Chau Fu on the 24th September 1861, went North of Formosa to 30° N. and 150° E.; there he turned South, crossed the line in 162° E., passed without trouble east of the Salomon Group and west of Caledonia, and arrived at Sydney on the 21st November, 58 days out; and he continues,—“while at Sydney there arrived an English barque 127 days, and another 107 days from Fu-Chau Fu; and a Dutch barque which left 14 days before me had not arrived on the 16th of December. These vessels all went through the China Sea.

“Leaving the east coast of China from the end of October to the end of January, bound for Sydney, I would advise a ship to go north of Formosa, if enabled to do so, without loss of time; otherwise, go between the Pescadores and Formosa, and outside the Bashees, and stand down south or S.E. as high as the N.E. Trade or Monsoon will admit without pinching, keeping topmast studding sails set, and try to reach the line in 140° to 145° E. From there steer along the line and pass between New Ireland and Bougainville; or steer along the north coast of New Guinea, between that island and New Britain, along to the S.E. When in about 10° S. and 157° E., steer south or S.E., and pass either between Caledonia, and Fairway reef, or altogether west of these shoals, west of Caledonia, and so down to the N.E. coast of Australia, where you will find the northerly wind prevail.

“I give the preference to the New Guinea route because I do not believe that the West Monsoon blows so far to the east as Captain HUNTER says it does. It may blow to 160° E. as an exception, but not like a Monsoon. I met a captain at Sydney who had cruized there for three years, and he agrees with me in this respect,—he never found a West wind worth mentioning; and on the voyage up I was boarded by the officer of a whaler, who said that in their three years' cruise, they had never experienced a West wind. From 10° S. to the line, between 160° and 165° E., I had nothing but calms and light northerly winds. I did not notice even a sign of westerly wind; but I strongly believe that at New Guinea a constant West wind is blowing from November to February, and am confident that I could make the aforesaid passage to Sydney in 35 to 45 days, especially when under the line in January.

“This route is 600 miles shorter than going out to 80° N. and 155° E., and about 2300 miles shorter than through the China Sea and south of Australia.”

CHINA SEA;—ROCKS, SHOALS, &C.

THE following remarks on many of the islands in the S.W. part of the China Sea, between Singapore strait and the coast of Borneo; and on the rocks, islands, and shoals in the *main route* between Singapore and China, and in the route from Singapore to China by the Palawan passage, are the result of the surveys made during 1863–5, by the officers of H.M. surveying vessel *Rifleman*.

ISLANDS BETWEEN SINGAPORE STRAIT AND BORNEO.

St. Barbe Island is high, and appears like two islands when first seen, being

low in the centre. The highest hill on its N.E. end is 762 feet high, and in Lat. $0^{\circ} 8' 6''$ N., Long. $107^{\circ} 13' 32''$ E. The hill on the south end is 684 feet high.

Direction Island is smaller than St. Barbe island; between the two islands there are 20 to 30 fathoms of water. The summit of the island is 639 feet high, and in Lat. $0^{\circ} 14' 39''$ N., Long. $108^{\circ} 1' 53''$ E.

Welstead Shoal, nearly in mid-channel between Direction and Tambelan islands, is in Lat. $0^{\circ} 32' 27''$ N. The Longitude, $107^{\circ} 53'$ E., was obtained by true bearings to Direction island and Tambelan peak.

The rocks extend $\frac{1}{2}$ a mile in an E.N.E. and W.S.W. direction, their breadth being about a cable's length. They consist of a number of pinnacles, with varying depths of 7 to 8 fathoms.

When at anchor on the shoal, Direction island bore S.S.E. $\frac{1}{4}$ E. (the small islet off the west side of that island being just visible from the bridge,) and Tambelan peak bore N.W. $\frac{1}{4}$ N.

Pulo Dattoe is high and of an oblong form. The peak is in Lat. $0^{\circ} 7' 38''$ N., Long. $108^{\circ} 35' 50''$ E., and its height 1042 feet.

St. Esprit Islands.—This group extends 4 leagues, W. by N. and E. by S., and it is only necessary to remark here that vessels should be cautious when passing through them, as a coral patch of 3 fathoms water was found between the Brace islands and the island next west of them. The highest part, 825 feet high, of the largest island of the group, is in Lat. $0^{\circ} 37' 31''$ N., Long. $107^{\circ} 0' 50''$ E.

HOWQUA SHOAL is marked on some charts as a doubtful danger, S. by W. 4 miles from the south-west island of the St. Esprit group. The *Rifleman* steamed over and about its reported position for a day, but could not discover it.

GREEN ISLAND is small and covered with trees. Its centre is in Lat. $0^{\circ} 44' 43''$ N., Long. $107^{\circ} 18' 52''$ E.

The Tambelan Islands, about 35 miles N.E.-ward of the St. Esprit group, extend in a N.W. and S.E. direction. The highest peak of the Great Tambelan (1300 feet high) is in Lat. $1^{\circ} 1' 5''$ N., Long. $107^{\circ} 32' 22''$ E. On the W. side of this island there is good anchorage, with shelter from most winds; the channel between its S. point and the adjacent islets is a mile wide.

Rodger or Ellen Rock is of very small extent, and about 100 yards square; but at low water springs there are but 3 feet water on it. Its position is Lat. $0^{\circ} 41' 15''$ N., Long. $107^{\circ} 31' 12''$ E., and from it Tambelan peak is seen over the right summit of Pulo Jarrang, and bears N. $\frac{1}{2}$ E.: Green island W. by N. $\frac{1}{4}$ N., $12\frac{1}{2}$ miles; the right extreme of the Tambelan group N. by E.; and the left extreme N.N.W. $\frac{1}{4}$ W.

This is an exceedingly dangerous rock, for there are regular soundings of 19 to 22 fathoms close-to and for miles around it. The *Rifleman* was steaming about this danger for 4 days before it was discovered. It was ultimately found by the tide making against the wind and causing a slight ripple.

There is little doubt, but this is the rock seen by Mr. ROBERT LONEY, R.N., when in command of the *Rose Ellis*. The rock is so far from the islands, that

the least error in bearing would cause the discrepancy in its position as given by Captains RODGER and LONEY.

Europe Shoal extends about a mile in a N. by E. and S. by W. direction, the shoalest patch of 3 fathoms being on about the middle of the line. *Horsbush* gives 2 fathoms, but not less than 3 fathoms were found at low water springs, and the boats were sounding over it for several hours. Southward of the 3-fathoms patch, the shoal extends, westward, nearly $\frac{3}{4}$ of a mile, with 6 to 10 fathoms water. All around the shoal there are 18 to 25 fathoms.

The 3-fathoms patch is in Lat. $1^{\circ} 11' 19''$ N., Long. $107^{\circ} 25' 27''$ E., and the Rocky islets bear from it W. $\frac{1}{4}$ S. $12\frac{1}{2}$ miles; Gap rock E. by N. 9 miles; summit of Pulo Way S. by W. $\frac{1}{4}$ W. $5\frac{1}{2}$ miles; right extreme of the Tambelan group S.S.W. $\frac{1}{4}$ W. $6\frac{1}{2}$ miles; and left extreme S.W. $15\frac{1}{2}$ miles.

White Rock, about 80 feet high, lies E.S.E. from Pulo Jarrang, the south-east island of the Tambelan group. On its S.W. side are two small pinnacle rocks about 12 feet above high water. Vessels should not make too free with this rock, as shoal water extends from it between the N.W. and S.W. bearings to a distance of 2 cables.

Constance Shoal.—A danger has been reported and marked on the charts under this name, about $1\frac{1}{2}$ miles south of Pulo Jarrang. The *Rifleman* was steaming a whole day about this position without discovering any danger. Beyond being in the chart we are not furnished with any particulars, and, moreover, the shoal being marked as doubtful both in itself and in position, we are induced not to believe in its existence.

A CORAL SHOAL, however, was found lying off the S.W. end of Little Jarrang (the next island westward of Pulo Jarrang,) the shoalest part of which, with 3 fathoms water, bears W.N.W. $\frac{1}{4}$ of a mile from the south-west end of that island. From this patch (which is on the western extreme of the shoal,) it extends about S.E. by E. $\frac{3}{4}$ of a mile, with depths over it varying from 4 to 9 fathoms. This, probably, is the Constance shoal.

Tambelan highest peak on with the right extreme of Harbour island leads $\frac{1}{2}$ a mile westward of the shoal; and White rock on with the right extreme of Pulo Jarrang leads in 9 fathoms over its south-east end. White rock kept well open of the right extreme of Pulo Jarrang leads to the southward.

There are 17 to 20 fathoms water between this shoal and Little Jarrang.

Several other shoal patches and dangers were found near the Tambelan islands, but they lie out of the ordinary track of vessels, and a glance at the chart will give a better idea of them than a long account here.

Rocky Islands, lying N.W. $\frac{1}{4}$ W. 12 miles from the channel between Pulo Way and the outer island of the Tambelan group, are merely two barren rocks, the resort of sea birds. They are bold close-to, and occupy a space of about 2 cables in extent. The northern and larger rock, 134 feet high, is in Lat. $1^{\circ} 11' 9''$ N., Long. $107^{\circ} 13'$ E.

Gap Rock lies North 11 miles from the eastern extreme of the Tambelan group, in Lat. $1^{\circ} 12' 30''$ N., Long. $107^{\circ} 34' 30''$ E. This rock, which consists of two large boulders lying upon a flat rock, is very remarkable; the larger of these

boulders is 124 feet above the water. There is no small rock to the eastward of it, as mentioned in HORSBURGH, but a shoal extends about 2 cables from its south side.

St. Julian, in Lat. $0^{\circ} 55' 40''$ N., Long. $106^{\circ} 43' 30''$ E., is a remarkable island, being nearly a mile long, and only 200 yards broad. The island is low in the centre, rising to a hill 537 feet high on the north end, and to another 318 feet high on the south end. The hill on the north end forms an exceedingly bold cliff to seaward. There is deep water close to on all sides.

Camel's Hump, in Lat. $1^{\circ} 11' 46''$ N., Long. $106^{\circ} 53'$ E., is about $\frac{1}{4}$ a mile long, east and west, and about $\frac{1}{2}$ of a mile broad. It is well named, the highest part of the island forming a sort of hump, the height of which is 574 feet. No danger was discovered in its vicinity.

Saddle Island, in Lat. $1^{\circ} 19' 20''$ N., Long. $107^{\circ} 2' 17''$ E., is only $\frac{1}{4}$ a mile long, and a $\frac{1}{2}$ of a mile broad. This island is also well named; the hills forming the saddle are in line on a S. $\frac{1}{2}$ W. and opposite bearing, the higher one on the north side being 387 feet high.

Victory Island, in Lat. $1^{\circ} 34' 46''$ N., Long. $106^{\circ} 18' 40''$ E., rises to a hill in the centre, 285 feet in height. A patch of 5 fathoms, with deep water all round, was found about $\frac{1}{2}$ of a mile off its S.W. end.

Acasta Rock, lying N. by W. 4 miles from Victory island, is just under the surface of the water, and in calm weather the central part appears of a very brown colour, declining to a pale green around. The least swell breaks on it.

Barren Rock, in Lat. $1^{\circ} 31' 50''$ N., Long. $106^{\circ} 25' 35''$ E., is a whitish rock 80 feet high, about a cable's length in extent, with deep water all around it.

GENERAL REMARKS.—As the *Rifleman* was constantly shifting her position during the operations of the survey, no good opportunity offered for obtaining a series of tidal observations; but it was observed, that during the S.W. Monsoon (from the middle of July to the middle of September,) and also during the N.E. Monsoon (in the month of December,) the tides set to windward every day against the prevailing current, although they were uncertain as to commencement and time of duration.

The weather was very fine and the winds generally light. *Ships would frequently shorten their passages through this part of the China sea if they kept a kedge ready to let go during light airs and calms, and when both current and tide would otherwise be setting them back over the ground they had with difficulty gained.*

All the islands, like most others in the tropics, are covered with a dense vegetation, and have, generally, white sandy beaches upon which turtle and the iguana may frequently be found.

The islands of the St. Esprit group, and others, are occasionally visited by small parties of Malays for the purpose of catching turtle.

The only islands permanently inhabited are those of the Tambelan group, all of which have a few Malays upon them. The village in the bay of the Great Tambelan contains about 500 inhabitants, but vessels cannot get supplied there. A few fowls were procured, but with great difficulty.

ROCKS, ISLANDS, AND SHOALS IN THE MAIN ROUTE BETWEEN SINGAPORE
AND CHINA.

Hughes Shoal.—On leaving Singapore, the *Rifleman* proceeded first to Victory island, to thoroughly examine the 5-fathoms shoal off the S.W. end of that island, over which one of her boats had passed during the recent survey, and also to search for the doubtful reef of HORSBURGH, said "to have been seen by Captain HUGHES, of the *Bombay Merchant*, in January 1825, and was nearly in one with Victoria island, bearing N.E. 5 or 6 miles."

The *Rifleman* anchored on the shoal, the island bearing N.E. $\frac{1}{2}$ E., distant $\frac{1}{2}$ a mile, in $3\frac{1}{2}$ fathoms, reduced to low water springs, which was the least water found. The shoal is of coral, $\frac{1}{2}$ of a mile long, N.E. and S.W., and a $\frac{1}{2}$ of a mile broad. Its outer edge in 8 fathoms lies S.W. $\frac{1}{2}$ W. $\frac{1}{4}$ of a mile from the island.

It is possible that Captain HUGHES meant that his ship was distant from the island 5 or 6 miles when the breakers were seen in one with the island. However that may be, after a careful search under favourable circumstances (the water being so clear that the formation of the coral could be seen distinctly all over the shoal), the least indication could not be found of any other danger in that direction. Believing, therefore, that the shoal explored was, in all probability, the same that was seen by Captain HUGHES, it was named Hughes' shoal.

Pyramidal Rocks.—From Victory island a line of soundings was carried to the position of a "doubtful rock" placed 11 miles S.W. of the Pyramidal rocks off the west coast of the Great Natuna. The *Rifleman* passed close to the spot without discovering any danger, and had soundings in 83 fathoms.

The Pyramidal rocks were passed within 4 miles, but it was getting too dark to examine them closely. They appeared to be just as they are described in HORSBURGH, and their position is within a mile of the chart.*

French Rocks.—From the Pyramidal rocks a line of soundings was carried to the position of the French rocks, represented as three rocks above water lying N.N.W. $\frac{1}{2}$ W. of Pulo Laut, or the North Natuna. Their position was approached on a W. by N. $\frac{1}{2}$ N. bearing, and at noon the *Rifleman* was 2 miles north of it; she then steered south $7\frac{1}{2}$ miles, N.W. 9 miles, and N.E. $6\frac{1}{2}$ miles, without discovering any signs of the rocks. The soundings about the spot were from 35 to 40 fathoms.

Holland Bank is an extensive coral bank with various depths of water upon it. Its greatest length (under a depth of 10 fathoms) is $6\frac{1}{2}$ miles E.N.E. and

* A Dutch Notice, printed at Batavia in 1857, states that a rock, 25 feet above water, was discovered lying N.E. by E. $\frac{1}{2}$ E. of the Pyramidal rocks. Its appearance was similar to those in the neighbourhood of Pulo Semione, and it is said to be in Long. $107^{\circ} 26' E.$

Also that the Dutch vessel *Lamina Elizabeth* struck on a reef lying off the south-east coast of Great Natuna island, with Pulo Kamodi and Pulo Jantay nearly in one, bearing N. by E. $\frac{1}{2}$ E.; Mount Ranay N. by W. $\frac{1}{2}$ W.; the nearest high land on Natuna W.N.W. $\frac{1}{2}$ W.; the south point of the same W. $\frac{1}{2}$ N.; and the point of Lagong island about W. by S.

W.N.W., and its breadth 4 miles. The shoalest patches are towards its N.E. end. The soundings on these patches are very irregular; the least water found was $2\frac{1}{2}$ fathoms, reduced to low water springs. From the centre patch, in Lat $10^{\circ} 39' 17''$ N., Long. $108^{\circ} 43'$ E., the south-west summit of Pulo Ceicer de Mer bore about E.S.E. distant 15 miles; and High rock about E. by S. $10\frac{1}{2}$ miles.

The south-west summit of Ceicer de Mer bearing S.E. by E. $\frac{1}{4}$ E. leads just outside the depth of 10 fathoms, on its north-east end; and bearing E. by S. $\frac{1}{4}$ S., leads outside the same depth on its south end. Therefore, vessels passing northward of the Holland bank, should not bring the south-west or high and sloping summit of Ceicer de Mer to the eastward of S.E.; and those passing south of the bank should not bring the same summit to the southward of East.

The soundings round the bank are very irregular, and afford no certain guide, but the bank is much steeper on its eastern edge than elsewhere. The lead, however, is not at all to be relied on in approaching that edge, for 20 fathoms may be obtained one cast, and 4 fathoms the next. Excepting the eastern part, if the lead be attended to and hove quickly, it will point out the edge of the bank before a ship gets into danger.

The following valuable remarks, from HORSBURGH, cannot be improved upon:—"To avoid this bank on its western side, do not raise Pulo Ceicer de Mer more than to have the summits of the two hills visible from the poop of a large ship when the island is bearing between E. $\frac{1}{4}$ S. and S.E.; for if the low part of the island between the hills be *in sight from the poop*, bearing from E. by S. to E.S.E., the vessel will be near the edge of the bank.

Pulo Ceicer de Mer.—The two small hills which were formerly supposed to lie near its north and south extremities, are, in fact, both towards the north end of the island, and bear E.N.E. and W.S.W. distant a mile from each other. The south-west and higher hill of the two is in Lat. $10^{\circ} 32' 36''$ N., Long. $108^{\circ} 56' 30''$ E., is 360 feet high, has a round top, slopes gradually until it joins the low land, and is visible 24 or 25 miles. The north-east hill, 306 feet high and of a conical form, rises abruptly from the low land, and has several irregular masses of rock near its summit, which give it a somewhat remarkable appearance.

The island is $3\frac{1}{2}$ miles long N.E. and S.W., and $1\frac{1}{2}$ miles broad. Nearly $\frac{1}{2}$ a mile off its north-east end are several masses of rocks with foul ground round them; the most conspicuous is a large black rock 60 feet high. This part of the island should not be approached by vessels of large draught nearer than $1\frac{1}{2}$ or 2 miles, nor by small vessels nearer than a mile. In a case of emergency it is possible, perhaps, to gain shelter from the S.W. Monsoon by anchoring off the north-east end in 14 or 15 fathoms; but the bottom is rocky and bad holding ground, and by no means to be recommended as an anchorage.

On the east side of the island is a sandy bay which has the appearance of affording convenient anchorage; but a coral reef not only fills it completely up, but projects in such a manner that the 5 fathoms line of soundings forms an arc of a circle convex to seaward more than a mile distant from the depth of the bay, and approaching within a cable or two of the north-east and south-east points of the island. Vessels should be extremely cautious in approaching this treacherous bay, as the soundings decrease so suddenly from no bottom with 40 or 50

fathoms to 4 or 5 fathoms, that the lead cannot be relied upon to give warning of the danger in sufficient time to avoid it.

A sandy beach extends along the whole west and south-west coasts of the island, the south-west point being formed by a number of black rocks. There is fair anchorage in 13 to 16 fathoms, with a bottom of sand and shells, all along these shores; but the best is just to the southward of the south-west point, where vessels may conveniently anchor in 10 to 14 fathoms. It is necessary, however, to be careful in coming to, as shoal water and rocks extend about $\frac{1}{2}$ of a mile from the island, and the depths rapidly decrease from 11 to 4 fathoms.

At $\frac{1}{2}$ a mile off the south-east end of Ceicer de Mer is a smaller island lying in a north and south direction, the highest point of which is 133 feet above the sea. The south-east part of Ceicer de Mer is nearly the same height, and both present steep rugged cliffs to the eastward. In the middle of the channel between these islands is a mass of rocks just above water, between which and the small island is a channel for boats. A $\frac{1}{4}$ of a mile S.E. of the small island is a conspicuous black rock about 30 feet high, with smaller rocks round it; 2 cables S.E. of which, again, are two rocks awash. The small island, therefore, should not be approached within a mile when bearing to the westward of North.

Pulo Ceicer de Mer is inhabited by poor fishermen and others, and is well cultivated, but no supplies could be obtained. The natives brought off a few fowls upon one occasion, and seemed pleased to receive some empty bottles, biscuit, &c., in return; but they refused all offers of money, and would not be prevailed upon to sell anything. They were much disturbed at the vessel remaining so long in their neighbourhood, and kept up an almost incessant noise with drums and gongs all the time she was at anchor. They always lined the beach, armed with spears and other Chinese weapons, when any boat landed, but did not attempt to molest the crew.

High Rock, of a white colour, 60 feet high, and the resort of sea birds, lies N.W. $\frac{1}{2}$ N., nearly 5 miles from the north-west point of Pulo Ceicer de Mer. Nearly half a cable north of it is a small rock a few feet above water; close to the northward of which is a rock awash.

In the channel between Ceicer de Mer and High rock the depths vary from 8 to 12 fathoms, and the bottom is coral. Near the rock some patches of 5 and 6 fathoms were found, but no danger discovered. The channel between Ceicer de Mer and Holland bank is about 12 miles wide. The depths in it are very irregular, varying from 26 to 10 fathoms, the bottom generally sand, or sand and shells at the deep soundings, and rocky at the shoal ones.

Caution.—Vessels should keep a good look-out when passing between Ceicer de Mer and High rock, or High rock and Holland bank; for although many hundreds of soundings were obtained in the neighbourhood, and the result of the survey affords reasonable assurance that these channels are quite safe, yet with depths so irregular and the bottom mostly of coral, the possibility of some small patch having escaped the lead, even in the most careful survey, should always be born in mind and guarded against as far as possible,

Pulo Sapata, or Shoe island.—Its summit, 346 feet high, is in Lat. $9^{\circ} 58' 23''$ N., Long. $109^{\circ} 8'$ E., and bears S. by E. $\frac{1}{4}$ E. $35\frac{1}{2}$ miles from the S.W.

summit of Ceicer de Mer. Under very favourable circumstances it is possible to effect a landing upon the rocks at its base; but otherwise it is an inaccessible barren rock, $\frac{1}{2}$ of a mile long, north and south, about half as broad, and visible in clear weather at 22 or 23 miles.

With the exception of a rock awash lying a $\frac{1}{2}$ of a cable eastward of its south end, the island is bold close to; 16 and 17 fathoms were obtained about 2 cables eastward of it, and $\frac{1}{2}$ a mile off in that direction 25 to 30 fathoms. On the west side the soundings are a few fathoms deeper.

The Pyramid or Little Catwick, is a small peaked rock 56 feet high, lying N.W. by W. $\frac{1}{2}$ W. $2\frac{1}{2}$ miles from Pulo Sapata. It is steep close to, with no danger near it, and can be seen about 9 or 10 miles.

The channel between this rock and Pulo Sapata is free from danger, and the soundings in it are deep,—50 to 65 fathoms. The following observations from HORSBURN are very valuable:—"Although this passage seems to be safe with a commanding wind, it ought not to be adopted excepting in a case of emergency, for it is contracted and the currents are strong and irregular about these islands. Ships passing here in the night, during the N.E. Monsoon, ought to make proper allowance for a south-west current, which is liable to deceive, and to carry them down upon the islands, particularly if the wind is strong at the time."

Round Island, or Great Catwick, is a barren rock, 196 feet high, and about $1\frac{1}{2}$ cables in diameter; bearing W.N.W., distant $11\frac{1}{2}$ miles from Sapata, and nearly South, about 30 miles from Ceicer de Mer. It is bold close to, having 30 to 50 fathoms at a short distance from it in all directions.

Yusun Shoal, in Lat. $10^{\circ} 16' N.$, Long. $109^{\circ} 2' 15'' E.$, is a very small coral patch of 4 fathoms, lying in the fairway of the channel between Ceicer de Mer and the Catwicks. From it the south-west summit of the former bears N. by W. $\frac{1}{2}$ W. $17\frac{1}{2}$ miles, the Great Catwick S.S.W. $\frac{1}{2}$ W. $14\frac{1}{2}$ miles, and Sapata S. by E. $\frac{1}{2}$ E. 18 miles, which is very nearly the position assigned to it by its discoverer; close round it are 45 and 50 fathoms, which is the general depth of the middle of the channel; but about a mile W.N.W. of the shoal is a patch of 24 fathoms.

In fine weather the shoal is not easily seen, but when blowing hard in the strength of the Monsoons, the sea has been frequently observed to break heavily upon it.

There is good reason to believe that the Yusun is the only danger in the channel between Ceicer de Mer and the Catwicks, which is otherwise spacious and safe. The soundings in the channel are irregular, and will be better understood by a reference to the chart, which these observations are intended to accompany than by a description here.

La Paix Rock is a small spot with a pinnacle awash lying nearly in the fairway of the channel between the Great and Little Catwicks, and which may, with this exception, be considered safe to navigate. From the pinnacle the Great Catwick bears west a little northerly, distant $4\frac{1}{2}$ miles, and the Little Catwick is seen open to the south of Pulo Sapata, S.E. by E. a little easterly, $5\frac{1}{2}$ miles.

Except in exceedingly fine weather the sea always breaks upon this rock, but

vessels should not attempt the channel at night, unless their position is exactly known, and circumstances otherwise favourable.

