

then steer for it until the *fairway buoy* is visible, which is situated $1\frac{1}{2}$ miles of the island. From this *buoy* steer N.N.E. until the *black buoy* bears East N.E. by N.

" *Vessels entering from the westward*, in latitude north of Diamond island, bring it to bear S.E., and steer in for it until the *fairway buoy* is made, then proceed as above directed for vessels entering from the southward. This passage, however, should be attempted by sailing vessels only in the North-east Monsoon.

" Vessels unable from stress of weather to distinguish the different marks, may anchor under Diamond island, where good anchorage and smooth water is to be found.

" **Kingie Island to Bassein.**—A vessel should proceed up the river about a mile from the shore, until up to Yeajoue Creek; thence she should sheer over to the eastern bank, gradually, until the *black buoy* on the south end of the shoal is seen, which is to be passed, keeping it on the port hand about two cable lengths, and keep the eastern bank until after passing the *red* and *white* buoys in the same manner as the *black*; then stand up mid-channel, passing Sesostrie island, which are marked by a *red* buoy. *The rocks lie inshore of the buoy.* Keep in mid-channel until close up to Enterprise island, taking care to give the spit which extends a little way down from the south end of the island a good berth. The passage on each side of the island—one to the east and another to the westward. The passage to the left is preferable for a ship of light draught, as it is wide, and there is more room to work.*

" The passage to the eastward is taken by vessels of large draught. Vessels of small draught keep close to the eastern shore, in order to avoid the Pariah rock.

" In sailing up the passage to the left of Enterprise island, care must be taken not to approach too close to the spit that extends north of the island. Proceed up the river as the village of Tumam-Dewa, that lies in a creek on the port hand; then sheer over to the eastern bank between the *red* buoy and Elephant island, going *to the island than the buoy*, until you get into 7 fathoms; then steer up on the eastern shore, until abreast of the Pamawaddie river; from this steer over towards the *black buoy*, giving the Cackatoo rocks a berth of at least two cables' length. The rocks are seen above water, except at spring tides, when they are covered. There are three patches: two of them show above water half ebb to half flood; one is small and extends to 138 yards outside the others; the least water on it at dead-low spring tides is 16 feet. Keep the port shore until you reach the second creek, where the channel becomes much wider.

" The 'junction' is so called from being at the top or north end of Napoota island, where two branches of the river meet, the one from the east being the main branch to Bassein.

" At Napoota reach you may steer up until approaching the 'junction,' where the eastern shore, a mud bank extends a quarter of a cable's length from the bank; there is also a bank extending from the port side. These can be avoided by keeping in nearly mid-channel. In the third reach there is a bank of mud, which is known by a *white board* in the bushes. On the port hand this shoal extends half way over, and the whole length of the reach in which it is, so that vessels

* It is possible that the buoys alluded to in this notice of the navigation above Dalhousie have been removed.

keep the starboard bank going up, and *vice versa* coming down. The remainder of the passage upwards is without danger, and easy of navigation.

"There is deep water close to the bank, and the ground chiefly very soft mud. Vessels should have a small warp anchor in readiness to run out if required, and should use a light working anchor for dropping; this will relieve the crew of much labour.

"Vessels should show their numbers before arriving at the village of Takion, and Masters should report their arrival at the Master-Attendant's Office and Custom-house, as soon as possible."

CAPTAIN HECKFORD says of Dalhousie:—"The port is not safe in bad weather, nor during the change of the Monsoons, as the fearful loss of shipping will fully testify. Commanders are cautioned not to remain at this anchorage longer than is actually necessary in arriving at it from sea, and not to attempt to resort to it when bound out, without they are prepared to depart and the weather suited to this object."