Julia Shoal is a small coral patch about a quarter of a mile in extent, with only $2\frac{1}{2}$ fathoms on it at low tides, lying S.E. by E. distant $3\frac{1}{2}$ miles from Pulo Sapata.

The Little Catwick in line with the north extreme of Sapata, N.W. by W. $\frac{1}{2}$ W. leads nearly half a mile north-eastward of the Julia; the Little Catwick exactly in line with the south extreme of Sapata, leads over 10 fathoms water on the south-west edge of the shoal; and the Little Catwick well open of the south extreme, N.W. $\frac{1}{2}$ W. leads half a mile south-westward.

When the Little Catwick is just lost behind the south extreme of Sapata, and the angle of elevation of that island is $1^{\circ} 22'$, or more (the height of the eye being 15 feet), ships will be 1 mile or more inside the Julia. When the angle of elevation is $0^{\circ} 45'$ or less, (the height of the eye being 15 feet), they will be 1 mile or more outside the shoal.

In 1836, Captain THOMAS, of the ship *Good Success*, observing a rippling, sent a boat to examine it, and found a sharp pinnacle rock to which the boat was held by a boat hook. In 1847 it was examined in the ship *Julia*, but no less water than 3 fathoms could be found, which is no doubt the usual depth upon the shoal, although it is not safe to depend upon finding more than $2\frac{1}{2}$ fathoms.*

From the examination made in the *Julia*, the danger obtained a position on the charts, which position was very nearly the same as that ascribed to it by Captain THOMAS. We also agree with both in bearing, but make the distance from Pulo Sapata (which with them must have been a matter of judgment only) a mile less than they.

There is no doubt that the existence of this shoal has been the cause of more anxiety, perhaps, than any other in the China sea. In all probability many of the reported positions of dangers in that locality (for instance, the Hopkins bank), have proceeded from this shoal, having been seen and its position wrongly estimated.

The *Christopher Rawson* (the only vessel heard of striking on a shoal near Pulo Sapata), was probably lost upon the Julia shoal; and from the impossibility of correctly calculating the ship's position at the time of the accident, the navigation of the China sea has for 20 years been encumbered with the **Rawson Shoal**, which appears on the charts as a doubtful danger about 20 miles E.S.E. of Pulo Sapata: it was hereabouts the *Christopher Rawson* was supposed to have struck; but this position must have been a matter of mere conjecture.

A day was also spent in searching for the **Hopkins Bank**, but no sign of danger was met with in this case either.

The **Eaglan** is another doubtful danger† which could not be found, there being upon the spot no bottom with 300 fathoms.

* It is possible that the *Christopher Rawson* knocked off the pinnacle mentioned by Captain THOMAS. She struck with great force, dragging the stern-post clean out of her.

† The ship *Lady Raglan*, in September, 1858, is said to have passed over a rocky shoal lying about S.E. $\frac{1}{2}$ S. 39 miles from Pulo Sapata, in Lat. $9^{\circ} 28' N.$, Long. $109^{\circ} 25' E.$ No soundings were tried for, but the rocks were plainly visible under the vessel's bottom. Shoal water was seen a short distance off; the direction, however, is not stated.

Forth, Columbia, and Alexander Shoals.—A day was spent in carefully searching for each of these doubtful dangers, but nothing of the sort could be met with. Upon the positions of the Forth and Alexander the *Rifleman* had no bottom with 500 fathoms; and no bottom with 350 fathoms upon that of the Columbia.

Captains WHITE and CROCKETT, experienced navigators in the China sea, state that they have passed over the positions of all these supposed shoals, and have never seen any sign of danger. Many similar statements have been received from other captains not so well known as those referred to, but in every way worthy of credit.

From these, and from the result of the *Rifleman* examination, it may, therefore, be inferred that the main route to China is not fraught with so much difficulty and danger as has been imagined; and that, with the exception of the Julia shoal, there is no good reason for believing in the existence of any danger between Pulo Sapata and the western edges of the reefs known to extend from the North danger far to the south-westward.

Minerva Bank.—Soundings were tried for on the spot where this bank is said to be, but no bottom was obtained with 200 fathoms. Mr. REED, has, however, no doubt that it exists somewhere near its assigned position on the chart; but as 28 fathoms is the least water reported upon it, he did not deem it sufficiently important to occupy his time in making a closer search.

Corsair Rock.—The existence of this rock has frequently been denied. The *Rifleman* passed so close to its reported position, Lat. $9^{\circ} 54' N.$, Long. $108^{\circ} 35' E.$, that she must have seen it had it been there.

Royal Bishop Bank.—From near the Great Catwick, the *Rifleman* carried a line of soundings for this bank until she came to a coral patch having 10 fathoms least water upon it, in Lat. $9^{\circ} 40' N.$, Long. $108^{\circ} 14' E.$ Its extent is $3\frac{1}{2}$ miles long, E.N.E. and W.S.W., and about $1\frac{1}{2}$ miles broad. There are 28 to 30 fathoms all round it.

Circumstances did not permit of a farther search for the shoal patches said to be found on the Royal Bishop, and which will probably be discovered to the northward of the bank examined.

Helen Shoal is a small patch $1\frac{1}{2}$ miles in length, E.N.E. and W.S.W., and a mile wide; its centre is in Lat. $19^{\circ} 12' N.$, Long. $113^{\circ} 53' 39'' E.$ The least water upon it is $6\frac{1}{2}$ fathoms, the general depths being 8 and 9 fathoms; around it no bottom could be obtained with 100 fathoms of line.

St. Esprit Shoal is a coral bank $2\frac{1}{2}$ miles in length, east and west, and $1\frac{1}{2}$ miles in breadth; the centre of the shoal is in Lat. $19^{\circ} 38' N.$, Long. $113^{\circ} 2' E.$ The general depths upon it are 9 fathoms, the least water obtained being 7 fathoms, with 60 to 80 fathoms close to. The *Dove* remained at anchor upon the shoal for two days, on both of which good observations were obtained for determining its position.

Captain Ross, of the *Discovery*, who passed over the shoal in 1813, placed it about 5 miles to the south-eastward, and Monsieur D'APRES 19 miles to the westward, of the above position. D'APRES' position was well sounded over, and regular depths of 95 to 105 fathoms obtained. The *Assevedo's* account placed

the shoal in Lat. $19^{\circ} 6' N.$, Long. $113^{\circ} 4' E.$, and this position was also sounded over, but no bottom could be obtained with 200 fathoms of line.

The *Dove* also sounded over the position of the discoloured water seen from the *Althea* in 1806, Lat. $19^{\circ} 38' N.$, Long. $112^{\circ} 17' E.$, but regular depths from 65 to 70 fathoms were found in that locality.

The St. Esprit shoal is described in Horsburgh's Directory (Vol. 2, p. 244) as being "6 leagues in diameter, with 9 to 15 fathoms on its southern part, and on the northern part there are rocks even with the water's edge;" but no such dangerous shoal exists near any of the above localities, all of which were sounded over under circumstances extremely favourable for observing the sea topping or breaking over dangerous patches, had any such existed.

Currents.—The strong rippings on the St. Esprit shoal, mentioned by Ross, were not observed by the officers of the *Dove* during the two days she was anchored on the shoal. Strong rippings were, however, seen during the search over the various positions ascribed to the shoal, but on examination they appeared to be mere current rippings, the water being as deep there as elsewhere. The current was found to set generally to leeward.

SHOALS AND DANGERS IN THE ROUTE FROM SINGAPORE TO CHINA BY THE

PALAWAN PASSAGE.

The Breakers off St. Pierre Islands, which were supposed to lie about 3 miles S.S.W. from the smaller island of St. Pierre, do not exist.

Logan Reef.—Captain LOGAN, of the *Rob Roy*, bound from Labuan to Singapore, reported having seen off Api point, on the N.W. coast of Borneo, the wreck of a vessel ashore on a reef, lying with Marundum island bearing N.E. $\frac{1}{4}$ N., Haycock island N. by W. $\frac{1}{4}$ W., and St. Pierre island W. $\frac{1}{4}$ S.

Several of H.M. gunboats have passed over the position assigned to this reef without discovering the least trace of danger; nor was the *Rifleman* more successful in finding it. There is, in fact, good reason to conclude that Captain LOGAN was mistaken in supposing the wreck to be on a reef. The wreck was fallen in with afterwards by other vessels, drifting about, and ultimately went on shore a short distance southward of Api point.

Niger Bank, discovered in 1858 by H.M.S. *Niger*, is composed of hard clay, $4\frac{1}{2}$ miles long, east and west, and $1\frac{1}{2}$ miles broad. The outer edge of the centre part of the bank is about North, distant 5 miles from Tanjong Datu. The bank has 5 to 9 fathoms on it; the 5-fathom spots are towards the east and south-east ends.

The Acid Patches were reported to be "two coral shoals off the N.W. coast of Borneo; the position of the eastern shoal was given as Lat. $3^{\circ} 45' N.$, Long. $112^{\circ} 42' E.$; the other shoal on the same parallel, and a short distance to the

westward." The *Rifleman* anchored near to these patches, and searched for them without success. It is possible, however, they may exist somewhere in that locality.

Scout and Victoria Patches are two coral shoals to the south-westward of the Bruni patches, the channel between which and the coast of Borneo, heretofore considered quite safe, being thereby rendered very dangerous. Each shoal extends nearly a mile in a north and south, and about half a mile in an east and west direction.

H.M.S. *Scout* passed over the edge of the former patch, in 4 fathoms. The least water found by the *Rifleman* was 2 fathoms, which lies S.W. by S., $4\frac{1}{2}$ miles, from the west Bruni patch, and W. by S., 12 miles, from Ketí islet.

The Victoria patch was discovered by H.M. I.N. steam-vessel *Victoria*, 16th August 1860, and the least water obtained upon it was 17 feet. It bears S.S.W. $\frac{1}{4}$ W. 7 miles from the west Bruni patch, S. by W. $\frac{1}{4}$ W. 2 miles from the Scout patch, and W.S.W. $12\frac{1}{2}$ miles from Ketí islet.

The only mark to clear these dangers is a bearing of Ketí islet, which is just visible at a distance of 12 miles. For vessels passing inside the Bruni patches, the safest course will be to keep along the edge of the shore bank in 5 fathoms. But the more prudent plan to adopt, particularly in ships of large draught, is to pass outside the Bruni patches where there is nothing in the way. The islands Great Rusukan and Kuraman, with the high land of Labuan island, can be seen in plenty of time and run boldly for, except in thick bad weather, which seldom occurs on this coast.

Luconia Shoals.—Several dangers from 90 to 120 miles to the north-westward of Barram point and between the parallels of $4^{\circ} 55'$, and $6^{\circ} 2' N.$, and the meridians of $112^{\circ} 16'$ and $112^{\circ} 42' E.$, were known as the Luconia bank, dry,—Luconia shoal,—Luconia breakers,—George and Abercrombie shoal,—and the Friendship shoal.

These were found to comprise a mass of coral reefs and shoals, amongst which no vessels should venture. Whilst preserving the names of the original discoverers for particular or more conspicuous portions of these dangers, we have adopted the general name of the "Luconia shoals" as referring to the entire group.

The position ascribed to the "dry bank" was sounded over without discovering it; but 5 miles north of its reputed position a reef was found upon which the sea was breaking in fine weather, and which is no doubt the "dry bank" of the charts. This danger, in Lat. $5^{\circ} 3' 24'' N.$, Long. $112^{\circ} 38' 36'' E.$, was named the Luconia breakers. From this position dangerous shoals, with rocks nearly awash on them, extend 12 miles west, 5 miles south, 2 miles east, and 3 miles north. This may not be the entire extent of the shoals in this vicinity, but bad weather prevented the *Rifleman* from making a further search.

The most conspicuous danger of the Luconia shoals is in Lat. $5^{\circ} 31' N.$, Long. $112^{\circ} 33' 17'' E.$, about a mile long, N. by E. and S. by W. and one-third of a mile broad. From these breakers, shoals extend as far as the *Rifleman* was able to sound, viz., 18 miles north, 5 miles south, 5 miles east, and 13 miles west.

It is probable that these soundings have nearly reached the limits of these shoals, excepting to the northward, in which direction they are only as far as the latitude of the southern part of the Friendship. Captain BATE in H.M.S. *Royalist* passed over the position ascribed to the George and Abercrombie without finding it. He supposed that it and the Friendship were the small shoal; but the error was in the longitude of the George and Abercrombie, which placed it too far to the westward. It exists, and forms part of the mass of shoals which extends continuously from the Seahorse breakers to the Friendship.

Caution.—No directions can be given that will enable vessels to pass safely through these reefs and shoals. Although not less than 3 fathoms was found upon those to the northward of the Seahorse breakers, yet they should be avoided as it is quite possible they may be knolls with less water upon them which have escaped the lead.

Kirton Shoal and Euphrates Reef, two doubtful dangers reported to be in the fairway of vessels proceeding to the Palawan between the Luconia shoals and Barram point; the *Rifleman* passed over their reported positions and sounded about the locality without finding anything like danger, but it will be necessary to make a much closer search before removing them from the chart.

Islands and Dangers off Bruni Cliffs.—The five Commades and Three islands, &c., have no existence. This has now been proved by the *Rifleman* carrying lines of regular soundings right across the whole of their positions.

Ottawa Shoal.—Reported position Lat. $7^{\circ} 16' N.$, Long. $115^{\circ} 5' E.$ The *Rifleman* searched for this danger for 3 days, but could find no indication of it; nor could bottom be got with 1000 fathoms of line. The area sounded over is comprised within the following limits;—8 miles east, 15 miles west, 5 miles north, and 5 miles south of the position given above. It is much to be regretted that the broken water seen from the *Ottawa* was not examined from a boat, and the fact of the existence of a shoal or otherwise placed beyond a doubt.

Roger Breakers were reported to be in Lat. $8^{\circ} 21' N.$, Long. $116^{\circ} 25' E.$ Mr. REED remarks—"This is another instance in which it was most desirable that a boat should have been lowered to examine the breakers and to find out if there was really any rock there or not. It was of the greatest importance to avoid placing a doubtful danger at the very entrance and in the centre of the fairway of the Palawan channel. We searched over and about its position for a day without finding anything of the sort, and I think that the appearances must have been deceptive in this case. It is well known how frequently they are so to all accustomed to navigate the China sea. Captain CURLING, of the P. & O. Co's steamer *China*, who has made many voyages by this route, assures me that the appearance of breakers where no real danger exists, is very common in the Palawan.

"I think, after much consideration, that this very doubtful danger should be removed from the charts. It is a great pity to encumber an important channel like the Palawan, where so many real dangers exist, with doubtful ones. Ships, not unfrequently, I believe, get too near real dangers whilst keeping clear of

imaginary ones, and I am of opinion that in much frequented channels it is wiser not to insert doubtful dangers unless there be very strong reasons for believing them to exist.

"If we are ever to have a complete Chart of the China sea, Captains of vessels should assist in the work by endeavouring to ascertain when passing near what appear to be dangers—in such cases as the Ottawa and Roger breakers, for instance—whether they be such or not. An hour or so would have decided the point beyond all doubt in either of the above cases, whereas several valuable days of our time were occupied in searching about the spots without enabling us after all to decide the matter positively."

Furious Shoals were discovered in August 1859, by H.M.S. *Furious*. From the ship's position at anchor in 11 fathoms in Lat. $7^{\circ} 3' 19''$ N., Long. $116^{\circ} 17' 15''$ E., on the North Furious shoal, the middle Mantanani island* bore S. $\frac{3}{4}$ E., and Banquey peak E. by N. $\frac{3}{4}$ N. The shoal is of coral, and extends N.W. by N. and S.E. by S., nearly 2 miles. The least water upon it is 7 fathoms.

The South Furious shoal is a small coral bank barely half a mile in extent, N.N.W. $\frac{1}{4}$ W. nearly 7 miles from the west extreme of the Mantanani islands. It is in Lat. $6^{\circ} 48\frac{1}{4}'$ N., Long. $116^{\circ} 10\frac{1}{4}'$ E. The least water upon it is 7 fathoms.

Other Shoals off the Mantanani Islands.—N.N.W. about 5 miles from the west extreme of the Mantanani islands is a small patch of 7 fathoms; and N. by W. $\frac{1}{4}$ W., $3\frac{1}{4}$ miles, is another spot of 10 fathoms.

About 2 miles S.S.W. of the South Furious patch is a bank of coral of 7 fathoms, about a mile in extent; westward and south-westward of which again, are other and more extensive banks, the limits of which were not determined. Seven fathoms was the least water found upon any of them and the soundings were very irregular.

In bringing a line of soundings from these shoals towards Labuan, the *Rifleman* came on another bank at night, lying S.W. by W. 17 miles from the middle island of Mantanani group. Possibly this may be a dangerous bank, for passing over it slowly, very irregular soundings and as little as 4 fathoms water was obtained.

Barton Rock, reported as awash in Lat. $6^{\circ} 52'$ N., Long. $116^{\circ} 16\frac{1}{4}'$ E., $9\frac{1}{4}$ miles North of the Mantanani islands;—the *Rifleman* passed over the position of this danger without finding it; 28 fathoms was the least water obtained, but circumstances did not allow of a farther search.

Vernon Shoal was discovered by H.M.S. *Vernon* in 1858, and the least water obtained on it was $4\frac{1}{4}$ fathoms. The *Rifleman* found only $2\frac{1}{4}$ fathoms, and in some places the water appeared to be much shoaler. This might have been caused by the sun shining upon the water. There is but little doubt, however, that it stretches a long way to the westward, and probably is connected by a series of shoal patches with the shoals passed over by H.M.S. *Fury* in 1858.

* A small, but high island, between the two large ones of the group.

Caution.—It is apparent from the above observations, that the whole of that part of the China sea extending from the Fury banks N.W. of Labuan, in a line passing over the Saracen bank and Mangalum island to the Furious shoals, should be navigated with the greatest possible caution. To render this navigation safe it will be necessary to make a close survey of the whole, similar to Captain BATE's survey of the Palawan, and to bring down the 100 fathoms line from where he left off, along the whole coast of Borneo as far as the Luconia shoals.

Commanders of vessels proceeding to China by the Palawan channel are therefore cautioned not to venture amongst the shoals near Labuan and Mangalum island, but to keep to the northward of them, and closer to the track recommended by HORSBURGH. It will be seen that that line passes very close to the Ottawa. This is why it was so necessary to determine whether that shoal existed or not, and occasions so much regret that Captain GRIBBLE did not settle the question definitely, and thereby render a most important service to the Hydrography of these seas.

Fury Banks.—Two dangerous coral banks were passed by H.M.S. *Fury*, in 1858, on her passage to and from the island of Moaro, on the north-west coast of Borneo.

The first, in Lat. $5^{\circ} 42' N.$, Long. $114^{\circ} 59' E.$, and situated to the north-west of the 4 fathoms sounding, marked Samarang, appeared to be 4 or 5 miles long, east and west, and 3 to 4 miles broad, with heavy breakers extending $1\frac{1}{2}$ miles. There was a heavy sea at the time, and the deepest water obtained was 12 fathoms, the least 6 fathoms.

The second, in Lat. $5^{\circ} 56' N.$, Long. $114^{\circ} 50' E.$, was also about the same length, east and west, and, as far as could be judged from the discoloured water, 3 miles in breadth. No breakers were seen; the bank appears to be steep-to, and was first struck on one side with a depth of 11 fathoms, and on the other with 7 fathoms. The vessel was then steered W. $1\frac{1}{2}$ miles, when the soundings shoaled, then North, when they shoaled to $4\frac{1}{2}$ fathoms, and then suddenly deepened to no bottom with the hand lead. The soundings on this bank were very regular.

Caution.—Vessels proceeding by the Palawan passage should be careful not to stand too far to the southward, between the northern Fury patch and the North Furious shoal, until the locality has been more thoroughly examined, as many indications of danger have been found to exist there.

A dangerous rock, with only 3 feet water on it, lies in Lat. $5^{\circ} 44' N.$, Long. $114^{\circ} 57' E.$, between the southern of the Fury patches and the Vernon bank, about 26 miles north-westward of Labuan. At $1\frac{1}{2}$ miles to the southward of this danger is another with 8 feet water on it.

Ruby Shoal.—The supposed position of this shoal was also ineffectually sounded over in 1864 and 1865; nothing was seen on either occasion which could lead to the supposition of there being any danger in the vicinity.

Caution.—Great attention should be paid to the lead and a good look-out kept for discoloured water when in this neighbourhood, for it is well known

to be full of shoals, and the mariner is cautioned not to make too free with its navigation.

Gillies Shoal.—The position of this shoal, which was ineffectually searched for in 1864, was again sounded in 1865, but no trace of shoal water was observed; the depth when on its supposed position was 800 fathoms.

Bombay Castle, Orleans, Johnson, and Kingston Shoals were found to be patches on the edge of a large coral bank, which has been named the Rifleman bank.

Rifleman Bank lies between the parallels of $7^{\circ} 31' N.$ and $7^{\circ} 57' N.$, and extends from Long. $111^{\circ} 32' E.$ to $111^{\circ} 45' 30'' E.$ of Greenwich.

Around the edge of the bank several shoal patches were found, one of which, $\frac{1}{2}$ a mile in extent, in Lat. $7^{\circ} 55' 20'' N.$, Long. $111^{\circ} 42' E.$, has only 11 feet water; with this exception, 4 fathoms was the least depth obtained on the bank.

It is deemed probable that the 11-feet patch is the shoal observed by Captain CAMERON, of the *Orleans*, who obtained a cast of 8 feet, and placed the danger in Lat. $7^{\circ} 56' N.$, Long. $111^{\circ} 38' E.$ The 8-feet knoll was not found by the *Rifleman's* boats, but it is quite possible to have escaped the lead, for large isolated rocks are known to exist on coral reefs, though extremely difficult to find.

Heavy breakers mark the position of this patch, in any but the finest weather.

In the centre of Rifleman bank the soundings are from 20 to 40 fathoms, sand and coral; and around its edge, outside, a few deep casts were obtained, varying from 300 to 600 fathoms.

The *Rifleman* sounded over the position assigned to the Bombay Castle reef, in Lat. $7^{\circ} 56' N.$, Long. $111^{\circ} 51' E.$, but no bottom was obtained with upwards of 100 fathoms of line, nor could any sign of shoal water be seen from the mast-head under most favourable circumstances, when on, and cruising around its supposed position; it is therefore deemed probable that the *Bombay Castle* must have sighted the 11-feet patch on the Rifleman bank, as the latitude is nearly the same, though the longitude differs 9 miles.

Prince Consort Bank, situated between the Vanguard and Prince of Wales' banks, was discovered whilst carrying a line of soundings between the North Danger and Singapore.

The bank extends from Lat. $7^{\circ} 46' N.$ to Lat. $7^{\circ} 58' N.$, and between the Longitudes of $109^{\circ} 55' E.$ and $110^{\circ} 6' E.$ No danger exists on it; the general soundings are from 30 to 50 fathoms, sand and coral, the least water found being on a small coral patch of 10 fathoms.

Lizzie Webber Reefs.—While proceeding from the wreck to Labuan, in the boats, Captain DALLAS reports that they saw breakers in Lat. $7^{\circ} 38' N.$, Long. $113^{\circ} 55' E.$, and in returning to the wreck in a small vessel, the *Lizzie Webber*, they struck upon a reef in Lat. $8^{\circ} 4' N.$, Long. $113^{\circ} 12' E.$ This latter reef is a narrow strip of sand and coral lying very little under water, in a north-east and south-west direction.

East London Reef is 7 miles in length East and West, the breadth varying from 1 to 2 miles. Its east end is in Lat. $8^{\circ} 49' 38'' N.$, Long. $112^{\circ} 37' 26'' E.$

The coral bordering the reef encloses a lagoon having from 4 to 8 fathoms water; no entrance into the lagoon was discovered, but there was an appearance of numerous coral patches inside.

The sea breaks heavily on this reef, and on its western extremity are one or two rocks which seldom cover. No soundings could be obtained with 100 fathoms of line at the distance of a mile from where the coral dries, and the attempt was equally unsuccessful with 500 fathoms of line, at the distance of 2 miles from the reef in a northerly direction.

Quarteron Reef, named after the Spaniard who discovered it, is awash, and shaped like a crescent, whose chord is 3 miles in length E. by S. and W. by N., with the curve to the southward. Its eastern extremity is in Lat. $8^{\circ} 50' 54''$ N., Long. $112^{\circ} 49' 34''$ E.

This reef was found to be steeper-to than any yet visited, for although deep water is found close to all, there was generally some slope from the rocks awash, on which the vessel could anchor for a short period, to enable the position to be fixed; here, however, although the *Rifleman* anchored in 5 fathoms, with the jib-boom over the rocks awash, the reef was so steep as to cause the anchor to roll down the incline, and run the cable out to the clinch.

Central London Reef.—This important danger was discovered whilst sounding between the East and West London reefs. It is a coral patch awash, $\frac{1}{2}$ a mile in extent, with a shallow lagoon inside the belt of coral. On the south-western extremity of the reef, is a sandy cay 60 or 70 yards in circumference, which is probably covered at high water springs.

The centre of this danger is in Lat. $8^{\circ} 55' 30''$ N., Long. $112^{\circ} 20'$ E.; it is in every respect a most dangerous reef, and lies directly in the track of vessels working up or down the China sea.

Being small, it is not marked by great masses of breakers, like those which so readily point out the positions of the East and West London reefs, for one of which it has probably been mistaken, when sighted, as it has doubtless been.