COAST OF PEGU.—The coast of Pegu, from Bassein river to the Gulf of Martaban, is generally low and woody; it comprises, in fact, the delta of the great river Irawaddy. Fronting it to a considerable distance seaward are reefs and shallow flats; hence it requires considerable care to approach, especially when the wind is from southward. The land is seldom visible from any distance, which renders precaution when approaching the more necessary. An examination of this sea-board was made in 1850 by LIEUTENANT FELL, of the Indian Navy, and the following is his description of the soundings off it:—

"From Porian point, which forms the south-east extreme of the eastern shore of Bassein river, and which bears E. $\frac{1}{2}$ S. from Diamond island, a bank extends off it to the distance of about $2\frac{1}{2}$ miles, and continues in an E.S.E. direction, 52 or 53 miles, from whence it runs in an easterly direction, and gradually trends to E.N.E., then to N.E., on towards Rangoon. The southern extreme of the Baragu flat is in Lat. $15^{\circ} 29\frac{1}{2}'$ N., Long. $95^{\circ} 12'$ E., from whence the land is seldom visible, except in very clear weather.

"A vessel passing north of Diamond island, and bound eastward with a fair wind, ought to keep the large pagoda on with, or a very little open with, the north end of Diamond island, until she deepens to $10\frac{1}{2}$ or 11 fathoms; she may then stand to the E.S.E., keeping in a line of $9\frac{1}{2}$ or 10 fathoms, and altering her course so as to keep in this depth until abreast the south extreme of Baragu flat, when to keep in this water she will steer an east course, on which line she will (when eastward of Baragu point) deepen her water to 12, 15, and 16 fathoms. She may then, if bound to Rangoon, stand to the N.E., taking care not to come under 10 fathoms until northward of the Krishna shoal. If bound to Maulmain, she ought to steer E. by N. $\frac{1}{2}$ N. or E.N.E. (altering her course according to the time of tide), when she will again shoal her water to 10 and 9 fathoms, which depth is the best line to keep in until sighting the eastern coast; but during the South-west Monsoon it would be advisable to keep more to the southward, in 14 or 15 fathoms, making the land near to Kalegouk island.

"**Krishna Shoal** extends from Lat. $15^{\circ} 36'$ N. in a N.E. direction to Lat. $15^{\circ} 47'$ N., and is a bank of hard sand situated to the E.S.E. of Baragu point, distant from the nearest shore 10 miles. It is a narrow ridge about 1 mile wide, having

a channel between it and the shore, with $3\frac{1}{2}$ and 3 fathoms in it, bottom of soft mud. When to the N.E. of the Krishna shoal, a vessel ought not to come within 4 $\frac{1}{2}$ fathoms until in Lat. $16^{\circ} 13' N.$; she will then be abreast of China Buckeer.*

"During the N.E. Monsoon, vessels from Bengal should make cape Negrais, and ought to endeavour to pass northward of Diamond island, by doing which they will save much time, as during the months of November, December, and January the wind is little or no flood-tide south of Alguada reef, except during the springs. At low water times there is a strong set to the W.N.W.

"The soundings westward of Alguada reef are generally even, with fine green mud and mud, with 30 fathoms, 18 miles to the westward; to the S. and S.S.W. near to the reef, the bottom is very uneven, coarse sand and mud alternately. Within 8 or 10 miles to the S.S.W., when the soundings become more regular, with sand, shells, and rotten coral, which bottom continues the same nearly on to Foully island. This bottom is a good guide for vessels during the S.W. Monsoon, but it is not advisable to approach the Alguada reef. To the E.S.E. about 12 miles the bottom is all mud, and continues on to the Tanasserim coast. Vessels proceeding eastward with a working wind ought to be guided entirely by the lead, which should be kept going when approaching the Baragu flat, and ought not to stand within 5 fathoms, from which the soundings decrease quickly to 3 fathoms.

"The tides on the coast of Pegu are very irregular during the N.E. Monsoon, and there is scarcely any perceptible flood during the neaps off the Baragu flat, and the springs not running more than three hours at the rate of 1 to $1\frac{1}{2}$ miles per hour. When to the N.E. of Baragu point, the tides become stronger—on the springs running $3\frac{1}{2}$ and 4 knots, and during the neaps, 2 to $2\frac{1}{2}$ knots. The rise and fall of tide at Alguada reef is about 12 feet. H. W. on the days of F. and C. at 10h. Off Baragu flat the rise is only 7 feet, high water at 11h. A little northward of the Krishna shoal the rise is 12 feet, high water at 11h. Eastward of Rangoon river the tides run very strong during the springs, greatest velocity being upwards of 7 miles an hour, and the rise and fall from 25 to 27 feet.