Caution.—Like all other dangers in the China sea visited by the *Rifleman*, this reef is surrounded by deep water, thus rendering the lead useless; it is therefore essentially necessary to observe the greatest precaution when in their vicinity, and never to stand towards them with the sun shining ahead, as under these circumstances it becomes almost impossible to distinguish shoal water or breakers.

The Fiery Cross and Investigator N.W. Reef.—The ship *Fiery Cross* from London to Hong-Kong was wrecked, 4th March 1860, on a reef reported to lie about midway between the Dhaulie and N.W. Investigator shoals; but the *Fiery Cross* and *Investigator* N.W. reef, which are marked as two distinct dangers in the chart, prove to be one extensive coral reef having several dry patches on it, upon most of which the sea breaks even in light winds, or with a light swell. It is 14 miles in length N.E. by E. and S.W. by W., and 4 miles in breadth. The south-west end of this danger is in Lat. $9^{\circ} 32'$ N., Long. $112^{\circ} 53'$ E.; and its north-east end in Lat. $9^{\circ} 41'$ N., Long. $113^{\circ} 4'$ E. The largest dry patch is at the south-west end of the reef, and here were found the

wrecks of two vessels, supposed to have been those of the *Fiery Cross* and *Meerschauum*, both of which ships are known to have been lost upon this reef.

Flora Temple Reef, on which the ship *Flora Temple* was wrecked, October 1859, on her passage from Macao to Havana with Chinese coolies, lies in Lat. $10^{\circ} 19' N.$, Long. $113^{\circ} 34' E.$ The soundings were 4 fathoms under the bows and stern of the wreck; no bottom with 27 fathoms of line within a short distance to the south-east, and close to the reef; and no bottom with 70 fathoms within a mile to the north-west. The breakers were not more than 150 yards wide, and extended about $\frac{1}{2}$ a mile in a curved line from N.E. to S.W.

Caution.—The mariner is cautioned not to make too free with the dangerous archipelago of reefs and banks lying between Pulo Sapata and the coast of Palawan until their position and existence are more correctly ascertained. Vessels have passed through them with difficulty and risk; but others have either been wrecked or have lost their anchors on the extensive coral flats.

North Danger Reef, of coral formation, is about $8\frac{1}{2}$ miles long, in a north-easterly and south-westerly direction, and $4\frac{1}{2}$ miles broad. On the north-west side of the reef are two sandy cays, the north-easternmost of which is $\frac{1}{2}$ a mile in length, and a $\frac{1}{2}$ of a mile in breadth, with an elevation of 10 feet above the level of the sea at high water; the south-western cay is only 4 cables long, and $1\frac{1}{2}$ cables broad, but its elevation is 15 feet above the high water level.

Between these cays is a passage 1 mile broad—with from 4 to 9 fathoms—leading into the lagoon of the reef, where the depth of water is from 20 to 25 fathoms.

Shoal water exists all round the edge of the North Danger reef, and there are heavy breakers over the coral, awash at its north-east and south-west extremities. No soundings could be obtained close to the edge of the reef with upwards of 100 fathoms of line, but one cast of 380 fathoms was procured $1\frac{1}{2}$ miles north-east of the breakers on its north-eastern extremity. On the eastern side of the reef no bottom could be obtained with 480 fathoms of line.

Both cays are covered with coarse grass, and on the north-easternmost of the two is a stunted tree in Lat. $11^{\circ} 28' N.$, Long. $114^{\circ} 20' 45'' E.$ of Greenwich. The cays are frequented by Chinese fishermen from Hainan, who collect Beche-de-mer, turtle-shell, &c., and supply themselves with water from a well in the centre of the north-eastern cay.

CURRENTS.—During the time the *Rifleman* was at anchor among the reefs, careful observations were taken of the set of the currents; the result agreed with that obtained in 1864, viz., that during 16 out of the 24 hours the current invariably sets to windward, generally with the greatest force when the Monsoon was strongest.

Scarborough Shoal.—The following notice appears in an *Annonce Hydrographique*—published by the French Hydrographic Office.

Scarborough shoal or Maroona has recently (March 1866) been examined by H.M. surveying-vessel *Swallow*. It is a coral reef, in the form of an irregular triangle, the sides of which face the South. West, and N.E.; and about 25 miles

in circumference. The reef encloses a shallow lagoon, the opening to which is at the S.E. extremity, and about $2\frac{1}{2}$ cables' wide.

From this opening the reef extends S. 49° W. $1\frac{1}{2}$ miles, to a rock 10 feet high; then $5\frac{1}{2}$ miles to the westward with a slight curve, and finally West to its S.W. extremity. This is the south side of the reef, and besides the rock just mentioned there are two others,—one, of 5 feet, about 4 cables to the eastward of the S.W. elbow,—and the other, of 7 feet, about $1\frac{1}{2}$ miles still further east.

From the S.W. elbow, the reef extends N. 27° W. with a slight westerly curvature for 2 miles, and then N. 20° E. for the distance of 4 cables, where, in an inward bend of the reef, was a wreck. Thence, in a serpentine line, it extends northward $4\frac{7}{8}$ miles to the west extremity, and then E.N.E. for 1 mile. On the west side of the reef there are two rocks, 10 feet high,—one in a bend N. 27° W. $1\frac{1}{2}$ miles from the wreck,—the other N. 3° E. $2\frac{1}{8}$ miles from the former, and S. 8° E. $1\frac{1}{8}$ miles from the west extreme of the N.W. front of the reef.

From the east extremity of the N.W. front, the reef has a general direction towards S.E. by E. for $6\frac{7}{8}$ miles, with a N.E.-ly curvature for the first half of the distance, and with a S.W.-ly trend for the second half, thence to the eastward for $1\frac{1}{2}$ miles, and lastly, S. by W. 9 cables to the east side of the opening mentioned above. On the N.E. side of the reef there are three rocks, 6 feet high;—the first, 9 cables N. by W. from the opening; the second, $1\frac{1}{2}$ miles N.W. of the former; and a third rock, N.W. by W. 7 miles from the second, and S. 74° E. $\frac{1}{2}$ a mile from the east end of the N.W. front.

Soundings. In the middle of the opening there are soundings of from $5\frac{1}{2}$ to 22 feet; outside of which at the distance of 2 cables are 100 fathoms water. At the same distance off the south side of the reef there is no bottom at 150 to 160 fathoms. Off the west side of the reef, no bottom was reached at 150 to 190 fathoms, except at the distance of 1 mile W.N.W. of the north rock, where one sounding gave bottom at 134 fathoms, shells and coral,—and at $1\frac{1}{2}$ miles south of the same rock, 135 fathoms, weed, sand, and coral. Off the N.E. side of the reef the depth is about 110 fathoms, sand and coral,—and the same, $\frac{1}{2}$ a mile N.E. of the most easterly rock.

Position.—From good observations made close to the wreck, that part of the reef is in Lat. $15^{\circ} 6' 44''$ N., Long. $117^{\circ} 43' 49''$ E. of Greenwich.

Tide.—It is high water, full and change, at 8h. 15m. and the spring rise is 5 feet.

JAVA SEA:—WESTERN PART.

Commander BULLOCK, of Her Majesty's steam-vessel *Serpent*, has recently (1866) examined the positions of various dangers, which were supposed to lie in the track of vessels from Sunda strait and Batavia to Singapore; he reports that the Dolphin, Antelope, Jason, Banterer and Anna Paulowna shoals, were searched for, but not found; their names are therefore expunged from the chart of the Western part of the Java sea.

The position of Lynn bank, which uncovers at low water; as well as that of the Coventry reef, which also dries at low water, and on which the sea always

breaks, has been accurately determined. The positions of several other dangers in this locality have also been rectified.

A shoal has recently (May 1866) been reported by Captain R.L. SANDS of the *Glencoe*, who, when coming down the Java sea, passed close to the wreck of a barque lying in the fairway; its position was, North Watcher N. 62° E. $4\frac{1}{2}$ miles, North island S. 20° E. $1\frac{1}{2}$ miles, S. island of the Two Brothers N. 74° W. $18\frac{1}{2}$ miles: this has since been corroborated by two other ship masters, who have reported the wreck near the North Watcher, without, however, giving the position.

STANTON CHANNEL—BANKA STRAIT.

Stanton Channel—Smits Bank consists of four smaller banks, nearly connected, and forming one long narrow ridge 15 miles in length, with its shoalest part of 3 feet, lying 6 miles, and the next shoalest of 9 feet, 3 miles from the north-western end, and two other patches of 3 fathoms and $2\frac{1}{2}$ fathoms to the south-eastward of them.

Panjang hill, bearing N.E., leads to the north-eastward of this bank, between it and the Nemesis bank, in 6 fathoms at low water. Gadong peak, in line with Toboe Ali point, N.E. $\frac{1}{2}$ E., or Lucipara S.W., clears the south-eastern end in 4 fathoms; and Lalarie point N.W. by W., or not approaching the bank in a less depth than 10 fathoms, clears the north-eastern side.

Melville Bank, 5 miles long, and nearly $\frac{1}{2}$ a mile broad, lies a $\frac{1}{2}$ of a mile to the eastward of the south-eastern part of Smits bank, with a depth of 7 and 8 fathoms between. The shoalest part of this bank is near its north-western extremity, and is about 2 miles in length, with from 2 to 3 fathoms on it. At the north end, in 5 fathoms, Laboh point bears N.E. by E.; and the bank is cleared to the south-east in 7 fathoms by the latter point bearing N. by E. $\frac{1}{2}$ E.; and to the eastward in 8 fathoms, by not bringing Parmassang peak more open to the westward of Banka hill than N.W. $\frac{1}{2}$ N.

Between the above banks and Lucipara, there are many others, all tending in the same direction, with narrow deep water channels between; but as these channels are exceedingly narrow, and no marks can be given to clear the banks they are not available for vessels.

Eastern Bank.—The bank bounding the eastern side of Stanton channel is 13 miles long and nearly a mile wide at 3 miles S.W. by S. of Laboh point, which is the broadest and shoalest part. It is formed by three smaller banks nearly joined together, with from 2 to 3 fathoms on the north-western and south-eastern ones and only $4\frac{1}{2}$ feet on the middle of the centre bank. The north-western extremity is separated from a projecting horn, extending from the shore mud flat, at 2 miles S.S.E. of Pulo Dahun, by a narrow channel of 6 fathoms.

Gadong peak, in line with Toboe Ali fort, bearing N.E. $\frac{1}{2}$ N., clears the south-eastern part of the bank, in $4\frac{1}{2}$ fathoms, to the southward; Dapur island, S.E. by E. $\frac{3}{4}$ E. to the westward; and the Mamelon or Hummock kept open to the westward of Pulo Besar, N.W. $\frac{3}{4}$ N., clears the west side of the north-west extremity of the above banks.

There is a small bank of sand lying one mile to the westward of the south-east extreme of the Eastern bank, but as a depth of not less than $4\frac{1}{2}$ fathoms was found on it at low water, it is not dangerous to ships passing through.

Inner Channel.—To the eastward of the eastern bank along the coast of Banka, there is an inner channel nearly a mile wide, with from 4 to 6 fathoms water in it, but as it is encumbered with shoals, it is only navigable for small vessels. Dapur island, bearing S.E. by E. leads nearly mid-channel.

There are also two outlets in the main channel over the eastern bank, in 5 and 4 fathoms; the former with Pulo Dahun, bearing N.N.E.; the latter and southern outlet, when Pulo Puni and Gosong point are in line, E. $\frac{1}{2}$ N.

Nemesis Bank, lying nearly mid-channel between Pudi and False First points, is a long ridge of sand extending 9 miles in a N.W. by W. and S.E. by E. direction, with irregular soundings of from 3 to 10 fathoms on it. The shoalest part consists of two patches of 3 fathoms, about 2 cables each in extent, on one of which the French frigate *Nemesis* grounded. They lie E.S.E. and W.N.W. from each other, distant $\frac{1}{2}$ a mile, and from the western patch Lalarie point bears N.N.W. $\frac{3}{4}$ W., $4\frac{1}{2}$ miles,—and False First point S.S.W. $\frac{3}{4}$ W., $4\frac{1}{2}$ miles.

Casuarina point kept open of Lalarie point bearing N. by W. $\frac{3}{4}$ W. leads to the westward of these shoal patches, in 14 fathoms water; the Mamelon or Hummock N. by E. $\frac{1}{2}$ E., or False First point S.W. $\frac{1}{2}$ S., leads to the eastward: whilst Lalarie point bearing N.W. $\frac{1}{2}$ N. clears them to the northward. There is another patch of 5 fathoms lying 2 miles from the south-east extreme of the bank, with False First point W. $\frac{1}{4}$ S. and First point S. by W. $\frac{1}{4}$ W., distant $3\frac{1}{2}$ miles.

Making the Land.—Vessels from the southward intending to proceed into Banka strait by the Stanton channel cannot fail in approaching the coast of Banka to recognise the mountain of St. Paul by its flattish top, having several nipples of nearly the same elevation, and Gadong and Toboe Ali Lama peaks by their conical appearance.

Mount St. Paul rises with a gradual acclivity on its south-eastern shoulder to a peak 990 feet in height, with two others adjoining, of nearly the same elevation, the western peak terminating rather abruptly to a lower spur in the direction of Gadong hill.

When to the westward of Puni island, owing to a projecting spur from the middle peak, the eastern peak of St. Paul is hidden, and the western one then appears the highest, and forms, with the north-west brow, a saddle hill.

Gadong is a pyramidal peaked hill, and its summit attains an elevation of 593 feet.

Toboe Ali Lama.—The peak of this hill is less elevated, but similar in shape to that of Gadong. It rises to 512 feet above the level of the sea, and, owing to the land contiguous to the above hills being low, they appear as islands at a distance over 15 miles.

Mount Pedang.—Should the weather be clear, the distant high range of Pedang will be visible. The highest peak of this range is quoin shaped, attaining from its western shoulder an elevation of 2217 feet, with several lower hills of a rounder and more conical appearance adjoining, the two westernmost being about 1200 and 1400 feet high.

Dapur Islands.*—On a nearer approach to Banka, the two small Dapur islands will be seen. At low water they are connected by rocks; and a coral sandy beach extends from the southern and highest, which very much resembles a shoe in appearance, and is 120 feet high. Between it and Baginda point, which has a small round hill over it, the land (with the exception of some hillocks nearly midway) is low, and, as it will be found throughout the whole of Banka strait, entirely covered with trees, with mud banks extending some distance from the shores.

There is a narrow channel, $\frac{1}{2}$ a mile wide, between the Dapur islands and Dapur point; from thence to Nangka† point, there are several white rocks lying inside the mud flat close to the shore.

Nangka Point may easily be distinguished by a round hillock, 264 feet high; and the receding land forming Toboe Ali bay, the shore of which is low, and fringed at high water with sandy beaches inside the mud flat, which here extends 2 miles off the land.

Toboe Ali Fort, with its red-roofed barracks, stands upon a low mound 40 feet in height, at the left point of the entrance of a small river, on the banks of which is the village of Sabang, situated close to the fort, and containing a mixed population of 600 Malays and Chinese. At low water the river dries to 3 cables from its mouth. No supplies of any description can be procured but water and wood; the former may be obtained at the above river, or at a small stream $\frac{1}{2}$ a mile to the eastward of it, from half flood to half ebb. A Dutch Administrator and a Captain, with a small military force, garrison the fort.

Anchorage.—The anchorage off Toboe Ali Fort is in 4 fathoms (mud,) with Toboe Ali Lama peak bearing S.E. by E. $\frac{1}{2}$ E., and Gadong peak in line with Toboe Ali fort N.E. $\frac{1}{2}$ N.; smaller vessels may approach on this bearing nearer the shore as the soundings decrease regularly. In southerly and south-westerly winds there is a heavy swell here which makes the landing difficult.

Toboe Ali Point has several white rocks near it, and a conspicuous tree on its summit, which is 213 feet in height, and visible 14 miles off.

Gosong Point.—From Toboe Ali point the land forms a deep bay with low mangrove trees to Gosong point, where a small stream disembogues into the sea.

From Gosong to Laboh‡ points the land is more elevated,—the highest part, 250 feet in height, with rocky points and sandy beaches, between which are numerous rocks close to the shore.

Pani Island, lying midway between these points, is 47 feet in height and conspicuous from the white granite rocks forming its base, and other rocks of a similar appearance near it.

Laboh Point from the south-east presents rather a shelving appearance, with

* Dapur, Cooking place. Prahus in passing generally land to catch turtle, as it is the only place in Banka strait that they are seen.

† Nangka, the jack fruit (*artocarpus integrifolia*).

‡ More probably Labuh-an, Anchorage.

large white rocks extending from it, which when seen from the westward, have the appearance of a village, from the contrast they offer to the green verdure of the point. Prahus frequently anchor here.

Parmassang Range.—A vessel having proceeded thus far, the high range of Parmassang will be visible, rising from a gradual slope on its western shoulder to a flat top peak, with two lower ones adjoining. The three hills of Banka, Panjang, and Wooded will also be seen; the two former may be known by their wedge shape, and the latter by its isolated position.

The shores of the coast from Laboh to Dahun points are low, and covered with mangroves; there is a range of hillocks parallel to the coast, the highest of which is 230 feet in height. There are also several small rivers; and close to the coast, at 2 miles N.W. $\frac{1}{2}$ W. of Laboh point, a remarkable square tree, 167 feet high, which is very conspicuous, there being no others of the same elevation near it; in clear weather it may be seen 12 miles off, closely resembling a ship under sail.

Dahun Point.—At this point the land attains a greater elevation, faced with sandy beaches and rocky points; at $4\frac{1}{2}$ miles to the N.N.E. $\frac{1}{4}$ E. of the point is a round hill, named Wooded, 315 feet in height, and very conspicuous from the high trees on it, and from there being no other hills near.

The cluster of rocks lying to the westward of Dahun point, are nearly all, with the exception of Pulo Dahun, covered at high water. The latter is 30 feet in height, and remarkable by its having a solitary tree on it,—whence its name Dahun, in Malay meaning leaf or bough.

Panjang Hill (or Long hill) rises close to the coast between Dahun and Banka points. When seen from the south-east it shows (as already stated,) as a wedge, with its greatest elevation, 316 feet, on its eastern end. From the north-west it appears as a long hill rising to a peak near its centre, with a conspicuous gap between the trees. A stream of fresh water runs close to the north side of this hill, and the coast between it and Pulo Besar is low, and covered with mangroves, off which there are several ledges of rocks.

Pulo Besar is nearly connected with Banka point by rocks. Although its name in Malay signifies large, it must be so in comparison with Pulo Dahun, it being only 3 cables long, and 63 feet high.

Banka Point and Hill.—The land to the westward of this point recedes into a bay; the point is about the same elevation as Pulo Besar, but at $1\frac{1}{2}$ miles to the northward it rises to Banka hill, which from the south-east appears of similar shape to Panjang hill, but differs in having the highest part on its western extremity. From the north-west it shows with a flat top, having three clumps of trees on its summit, the whole height being 256 feet.

Lalarie or Lang-kong Point is 68 feet in height, and the perpendicular aspect of the trees on it, gives the point on all bearings a bold bluff appearance.

Casuarina Point, so called from a number of Casuarina trees on it, is nearly midway between Lalarie and Brame points. The coast between is low, with sandy beaches at high water; several hills, from 300 to 400 feet high, rise at 3 to 4 miles inland.

Brame Point is a termination of a spur from the Parmassang range, with a conical peak of 505 feet over it showing very prominently both from the northward and southward.

Tambaga Rocks (or Copper rocks,) so called from their reddish colour, are a group of three small rocks, lying east and west of each other, about a cable in extent. The highest and western rock is 4 feet above high water, and from it Second point bears W. $\frac{1}{4}$ N. $5\frac{1}{2}$ miles, and Brame point N. by E. 3 miles. Shoal water, about $\frac{1}{2}$ a mile in breadth, extends nearly $\frac{1}{2}$ a mile to the northward, and $2\frac{1}{2}$ miles to the southward, and forms, with the shore and bank of Banka, a channel $\frac{2}{3}$ of a mile wide.

Water may be procured at a stream about $\frac{1}{2}$ a mile to the northward of the Tambaga rocks, from half flood to half ebb, after which the mud prevents a boat approaching near.

Mintok Bank.—There is less water on this bank than the depth given on the Dutch chart, having near its south-east extreme a depth of only 2 fathoms at low water. A *temporary* triangular *beacon* of wood has recently been placed on the Hodji and on the Brom Brom rocks.

Frederik Hendrik Rocks.—A *red buoy*, surmounted by a staff, and the letters F.H. on a vane, is moored in 13 fathoms water at $3\frac{1}{2}$ cables to the S.E. of this shoal, and is visible about 3 miles off. From it Bata-karang point bears W. by S., Monopin hill E. by S., and Kalian point S.E. by E. $\frac{1}{2}$ E., but as the buoy from the strong tides frequently shifts its position, vessels are cautioned not to place too much dependence on it; do not approach the westward side of the shoal under a depth of 14 fathoms.

Tides.—In the S.E. monsoon it is high water, full and change at Toboe Ali point, on the Banka shore, at 8.30 P.M. The ordinary rise at springs is $10\frac{1}{2}$ feet, but it sometimes reaches to 12 feet. The highest tide generally occurs two days after full and change. The rate at springs is $2\frac{1}{2}$ knots. The flood stream sets to the N.W. and runs for about 12 hours, and the ebb the same period in the opposite direction, but they are both sometimes influenced by the strength of the monsoon. When it is blowing strong from the S.E., the flood stream often runs for 14 hours.

At Laboh point it is high water, full and change, at 11 P.M., and the rise is 10 feet at ordinary springs.

After rounding Lalarie point in the S.E. monsoon, the flood sets N.N.W., and the ebb to the S.S.E. along the Banka shore.

The time of high water at Laboh point being $2\frac{1}{2}$ hours later than at Toboe Ali point, in the southern part of the Stanton channel, for a few days after full and change the tides will be found (as there is generally 12 hours flow and ebb) to run in one direction all night, and the opposite direction during the day, with a velocity of from $2\frac{1}{2}$ to 3 knots. The current also setting directly mid-channel, the flood N.W. by W. and the ebb S.E. by E., vessels may take advantage of it in light airs to drop through.

In the N.W. monsoon it is high water, full and change, at the Nangka islands at 7 A.M., and the rise is about $9\frac{1}{2}$ feet. At Kalian point, near Mintok, it is high water at 8.17 A.M., and the rise is $12\frac{1}{2}$ feet. Many eddies and small races will be

met with in the vicinity of the Nangka islands; they are caused by the tidal flood wave from the China Sea, meeting the flood from the southward.

Between Bata-karang and Fourth points, the ordinary current in Banka strait after heavy rains is considerably accelerated and diverted in the direction of Kalian point, until it nearly reaches mid-channel, by the freshes from the many rivers in this vicinity. Vessels sometimes take advantage of this to complete water, as it is frequently quite fresh on the surface. In the N.W. monsoon there will always be found a current setting to the south-eastward, following the trendings of the bank along the Sumatra coast, whilst, on the Banka shore more regular tides will be met with.

Sung-el Soengsang or Palembang river.—Since the survey of the north-west part of Banka strait in 1860, a deeper and more direct entrance to the main channel of this river has been formed, carrying 9 feet at low, or 22 feet at high water springs.

This new entrance is marked with beacon poles, similar to those in the old passage, but as, on account of the many floating trees and strong freshes, they will probably not remain long in their position, a vessel of large draught may safely enter at high water by bringing the trees forming the west point of the river entrance S. by W. $\frac{1}{2}$ W., and running for them on that bearing until Pulo Payong (Umbrella island) bears South; then steer for the island, but take care in approaching it to keep close to the eastern bank of the river, to avoid the spit extending 2 miles off its north end. If a pilot is required one may be obtained at Kampong Soengsang, the small village on the left bank, but there is no channel available for ships on the west side of Payong.

This branch of the Soengsang at its entrance is upwards of a mile wide, but within the navigable channel is contracted in some places to a cable by the different islands and banks, until close up to the town of Palembang when the river widens to $\frac{3}{4}$ of a mile with 5 and 6 fathoms close to the shore.

Vessels can navigate the whole length of the river, up to the town, by keeping close to the right bank; but those of large draught are recommended, when passing Pulo Singris and the bank off Kampong Maya, to keep near the opposite shore. Both sides of the river are wooded, and on nearly all the isolated banks there are small trees, and on others fishing stakes, consequently there will not be much difficulty in avoiding them.

Palembang, one of the largest Malay towns in the Archipelago, and the largest in Sumatra, derives its name from the many bridges across the numerous creeks that intersect it. A Dutch resident and other officials reside here, and to support their authority there is a military force consisting of one European and two native companies. The total number of Europeans in the town is 109, and by the last census the native population consisted of 45,000 Malays, 4,000 Chinese, and 1,000 Arabs. The climate in the vicinity is considered so salubrious that convalescent soldiers are sent here from Banka.

Near the extreme end of the town, commanding the mouth of the Ogan river, is a substantially built fort. It is a square enclosure of masonry, with walls

8 feet thick, about 50 feet high, loop-holed, and at each angle a circular bastion mounting 8 guns in casement embrasures. The fort could easily accommodate 1,500 men, and is surrounded outside with strong wooden palisades, a thick bamboo hedge, and a ditch 20 feet broad. The fort is in Lat. $2^{\circ} 59\frac{1}{2}'$ S. There are several smaller forts some distance up the river.