"Vessels from Amherst bound to Rangoon ought to endeavour to keep in at least 5 $\frac{1}{2}$ to 6 fathoms low water, until they sight the land near China Buckeer, and then stand to the northward, as before directed."

CAPTAIN N. HECKFORD says:—"When approaching Baragu sand from westward (the vicinity of which in fine weather is ascertained by the eddies that prevail in that particular part of the gulf only), the best depths to preserve are from 15 to 20 fathoms, not less, and you will cross over the tail of it in 10 and 11 fathoms. The soundings will be of dark brown-coloured mud, mixed with very small *entire* shells, and this is the only spot throughout the track from outside the Alguada reef to the coast of Martaban, where this description of shell is to be found. In steering eastward, you will deepen again to 14 or 15 fathoms. After getting eastward

* Rangoon River is 18 miles N.E.-ward from China Buckeer River. In Horsburgh's Directory, China Buckeer is mentioned as appearing like a low island when viewed from the sea, and is not more than 6 fathoms. CAPTAIN HECKFORD says: "China Buckeer appears like a detached island; being covered with dense jungle, makes it very conspicuous, and the land like it on this part of the coast; an opening between it and the main appears at its east end when just visible from the southward above the horizon. This is the only distinguishing mark south-westward of Elephant point."



I Dragon Pagoda

Phoenician C. & S.

RANGOON

DeTia C. & S.

Kings Pt.

Lifley Sand

High Trees of Dallas

Chokey Pt.

Old Chokey

De Silvas Pt.

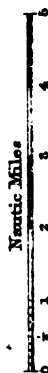
Silvas Sand

Barren Creek

151/2 P.D. 4

I. Syrian Pagoda (P.D.)

RANGOON RIVER



H.W.R. & C. (Rangoon) V^a 30th
Do (Elephant Pt.) III 16
Springs Rise 21st Neape 14th

This Plan is from the survey of 1864. As the sands appear to be of a changeable character the employment of a Flot is indispensable.

Baragu sand, which will be easily known by the nature of the soundings; if they be pure mud, of a light brown colour, you can steer to the N.E. and N.E. by N.

"If bound to Maulmain, after passing Baragu sand, and when about half way between the tail of that sand and the north end of Kalegouk island, you will have much deeper water. But the $10\frac{1}{2}$ fathoms soundings extend across the gulf to Double island, and from the north end of Kalegouk the $12\frac{1}{2}$ fathoms extend about 40 miles to the westward. These soundings, after getting well to the north-eastward of Baragu sand in 7 or 8 fathoms, consist of soft oaze; with the Rangoon river N.W., stiff mud; eastward of this, and towards the Martaban coast, they are of dark olive-coloured mud.

"I have never found any mixed soundings or sand eastward of Baragu sand in the Gulf of Martaban—clear of danger. And safety requires that you should find your mud soundings mixed; at the same time convinced that you are eastward of Baragu sand (with a flood tide), anchor without loss of time, as you are not far from danger. And, as all dangers must be N. or N.W. of you, a S. or S.E. course will enable you to get clear of them, should you be in their vicinity; except you are in the mouth of the Sittang river, which is ascertained by the overfalls, set and strength of the tide, and the high land to the N.E.-ward. Should you, through some extraordinary circumstance, get in the mouth of this river, and can ride out one flood-tide (although I have never heard of but two vessels escaping from it), weigh at high water, and work to the S.S.W., keeping the lead constantly going, as the channels between the sands are deep, though narrow, and anchor when the flood is in."

RANGOON RIVER.—This river is about 2 miles wide at the entrance, whence, to the town of Rangoon, a distance of 20 miles in a N.W. by N. direction, it gradually decreases in width, till opposite the town it is only one-third of a mile across. The shore on each side of the entrance is low, and can be seen only from a moderate distance; but a beacon, coloured black and white, has been erected on the eastern or Grove point, and another, red and white, on the western or Elephant point, as marks to show the position of the river from seaward. Shallow flats extend out a considerable distance from the shore on each side of the river, and the edges of these, in the immediate vicinity of the entrance, are marked by buoys, to indicate the channel-way in. The soundings in the entrance are 5 to 7 fathoms; thence up the river is a general depth of 5 fathoms, excepting at about 2 miles eastward of the town, where is a bar of 6 to 10 feet.

Spring tides rise 21 feet, and neaps 14 feet.

Light.—The entrance to the river is now (1859) indicated by a light-vessel, the position of which is Lat. $16^{\circ} 19' N.$, Long. $96^{\circ} 20' 30'' E.$; it is moored in $3\frac{1}{2}$ fathoms, soft mud, at low water spring-tides, and shows a fixed light, visible from a distance of 8 miles. A blue light is burnt every hour from 7h. P.M. to 4h. A.M.* In 1859, the following instructions for entering the river were issued by MR. H. LEWIS, the Master-Attendant of the port:—

"Commanders of vessels bound to the port of Rangoon should endeavour to make the coast well to the southward about the China Buckeer river, as many ships have been lost in consequence of having been swept by the strong flood-tide on to the

* The construction of a lighthouse on Elephant point, the west point of the river, is in contemplation.

extensive sands to the northward and eastward, and into the Sittang river, in which direction the spring flood sets with dangerous velocity. Pilots are usually cruising well to the southward of the light-vessel stationed at the entrance to the river.

"With the beacons on Elephant and Grove points bearing to the northward, steer for the light-vessel. Flood sets N.E. by N.; ebb S.W. by S. $3\frac{1}{2}$ to 4 knots. From the light-vessel, with a fair wind, steer N. by E. $\frac{1}{4}$ E., about 5 miles for the outer black buoy, passing it to the westward a good cable's length; thence steer North for the upper black buoy till the upper red buoy is in sight, bearing N.N.W., pass to the eastward of this, with the western beacon bearing N.W., and steer in for Elephant point, which bearing from W.S.W. to S.S.W., distant half a mile, will give good anchorage. Care must be taken not to bring the black buoy to the westward of N. $\frac{1}{4}$ E., nor the red buoy to the eastward of North.

"From Elephant point to Rangoon steer along the right bank of the river, about a cable's length from shore, until close to Bassein creek, then cross over to the left bank, along which steer at a distance of $1\frac{1}{2}$ cable's length from the shore, until Dagon pagoda bears about N.W., then steer in mid-channel, between the red and black buoys on the Hastings shoal, for the flagstaff in the town, and anchor opposite the dockyard."

SITTANG RIVER.—The coast eastward of Grove point is low, and fronted for a considerable distance seaward by a shallow flat, hence it cannot be approached in a large ship. Sittang river is 25 or 40 miles from Rangoon river: it is shallow at its entrance, but a survey of it might possibly discover some channels among its banks sufficiently deep for a ship of ordinary size. The river is quite unknown, as foreign vessels never enter it. On its eastern shore the country rises into hills, named the Zingaat or Martaban hills.

Tides.—The tides on the coast of Pegu generally run very strong; the flood sets East and E. by N., and the ebb in the contrary direction to the westward of Baragu point; but from that point to Rangoon bar the flood sets N.E. and N.E. by N., and the ebb to the S.W. Farther east, between Rangoon river and the coast of Martaban, the flood runs strongly N.N.E. and N. by E. into the bottom of the gulf, and the ebb with equal strength out of it, in the opposite direction. When the rivers are swollen, and the low country inundated by the rains at the end of the South-west Monsoon, the ebb tides run much stronger and run longer than the flood tides, occasioned by freshes from the rivers; the water then is very thick and muddy at a considerable distance from the land, which is more or less the case on this coast at all times, opposite to the numerous rivers that disembogue into the sea.

Abreast of Baragu point, and farther westward, the velocity of the tides is not nearly so great as off Rangoon river and in the bottom of the gulf; for here it is frequently in the springs 4 and 5 miles an hour, and sometimes more, near the edges of the shoal-banks. After the rains, the tides off Rangoon river are subject to a circular motion; the first of the flood sets East, changing gradually to N.E. about $\frac{1}{2}$ flood, and to North in the latter part. The ebb sets just the reverse, beginning to run West; it changes gradually to S.W. and South, ending at S.E., but there is no slack water at these times, the tides continuing to run $1\frac{1}{2}$ or 2 knots when changing from the flood to the ebb, and the same at the opposite change.