Covered prahus (called bedahs) daily arrive from the interior laden with large supplies of cotton for exportation. This useful article grows quite wild some distance up the river, in some places close to the stream and covering many miles of land. The greater portion of it is sent to Batavia. The total quantity exported this season is estimated at 1,735,500 lbs.

All the necessities of life are here found in abundance. The country abounds in large game, deer, wild pigs, &c. The river swarms with fish. Beef, fruit, vegetables, &c., are cheap and plentiful. Foreign vessels are not permitted to trade, and Dutch European vessels are not allowed to enter the river unless under special circumstances. The export trade, consisting principally of pepper, rattans, cotton, honey, dye woods, and gutta percha, is confined to 13 European built ships, and numerous country craft, all owned by wealthy natives.

From November to March rains prevail, and the wind varies from N.W. to N.E. At this period vessels belonging to Palembang either remain in port or trade to other places, as it is almost impossible for sailing vessels at this period to make any progress up the river, against the freshes. During a stay of five days off the town in January, the influence of the flood was not once felt. The ebb slackened during the day, but at night it often ran 5 knots. After much rain the freshes out of the river are felt in Mintok bay.

Lestpara Island.—All the trees on the peak of this island, with the exception of a solitary one in the centre, have been cut down. There will be no difference in the elevation of the island, as this tree is the highest, but instead of rising to a peak as it formerly did, the summit presents a ragged appearance, and in making the land there will be more difficulty in distinguishing it from the trees on the flat coast of Sumatra.

Pulo Taya rises to a double peak 630 feet above the sea. The northern peak is about 60 feet less in elevation, and both peaks being in line on a N. by E. and S. by W. bearing, they then show as a single triangular peak; there are two small islets off its north-east side. The whole shore of the island is steep, and may be approached to 3 cables.

The island is uninhabited, of granite formation, and covered with wood. Two sandy bays are formed in the bight between the hills. There is a spring of excellent water on the western side of the island, and a boat at high water can approach to 40 feet, but at low tide rocks extend nearly a cable from the sand. The knowledge of this is most important to the mariner, as no similar facility for water occurs between Banka and Rhio strait. In the fine season boats come here from Linga seeking turtle.

Castor Bank is a long ridge of coral and sand, nearly a mile wide, and 13 miles long in a N.N.E. direction. The general depths on it are 10 to 6 fathoms, but on one part, N.E. $\frac{1}{4}$ N. 10 miles from Pulo Taya, there is a ridge about

a mile in extent, and its eastern side steep-to, carrying only 5 fathoms. The bank is famous for a red species of fish, called from their colour *Ikan Merah*.

The Cowman bank, said to lie $6\frac{1}{2}$ miles N.E. by N. of the Castor, was searched for in vain. The Dutch have also made several ineffectual attempts to find it, and the bank is erased from their charts. Neither do the fishermen of Linga believe in its existence.

The *Saracen* anchored on the supposed position of Smith bank, S. $\frac{1}{2}$ E. 20 miles from Pulo Taya, and sounded in every direction, 10 miles north, 4 miles south, and 5 miles east and west. The soundings were regular, from 7 to 9 fathoms, mud bottom, and gave no indications of the existence of a bank.

The blank space on the chart off the Sumatra coast, south of Tanjong Bon, was partly sounded. A bank of 4 fathoms was found with Tanjong Bon, bearing N.W. by W., distant 9 miles; a depth of 6 fathoms also nearer the shore. It is probably a projecting horn or spit extending from the mud flat, and as shoaler soundings may be found, vessels bound to Brahalla strait should keep 5 miles off shore until Tanjong Bon bears west.

Linga Island.—Numerous hillocks from 200 to 300 feet high form the east side of this island, and give the coast a uniform appearance. The peak of Pulo Rodong, resembling a haystack in appearance, 724 feet high; the mountain of Linga, with its high split peak, 3921 feet high, called by HORSBURGH, from the strong resemblance, Asses Ears; the Domino islands and sharp pyramidal peak over the east extreme of Linga, were good objects for fixing the soundings, which were confined to those above 10 fathoms, as vessels can gain no advantage by keeping close in shore.

The east extreme of Linga, called by the natives Tanjong Eung, from its prominent position and pyramidal peak, 750 feet high, is very conspicuous, and visible in clear weather 30 miles off. Tanjong Roe may be known by a saddle hill, 630 feet high, near it. The southern coast of Linga, between these points and between Tanjong Roe and Linga river, being low, both points make like islands when above 13 miles distant.

Linga Road.—The *Saracen* anchored in this road in 4 fathoms, mud, Pulo Badas bearing N.N.E. $\frac{1}{2}$ a mile,—Sinkep peak, 1440 feet high, S.S.W.,—and Ponoebo peak, 955 feet high, W. $\frac{1}{2}$ S. Pulo Badas is connected by a reef to a larger island, with a grove of cocoa-nut trees on it, called by the natives Pulo Mapar. The village here contains about 300 Malays and Chinese, chiefly fishermen.

Good water was obtained, but with difficulty, from a well in the interior of the island. It was at first procured from a well near the village, but the natives, from religious scruples, objected to its use. The shore is bordered by a reef, which makes watering difficult, except from half flood to half ebb.

The town of Linga, called by the natives Dyak, is prettily situated on the banks, and nearly a mile within the entrance of the fresh water river marked on the chart. The high, rugged, fantastic peak of Linga in the background, together with the rakish appearance of the country prahus, all moored to cocoa-nut trees and areca palms, their rich foliage almost obscuring the houses, give to the whole a picturesque appearance. The river is not more than 100 feet wide, and will

only admit small vessels, as its bar dries at low water springs. Both sides near the entrance are densely wooded, and alligators are numerous.

The town is said to contain about 4000 Malays and 1500 Chinese. The former prefer their usual style of houses constructed on poles, but the Chinese have substantial buildings of stone. The produce is rattans, pepper, and gambier, which is carried to Singapore and Rhio by country vessels and prahus. Gold is found in small quantities after heavy rains. Tin has not yet been found, but the neighbouring island of Sinkep produces some. There are no Europeans on the island. The Sultan is nominally under Dutch protection, and the resident of Rhio pays him an annual visit.

Tides.—In Linga road it is high water, full and change, at 7 p.m., and the rise is 7 feet. The flood runs at the rate of 2 knots to the westward.

Tides.—During the shifting months of the Monsoons the tidal streams are regular, but during their strength the surface current will always be more or less governed by the wind.

The flood tidal wave comes from the northward, and runs nearly parallel to the east coast of Bintang, along its southern side towards Abang strait, and to the northward in Rhio strait, meeting another tide from Singapore strait near the town of Rhio.

The flood sets to the southward along the east coast of Linga, and close to Tanjong Eung, its south-east extreme; from thence it runs west to Ponoobo strait, and obliquely across Linga bay to Brahalla strait. From Tanjong Eung to Pulo Taya, and onwards to Banka strait, its direction is nearly south; another stream from about 2 miles south of Taya sets towards Brahalla strait.

The ebb stream sets in the opposite direction, and the meeting of this stream from Banka and Brahalla strait was observed to take place near the supposed position of Smith bank.

Winds.—During the shifting months of the S.E. Monsoon, sailing-vessels are often 5 and 6 weeks in making the passage from Singapore to Banka strait. In the month of September, the *Saracen* had the S.E. Monsoon strong, with much rain; about the equinox there were several heavy squalls. This Monsoon is generally supposed to shift about the beginning of October, but during the whole of this month the wind was only 4 hours from the northward, there being a succession of calms, light southerly airs, a close muggy atmosphere surcharged with electricity, and frequent heavy Sumatra squalls or south-westers. On the 9th of November the Monsoon shifted with furious gusts.

These squalls at this season generally take place at night, accompanied with heavy rain, thunder and lightning. They are of short duration, and it was noticed that when one occurs about the time of full and change, another may be expected an hour later every night till the next change of the moon.

RHIO STRAIT.

Rhio Strait.—In this strait, owing to the similarity in the appearance of the coast, which is covered with trees, it is extremely difficult for a stranger, especially

in thick weather, to recognize the different points and islands. The following brief observations, taken in the *Saracen's* passage through from Singapore, may therefore be found useful.

The ebb from Singapore meets the flood setting through Rhio strait about the Pan shoals; vessels therefore weighing at high water from Singapore will carry a fair tide through both straits.

The Governor's house at Singapore bearing West, leads 2 miles south of Johore shoals; and Johore hill, North, leads east. Entering Rhio strait, pass eastward of Pan shoals, and to do so, be careful not to bring Johore hill north of N.N.W. $\frac{1}{2}$ W. until Barbukit hill bears N. $\frac{1}{2}$ W. The above hills bear a slight resemblance to each other, being of the same height, and of a pyramidal shape. Barbukit may be recognised by the low land adjoining it; Johore terminates abruptly to the point forming east entrance of Tambuk strait.

Pulo Skeree, on east side of entrance of Rhio strait, is of an oblong form, about 80 feet high, and will be recognised by the coast near it receding to the north-east, in the direction of Subong river.

Maling Jarong are a group of flat rocks, extending nearly a mile off shore, with a single clump of trees upon them. Detached rocks will be seen at low water nearly to West point, which presents a round, shelving appearance, and may be approached nearer than the land northward of it.

Pulo Bato, fronting the bay between West and Bato points, lies nearly north and south, and with the exception of a round lump, which rises in its centre, is lower than the adjacent land. There is deep water in the bay between it and the shore, but its south end is nearly connected with rocks to Bato point. Vessels occasionally anchor off its northern end. At Bato point the land recedes abruptly to the eastward.

Loban Islands, lying south of Bato point, may be recognised by the gradual rise the largest island takes from its north end to a round hummock in the centre, which with the islet off its west end, Loban Kitjel or Little Loban, present, to vessels approaching them from the westward, the appearance of three distinct hills.

Between these islands and Bato point are numerous rocks, one of which, named Dessa, is conspicuous from having a solitary tree upon it.

It was too dark to see the *beacon* on Isabella shoals, and the *Saracen* anchored for the night 2 miles S.W. of Tercoli island.

Pulo Tercoli is low, flat, and about 30 feet high, and like the other islands entirely covered with trees. Bintang hill, rising from a broad base, is visible in clear weather throughout the strait. Its flat peak bore when in line with the extremes of Tercoli, N.E. $\frac{1}{2}$ E. and N.E. $\frac{1}{2}$ E.

Pulo Pankel at a distance makes as two distinct round hills; on a nearer approach a sandy beach will be seen at its south end, from which rocks and fishing stakes extend nearly $\frac{1}{2}$ of a mile.

Mobat Islands.—At $2\frac{1}{2}$ miles westward of Pankel is the largest and highest of the two Mobat islands, readily distinguished by its prominent position, and the deep inlets to the west and south. It rises to a round peak, with the greatest

declivity on its west side; whilst the smaller island, or West Mobat, is considerably lower towards its centre.

In the inlet to the southward of these islands are two prominent rocks, bearing a striking resemblance to boats under sail. Great Garras island has a flat summit, terminating with abrupt points. Little Garras, lying off its south-east end, is of a triangular shape.

The **Topies** are a cluster of small round islets and rocks, similar in form and appearance; the northern, 112 feet high, and the southern, about the same height, are the largest of the group. When approaching the latter from the northward, it appears of a crown shape, and in clear weather may be seen 10 miles off.

Alligator Island, off the west end of Pulo Siolon, trends nearly north and south, and its highest part, 162 feet high, is at its northern end. Approaching from the northward, it appears to have a gradual declivity to its southern end; but when abeam, it shows as three round lumps.

Pulo Siolon.—South-west hill, at the south-west end of this island, when seen from the northward, makes with a peaked top about 246 feet high; but when viewed from the southward, it assumes more of a double-peaked hill, terminating to the westward in a point which forms the south-west extreme of Siolon or Apen island.

At 4 miles eastward of South-west hill is Siolon hill, which has a flat table summit, and is remarkable from its being the highest in Siolon island. It rises abruptly from the northward to an elevation of 537 feet, and terminates to the southward in a bluff point, close to which is Segai islet, which is lower than the adjacent land. At a distance of 12 miles to the southward, both Siolon and South-west hills, owing to the land between them being low, appear as islands.

Pulo Talang may be known by a square hillock over its south-east end, which with a sharper peak west of it, forms a saddle. The land from thence to the western end of the island is of nearly the same elevation.

Pulo Dumbo, a small round island, on the west side of entrance of Rhio strait, and to the southward of this, the high conical peak of Rodong, the only hill of this feature in the vicinity, with South-west hill on Siolon, Pulo Talang, and the extreme land to the eastward (Pulo Gin, with a flat peak near its centre) will, at a distance of 14 miles, readily show the approach to Rhio strait, whilst, at a nearer distance, the Topies, Alligator, and other islands, just described, cannot fail to point out the southern extreme.

Hendrik Jan Rock, on which a Dutch ship of that name struck in February 1861, is a dangerous pinnacle, off the South entrance of Talang island nearly awash at low water, and steep-to, having 9 and 10 fathoms close around it. It lies S.E. $\frac{1}{2}$ of a mile from south-east point of Talang, with the summit of South-west hill just shut in by south-west extreme of Talang.

This rock is of small size, and there was great difficulty in finding it. Several other shoal patches were found in the channel between Talang and Pulo Gin; but they all, except the Hendrik Jan, lie out of the track of ships, unless this

channel is mistaken, in thick weather, for the entrance of Rhio. Vessels should give these islands a berth of 2 miles in passing, and not bring Pulo Terobi east of E. $\frac{1}{4}$ N., until South-west hill comes well open of Pulo Talang.

DURIAN STRAIT.

The *Saracen* left Banks strait on 24th December for Singapore, and worked to windward along the Sumatra shore, filling in the soundings and contour of the 3-fathoms line to Tanjong Bon. Here, as was anticipated, a spit of 3 fathoms was found at 10 miles S.E. of this point projecting nearly 3 miles east from the ordinary depth inshore.

During the prevalence of strong northerly winds in the months of December and January, sailing vessels will save much time by adopting the route through Brahalla and Durian straits to Singapore, for here they will have smooth water, good anchorage, and but little tide, whereas on the east side of Linga at this season of the year, there is generally a heavy sea, and a southerly current sometimes running at the rate of 3 knots. In Brahalla strait vessels will also be greatly assisted by the squalls from the Sumatra coast.

Bank off False Durian.—Caution should be used in approaching Durian strait, as a bank of sand and shells, carrying a depth of 3 fathoms, lies 1 mile South from the rocky islet off the east extreme of False Durian. Near the centre of the bank the high peak of Great Durian is just open east of this rocky islet, and False Durian peak bears N.W. $\frac{1}{4}$ W. Vessels from the southward after passing South Brother island should give the south side of False Durian a berth of 4 miles, as other shoals extend nearly this distance on the above bearing.

All these dangers will be avoided by keeping South Passage island, or west end of Little Durian, open east of the rocky islet off east extreme of False Durian; or by not bringing the latter north of N.N.W. until nearly abreast of it, when it may be approached to 2 cables.

Prince Island, on the west side of Durian strait, is a coral formation not much above high water, but having some soil between the rocks. It is covered with trees, and their height being about 100 feet the island has a round and conspicuous appearance. On the eastern side there is a coral ledge, nearly awash at low water, extending 3 cables beyond the trees, and E.S.E. from the south extreme of the island.

DANGERS EASTWARD OF BINTANG.

Panjang Island must be approached with great caution, especially off the north-east point, where rocks extend 1 mile from the shore. On the north-east side of the island the coral reef (which as a rule fringes all the other islands and

east coast of Bintang) is absent, leaving a small sandy bay, where vessels may anchor in 8 or 9 fathoms, about $\frac{1}{2}$ of a mile from the shore. As the bottom in parts of this bay is foul, great care must be taken to keep two rocks, named in the Admiralty charts Bare rocks, open of a small islet with a single tree on it, forming the south extreme of the bay. Wood and water may be procured in this bay, and boats may approach close to the beach at all hours of the tide.

Pulo Ruig or Ragged Island, appropriately named from the irregular appearance of the trees on its summit, is the outer and easternmost island of those off the east coast of Bintang. This island is about the same size and height, 315 feet, as Pulo Borean, and is steep at 3 cables off. There is a coral bank with 3 to 5 fathoms over it, and about 1 mile in extent, with Pulo Ruig bearing E.N.E. distant $5\frac{1}{2}$ miles. Pulo Borean, or Saddle island (from its shape,) bearing S.S.W., clears the eastern side of this reef.

A rocky patch, with 3 fathoms over it, also lies with the Boat rocks, bearing N.W. by W., distant 1 mile.

Raleigh Bank, the position of which is marked in the Admiralty chart as doubtful, with 4 fathoms over it, carries only 2 fathoms over a coral bottom. Pulo Borean, or Saddle island, bears from it W. by N. $\frac{1}{2}$ N., distant 5 miles; and Pulo Ruig N. by E., 11 miles.

The Bank South of Saddle Island, placed in the chart as having 7 and 9 fathoms on it, carries only 2 fathoms over coral and sand. This shoal is nearly a mile in length, and $\frac{1}{2}$ a mile in breadth; from the centre of the shoal Pulo Borean, or Saddle island, bears N.W. $\frac{1}{2}$ N., distant $4\frac{1}{2}$ miles.

Several other knolls with 4 and 5 fathoms over them lie between this shoal and the Geldria bank, of which they are considered to be a continuation; they should be avoided by vessels of heavy draught. Pulo Terobi, the southern islet off Pulo Gin, bearing W. $\frac{1}{2}$ S., clears the south extreme; and the Boat rocks in line with Pulo Borean (Saddle Island) W. by S. $\frac{3}{4}$ S., or Pulo Ruig N.N.W. $\frac{1}{2}$ W., clears the north extreme. No good near marks can be given to clear the eastern side, which is steep-to, but the high peak of Linga bearing S.S.W. $\frac{1}{2}$ W. is a broad and distant clearing mark, and leads over a large bank carrying 7 to 10 fathoms.

Frederick Reef, awash at low springs, consists of two rocks about a cable's length apart, near the middle of a coral bank 3 cables in length north and south, and nearly 2 cables in breadth, having 20 to 22 fathoms all round, except at the north-east side, where irregular soundings from 10 to 13 fathoms extend $\frac{1}{2}$ a mile from it. From the centre of this reef Pulo Ruig, or Ragged island, bears N.W. $\frac{1}{2}$ N., $23\frac{1}{2}$ miles, and Pulo Borean, or Saddle island, W.N.W. $21\frac{1}{2}$ miles.

In the vicinity of this dangerous reef in light winds the discolouration of the water is the only guide, and in fresh breezes it is difficult to distinguish breakers from the swell. Breakers on the reef can only be distinguished when the tide is setting against the wind with a comparatively smooth sea. Off Bintang island at the change of the monsoon in April, the flood runs for 8 hours, and the ebb 6 hours. In June the tides are reversed, consequently a tide against the wind will only take place a few hours each day.

As this most dangerous reef lies in the direct track of vessels, the utmost care

is necessary to avoid it. A vessel will clear it to the eastward by not going into less than 25 fathoms, and to the westward by keeping Gin peak, (a conspicuous hill, 337 feet high,) Gunong Kwas (857 feet high, on Bintang,) and Pulo Boreas well in sight, until the latter bears W. by N. The high peak of Linga island S.S.W. $\frac{1}{2}$ W., or Pulo Ruig bearing from N.N.W. to N.W. by N. will also lead clear.

From a close examination, and soundings having been taken in every direction to the extent of 7 miles eastward, and from 4 miles south of the reef to the Geldria bank, Mr. STANTON is led to believe that this reef is the only danger in that vicinity.

The reef is in Lat. $0^{\circ} 39' 4''$ N., Long. $105^{\circ} 10'$ E., or 41 miles eastward of Great Bintang hill.

Sand Bank South of Pulo Gin.—A bank carrying 7 and 9 fathoms over it lies S.S.E., 16 miles from Pulo Gin. It is 17 miles in length in a N.N.E. and S.S.W. direction, with its eastern side steep. At the northern end of the bank Pulo Ruig bears N.N.W. $\frac{1}{2}$ W., which clears also the Geldria and Frederick reefs. In the N.E. Monsoon much rain and thick weather is experienced, and this bank is a good guide to clear the reefs and will save anchoring in deep water.

Brakit Rock, a cable in length, in a N.W. and S.E. direction, and $\frac{1}{2}$ a cable in breadth, with 2 fathoms over it at low water, lies N.N.E. $\frac{1}{2}$ E., $2\frac{1}{2}$ miles from Tanjong Brakit, the north-east point of Bintang, having 10 to 12 fathoms close to it all round.

At the southern and shoalest part the north extreme of Pulo Sumpat appears in line with the apex of Little Bintang hill S.W. $\frac{1}{2}$ S. A conspicuous double tree on a long hill 4 miles from Tanjong Lokan appears just inside the point bearing S. $\frac{1}{2}$ W. This tree kept well open of Tanjong Lokan clears the eastern side; Pulo Panjang peak S.E. $\frac{1}{2}$ S. will clear both the eastern and northern sides; Barbukit hill, about four times its own breadth open eastward of Horsburgh lighthouse, will also lead a vessel northward; and Little Bintang hill well open north of Pulo Sumpat clears the western side of this rock,

Pulo Sumpat, a small island 178 feet high, will be known by its saddle shape. The four wrecks shown on the chart off Brakit point have disappeared.

The Coast.—Pulo Cocob, forming the eastern side of Brakit point, may be approached within $\frac{1}{2}$ a mile; from thence southward to the Black rock, which is steep-to, the soundings shoal gradually, and the lead is a good guide.

Black Rock may be approached to 2 cables. At nearly 3 miles S.S.E. $\frac{1}{2}$ E. from the Black rock, in a direct line to Pulo Soto or Volcanic island, is a dangerous pinnacle rock awash at low water with 10 and 11 fathoms close to it. By not bringing Black rock to bear northward of W. by N., a vessel will pass well to the northward of it, or keep without the direct line between Volcanic island and Black rock.

Pulo Suto, or Volcanic island, is steep-to on its north side, but a reef of coral extends $\frac{1}{2}$ a mile from its southern extreme.

Tides.—It is high water at full and change at Horsburgh lighthouse at 10h. 10m. p.m.; at Tanjong Brakit at 11h. 0m.; at Pulo Suto at 3h. 40m.; at

Pulo Panjang at 4h. 20m.; at Pulo Borean at 6h. 0m.; and at Pulo Terabi at 1h. 0m. p.m.; and the rise is 9 feet, but on some extraordinary occasions it rises 12 feet.

FORMOSA ISLAND:—SOUTH AND WEST COASTS.

BETWEEN SOUTH CAPE AND TA-KAU-KON.*

South Cape or Nan-Sha in Lat. $21^{\circ} 54'$ N., Long. $120^{\circ} 50'$ E., gradually slopes down from a peculiarly rugged hill, the summit of which is distant 4 miles, and 1,035 feet high. With the exception of a few bare patches which have been burnt, the whole of the cape is thickly wooded. The cape or point is fringed by coral.

South-West Point bearing W. by N., 7 miles from South Cape, is the termination of the Gooswa promontory, an almost level ridge 500 to 600 feet high, which extends 7 miles in a N. by W. direction.

Kwa-Leang Bay formed between the South Cape and South-west point, runs up on the western side to a distance of more than 2 miles. At the head is a white sandy beach, which being under the dark land shows out conspicuously. To the eastward and towards the South Cape are alternate sandy bays and prominent points, three conspicuous black rocks, about 10 feet above high water, lie almost equi-distant from each other, and $\frac{1}{2}$ a mile off shore, they are easily distinguished, and steep-to. On the west side between the points of the bay the depth is 66 fathoms, $1\frac{1}{2}$ miles from the shore. On the eastern side and at the same distance the water is much shoaler, there being only 28 fathoms.

Anchorage.—In the N.E. Monsoon good anchorage will be found anywhere on the north and north-east sides of the bay, in 10 or 12 fathoms, about $\frac{1}{2}$ a mile off shore. The *Dove* anchored on two occasions; on the first at $\frac{1}{2}$ a mile northward of the South cape, and on the second at $\frac{1}{2}$ a mile off the middle sandy bay. In anchoring near the South cape care should be taken as the ebb tide sets with a velocity of 4 knots to seaward and the tide ripple off the point is very heavy.

Caution.—The natives of Kwa-leang bay are hostile to strangers. During the survey the *Dove's* boat was attacked, one man was wounded, and the surveying party narrowly escaped being cut off. It has been, however, reported that Europeans have been kindly treated when in distress.

Gooswa Promontory extends in a N. by W. direction, 7 miles from South-west point. There is little difference in elevation, the southern summit being

* These remarks on the south and west coasts of Formosa (or Taiwan,) between the South Cape and Ta-kau-kon, and between Ka-kaou and Wan-kan,—also on the Formosa banks, are by the officers of the *Dove*, tender to H.M. surveying-vessel *Swallow*.

538 feet high, and the northern 627. The most conspicuous feature is a sand beach in Chim-kong-o bay, a mile north of South-west point. When approaching the promontory from the northward it appears as an island; the shore is steep-to; at 2 miles off there are 200 fathoms water, and at a $\frac{1}{2}$ of a mile, 50 and 60 fathoms.

Lung-Keaon Bay is formed between the north extreme of the Gooswa peninsula, and a sugar-loaf hill (411 feet high) and is 4 miles in extent; from the middle of the bay is a projecting sandy point, with low water rocks extending 2 cables from it. A small walled town stands at the back of the bay about a $\frac{1}{2}$ of a mile from the beach.

To the northward of Gooswa promontory the coast is inhabited by Chinese, the natives living in the mountain and seldom visiting the coast; perpetual warfare is carried on between the two, and whilst surveying the coast the travelling parties of Chinese met with were always armed with gingalls and swords.

Anchorage.—Good anchorage may be found in this bay in from 5 to 10 fathoms during the N.E. Monsoon; with the sandy point bearing N.E., distant $\frac{1}{2}$ of a mile, there is good holding ground, as also midway between the point and the sugar-loaf, in 8 or 9 fathoms.

Le-Liang-Swa is the northern termination of the higher mountains of Formosa, and rises to the height of 2,365 feet. There is but little difference in the elevation of this range through an extent of 5 miles. The highest summit, when seen from the north and west, makes as a pap.

Che-Tong-Ka projects $\frac{1}{2}$ a mile from the foot of the high land, and bears N. by W., 13 miles from Gooswa promontory; the coast is bold and steep-to, the hills descending almost to the water's edge. Vessels can anchor anywhere along the coast in 8 or 9 fathoms, finding good shelter from winds ranging from North round to S.S.E. Two miles north of Che-tong-ka the bold land terminates at the foot of a hill 1,340 feet high, whence the mountain range trends to the N.N.E., and the shore, which is low and level, to the N.W.

Lambay Island is the only island on the west coast of Formosa. Its summit is flat, the most elevated part being 258 feet, this is in Lat. $22^{\circ} 20' 30''$ N., Long. $120^{\circ} 22' 30''$ E. The island is $2\frac{1}{2}$ miles long in a N.E. direction with an average breadth of a mile, its shores are fringed with coral; the northern shore is rugged with a few small sand beaches, the south-eastern has a sand bay $\frac{1}{2}$ a mile in extent near the middle. The most conspicuous point is the north-eastern, which is round, and composed of fine white sand. Houses, inhabited by fishermen, are scattered over the island. No anchorage can be obtained near this island, as within a $\frac{1}{2}$ of a mile there are 30 and 40 fathoms water.

Tang-Kang River has its entrance N.N.E., 7 miles from the north point of Lambay island: at low water there are only 4 feet on the bar, which shoals suddenly from 20 and 30 fathoms. The entrance generally can be distinguished by the junks which are moored on the north bank of the river, as also by a clump of trees which is seen a little distance to the eastward and about 2 miles inland. The town stands on the south side of the river near the entrance, and has about 20,000 inhabitants. The principal export is rice, which is carried in junks of

small size. Between Tang-kang and Lambay is a remarkable depression in the sea bed, being in some places nearly 200 fathoms in depth. Abreast of the river is the only place between Ta-kau-kon and Lung-keau bay where a ship cannot find good anchorage in the N.E. Monsoon.

Hong-Pe-Taou, a rocky point between Ta-kau-kon and Tang-kang, is the termination of the smooth and slightly-rounded Hong-swa, which is 468 feet high. Between the hill and point is a well-marked saddle hill 259 feet high; which, when seen from the north or south, appears as two chimneys. Towards Ta-kau-kon the coast is low and bushy, and is inhabited by fishermen who live in scattered houses. The large lagoon which terminates the harbour of Ta-kau-kon, stretches up to within 2 miles of Hong-swa, leaving only a narrow slip between it and the coast.

Ta-Kau-Kon, the Consular port of Tai-wanfu, is the only harbour on the west coast of Formosa available for vessels of 12 feet draught; the entrance is midway between Saracen's head and Ape hill, and the fair channel is only 200 feet wide. The bar is $\frac{1}{2}$ of a mile off the entrance, and has 10 and 11 feet at low water spring tides. Immediately inside, and facing the entrance, is a sand spit with 7 feet on it at low water, which narrows the harbour to 200 feet, and ships being towed in or out frequently ground on it.

DIRECTIONS.—Vessels making for this port will easily distinguish the entrance. Ape hill, with its flat top, 1,110 feet high, and large white landslip facing to seaward, can be seen in clear weather upwards of 30 miles. To the southward is Saracen's head, appearing as a detached portion, and the small gap between the two is the entrance to the harbour. If obliged to run for the entrance in bad weather, bring it to bear E. by S. $\frac{1}{2}$ S., and run boldly in, keeping the northern shore close aboard. As the rocks are neared, starboard the helm and round the northern head close-to, shooting into a little sandy bay, where a vessel may touch the ground with her forefoot without sustaining any damage, afterwards hauling into a berth, mooring head and stern. Small vessels drawing 8 and 9 feet can run past the moored shipping, keeping the northern head on a West bearing, anchoring in less than 2 fathoms, and veering chain just sufficient to swing clear.

Sugar and rice are the chief exports; barques of 400 tons load to the draught of 12 feet, completing the cargo in the roadstead. The harbour is filled with 14 or 15 vessels. There is a good Chinese pilot, who also supplies catamarans for towing vessels in or out.

COAST BETWEEN KAKAOU AND WANCKAN REEF.

To the northward of Fort Zealandia the coast has no distinguishing feature, the highest bushes and huts being but a few feet above the low level land.

Kakaou, in Lat. 23° 13' N., Long. 120° 3' E., is a temporary fishing village, standing on the north bank of a small and narrow inlet, in the entrance of which there are 8 feet at low water; only boats can enter this inlet, and when blowing a strong monsoon it is attended with difficulty, as the sea breaks the whole way across.

Paw-tay-chui bears from **Ka-kaou** N.N.E. $\frac{1}{2}$ E., distant 11 miles. The coast between is a low narrow strip of land, which is only 4 or 5 feet above high water. The town is a mile from the entrance, the inhabitants of which are piratical, and often bid defiance to the mandarins. The entrance to this small inlet is from the N.N.W., and also difficult of access when the monsoon has any strength. S.S.W. of the town of Paw-tay-chui is the most conspicuous landmark between Wanckan and Kakaou; it is a mound $1\frac{1}{2}$ miles inland, and covered with trees and huts; the native name is Ang-hay-kang. West of this a spit extends for nearly a mile off shore.

From the entrance of Paw-tay-chui the coast stretches in a N. $\frac{1}{2}$ W. direction 6 miles; the trees inland are thicker and more continuous than to the southward, and when seen from that direction the northern extreme appears as a bluff.

Wanckan Reef or Chin-ne-ya is the westernmost part of the island of Formosa. The small sandy patch on the south end, on which a hut is erected, is only 1 or 2 feet above high water, and is in Lat. $23^{\circ} 31' N.$, Long. $120^{\circ} 2' E.$ To the southward at low water the reef dries nearly 2 miles and continuous in a N. by E. direction. S.S.W. from the hut, distant 3 miles, is a patch with only 4 feet on it at low water. The Wanckan reef may be considered the great danger in the Formosa channel, and the Chinese say that there are many junks and ships lost on it during the year. When coming from the north or south there are no land marks to guide the navigator, and the strong tides experienced render a ships' position at all times doubtful. Running parallel with the dry part of the reef, and 3 miles distant, is a long patch, with from 2 to 3 fathoms on it; this in the S.W. Monsoon breaks with great violence. The *Swallow* and *Dove* whilst sounding the channel in September 1864, anchored in 20 fathoms off the reef, and saw nothing but one continuous line of breakers as far as the eye could reach.

Ay-aw Bay, formed by the Wanckan reef and the low opposite shore runs north and south for a distance of 4 miles, and in some places it is 2 miles wide. A narrow channel with 10 feet depth of water can be traced out, which for junks and small vessels affords anchorage and shelter. In the S.W. Monsoon entering the inlet would be attended with almost certain destruction, but in the N.E. Monsoon good shelter can be obtained outside. Sugar is the principal export, which is shipped in junks of about 200 tons burden. This small place has much deteriorated during the last few years.

S. by E. 7 miles from the hut on Wanckan reef, and W.N.W. 4 miles from Paw-tay-chui is a sandy patch with 2 fathoms on it at low water, which must break heavily in the S.W. Monsoon. The depths on the coast are 8 and 9 fathoms at 3 miles West of Kakaou, 9 and 10 fathoms 6 miles off Paw-tay-chui; and 5 miles West of Wanckan reef there are 40 fathoms fine dark sandy bottom.

Tides.—It is high water full and change at Wanckan at 10h. 10m., and springs rise 5 to 6 feet. The tide turns with high and low water by the shore, the flood running $8\frac{1}{2}$ knots, and setting to the N.N.E., the ebb in an opposite direction, and not quite so strong. Between Wanckan and Kakaou the tides do not attain a greater velocity than $1\frac{1}{2}$ to 2 knots, and run parallel to the shore.

REMARKS ON FORMOSA BANKS:—Considering the limiting edges of the Formosa banks to be a depth of 20 fathoms, their northern edge will be in Lat. $23^{\circ} 28' N.$, Long. $118^{\circ} 25' E.$, and their eastern side in the parallel of $23^{\circ} N.$, and Long. $119^{\circ} 15' E.$ The western edge of the bank can scarcely be delineated, as it stretches from the Lamock islands without any marked irregularity in depth. The shoalest part, 5 fathoms, is in Lat. $23^{\circ} 1' N.$, Long. $118^{\circ} 29' E.$ The banks are formed of coarse white sand, with patches or mounds with from 7 to 10 fathoms water on them, these patches lie between the parallels of $22^{\circ} 40'$ and $23^{\circ} 15' N.$, and between the meridians of $118^{\circ} 10'$ and $119^{\circ} E.$ When sailing slowly through the water and sounding, it was frequently found to shoal suddenly from 18 to 8 fathoms, increasing in depth again as rapidly. Heavy overfalls generally indicate these sudden variations in depth. Fish abounds in large quantities; immense shoals were seen in the months of April and May. The current during those two months was generally found setting to the N.E., 1 mile an hour, increasing in strength as the coast of Formosa was approached.

GENERAL REMARKS:—Vessels trading between Ta-kau-kon and the port of Amoy should endeavour to sight Junk island, which is the most southern of the Pescadores; the course between is N.W. and S.E., which leads 10 miles to the northward of the Formosa banks. If making the passage from Amoy, Ape hill will be visible shortly after Junk island is passed, as it can be seen in fine weather upwards of 30 miles. Should the weather be thick, and the ships' position uncertain, the lead can then be relied on. If abreast of Ta-kau-kon, or to the southward, 100 fathoms and upwards will be obtained; if off Tai-wanfu or Kok-si-kon, 70 or 80 fathoms will indicate the position. The nature of the bottom can scarcely be depended on, as it varies from mud to fine dark sand and shells.

Vessels leaving Ta-kou-kon for Amoy in the N.E. Monsoon will gain most ground by working up the Formosa coast, as they are then enabled to stand through the Rover channel, after which, a moderate sailing vessel will be able to fetch Amoy.

Ships making the passage from Hong Kong to Shanghai during the S.W. Monsoon should sail through the Pescadores channel, as the current is steady in strength, seldom running more than a mile an hour, and the channel, compared with that of Formosa, is free from danger. Vessels from Hong Kong, bound to the northern ports, in the latter part of the N.E. Monsoon, with the intention of beating up east of Formosa, will sometimes meet with a south-easterly breeze off the South cape; should this happen it will be prudent to run up the west coast, taking care, after passing Ta-kau-kon, to sight the Pescadores, which will insure clearing the Wanckan reef.

ON THE PASSAGE THROUGH TORRES STRAITS.

[The best directions for the route through Torres strait will probably be the description given by two well-known and experienced shipmasters.]

Captain CHARLES HARROLD, writing to the *Mercantile Marine Magazine*, June 1860, says:—"Having made the passage from Australia to India through Torres straits upwards of a dozen times, and hence having had considerable experience of this route, probably the following remarks may prove acceptable to those commanders who have not been through before.

A ship leaving Sydney early in the season, from the beginning of April to the middle of May, should at once get an offing; later in the season (and with strong westerly winds) it is better to keep the land on board as far as Solitary isle or mount Warning; but should the wind veer to the southward with a rising glass, shape a course at once to pass 40 or 50 miles to the eastward of Cato bank; steering on a northerly course, keeping at least a degree to the eastward of Kenn reef, after passing which, a north-westerly course may be pursued, taking care to give the Alert and Lihou reefs a good berth of 50 or 60 miles. After leaving these dangers, there is nothing on the track to the Great Barrier;—the Osprey reef, and some others to the south-eastward are quite out of the way, and a ship has no occasion to go near them.

In approaching the Great Barrier, considerable care is necessary, if no observations for latitude have been taken; and an allowance must be made for the north-westerly set, so as not to get to the northward of Raine island *beacon*. The plan I always adopted was—*not* to run down on the Barrier and work to windward all night, but should the ship be upwards of 200 miles off at noon, and not be able to enter the next day, I would reduce sail at once and steer slowly on a course from 2 to 5 knots, according to distance, so as to reach within 30 miles of the Great Detached reef by the second morning, at daylight. Should no observations for latitude have been taken (or whether or no,) when breakers are sighted from the masthead, ahead of the ship or a little on the port bow, as you draw towards the reefs, or should you see them on the starboard bow as far as can be seen from the masthead, you may be sure you are to the northward, and should haul up immediately on the port tack; and if the wind is far enough to the eastward to lay along the reef, you will soon see clear water, and sight the *beacon* from the masthead; or should it be the Great Detached reef that you sight, clear water will be seen on the starboard bow, and by edging to the W.N.W. you will shortly see the *beacon*. I have always found this a good guide for Raine's island, for if you get too far down towards the reef before you find out your mistake, you will have great difficulty in working to windward. Should you be to the southward, which will rarely happen when steering for the Great Detached reef, you will be sure to see Yule's reef, and could then take Stead's passage, which, however, is not very easy to make.

After making the *beacon* and steering down with it, a little on the starboard bow, the edge of the Great Detached reef will be distinctly seen, also the reef off Raine's island; when the *beacon* bears north, haul up S.W. by W.; after a few

miles a very small sand bank will be visible from the masthead, on the starboard bow, and if you see it distinctly from the deck of a small vessel you are falling to leeward, and should haul up more to the southward. This is one place, I think, that should have a mast with a sort of basket-top placed on it as a beacon; it would be a good guide for ships entering late in the afternoon; for, after passing this, you are near the edge of soundings, and with night coming on, after getting on soundings, you should haul well to the southward and bring up at dark, taking care to give at least 60 or 70 fathoms of cable, as the holding ground is very bad (hard coral.) From this anchorage keep well to windward of the course until you sight either Ashmore banks or Middle banks. Ashmore banks show much higher out of the water and whiter than the Middle banks, which latter are at high water nearly covered; this also would be an excellent place for a mast-beacon. If there is sufficient daylight to reach Ashmore banks or under the lee of Cockburn reef, a better anchorage may be obtained. Or if it should be blowing a gale with squally weather, good anchorage in smooth water may be obtained under the lee of Sir Charles Hardy's isles; in going in, keep close to the weather island and anchor well to windward in a small sandy bay,—by so doing you will be in a better position for weighing in the morning. In anchoring here one voyage the chain fouled on the windlass, and before the other anchor was let go we were mid-channel. Next morning the tide would not let the ship cant any other way than head to the northward, the topsails were single reefed and yards hoisted to the masthead before we commenced heaving; the ship broke ground with the 15-fathom shackle in the hawse, and before we got the anchor off the ground and sail made we were close down on the leeward island, and only cleared it by scarcely a stones throw. In coming out from here you will have to keep N.E. by N. for a few miles, and might have to tack should the wind be to the eastward, but you can see the Middle and Ashmore banks quite plainly. If there is sufficient daylight to reach Cockburn reef, it will be found a still better anchorage than under Ashmore bank. It is quite smooth, especially at low water, although you require a good scope of cable, as the ground appears to be hard coral. In weighing from here you will soon see the edge of the reef that stretches to the N.W., and you may run down towards it until you can see it distinctly from the deck; then edge away along the reef, and, as you draw towards the end, you will see two sand-banks; the nearest one is small, and probably may be covered at high water, although I have never seen it quite covered, but you will be sure to see it from the fore-yard before you get too close, and very likely before they see it from the masthead. If bound to Bird islands, haul close round the small sand-bank, leaving the large bank on the starboard hand; this bank is high out of the water, with an extensive reef running off the weather side of it, which is also seen distinctly from the deck. This track I prefer to going close round the end of Cockburn reef, and having to haul to the southward. If bound on to Cairncross islands, leave the large bank also on the port hand, and, steering for Hannibal island, reefs V. and W. will be seen, also the Boydong cays; reef V. has a small sand bank on it.

After passing V. and W. reefs, the greatest danger of Torres straits is past, and all sail may be carried down to cape York; or anchor at Cairncross, and the next day, with a fresh breeze, you will get out in good time.

If the wind should be light, and a ship not able to reach cape York or mount Adolphus before dark, anchor close under the lee of a small sandbank at the end of reef X, which is far preferable to Turtle island; but should the night be fine and moonlight, having reached thus far, a ship could run on, and passing Albany isle, anchor round cape York. If rounding this cape in daylight, anchor abreast of two rocky islets, a short distance past the cape, in 7 or 8 fathoms water cape York bearing E. $\frac{1}{2}$ N. and Peaked hill S.S.W.,—this is a very good anchorage and you will be in a position to choose either Prince of Wales passage or Endeavour strait.

If intending to pass through the Prince of Wales channel, (which is as good as buoyed and beacons by the Hammond rock and the Ipili and North-West reefs, with no danger excepting a strong tide), should the wind be light and contrary, after passing the Albany isles steer to pass Ince point one mile off, taking care to avoid rock (a); the north-west reef can be seen from the mast-head a long while before you reach the point; at any rate, should it be hazy or squally, by passing point Ince, close, the North-West reef will be avoided, and Hammond rock will be seen; steer to pass close to, and before reaching it the Ipili reef will be distinctly visible, the rocks on it sticking up above water. Borrow towards the Ipili reef to clear the Sunk reefs; after passing this danger, the last in the straits, Booby island will be seen. Should you intend to anchor, leave the island on your port hand as the reef extends to some distance off the other side. The landing is very bad at low water, but you can pull close to the entrance of the cave at high water. I was once detained from noon till 9 p.m. landing a few casks of water sent by the Government.

If intending to go by Endeavour straits, which is quite safe, after passing Possession isle, you are soon out of the strong tide. I have always passed close to a high rugged island (Entrance island) west of Great Woody isle, as far preferable, and it leads you clear of M'Kenzie and Gibson rocks. My last voyage I towed through with the boat a-head, and shortly after a breeze came from the S.W., and squally, and we worked down within 3 or 4 miles of Red Wallis island, and brought up when the tide turned. Should the weather be fine and clear as you draw abreast of Red Wallis island, a good mark for mid channel is cape Cornwall on with Peaked hill, from which, steer to pass out to the south of Rothsay banks.

For Stead's passage no better directions can be given than those of Captain Towns, written upwards of twenty years ago, and which have, I believe, been printed in Horsburgh's Directory. The other passages to the southward are no doubt very good, but I cannot see the advantage of taking them, unless a good channel were surveyed in-shore towards the Bird islands, without having to go *via* Hardy isles and Cockburn reef. The Black rock, Captain Blackwood says is the best passage, but gives no directions for proceeding after entering.

In conclusion. I again repeat, that in running for the Great Detached reef, 25 to 30 miles is quite close enough to come to it until daylight; for if a ship get to either Ashmore bank, or Cockburn reef the first night, or even only just on soundings, she will reach Cairncross island the next day, and out clear the day following,—and she would not do any better by getting in earlier; she might reach Bird island the first night, but she would have to anchor under cape York

the next, unless she were a very fast ship, and had wind and tide in her favour, —she then *might* get through: but it rarely happens that a ship gets through with once anchoring; and it is certainly not worth the risk of running down close on the barrier for the sake of 12 hours. I have often gone through it in 48 hours, viz.—26 at anchor, and 22 under-weight. I am satisfied, that nearly all the wrecks have taken place through the anxiety of masters to get in early, and thus running down too close on the Barrier: the wrecks inside I attribute to going off the tracks laid down, and running in squally and thick weather. Great improvements might be made by placing a few mast beacons (with basket-tops to distinguish them by) and buoys at various places, rendering the passage by Raine island much easier for a stranger going through the first time.

Captain J. LEEMAN of the barque *Ambrosine* says:—On Thursday the 16th of September 1858, at 1.30 P.M., sighted the breakers on the Great Detached reef in Lat. $11^{\circ} 50'$ S., Long. $144^{\circ} 6'$ E.; saw a large vessel stranded upon it, with only her mizen mast standing. Followed closely the directions of Captain BLACKWOOD, R.N., and ran along the edge of this detached reef, until up with Raine island beacon, then altered the course to S.W. by W. $\frac{1}{4}$ W. 9 miles, and subsequently hauled up S.W. 9 miles, until in 15 fathoms; anchored at 8 P.M.

On Friday morning, saw the Middle bank, and also Ashmore bank; weighed, and soon saw the Sir Charles Hardy islands; then began to look out for the east end of Cockburn reef, and after rounding it steered direct for Cockburn islands (to avoid the shoal patches to the northward) until I made out the northern edge of the reef, 'then steered along it; it showed no break anywhere, but was plainly discernable by the light colour of the water—near its northern pitch, passed the wreck of the *Sir Archibald Campbell*, nearly broken up; watched for the north end of the reef, which runs off very fine, but still easily distinguished (and saw two sand banks ahead), and hauled close round its extreme pitch; steered S.W. for half an hour, about $3\frac{1}{4}$ miles, to avoid the rock marked "*awash at L. W.*," and then bore away for the Bird islands, which were now in sight, passing to the N.E. of them about a mile distant; afterwards followed the track on the chart closely and found it correct in every particular,—passing between Hannibal island and the reef V "*dry at L. W.*" in sight to the eastward; sighting also, to the eastward, Boydong Cays and Halfway island (low reefs with trees on them); continuing on a N.N.W. course, passed between Cairncross island and Bushy island, in a safe channel; afterwards steered N.W. by N. towards Turtle island, but dusk coming on before we reached it, anchored in 12 fathoms, about 5 miles from the main land, with some "*remarkable red cliffs*" bearing west from us, and Tern island in sight, bearing N.W. by N.,—having had the main land of Australia in sight all the way from Cockburn reef. Experienced a strong breeze and short sea; all night at anchor; if not in time to fetch Turtle island before dark, I should always recommend endeavouring to obtain shelter (for an anchorage) under the lee of Cairncross island.

Saturday, 18th, at daylight, commenced heaving, and with much labour purchased the anchor; at 7, weighed and passed Tern island, giving the reefs off

its east end a good berth; sighted Turtle island, and steered for it, keeping a look out for reef X "*with bushes*", but did not see it.

After leaving Turtle island, passed between Mount Adolphus island and Albany rock, and thence by rock marked "a" towards the northern end of Wednesday island, passing it, and leaving the N.W. reef on the starboard hand; on this reef was a large black ship, with a white house on deck, the foremast gone, but the main and mizen mast standing, with mizen royal yard aloft.

Steered close past Hammond rock (about a $\frac{1}{4}$ of a mile off), and then hauled up for some black rocks above water; passed them quite close, and then steered W.S.W $\frac{1}{4}$ W. for Booby island. Brought up under the lee of it, about $\frac{1}{4}$ a mile off, in 9 fathoms, the island bearing S.E.: landed, and in the cave found several casks, some empty, and some with fresh water in them; there were several bags of biscuit and some meat; the meat, I regret to say, was in a state of putridity, and the bread had suffered from age. The post office consisted of a canvass bag, hung on a cask standing on end, screened from the weather by an old tarpauling, which at one time had had the letters "Post Office" painted on it; could see nothing of the book said to be there for entering ship's names, but found several memoranda of shipping which had passed.

Many turtle's eggs were found nearly hatched, the young turtle being fully formed in them and alive. In every hole and corner of the island we found birds' eggs; there must have been many thousands of them, which would of themselves afford means of subsistence to a shipwrecked crew. On the summit of the island a flagstaff had been erected, and a tattered Union-Jack was flying in the breeze. At the little cove which forms the landing place, there was a ship's boat painted black, hauled up, but with a large hole in her bottom, and the oars had been taken away. The only natives seen throughout this passage were on Wednesday island, where they appeared on the beach and waved us to come on shore. At 2 p.m. weighed from under Booby island, just forty-eight hours from entering the strait, only eighteen of which we had been under canvass, having had fine weather and strong breezes the whole time. I am of opinion, that with care and attention, this passage should be as safe as any in the world, the survey and the charts are beautifully correct, and reflect great credit on the officers who compiled them.

ON THE PASSAGE THROUGH TORRES STRAITS

BY BLIGH'S ENTRANCE.

Captain W. S. CROUDAOK, writing to the *Mercantile Marine Magazine*, October 1864, says:—"As the great N.E. or Bligh's channel of Torres strait is evidently becoming the favorite passage to and from India &c., in preference to the Raine island route, and has already called forth through your pages, as well as elsewhere,

some very excellent articles on its superiority over the latter, I forward the following notes (which were published in the *Sydney Empire*) in reference to the same subject. The comparatively easy navigation of this channel cannot be too widely made known, and I would just observe in passing, that I am quite of the opinion of your correspondent Captain JAMES TURNBULL, of the *Glen Clune*, as well as with many others with whom I have spoken, that the extravagant rates of insurance demanded for vessels navigating Torres strait, might at once be abolished, if ships were bound to adopt the N.E. or Bligh's channel in passing through that strait.