On the west part of the coast, off Porian point, the perpendicular rise and fall of the tide is only 9 or 10 feet on the springs, but off Rangoon bar it is frequently 20 or 21 feet, and from 21 to 24 feet farther to the eastward in the bottom of the gulf

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H.W.L. and C. 25 Springs rise 22 ft. Range range 12 ft.

Green I.

NOTE
This Mon. is from the survey of 1848. The solids shift so frequently that the employment of a float is indispensable; shipmasters are cautioned therefore not to attempt to enter the river without such assistance. The buoys are moved as occasion requires.

near the banks at the entrance of Sittang river; it is therefore proper to be careful in making free with this part of the coast, and to acquire a knowledge of the tides, in order to prevent any mistake, by anchoring near high water in a situation where a ship would be aground at low water.

MAULMAIN.—Following the coast southward from the Sittang river, we reach in Lat. $16^{\circ} 30'$ the northern entrance of the river Salween, which is separated from the southern entrance by a large island, named Pelew Gewen. This island is 17 miles long from north to south, and 8 miles broad: it is moderately high, and is rather more elevated at its north and south ends than in the middle; at these ends are thick clusters of trees. A white pagoda stands on its south end upon the eastern part of the highest land, and appears just above the trees. The tops of the trees on the west side of the island are not visible at a greater distance than 12 or 15 miles; this coast is faced by a shoal which extends out 1 or 2 miles. The northern channel of the river is not navigable. The town of Maulmain is on the eastern bank of the river in Lat. $16^{\circ} 30'$, its situation being at the fork of the stream, where the north and south channels divide. According to the survey of 1842, the depth in the shallowest part of the river at low tide is 7 to 8 feet. The rise of spring tides is 22 feet; neaps range 12 feet.

The southern channel of the river Salween is that used by vessels bound to the port of Maulmain. It is 9 miles wide, but the greater part of this space is occupied by the Goodwin Sands, shallow flats extending southward from Pelew Gewen island, and by reefs jutting out from Amherst point, the south shore of the river; hence the navigable channel is less than a mile wide. The depth at low tide is 18 to 12 feet, and buoys, which are moved as occasion requires, mark the principal dangers. These sands are subject to frequent change; instructions for entering the river are consequently useless, and render the employment of pilots a necessity. Pilots are obtained from Amherst.*

The tides in the river Salween are strong, their velocity being about 5 miles an hour during springs, and 3 miles at neaps. Vessels drawing about 22 feet can ascend the river to Maulmain. We believe it is usual to employ a steam-tug, the channels between the sands being very narrow and tortuous.

Amherst Point (Cape Kyal-kaml, or Quekma), is low, so low that it cannot

* MR. NEAT MAJOR, agent for the Liverpool Underwriters' Association at Maulmain, wrote thus in 1863:—

"The entrance to this river is becoming so narrow and intricate, that it urgently behoves the Government to take some measures for the prevention of ships getting into difficulties similar to those of the ships *Laurel* and *Clara L. Preble*, which ships were both swept by the force of the tide on to Amherst reef, and, having received considerable injury, were compelled to return to Maulmain, discharge their cargoes, and be docked for further survey. These serious accidents have occurred within the present month, and I am credibly informed by some of the most respectable pilots that it is very dangerous to move a heavy ship out of Amherst road to proceed to sea without the assistance of steam power, or a strong commanding breeze, and even then it must be nearly high water.