"Left Sydney July 1st, 1860, becalmed 40 miles from the heads for five days; then a nice westerly breeze took us down to the Trades; pursued the new route, as published by Captain Denham, R.N., through the Coral sea, as far as Lat. 18° S., Long. 155° E., from which point, instead of steering for Raine island, we shaped a direct course N.W. $\frac{1}{4}$ W. by compass, to pass midway between the Eastern Fields shoals, and the coast of Guinea, and on the morning of July 17th, at 7 o'clock, we sighted the breakers on East cay, having seen nothing from the above given point of departure, until sighting the cay itself; the weather was very hazy on this run of nearly 700 miles, and the nights very cloudy; we felt little or no current, and the ship made the course good very accurately; we ran down fearlessly until we sighted the cays, never having reduced sail; at 8 A.M. the 17th, we were abreast of Anchor cay, the opening to the great N.E. channel, and having passed it, we hauled up, and by 6 P.M. (same day) we had reached Dove islet, and anchored under the lee of an island (without a name) bearing E. by N. from Dove islet; the next day the weather was very unsettled and squally, with showers; remained at anchor, having been joined by the ship *Storm Cloud*;—on Thursday 19th, at 5 A.M. we both weighed and proceeded for Prince of Wales channel, passing close round Bet rock or islet; and thence close past Ninepin rock. The course from this rock to the entrance of the Prince of Wales channel is S.W. $\frac{1}{4}$ S. by compass, and by reference to the Chart sheet No. 1, Admiralty, latest edition, there appears to be no dangers in the way, with depths of 8 and 9 fathoms. As we neared Double island, and mount Earnest, the look-out from the fore-topsail yard, reported breakers on the starboard bow, and as we approached them, the ship's position was taken as accurately as the opportunity afforded by prismatic compass, and the shoal at the same instant being judged nearly one nautical mile distant, was placed as follows:—A line drawn from the centre of Double island to the centre of mount Earnest, will pass through the centre of the new reef, (now called Campbell reef,) and it is $6\frac{1}{2}$ miles from the former, and $5\frac{1}{2}$ miles from the latter; it appeared to trend S.W. and N.E., about 1 mile long, and very narrow; should say it may have 4 to 6 feet over it when smooth water. It lays much in the track of vessels coming up from the great N.E. channel; reference to the chart above named will show that in the position we have given it, no soundings have been taken. Captain CAMPBELL, of the *Storm Cloud*, who passed it at the same time, assigns the same position to it. Both ships anchored at Booby island at 1.30 P.M., having come from our last anchorage—80 miles—in $7\frac{1}{2}$ hours. For large, or indeed for any ships, I consider the great N.E. channel preferable to the Raine island passage, there being no sunken reefs or dangers, and smooth water anchorages the entire length, with a

bank of soundings as you approach the entrance of the channel; no embarrassment from the glare of the sun, as in the passage from Raine island. As a general rule also, a ship will only require to anchor once, and even that may not always be necessary, for, if taking the channel early, as we did for example, had the wind been more easterly, we should have passed all the narrows before dark, and could then have hove-to until daylight, keeping mount Adolphus in sight, or any of the islands in that locality; but being the syzygy we found the weather unsettled, and the winds far from the south."

EDMUND A. ANKERS writes as follows respecting this passage through Torres Strait.—(see *Mercantile Marine Magazine*, February No., 1865, pp. 45-47.):—The ship *Queen of the East*, under my command, left port Jackson on the 29th June 1864, with horses, bound to Madras, and, although I had never been through Torres strait, I determined to take that route rather than attempt a winter passage round cape Leeuwin in a large ship with the (almost) certainty of losing some of the horses. I accordingly took the ordinary route to the northward, but owing to a succession of very light winds, and four days calm, I did not sight the "Eastern Fields" until the 14th July, and from the same cause did not pass Bramble cay until day-light on the 16th, having passed the north end of Portlock reef on the previous evening. The sea breaks high on both Portlock reef and the Eastern Fields, and they are plainly visible from the mast-head at the distance of 6 or 7 miles in clear weather.

July 16th, at 7 A.M.—Bramble cay bearing north, half a mile distant, Darnley island peak being clearly visible bearing S.S.W., steered a direct course for Stephen island, making due allowance for the tide (the flood setting pretty strong on the weather beam)—the shoal patches northward of Darnley island showing quite plain, being covered with a white sand or ground coral. Carried all sail during the day with studding sails on the port side, the wind being light from E.S.E.; at 3 P.M. the weather thick and squally, the rain at times completely obscuring the land, I anchored in 9 fathoms water, the N.E. end of Stephen island on with the peak of Darnley island, about half a mile off shore, the water smooth, and the holding-ground good.

Sunday, 17th July.—Got under weigh at daylight with a fine breeze from E.S.E. and clear weather. Set all sail and proceeded, giving her all studding sails as we went along, passing south of Dalrymple island, and north of Campbell, Marsden, Rennel, and Arden isles, between Dove and Cocanot islands, and north of the Three Sisters—Bet, Sue, and Poll. The extensive reef running out to the eastward from the northernmost of the sisters (Bet) is steep and free from outlying dangers; I sailed along within a cable's length of it in order to give a good berth to some shoal patches to leeward, which are, however, plainly visible from the mast-head. After rounding Bet, the Ninepin rock and Saddle island can be seen, if the weather be at all clear—the Ninepin being not unlike a vessel under sail; I then passed between the Ninepin and Harvey rocks; it is better to keep close to the Ninepin in order to avoid some shoal patches which lie to the north of Harvey rocks, some portions of which are only awash at low water. I then

steered down for Double island, where I anchored at 11 P.M. in 7 fathoms of water, half a mile off shore.

Monday, 18th July.—Got under weigh at daylight, made all sail and steered down for the Prince of Wales channel, rounding Wednesday spit at the distance of 80 yards, found the tide running like a mill-stream; rounded Hammond rock at 30 yards distance, the eddies so strong that the helm was almost useless. From the top-gallant yard I conned the ship through between Ipilli and Sunk reefs, keeping within 40 yards of the edge of Ipilli reef,—as Sunk reef being covered renders it the more dangerous of the two.

The Prince of Wales channel, which I thought the best, out to the westward, requires very great caution; in passing Hammond rock and Ipilli reef, I feel certain the ship was going over the ground at the rate of 10 knots per hour, the current having such power on the ship that I was compelled to assist the helm by working the sails, although I had a good breeze at the time. I should therefore consider it advisable, especially if the wind be light and baffling, to take the Prince of Wales channel as near slack water as possible, and am of opinion that a Commander would be justified in sacrificing a few hours in order to accomplish that object, especially in a dull sailing or bad steering ship, rather than run the risk of touching on the reefs just as the passage of the strait may be said to be accomplished. I reached Booby island at noon, hove-to, and deposited a few necessaries in the cave for the use of those less fortunate than myself.

After reading some of the records deposited in that cave, I was led to re-examine the comparative merits of the two passages, *i.e.* that by Raine island, and the one I had adopted—by Bligh entrance. For the one by Raine island I was solely dependent for information upon the charts, Horsburgh (1855) and various other sailing directions. By Bligh entrance I had, of course, the benefit of what experience I had gained on my passage, and the result has perfectly satisfied my own mind that I was correct in my former estimate that this entrance is the safest; the great objection urged against it, that of its being so far to leeward, I consider groundless. I carried my studding sails all the way through and have been assured by gentlemen of experience in the command of colonial ships that they have invariably passed through without a tack.

With regard to the inhabitants of the islands, they certainly have anything but a prepossessing appearance; they appear very poor and go perfectly naked. In passing the various islands, which I did at a distance of about a cable's length, I could not perceive anything to indicate cultivation, not even a banana or a stalk of Indian corn; the only signs of animal life were the savages themselves, and occasionally a sea bird standing solitarily on the reefs; the huts were merely a few sticks stuck up, with a covering of leaves or scurvy grass, no sides, and incapable of affording much shelter to the wretched inmates. With regard to their cannibalism I am not in a position to express an opinion, but should imagine it has its existence as much in the imagination as in reality. Two canoes came off to the ship at Double island from which I obtained some good specimens of tortoiseshell in exchange for some tobacco, that being the only word of English the natives appeared to know.

In conclusion, I must express my opinion that with a clear head, a good nerve,

and the aid of the excellent and valuable charts published by the Admiralty, no navigator of ordinary capacity need hesitate to take this passage. Every reef, rock, island, and shoal, being as correctly laid down on those charts as the mile-stones on the Queen's highway.

From Swan River to Singapore.—In both Monsoons adopt the route through Sunda strait, making the land to the eastward in the S.E. Monsoon, but to the westward in the N.W. Monsoon; then pass through Banka strait.

From Singapore to Swan River.—Between November and March, from Singapore strait, proceed S.E.-ward through Carimata strait, and across the Java sea, then through Sapodie and Baly strait. Between April and October, proceed southward through Banka and Sunda straits.

From Swan River to China.—From April to September, shape a nearly direct course for Sunda strait. From October to March, steer for the N.W. cape of Australia, and take the *eastern route* by Allas and Macassar straits in October and November; but by the Ombay and Gillolo passages from the middle of November to the middle of March.

Of the three entrances into the China Sea, that by Stanton channel and Banka strait is unquestionably the safest, considering that both Gaspar and Carimata straits are comparatively unsurveyed,—and this is especially the case when intending to beat against the N.E. Monsoon, or if the weather is variable with calms.

Bound to Singapore vessels will invariably take the Stanton channel and Banka strait, they may then proceed (1) by the *Outer route*—eastward of Linga and Bintang, and making Horsburgh lighthouse enter Singapore strait from the eastward;—or (2) by the *Middle route*, eastward of Linga, and westward of Bintang, through Rhio strait into the middle of Singapore strait;—or (3) by the *Inner route*, westward of Linga, through Varella and Durian straits, past the Raffles lighthouse and entering Singapore strait from the westward. The *Middle route* is generally safe, and having been buoyed and beacons by the Dutch Government is easily navigable; the *Outer route* is exposed in both Monsoons; the *Inner route* is adopted during the N.E. Monsoon.

APPENDIX.

CHINA SEA.

The following information of dangers, in the China and Java seas, discovered during the years 1866-1868, has been published on the authority of the Netherlands Commission for improving and correcting the charts of the Indian Archipelago.

CHINA SEA.—The ship *Scheweningen* struck on an unknown bank in lat. $1^{\circ} 19' 12''$ S., long. $106^{\circ} 39' 48''$ E., about 14 leagues E. by N. from Crassock point, the north extremity of Banka island. Immediately after the ship touched, a sounding of 4 fathoms was obtained, and a second sounding showed a depth of 15 fathoms.

North Coast of Banka.—A reef, with only $7\frac{1}{2}$ feet water, lies about $1\frac{1}{2}$ miles from the shore, and nearly midway between Crassock point and cape Tuen. From the shoal, Crassock point bears W. by N. $\frac{1}{4}$ N., Pulo Pongoh off cape Tuen S.E. $\frac{1}{4}$ S., and Pakoe point S. by E.

Banka Strait.—A rock, with 12 feet over it at low water, lies about 2 cables northward of the Hadjie reef, with Tanjong Bersiap, the eastern point of Banka island, bearing N. $\frac{1}{4}$ E., and Kalian point lighthouse E. $\frac{1}{4}$ N.

Gaspar Strait.—A reef has been discovered lying N.N.W. $3\frac{1}{4}$ miles from the Belvedere rock, also 17 miles distant from Gaspar island, and 28 miles from Brekat point on Banka island. The position given is lat. $2^{\circ} 8' S.$, long. $107^{\circ} 1' 15'' E.$

A reef, with only 6 feet water lies off the northern end of Pulo Leat. From a position $\frac{1}{4}$ of a cable northward of the shoal, the northern point of Pulo Leat bore S.W., and the eastern point of Pulo Anak, or Selagin, S. by E. $\frac{1}{4}$ E.

Karimata Strait.—A reef, situated on the north-east coast of Billiton, and shown as "doubtful" on the charts, has been found to exist. It dries in one spot, and is in lat. $2^{\circ} 37' S.$, long. $108^{\circ} 18' E.$

A bank that dries has been observed off the east coast of Billiton: from the bank Slandak island bears S.W. $\frac{1}{4}$ W., Gantong island W. by S., and Boesong Madau island N.W. $\frac{1}{4}$ W.; the position given is lat. $2^{\circ} 59' S.$, long. $108^{\circ} 21' E.$

A reef, with about 6 or 7 feet water, lies near the assigned but doubtful position of a shoal named Admiral Protet; from it Slandak island bears W. $\frac{1}{4}$ S., and Liendorg, one of the Scharvogel islands, S.S.W.; the position given is lat. $2^{\circ} 59' S.$, long. $108^{\circ} 38' E.$

Greig Shoal.—Careful examination has shown that the position of this danger, off the western coast of Borneo, is lat. $0^{\circ} 55' 30''$ S., long. $108^{\circ} 28' E.$; from the shoal Panambungan island bears E.S.E., and the peak of Karimata island S.S.E. $\frac{3}{4}$ E. The shoal is circular in shape, about $1\frac{1}{4}$ cables in diameter, and has 8 feet water over the shoalest part.

Java Sea.—E. $\frac{1}{2}$ N. from the south point of Peblakan or West island, distant about $3\frac{1}{4}$ miles, is a reef of coral and stone; this reef extends about one cable north and south, and $2\frac{1}{4}$ cables east and west; there is about 4 feet water over the shoalest part, and from 4 to 5 fathoms around the reef; from it the extremes of Rangat island bore N.W. $\frac{1}{4}$ N. and N.W. by N. respectively.

A reef also, on which the sea breaks heavily, extends a distance of about 2 cables (by estimation) from the north and north-east sides of Rangat island.

Careful examination has shown that the Siren bank, to be found on some charts in lat. $5^{\circ} 19' 30''$ S., long. $106^{\circ} 34' 45''$ E., does not exist, and that no danger has been found near the assigned position.

A reef with 15 feet water over it, and 7 to 8 fathoms on its eastern edge, lies about one cable to the southward of the Tambaga rocks in the Sapodie strait. From the reef the Tambaga rocks bear N.W. by W. and N.E. $\frac{1}{4}$ N. respectively; the east point of Giliang or Pondy island N. by E. $\frac{1}{4}$ E., and Sarotak point W. $\frac{3}{4}$ N.

A reef with $4\frac{1}{2}$ fathoms water lies to the north-east of Kangeang island, and S. $\frac{1}{4}$ E. 4 miles from the southern Kalkun or Turkey island. The position given is lat. $6^{\circ} 48' S.$, long. $115^{\circ} 44' E.$

Near the north-east Paternosters, in lat. $6^{\circ} 30' S.$, long. $118^{\circ} 18' 30'' E.$, the water was observed to be discoloured, and a coral reef supposed to exist.

Strait of Macassar.—The Laurel reefs extend from lat. $4^{\circ} 20' S.$ to lat. $4^{\circ} 36' S.$, the shoalest part, with 17 feet water on it, lying near the southern extreme.

The ship *Sea Serpent*, in lat. $3^{\circ} 56' S.$, long. $117^{\circ} 28' E.$, passed over a bank about a $\frac{1}{2}$ mile long, in from 4 to 6 fathoms.

A bank that dries, with a reef extending southward of it for about 1 mile, was discovered in lat. $3^{\circ} 31' 50'' S.$, long. $117^{\circ} 29' 40'' E.$ Careful investigation has shown that the shoals marked on the charts of the Macassar strait, in lat. $3^{\circ} 20' S.$, long. $117^{\circ} 32' 30'' E.$, and lat. $3^{\circ} 50' 10'' S.$, long. $117^{\circ} 45' 15'' E.$, do not exist.

A rocky shoal with 15 feet water on it lies to the north-west of Tanjong Kaniongan, on the coast of Borneo. From this shoal Pulo Kaniongan Kb. bears S.E. $\frac{1}{4}$ S., and the east and west points of Pulo Kaniongan Bz., S. $\frac{3}{4}$ E. and South respectively.

A small detached reef with only 4 feet water, and about 15 square feet in extent, lies in lat. $1^{\circ} 23' 30'' N.$, with Pulo Bilangbilangan bearing N.N.E. $\frac{1}{4}$ E.

Celebes.—A reef, on the eastern edge of which a sounding of 6 feet was obtained, has been discovered near Togeau island in the gulf of Tomini. From the shoal the following bearings were taken, the hill at the western extreme of

little Waleah island N. by W. $\frac{1}{4}$ W., south point of great Waleah island E. by N. $\frac{1}{4}$ N., Teloga island E. $\frac{1}{4}$ S., north point of Pu-ah island E. by S., south point of Pu-ah island E. by S. $\frac{3}{4}$ S., Palala point on Togeian island, W. by S. $\frac{1}{4}$ S., and Toro Batu W. $\frac{3}{4}$ S. Variation 1° Easterly in 1870.

Philippine Islands.—The ship *Wild Rover*, at the western entrance of Basilan strait, in lat. $6^{\circ} 55' N.$, long. $121^{\circ} 43' E.$, passed over a bank on which soundings in from 6 to 10 fathoms were obtained.

The following description of the dangers lying between the Fiery Cross and North danger reefs, in the main route of the China Sea, and of shoals in the Palawan route, as well as some remarks on the Paracel islands, are by Navigating Lieutenant John W. Reed, R.N., Commanding H.M. surveying vessel *Rifleman*, 1867-1869.

Royal Charlotte Reef, somewhat rectangular in form, is $1\frac{1}{2}$ miles in length, N.W. by W. and S.E. by E., and $\frac{7}{8}$ mile in breadth. On its south-eastern side are some stones 2 to 4 feet above high water; the highest of them is in lat. $6^{\circ} 57' 18'' N.$, long. $113^{\circ} 35' 30'' E.$; there are also one or two stones on its north-east edge which just show at high water.

Swallow Reef, formed of a belt of coral surrounding a shallow basin of water, is $3\frac{1}{4}$ miles long, E. $\frac{3}{4}$ N., and W. $\frac{3}{4}$ S., and $1\frac{1}{4}$ miles wide. At its eastern part are some rocks from 5 to 10 feet above high water, the highest of which is in lat. $7^{\circ} 23' N.$, long. $113^{\circ} 50' 23'' E.$; there are also one or two stones on the south-eastern side which show at high water; the west end terminates in a sharp point.

Sandy Island, reported in 1863 by Mr. W. Andrews, master of the barque *Thames*, to be in about lat. $7^{\circ} 20' N.$, long. $114^{\circ} 10' E.$, was looked for in the *Rifleman*. At noon from lat. $7^{\circ} 12' 15'' N.$, long. $114^{\circ} 1' E.$, a course was shaped for the reputed position of the island, and at 2 hours 30 minutes the vessel was in the same latitude and one mile to the eastward of its reputed position; from thence a course was steered for the South Ardasier shoal: no appearance of shoal water could be seen from the vessel on either of these courses, and certainly no island exists within 5 or 6 miles on either side of the lines passed over by the ship.

Ardasier Bank, has only been partially explored, but it is very extensive, and it seems probable that the South Ardasier, Gloucester, and North Ardasier breakers, as also the breakers seen by Mr. Dallas in 1860, will prove to be shoal patches on different parts of one large bank. The south-eastern side, which forms one of the northern limits of the approach to the Palawan passage, has been surveyed in the *Rifleman*; the general direction of this part is N.E. by E. $\frac{1}{4}$ E., and S.W. by W. $\frac{1}{4}$ W. for a distance of 20 miles, but the outline of the edge is very irregular. Several shoal patches of 3 to 5 fathoms were found near the edge, and the shoalest part discovered had but $2\frac{1}{2}$ fathoms over it; this last is in lat. $7^{\circ} 36' 37'' N.$, long. $114^{\circ} 10' 10'' E.$, very close to the position ascribed to the South Ardasier breakers.

Stags Shoal, placed on the charts in lat. $8^{\circ} 24' N.$, long. $112^{\circ} 57' E.$, was

reported in 1802 by Mr. Trinder, commanding the brig *Amboyna*. The following is an extract of his report:—"The north end of the shoal extended S.E. and S.W. in form of a triangle, with rocks above water and breakers in various parts, the intermediate space apparently very shoal, and the southern extremity could not be discerned from the masthead."

The *Rifleman*, from a position 5 miles north of that given above, was steered E.S.E. 12 miles, when she was in the latitude of the shoal, and 11 miles east of it; there no bottom was obtained at 200 fathoms; a west course was then steered for 21 miles, and next a S.E. by E. course until the longitude of the shoal was reached; soundings with 40 fathoms of line were tried for, as quickly as possible on the different courses, and on the spot assigned to the danger bottom, dark ooze was brought up from a depth of 1085 fathoms.

The *Rifleman* had previously passed over the position, and H.M.S. *Reynard* in 1862, also steamed about the locality, and it is certain from the result of these searches that no such shoal exists within 10 miles of the position given above.

The soundings obtained in the *Rifleman* in former years, prove that the shoal does not exist to the westward, and it seems probable that the danger seen from the *Amboyna* was part of the Lizzie Webber or Canada shoal.—25 miles E.S.E. of the position ascribed to the Stags—and this is the more probable from the fact of the *Amboyna* cay being found 11 miles further west than it was reported by Mr. Trinder.

Dhaulie Shoal.—In 1826 the schooner *Dhaulie* anchored at night upon a shoal of 3 fathoms, which, at sunrise the following morning, appeared to be about 1 or 2 miles in circumference. At noon of the preceding day, the vessel passed a mile to the westward of, what was supposed to be, West London reef, and from thence had steered N. by E. $\frac{1}{2}$ E., 43 miles, until she anchored in 3 fathoms on the shoal, which would place it in lat. $9^{\circ} 32' N.$, long. $112^{\circ} 24' E.$

The *Rifleman* was employed a whole day in searching over and about that locality, under the circumstances of a heavy swell and light breeze, which are very favourable for the discovery of shoals in deep water, but no shoal could be found: on the spot, bottom (dark ooze) was brought up from 1060 fathoms.

The London reefs were, until lately, placed upon the charts very much out of their proper positions, and it seems probable that the reef the schooner passed to the westward of was either the East London or the Cuarteron, and that the shoal she anchored upon was one of the shoal patches of the Fiery Cross reef, which is in the same latitude as that ascribed to the Dhaulie shoal.

Discovery Great Reef.—The south end of this danger is in lat. $10^{\circ} 0' 42'' N.$, long. $113^{\circ} 51\frac{1}{2}' E.$, and bears E.N.E., 52 miles from the north-east end of the Fiery Cross reef; it is a long narrow coral reef, the greater part of which dries at low tides, with several large rocks upon it which always show above water; in the centre is a lagoon, which appeared to be shallow, and to have no passage through the reef leading into it. From the south point the reef trends first due North, 5 miles, and then N. by E., 5 miles; it is a mile broad at the south end and $\frac{1}{2}$ mile at the north. No bottom was found at 100 fathoms within a very short distance of any part of the reef except off its north end, where the *Rifleman* anchored in 42 fathoms, nearly $\frac{1}{2}$ mile from the rocks; at $\frac{1}{2}$ mile off the south-west point a sounding of 192 fathoms sand and coral was obtained.

The Hainan fishermen report a reef or shoal lying 10 miles north-eastward of Discovery Great reef, but it has not yet been possible to examine that locality, which should for the present be avoided by seamen.

Discovery Small Reef lies E. $\frac{1}{2}$ N., $9\frac{1}{2}$ miles from Discovery Great reef in lat. $10^{\circ} 14' N.$, long. $114^{\circ} 14' E.$; it is a small round coral patch, $\frac{1}{2}$ mile in diameter, dry in places at low tides, with very deep water all around. Soundings of 174 and 180 fathoms, sand and coral, were obtained very close to its eastern side, and no bottom at 210 fathoms the same distance off the opposite side.

Western or Flora Temple Reef is a very dangerous reef, having patches of rocks just under water at the south-west part, and but 1 to 3 fathoms in other places; its centre, in lat. $10^{\circ} 15' N.$, long. $113^{\circ} 37' E.$, lies N.W. by W. $\frac{1}{4}$ W., $16\frac{1}{2}$ miles from the north-west end of Discovery Great reef, and is the westernmost danger in this part of the China Sea. It is $1\frac{1}{2}$ miles long N.E. and S.W., and rather more than $\frac{1}{2}$ mile broad at the southern part, decreasing to half that breadth at the opposite end. The *Rifleman*, for the purposes of the survey, anchored in 5 fathoms on the north-eastern extreme of the reef, which had to be approached with great caution, as shoal water was seen at a very short distance inside the edge; soundings of 18 to 74 fathoms were had close-to, but at a short distance off, no bottom at 100 fathoms.

The reef upon which the *Flora Temple* was lost in 1859 was said to lie 6 miles north-westward of the Western reef, but the *Rifleman* passed over that position, and certainly no danger exists there; moreover, the description of the reef given at the time of the wreck applies exactly to the Western reef, where, without doubt, the ship was lost.

Doubtful Reef.—The locality of the reef of doubtful existence, placed on the late charts 10 miles north-eastward of Discovery Great reef, was examined in the *Rifleman*, but no sign of shoal water could be discovered. This danger was placed upon the chart from the rather vague report of some fishermen last year, but the master of a junk and other fishermen met with at Itu-Abaer, this present season (1868), deny that any shoal exists there.

Tizard Bank, with Reefs and Islands.—From Discovery Small reef the nearest part of this bank bears N.E. by E., and is distant 16 miles. It is very extensive, and like the generality of the large coral banks in the China Sea, consists of a lagoon bordered by shoal patches. Several of the patches upon the Tizard bank are dangerous reefs, dry at low water, two having an island on them, and a third a sand cay. The bank lies in an E.N.E. and opposite direction, and extends nearly 31 miles; its breadth in the middle being 11 miles, at the south-west part 7 miles, and at the opposite end $3\frac{1}{2}$ miles.

ITU-ABAER, the larger of the two islands, is situated at the north-west corner of the bank, and is $\frac{3}{4}$ of a mile long E. by N. and W. by S., and a $\frac{1}{2}$ of a mile broad. The reef surrounding it extends in some places to the distance of a short $\frac{1}{2}$ mile, and in others not nearly so far, its limits, however, are generally defined by a line of breakers. The island is covered with small trees and high bushes, with numerous nests of sea birds. Two or three cocoa-nut and a few plantain trees stand near a small well, but the most conspicuous object is a single black clump

tree, on the north side of the island, which may be distinctly seen 10 miles off; this tree is in lat. $10^{\circ} 22' 25''$ N., long. $114^{\circ} 21' 45''$ E.

SAND CAY.—A little more than 6 miles, East, from Itu Abaer is a small Sand Cay, nearly in the centre of a round-shaped reef $\frac{1}{4}$ of a mile in diameter. The island and cay are connected by a line of shoal patches, which form the north-east part of the bank; and nearly midway between, but nearer the island, is a dangerous reef, entirely covered at half-tide, about the same size as that surrounding the cay. Elsewhere on the northern edge of the bank there is not less than 4 fathoms, and vessels may safely anchor in from 7 to 11 fathoms about $1\frac{1}{4}$ miles westward of the sand cay, midway between it and the reef just described.

PETLEY REEF, an oval-shaped patch a little over a mile in extent, lies E. by N. $\frac{1}{4}$ N., $5\frac{1}{4}$ miles from Sand Cay; it forms the extremity of a remarkable strip of coral $1\frac{1}{4}$ miles wide, projecting like a horn in a N.N.E. direction from the main body of the bank, the edge of which trends E.S.E. from the cay; no less than 6 fathoms was found upon the strip, except within a mile of the southern part of the reef above-mentioned, where it shoals to 4 and 3 fathoms, and no bottom could be obtained with 100 fathoms of line at a short distance on either side of it.

ELDAD REEF, the north-east end of which is in lat. $10^{\circ} 23' 10''$ N., long. $114^{\circ} 42' 10''$ E., forms the eastern extreme of Tizard bank. It is a peculiar-shaped reef, $4\frac{1}{4}$ miles long, N.N.E. $\frac{1}{4}$ E. and S.S.W. $\frac{1}{4}$ W., the southern and middle parts being about $1\frac{1}{4}$ miles wide, but of irregular outline; and the northern part tapering away in the form of a long narrow tongue, on either side of which no bottom could be obtained with 100 fathoms of line. A few large rocks are visible at high water, and at low water many smaller ones uncover. Shoal patches extend nearly $\frac{1}{4}$ of a mile to the westward of the reef.

NAMYIT ISLAND, lies due South from Itu Abaer, distant $11\frac{1}{4}$ miles; it is very small being but 3 cables long east and west, and one cable broad, and is surrounded by a reef which projects more than a mile to the westward, and about $\frac{1}{2}$ of a mile in other directions.

GAVEN REEFS, are two dangerous reefs, covered at high water, which lie to the westward of Namyit island; the first is oval-shaped; $\frac{1}{4}$ of a mile long N.N.W. and S.S.E.,—the island bearing from it E. $\frac{1}{4}$ N., distant 6 miles; the second is a mile long North and South, and nearly $\frac{1}{4}$ of a mile broad at its northern end, narrowing to a point at the opposite end: this last is the westernmost danger of the Tizard group, and its outer edge is in lat. $10^{\circ} 13' 20''$ N., long. $114^{\circ} 13' 7''$ E.

Anchorage.—The above comprise all the dangers found upon this great bank and, with the exception of a small 3-fathom patch which lies N.E. nearly a mile from Namyit island, nothing less than 4 fathoms was found upon any of the shoal patches surrounding the lagoon; so that vessels of moderate draught can in cases of necessity and in fine weather, find convenient anchorage on any of them, observing always due care and caution in approaching them, so as to guard against possible danger from some shoal spot having escaped the lead.

Loai-ta Bank and Reefs.—Loai-ta bank extends 21 miles N.E. and S.W.; its southern part is $5\frac{1}{4}$ miles wide, and its centre 7 miles; from thence it gradually narrows to a point at its north-east extreme.

Loai-ta island (south island of Horsburgh) lies N. $\frac{1}{4}$ E., distant 18 miles from

Itu Abaer, its north-west extreme being in lat. $10^{\circ} 40' 45''$ N., long. $114^{\circ} 24' 54''$ E. It is a low sand island, covered with bushes, and very small, being but $1\frac{1}{2}$ cables in diameter; a reef surrounds it, extending in some places, nearly $\frac{1}{2}$ a mile.

A reef about $1\frac{1}{2}$ miles in extent, dry at low water, and having a small sand cay near the centre, lies 5 miles north-westward of Loai-ta. Another and larger reef lies $\frac{3}{4}$ of a mile to the south-westward of the one just mentioned, extending in that direction $1\frac{1}{2}$ miles, its width being about a mile. The south-west extreme of this last reef, which is also the south-west extreme of Loai-ta bank, is in lat. $10^{\circ} 42' 2''$ N., long. $114^{\circ} 19' 1''$ E.; the sand cay bearing N.E., distant nearly 3 miles, and Loai-ta island E. by S. 6 miles.

From the sand cay above mentioned, the north-western edge of the bank trends away E.N.E. 5 miles, and then N.E. 13 miles; no less than 4 fathoms was found anywhere upon this part of the bank.

Lan-keeam Cay and adjacent Reefs.—A coral patch $\frac{1}{2}$ a mile in extent, which partly dries at low water, lies E. by N. 2 miles from Loai-ta island; and E.N.E. $6\frac{1}{2}$ miles from the same island is a larger reef, $\frac{3}{4}$ of a mile in diameter, having a sand cay near its centre; this cay, known to the Hainan fishermen as Lan-keeam, is in lat. $10^{\circ} 43' 20''$ N., long. $114^{\circ} 31' 1''$ E.

N.E. by E. $\frac{1}{2}$ E. 3 miles from Lan-keeam is a small dry patch which forms the south-east angle of the great Loai-ta bank; and N.E. $\frac{1}{2}$ N., $4\frac{1}{2}$ miles from that cay is another small reef; this last is the northernmost patch which dries.

From the reef just mentioned the south-eastern edge of the bank trends away N. by E. for about 9 miles, where it meets the north-western edge; nothing less than 4 fathoms was obtained on this part of the bank.

Soubi Reef, the south-west end of which is in lat. $10^{\circ} 53\frac{1}{2}'$ N., long. $144^{\circ} 4' 1''$ E., lies about 16 miles north-westward of the Loai-ta reefs, and 8 miles south-westward of Thitu reefs, and is the westernmost danger in the locality; it is an irregular shaped coral reef, nearly $3\frac{1}{2}$ miles long, N.E. and S.W., and 2 miles broad, is dry at low water, and has a lagoon, into which there appears to be no passage.

Thitu Reefs and Island—(the N.W. dangers of Horsburgh) consist of several very dangerous patches grouped upon two coral banks, separated by a narrow deep gut. Thitu island is a low sand island, somewhat round in shape, and not quite $\frac{1}{2}$ mile in diameter, situated near the centre of the dangers, on the southern part of a reef, which dries at low water, and which extends $\frac{3}{4}$ mile eastward of the island, forming in that direction the extreme of the western bank. Near its south-west end is a dark clump tree in lat. $11^{\circ} 3' 9''$ N., long. $114^{\circ} 16' 25''$ E.; in addition to this clump tree the island has upon it some low bushes and two stunted cocoa-nut trees, near to which is a small well and a few plantain trees.

From the island the western bank widens out in directions N.W. and S.W. for a distance each way of $2\frac{1}{2}$ miles; the north side of this part of the bank is marked by a round coral reef, $\frac{3}{4}$ mile in diameter, between which and the reef surrounding the island are soundings of $2\frac{1}{2}$ to 7 fathoms, the deep water being nearer the island. The south edge of the bank is also marked by a reef, but this is much smaller than the one just described, and the depths between it and the island are more favourable for anchoring upon than on the opposite side of the bank, being

in no place less than $4\frac{1}{2}$ fathoms. From these two reefs the bank gradually narrows, and terminates in a point in lat. $11^{\circ} 2' 30''$ N., long. $114^{\circ} 10' 30''$ E., the island bearing E. $\frac{1}{2}$ N., distant 6 miles.

On the north edge of the bank is a sand cay which bears from the island W. $\frac{1}{2}$ N., distant nearly $3\frac{1}{2}$ miles. This is also on a large patch of reef, dry at low water, and between it and the western extreme of the bank are dangerous reefs, nearly always marked by breakers. There is a passage into the lagoon between the sand cay reef and the one $2\frac{1}{2}$ miles N.W. of the island, with depths of 5 to 12 fathoms.

The south side of the bank is not nearly so dangerous as the north side, and vessels may anchor upon it with the sand cay bearing N.E. by N. and N.W. by N., or to the eastward of the patch which lies S.W. $2\frac{1}{2}$ miles from the island, with the cay bearing N.W. by W. $\frac{1}{2}$ W., and the island N.E. $\frac{1}{2}$ E. In the lagoon the depths are 17 to 19 fathoms.

The eastern bank is a mass of dangerous reefs and patches, its western extreme is more than a mile eastward of Thitu island, extending from thence $1\frac{1}{2}$ miles East and $3\frac{1}{2}$ miles N.E., with an average breadth of 2 miles.

Mi-Lo or North Danger Reef has been described on page 89.

Trident Shoal, lying E. by N. 16 miles from North Danger, is a coral bank $7\frac{1}{2}$ miles long and 6 broad, of the shape of a shoulder of mutton, the broad part being to the northward; it is composed of many patches with less than 10 fathoms water over them, two of which are dangerous. These patches lie round the edges of the bank, forming a lagoon, the depths in which are 26 to 37 fathoms; close outside of them, there is no bottom at 100 fathoms.

The most dangerous patch is at the northern extreme of the shoal, and extends $1\frac{1}{2}$ miles East and West, and $\frac{1}{2}$ mile North and South; near the centre, in lat. $11^{\circ} 31' 30''$ N., long. $114^{\circ} 39' 15''$ E., is a small spot which dries at low water springs; the depths on other parts of the patch vary from $1\frac{1}{2}$ to 6 fathoms: the other is at the eastern extreme of the shoal and bears S.E. $\frac{1}{2}$ S., distant $3\frac{1}{2}$ miles from that just described; it is a small spot of $2\frac{1}{2}$ fathoms, with depths of 3 to 5 fathoms at the distance of $\frac{1}{2}$ mile around it; some casts of 4 fathoms were had about a mile W. by S. from the dry spot, but no less than 5 fathoms was found on any of the other patches.*

The Bremen vessel *G. E. Lorenz Meyer*, Captain Moller, reported having at night struck upon a shoal which was said to lie in lat. $11^{\circ} 25' 30''$ N., long. $114^{\circ} 51' 30''$ E.; this position was examined, but no danger discovered, and there is but little doubt that the vessel struck on the eastern patch of the Trident shoal.

Lys Shoal lies 2 miles to the southward of Trident shoal, and like the latter is formed of a number of patches under 10 fathoms, with a lagoon in the centre; only one danger, a small spot of 17 feet, was found, and this lies near the south-west extreme of the bank, in lat. $11^{\circ} 19' 40''$ N., long. $114^{\circ} 34' 24''$ E.; around it

* Captain Lyall, of the *Trident*, who discovered this danger, placed it in 6 miles to the northward of this position, and the *Rifleman* was employed 5 days searching that locality without discovering any danger, and it is certain none exists there.

the depths are 5 fathoms. Some 5-fathom patches were also found near the north-east end of the bank, but nothing under 6 fathoms was met with elsewhere, the general depths on the patches being 7 to 10 fathoms, and a short distance outside of them bottom was not reached with 100 fathoms of line.

Caution.—Seamen should not attempt to pass through the reefs in this part of the China sea, as a line of dangerous shoals, extending many miles, is known to exist to the eastward of the dangers described above.

Macclesfield Bank.—The *Rifleman*, on her way from Hong-Kong to the North Danger crossed this bank in March 1865, and again in April of the present year. On the first occasion, soundings were struck in lat. $16^{\circ} 11' N.$, long. $114^{\circ} 26' E.$, in 115 fathoms, bottom sand and mud; a line of soundings was then carried in a S. by E. direction over the bank, and the least depth of water met with was 12 fathoms, the general depths being from 40 to 50 fathoms; but a patch of 15 fathoms was found near its southern edge in lat. $15^{\circ} 34' N.$ long. $114^{\circ} 30' E.$: and 5 miles further southward no bottom could be obtained with 307 fathoms of line.

On the second occasion of crossing the bank star observations placed the ship at 5.30 a.m. in lat. $16^{\circ} 34' N.$, long. $114^{\circ} 18' E.$; from thence steered for the 4-fathom patch, reported to have been passed over in 1867, by Captain Moses, of the Siamese vessel *Bangkok*, in lat. $16^{\circ} 2' 30'' N.$, long. $114^{\circ} 2' 30'' E.$; the deep sea lead was kept constantly going but no bottom was obtained with 50 to 60 fathoms of line. At noon found the ship to be in lat. $15^{\circ} 59' N.$, long. $113^{\circ} 58' E.$, and that she had passed about 2 miles to the westward of the ascribed position of the patch. Proceeding to the southward, soundings of 42 fathoms, coral bottom, were had on the northern edge of the bank in lat. $15^{\circ} 51' N.$, long. $113^{\circ} 57' E.$, regular depths of 42 and 43 fathoms were carried until in lat. $15^{\circ} 30' N.$, long. $113^{\circ} 57' E.$, where 32 fathoms were obtained; 3 miles south of this position no bottom was reached with 100 fathoms.

The *Rifleman*, on her passage from Hong-Kong to the reefs, in May 1868, struck soundings in 40 fathoms on the northern edge of this bank in lat. $15^{\circ} 38' N.$, long. $113^{\circ} 40' E.$; from this position a line of soundings—40 to 33 fathoms—was carried across the bank in a S. $\frac{1}{2}$ E. direction for 11 miles, when no bottom with 50, and immediately afterwards, no bottom with 100 fathoms of line, could be obtained.

Coral Bank.—When proceeding from Loai-ta island, round the northern edge of Archipelago, soundings of 47 fathoms were obtained on a coral bank in lat. $11^{\circ} 28' N.$, long. $116^{\circ} 46' E.$; steering E. by S. $\frac{1}{2}$ S.; 3 miles farther on 44 fathoms were had, and shortly afterwards 12 fathoms on a small coral patch in lat. $11^{\circ} 26' N.$, long. $116^{\circ} 53' E.$ Continuing the same course, the depths were 42 fathoms for a distance of 5 miles; at 8 miles 125 fathoms, and at 14 miles 175 fathoms; a few miles farther on no bottom was reached with 200 fathoms of line.

South Shoal lies at the north-east angle, as Nilo reef lies at the north-west angle, of the archipelago of reefs, and forms the north-east limit of the Palawan passage; it is a pear shaped coral bank, 8 miles in length N.N.E. $\frac{3}{4}$ E., and S.S.W. $\frac{1}{4}$ W.; $4\frac{1}{2}$ miles in breadth at the north end and 3 miles at the south end; it is not dangerous, the least water upon it being $4\frac{1}{2}$ fathoms; this depth is found

on a 5-fathoms patch, about $\frac{1}{2}$ mile in extent, at the north extreme of the bank in lat. $10^{\circ} 50' N.$, long. $117^{\circ} 46' E.$ Nothing less than 6 fathoms was found on any of the other patches surrounding the lagoon; the depths in the lagoon vary from 17 to 19 fathoms at the shoal edges to 35 fathoms in the centre.

The northern part of this shoal was passed over by the *Seahorse* many years ago, and the southern part by Captain Routh, of the *Bombay*, in 1835.

Holmes Shoal.—From the Routh shoal, a S.E. $\frac{1}{2}$ S. course was steered to pass over the doubtful Holmes shoal; no bottom at 200 fathoms was obtained on its reputed position, nor was any sign of shoal water seen for a distance of 7 miles further to the south-eastward; from this last position the ship was steered North 8 miles, and then S.S.W. $\frac{1}{4}$ W. 23 miles, with the same result, again crossing over, or near to the position of the shoal. Captain Curling, in the Peninsular and Oriental Company's service, passed over the spot in 1862, without seeing anything like shoal water, and many other Commanders of steamers have reported to the same effect.

Although circumstances prevented the usual minute searches being made for this danger, yet it should be removed from the chart; it certainly does not exist where reported, and there are reasons for believing that the *Fairie Queen* shoal, 18 miles to the westward, is the real Holmes shoal.

Luconia Shoals.—Most of the extensive group of dangers known under this name were surveyed in the *Rifleman*, and an account of them published in 1863, but the survey was not, and is not completed to the northward and westward, but additional information is now given.

The northernmost of the shoal patches reached in 1863 was in lat. $5^{\circ} 48' 30'' N.$, long. $112^{\circ} 32' 15'' E.$: this year the ship was anchored near a $2\frac{1}{2}$ fathoms patch, in lat. $5^{\circ} 55' 15'' N.$, long. $112^{\circ} 31' 30'' E.$, on the northern edge of a coral bank, traced for 2 miles to the southward, but which no doubt extends to the northernmost patch surveyed in 1863, and just referred to; vessels should not pass between these positions.

Friendship Shoal is the northernmost of the Luconia group; the *Rifleman* crossed it without getting less than $4\frac{1}{2}$ fathoms, although there appeared to be less depths in some places. The north part of the shoal is in lat. $5^{\circ} 59' 30'' N.$, long. $112^{\circ} 31' 30'' E.$, and though this position must be considered approximate, it is nevertheless near the truth. Lines of soundings were had in the ship in directions N.E., North, and N.W., from the north end of the shoal for a distance of 4 miles, but no shoal water was found.

GENERAL REMARKS.—The *Rifleman* left Hong-Kong on the morning of the 9th of April 1868, and arrived at the North Danger reef on the fourth day afterwards sailed down under the favourable conditions of light easterly breezes and smooth water; the weather was exceedingly fine without any of the squalls so frequent at other times, up till the 23rd of May, when the south-west monsoon set in with great violence, driving the vessel from the Loi-ta reefs. The weather continued unsettled and threatening, with strong south-west winds during day time, falling light towards night, until the 5th of June, when the ship arrived at Labuan. Hainan fishermen, who subsist by collecting trepang and tortoise-shell, were found upon most of these islands, some of whom remain for years amongst the reefs.

Junks from Hainan annually visit the islands and reefs of the China Sea with supplies of rice and other necessities, for which the fishermen give trepang and other articles in exchange, and remit their profits home; the junks leave Hainan in December or January, and return with the first of the S.W. monsoon. The fishermen upon Itu Abaer were more comfortably established than the others, and the water found in the well on that island was better than elsewhere.

TIMOR and JAVA.—The following Hydrographic remarks, made during a recent cruise of H.M.S. *Serpent*, Commander Charles J. Bullock, R.N., have been issued by the Admiralty.

Beatrice Shoal, in lat. $10^{\circ} 31' 30''$ S., long. $123^{\circ} 35'$ E., was discovered by Commander John Hutchinson, of H.M. surveying vessel *Beatrice*, and subsequently Mr. Waleson, the harbour master of Koepang, succeeded in finding on it a knoll with only 5 feet water, over which the sea almost always breaks. The shoal is an oval shaped coral bank, lying E.N.E. and W.S.W., $\frac{1}{4}$ a mile in extent; soundings of 3 to 6 fathoms are found on its central part (where probably the knoll is) deepening to 8 and 10 at either end where there is tolerable anchorage; outside this the reef falls steeply into deep water. The centre of the shoal is on the following bearings:—N.E. point of Oessoë island (the island east of Landu) W. $\frac{1}{4}$ N. $7\frac{1}{2}$ miles; the conspicuous double hill over the point, W. $\frac{1}{4}$ N.; the high flat-topped hill of Rotti, S.W. $\frac{1}{4}$ W.; south-west point of Timor (entrance of Semaö strait) N.W. $\frac{1}{4}$ N.; White cliffs of Timor, N.E. northerly.

Rotti Island.—When passing the north-east point of Oessoë the water was suddenly shoaled to 5 fathoms, the point then bearing N.W., $1\frac{1}{4}$ miles distant. The shoal was not examined.

An unexamined coral bank, on which the least water obtained whilst crossing it was 15 fathoms, lies $3\frac{1}{4}$ miles W.N.W. of Dana, the southernmost of the islands off Rotti. No examination was made of it.

Castle Rock.—The islands contiguous to the south and west points of Rotti are low, the southern ones particularly so. The exception is a rocky islet with steep cliffs, which is conspicuous at 20 miles distance when all the neighbouring land except the hills of Rotti has dipped. As it is difficult to recognise this useful landmark on most charts, it may be described as lying off the south-west point of Rotti, in the channel between Dana island and the main.

Anchorage.—The only anchorage recommended about the islands is on the north side of Noesa.

Savu and Benjoin.—H.M.S. *Serpent* coasted along the south shores of these islands to verify their positions, and found them fairly correct. They are bold, except that from the east point of Rai Diuwa or Benjoan, an extensive reef was seen on which the sea was breaking heavily.

Hookie or Dana (New island) is of coral, low, and covered with scrub, having a ridge along its north-eastern side of about 120 feet elevation, the western part of which is a detached knoll like a short horn. This latter is in lat. $10^{\circ} 49'$ S.,

long. $121^{\circ} 16' E$. Under this ridge and facing the north-east is a broad sand beach, which is the only practicable landing-place in fine weather. Off the northern part of this beach is the anchorage in 12 fathoms, sand, with the knoll bearing S.W. and the east point S.S.E. Wild goats abound on the island, but no fresh water could be discovered.

Cape Tafel is a peninsula of table land bordered by a high broken cliff and a few small reefs. Though about 300 feet high it may be styled low in comparison to the adjacent mountainous country. The western part is the higher and bolder, the eastern tapers into a low point off which is a low island. Soundings of 20 fathoms may be found west and south of the west cliff at the distance of a mile.

Badong Bay.—This open bay affords shelter from south-east winds, with anchorage in 8 to 6 fathoms, sand and mud, good holding ground; but there is little or no protection from the heavy ground swell that rolls in from south.

S.E. Cape of Java is the extremity of a low peninsula, on the northern side of which is a range of hills which terminate on the east at cape Sloko. The points of the low land dip at 10 or 12 miles, causing a false point to be seen beyond that distance. An extensive coral reef borders the cape, but north of the Sloko ranges the shore is very steep, and a ship working through may stand in boldly.

Mount Ikan is an isolated flat-topped bluff separated from the Sloko hills by a low isthmus, causing it at a distance to appear like an island. The charts show three hills, which is an error.

Prince of Orange Bank is of an irregular form, broader at its southern part; it lies nearly on the following bearings:—the low east extremity of Java, S. by W.; eastern summit over cape Sloko, S.W. $\frac{1}{4}$ S.; and the summit of mount Ikan, W.N.W.

Banjoewangie on the Java shore of Baly strait is a place of call for refreshments for vessels proceeding by the eastern passages. The water is good when the pipes are clean, otherwise it soon becomes fetid. This is the terminus of the electric telegraph. Banjoewangie is not always readily distinguished in the afternoon, when the sun is behind it; a good guide then is the Bakungan mountains, a triple topped range on the Baly shore, from which it bears West.

It is not advisable to anchor a sailing vessel close in during the south-east monsoon, for the difficulty in getting out may cause detention. Vessels working through the strait will save time by taking a pilot, for the tides are irregular and require local knowledge.

Anchorage in 7 or 8 fathoms may be found all along the shore from Pakem point to Pampang bay. The extremity of Pakem reef is marked by a black buoy with staff and ball.

PARACEL ISLANDS.—These islands were visited in February, 1865, by H.M.S. *Rifleman* for the purpose of relieving the crew of a wrecked vessel, and the following information was obtained by Mr. Tizard, Master R.N.

Lincoln Island.—South-east point in lat. $16^{\circ} 39' 34''$ N., long. $112^{\circ} 44' 23''$ E., is $1\frac{1}{2}$ miles long, N.W. and S.E., $\frac{3}{4}$ mile wide, and about 20 feet high; it is covered with brushwood, and surrounded by a coral reef, dry at low water, which extends $1\frac{1}{2}$ miles from its south-east point, $\frac{1}{2}$ mile from its north and east sides, and about a cables length from its south-west side. A narrow coral shoal runs off to the southward from the south-east point of the island, which is said by Horsburgh to extend 11 miles; time did not admit of its being properly examined, but judging from the soundings that were obtained, the dangerous part of this shoal does not appear to extend further than 3 miles from the island. Good anchorage can be obtained in the N.E. monsoon under its lee in 8 to 10 fathoms, coral, about $\frac{1}{2}$ a mile from the shore.

The spring of excellent water, mentioned by Horsburgh, is merely a well dug by the Hainan fishermen close to a stunted cocoa-nut tree, into which the salt water filters.

Pyramid Rock.—From south-east point of Lincoln island, Pyramid rock bears S.W. $\frac{1}{4}$ W., distant $7\frac{1}{2}$ miles; the position of the rock with reference to Lincoln island was ascertained, but no soundings were tried for around it. The coral bank round Lincoln island will, in all probability, be found to extend as far as the Pyramid rock.

Ampitrite Islands.—The two groups of islands designated by this name appear to be situated on the edge of an extensive coral bank, as a reef $1\frac{1}{2}$ miles wide with from 6 to 9 fathoms on it, it extends $3\frac{1}{2}$ miles to the south-eastward of Woody island, the extremity of which could not be seen from the *Rifleman* when crossing it; soundings of 25 to 30 fathoms, coral, were carried some miles westward of the group.

The spring of clear water, asserted by Horsburgh to exist on Woody island, is merely a small well dug by the fishermen, the same as that on Lincoln island.

The Crescent Chain.—The islands forming the Crescent Chain appear to be correctly placed as to position on Captain Ross's chart, but are not nearly so large as represented.

Duncan and Drummond Island were more particularly examined, and the passage between them sounded. The two islands called Duncan islands are now joined by a sandy spit which is always uncovered, they extend a mile in an east and west direction, are 4 cables in breadth and surrounded by a coral reef which extends in some places 4 cables from the shore, and dries at low water. On the westernmost of the islands is a cocoa-nut tree.

Drummond island is nearly round, its diameter being about 3 cables; 2 cables south of it is a rock which never covers. A reef of coral extends a short distance from the west side of the island, but runs for miles to the eastward and north-eastward of it. Both Duncan and Drummond islands are covered with brushwood. Between these two islands is a safe channel, upwards of a mile in width, with from 19 to 20 fathoms water; Horsburgh says this channel should not be taken in large vessels, the passage westward of Duncan island being preferable, but the *Rifleman*, when passing between Duncan and Money islands, suddenly got into shoal water, which appeared to extend across that channel, and therefore the channel between Duncan and Drummond islands is certainly safer for

steamers. Vessels may anchor to the northward of Duncan island in from 16 to 18 fathoms, about $\frac{1}{2}$ mile from the shore. *Bearings Magnetic. Variation* $1^{\circ} 20' E.$ in 1867.

CHINA:—The following remarks on the homeward route from China through the China Sea and the strait of Sunda are from the log of the British ship *Harkaway*, Captain David W. Stephens;—

Ships from Hong-Kong, bound through the Bashee channel, or any of the channels between Formosa and Luzon, from March to June inclusive, but more particularly in March and April, during brisk north-east winds and a strong westerly current, frequently take a week beating along shore to reach Breaker point before standing off:

Whereas, if after clearing the Lema channel, the vessels had stood off on a wind clean full to the south-east, they would soon have got out of the westerly current, and on nearing Luzon would experience the wind more from the eastward and sometimes from south-east, enabling them to tack to the N.N.E. with a strong current in their favour, and thus would probably get to the eastward of Formosa in less time than it would have taken to reach Breaker point by keeping along the coast of China.

Vessels leaving the coast of China or Manilla and bound towards Sunda strait in March, April, or in the early part of May may expect a tedious passage down the China Sea if proceeding by the old route which passes Pulo Sapata, particularly if they do not sail before the 5th or 10th of April:

Whereas if the track be taken along the coast of Luzon, down the Palawan passage, along the coast of Borneo, past Direction island, round Sorueton, and through the Karimata strait, passing close round the North Watcher, and on for St. Nicholas point on Java, they are likely to carry easterly winds, with fine weather, and a smooth sea the whole distance, thus making a direct course, and will avoid calms. The current will also be more favourable than otherwise until May is well advanced.

In approaching Sunda strait the Java side should be steered for, and kept aboard in May, as then the winds are light, those from south-east prevailing at night, and from north-east during the day; this precaution will prevent the vessel being carried by the current to the westward of the Button islet; this current runs constantly to the south-west in the middle of the strait, it is checked by the short flood, but runs strong with a long ebb.

With reference to the above directions for making the passage from China, and to prove the advantages of the eastern route, it may be stated, that in April 1861, two American ships sailed from Fu-chau-fu, one proceeded by Pulo Sapata on the west side of the China Sea, the other by the Palawan passage and Karimata strait; the latter ship passed Anjer 20 days before the other.

The *Harkaway*, on her passage in April and May 1862, carried an easterly wind the whole way down, and had no occasion to anchor.

S. part of Gaspar Strait.—Captain Locke of the *Belted Will* reports that after passing Gaspar strait, July 30, during a severe monsoon from E. by S., the ship while plunging heavily struck (as was supposed) the bottom, which was seen to be stirred up in her wake in one spot, as if it were a bank. She grazed over the shoal a second time without striking, and on sounding shortly after, got two casts of the lead 9 fathoms, but to the westward it was thought the water looked shoal. The vessel would not have touched if the water had been smooth. This dangerous spot is in lat. $3^{\circ} 35' 35''$ S., long. $106^{\circ} 56'$ E.

Karimata Strait.—The Chief of the Marine Department in Netherlands India, reports that the Commander of H.N.M. steamer *Mnas en Waal*, has discovered a reef off the Momprang islands (Karimata passage). This reef is placed on the charts of the W. coast of Borneo by Edeling in lat. $2^{\circ} 32' 30''$ S., long. $108^{\circ} 24' 5''$ E.

Also, that the Commanding officer of the steamer *De Briel* has seen, in the Karimata passage, an unknown reef with rocks above water, extending about $\frac{1}{2}$ mile, E.S.E. to W.S.W. It is placed in lat. $3^{\circ} 23'$ S., long. $109^{\circ} 27'$ E.

Karimata Strait.—Capt. Irwin of the *Arica* bound to Hong-Kong through the Karimata passage, having seen Kebatoo or Shoe island, found Karang Kawat or Grace shoal more extensive than generally placed on the charts; intending to lay-to for the night, southward of Scharvogel islands, came suddenly close to a rock from 50 to 60 feet long, the shoalest part having about 6 feet water, from that to 18 feet over the remainder;—Position, South from the South island and S. by W. $\frac{1}{4}$ W. from the eastern islet, in about lat. $3^{\circ} 31'$ S., long. $108^{\circ} 25'$ E.

Borneo—S. Coast—Bank near Southern Entrance to Pulo Laut Strait:—The steam vessel *Betsy* struck on a sand-bank near the southern entrance to Pulo Laut strait.

This bank has $2\frac{1}{2}$ fathoms on it, and lies with cape Pagatan N.E. by E., and cape Kandany Aver W. $\frac{1}{2}$ S. Position, as given, lat. $3^{\circ} 47' 45''$ S., long. $115^{\circ} 42' 9''$ E.

Gillolo Passage—Bank and Anchorage:—Capt. Collins of the American vessel *Brewster* reports to us as follows:—

At the southern entrance of Gillolo passage, 5 miles south of the "Black rocks" I was becalmed, and experienced a three knot current, setting about S.S.E., which drifted the ship towards Toppershead or Button island. When within 4 miles of it, saw bottom plainly; let go my kedge anchor in 14 fathoms—Toppershead island bearing S. by E., distant $3\frac{1}{2}$ to 4 miles.

This bank extends east and west, how far I was not able to ascertain, but, another vessel anchored about 3 miles east of me, on the same bank, therefore I think it extends as far as from Lawn island to Kekik island; found 50 fathoms between the bank and the islands, and 15 fathoms within a cable of Toppershead island.

There were nine other vessels in company, and had they known of this anchorage, they could all have availed themselves of its convenience, and thus escaped the anxiety and trouble incidental to being drifted about at the mercy of the tides

and currents. In my own case, I think I should have lost the ship on Toppers-head island, had it not been for the anchorage on the bank.

I am sorry that I cannot give you a more accurate description of it. I lay at anchor 24 hours (2nd of December, 1868), after which the current changed, setting strong to the N.W. enabling me to proceed on my passage. The vessel anchored with me had 12 fathoms; it may possibly be much shoaler in some parts.

S. entrance to Macassar Strait.—Shoal.—Capt. White of the *Sea Serpent* gives the following particulars of a shoal in lat. $3^{\circ} 56' S.$, long. $117^{\circ} 28' E.$, not mentioned in sailing directions, nor inserted on charts; "I drifted on it on a dark night during a dead calm and lay at anchor on it 15 hours; got the boats out and sounded all around the ship; found the extent of the shoal to be about 1200 feet, with 10 and 12 fathoms in the middle, and $4\frac{1}{2}$ to 6 fathoms all around the edges; and composed of dark coral; there was no discoloration of the water whatever; the position assigned this shoal was ascertained by two observations of two well adjusted sextants and two well rated chronometers.

January 1st, 1870.

CATALOGUE, 1872.

CHARTS,
WORKS ON NAVIGATION,
AND
NAUTICAL INSTRUMENTS,
&c. &c. &c.



PUBLISHED BY
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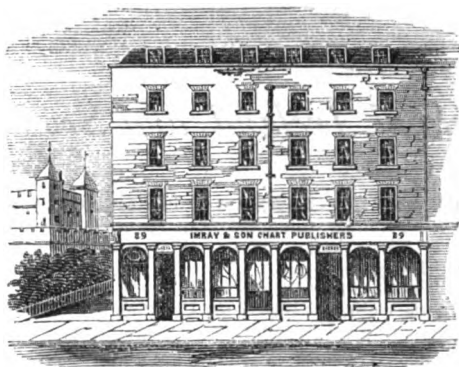
ON publishing a new Catalogue, we avail ourselves of the opportunity to thank our numerous Correspondents and Nautical Friends for the kind patronage with which they have hitherto favoured us, and for the very valuable and useful information we are constantly receiving from them. The high estimation accorded to our publications for their accuracy is chiefly to be attributed to the assistance so received; on this ground we are always ready and happy to receive suggestions tending to the improvement of any of our Works.

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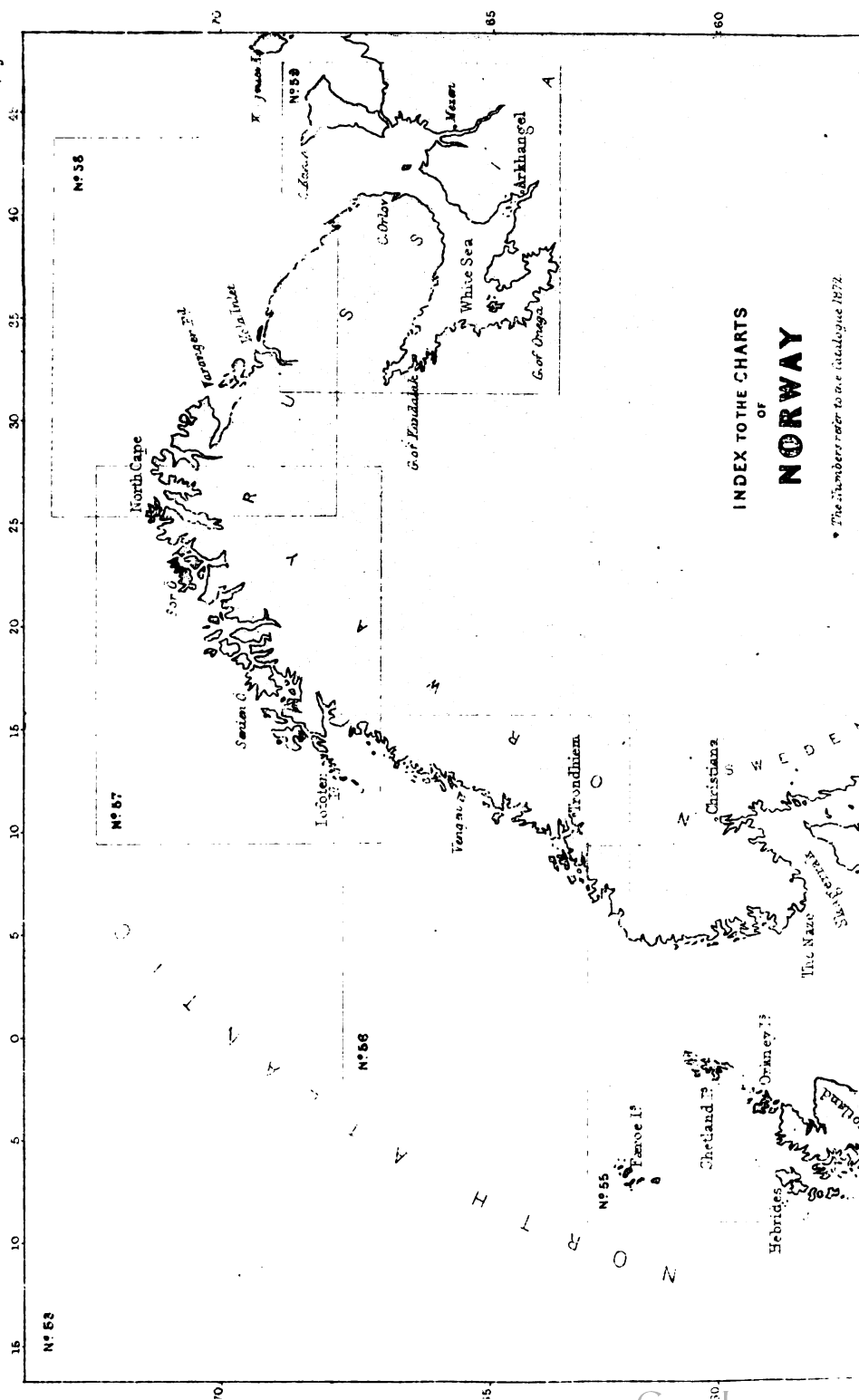
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Shipmasters going to Arkhangel should take charts Nos. 54, 55, 56, 57, 58, 59, as those publications exhibit the whole voyage to the White Sea. With the exception of No. 54 (a general chart for the whole navigation) the charts are all on the same scale and each contains many plans of harbours. The series is accompanied with a small Index chart (for which no charge is made), and it is requested that purchasers ask for it, if it be not supplied.

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- NOTE.—This chart, with the chart of the North Atlantic, No. 63, shows the whole navigation from Europe and the United States to the Cape of Good Hope and Cape Horn, and will be found very serviceable, as the directions of all the currents are delineated.
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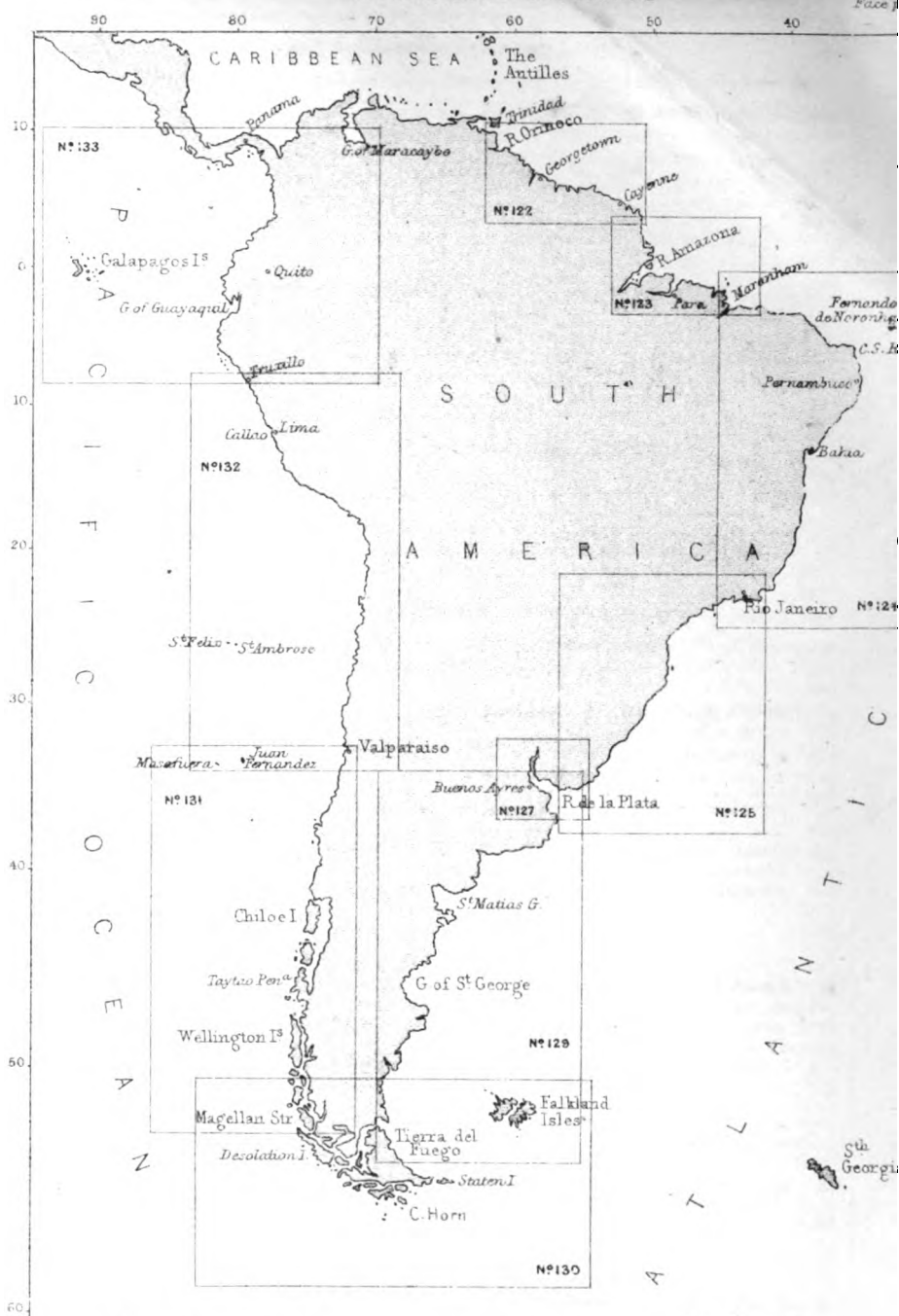
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INDEX TO THE CHARTS
of
SOUTH AMERICA

The Numbers refer to the Catalogue No. 1

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- 166.* **EAST INDIA ARCHIPELAGO (Western Route to China,—Chart No. 6).** Limits, latitudes $10^{\circ} 50'$ and $23^{\circ} 40'$ N., and longitudes $112^{\circ} 10'$, and $122^{\circ} 45'$ E. ... 7/6

* These charts (Nos. 161 to 166) of what is popularly known as the Western Route to China, exhibit the navigation from Sunda Strait to the Coast of China on a very large scale. Each consists of two sheets; the set, therefore, comprises twelve sheets. They have been compiled from the most recent British, French, Dutch, and Spanish surveys. In several of the charts there are notes descriptive of the currents, winds, &c., and remarks upon the courses most advisable to follow at certain periods of the year. If mounted on cloth for Captains' use, the price of each will be 2s. 6d. extra. An Index Chart accompanies the set.

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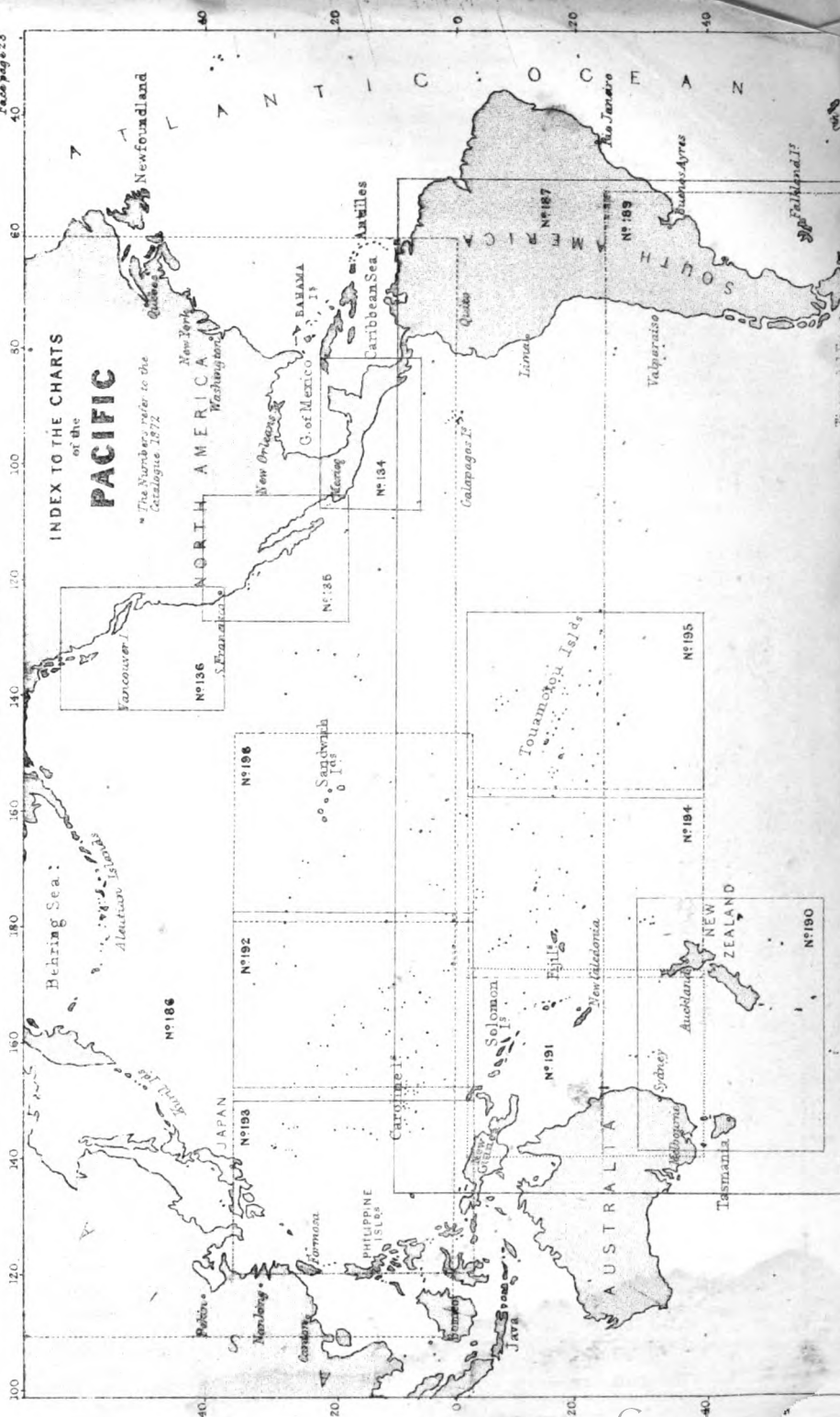
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INDEX TO THE CHARTS of the **PACIFIC**

The Numbers refer to the
Catalogue 1872

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Binnacles.—Dolphin Pattern, with Dome Tops and Lamps	£10 10s., £14 14s., £15 15s., &	17	17	0
„ Skylight Pattern, crown top	£4 4s., £5 5s., &	6	6	0
„ Octagon Pattern, wood	£6 6s., £8 8s., £9 9s., &	11	11	0
„ Pillar, crown top	£7 7s., £9 9s., &	12	12	0
N.B.—Binnacles of any pattern made to order.				

							£.	s.	d.
Compasses.—Plain Azimuth, with Sight							3	3	0
"	"	Azimuth	...	...	...	...	5	5	0
"	"	Best Prismatic Azimuth, with Sights	...	...	...	...	6	6	0
		With Tripods, £1 5s. extra.							
"	"	Mast Head Compasses, for avoiding the Local Attraction, of any size. With Cylinder Shade and Lamps.	...	...	...	...	<i>Various prices.</i>		
"	"	Amplitude,	...	...	...	...	£1	2	10 0
"	"	Stand for the above	...	...	...	...	extra	1	5 0
"	"	Brass Steering, 8, 9, 10, and 11 in.	...	...	...	...	from 13s. to	1	1 0
"	"	Wood ditto	...	...	...	...	from 6s. 6d. to	0	10 6
"	"	Brass Hanging ditto	...	...	...	...	from £1 to	1	5 0
"	"	Every variety of Brass Boat ditto	...	...	...	...	from 10s. to	1	1 0
"	"	Wood ditto	...	...	...	...	from 3s. 6d. to	0	6 0
"	"	Pocket ditto, in brass	...	...	...	...	from	0	1 6
"	"	Prismatic, in Sling Case	...	...	...	...	from	2	12 6

Barometers.—Best rosewood, marine, with Sympiesometer and Thermometer							£5 5s. to	6	6 0
"	"	Best rosewood, with arm and Thermometer, circular front, ivory scales, and rack motion	...	...	...	...	£2 10s. to	3	3 0
"	"	Ditto, with round head, and improved tube and cistern, common	...	...	...	...	...	2	10 0
"	"	Plain ditto, with Thermometer on the door in front	...	...	...	...	...	2	0 0
"	"	Wheel Pattern, various sizes and mounting, from	...	...	...	...	£1 5s. to	6	6 0
Aneroid Barometers, do.							from £2 10s. to	3	10 0

Sympiesometers							from	2	2 0
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Thermometers.—8 inches long, with box scale							...	0	1 6
"	"	8, 10, 12, and 14-inch Brewers' ditto, in Japan or Copper cases	...	...	...	...	from 3s. 6d. to	1	0 0
"	"	Night and day, for registering the greatest degree of heat or cold during the absence of the observer, from 12s. 6d. to	...	...	...	...	...	1	5 0
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"	"	"	6 in.	...	...	...	...	2	12 6
"	"	"	5 in.	...	...	...	...	2	2 6
"	"	"	4 in.	...	...	...	...	1	12 6

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„ with Shifting Leg		£1 10s. to	3 0 0
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