"I am under the impression that if the lower part of the river, from Fishing village to sea, was carefully resurveyed by competent surveyors, a new channel would be found to the northward of the present one; and if so, and properly buoyed, would be a great desideratum for vessels passing in and out of this river. There are two narrow passages or gaps in the Amherst reef sufficiently wide for any ships to pass through with safety in cases of emergency—such as parting a cable, or drifting, &c. These passages are well known to the pilots, and only require substantial beacons erected to mark their positions; this would be the means of relieving many anxious minds, for, take an instance of a ship parting her cable, her commander or pilot, guided by these beacons, could steer boldly through the passage, and proceed to sea with confidence."

be seen from a greater distance than 7 to 10 miles;* the lands in its vicinity are high and peaked, and visible in clear weather from a distance of 9 leagues. On the point is a white pagoda, called the upper Quekmi pagoda; another pagoda (the lower one), also white, stands on the rocks off the point. There are also several pagodas along the coast. At a mile S.S.W. from the point is a little island named Green, situated half a mile from the shore; and 12 miles southward from it, in Lat. $15^{\circ} 53' N.$, is Double island, so named because a chasm in the trees upon it causes it to appear as two islands when viewed on any bearing between N.E. by E. and S.E. This island is about 100 feet high, as many long, sufficiently bold to be approached within a mile, and so thickly wooded that it resembles an immense bush—it is very inconsiderable as compared with the high lands behind it, and is not easily distinguished until well in with the shore. In a south-easterly direction from Amherst point are some remarkable hills, the Table land and peak, which are sufficiently lofty to be visible from a distance of 30 to 45 miles: these, with the high land of Martaban to the N.E., which comes into view when you are in about the depth of 15 fathoms, are excellent guides for the port.

MR. DAVY, R.N., says, 1836: "In the North-east Monsoon a ship leaving the Sand Heads should steer about S.E.; or if the current to the southward be found stronger than usual, steer more easterly, passing in mid-channel between cape Negrais and Preparis island; or if bordering on the weather shore, round Alguada reef in not less than 20 fathoms; the depth in this channel will be found deepest towards Preparis island. From this the soundings become regular, with mostly mud bottom, decreasing as you advance eastward. On no account make the low land, or steer higher than E.S.E., until the meridian of Baragu point is passed. After passing that meridian, stand on and make the land about Double island. The parallel of $16^{\circ} N.$ should not be crossed until within five miles of the coast, as the tides there are at the strongest; and the shoals of Pelew Gewen island, also the flats at the mouths of the rivers, are very dangerous.

"In the South-west Monsoon shipmasters should endeavour to make the land a little southward of Kalegouk island; and in the event of bad weather, or if the weather has a threatening appearance—more particularly if it be at or near the springs—should not think of anchoring at Amherst, but should run inside Kalegouk, and anchor in 6 to 9 fathoms. Double island and the north end of Kalegouk bear from each other S. by E. $\frac{1}{2}$ E., and N. by W. $\frac{1}{2}$ W. 17 miles; when standing inshore, do not pass eastward of that line of bearing,—to a stranger, this will be the best possible guide. No part of the coast should be approached nearer than two miles, on account of the strong tides and the rocks and breakers extending out from the shore. When steering for Amherst great attention must be paid to the tides, and large vessels may anchor in 10 fathoms with the Reef buoy bearing N. by E., and the upper pagoda N.E. to E.N.E.

"It is high water on the days of full and change of the moon at Amherst point at 2h., and at the Reef buoy at 2h. 20m.; the greatest rise and fall of the tide is during the S.W. Monsoon, when it is often 26 and 28 feet, and the velocity 6 to 7 knots. Hence, during strong South-westerly winds, with a sea and so rapid a tide, the anchorage is unsafe. It is at this time that the value of the harbour within Kalegouk island can be properly appreciated. In the North-east Monsoon the rise and fall

* A small fixed light, visible 6 miles, is said to have been established on the point.

is 18 to 20 feet, and the rate of tide 3 to 4 knots per hour. The change of the tides is effected almost instantaneously; indeed, it may be said there is no slack water. The ebb-tide coming out of the river may be seen at some distance; it brings a vast accumulation of dark-coloured matter, which contrasts strongly with the sea,—it comes down with great force, and when it strikes the ship, makes it, as sailors say, “all grin again.” The strongest tides are found on the parallel of the river, and are not felt at the distance of 60 miles from the land; their strength also decreases as you steer to the southward. A 6-knot tide at Amherst will be found to have lost half its rate at Kalegouk, and at 10 miles farther south it will have still further decreased.”*

CAPTAIN D. ROSS, of the Indian Navy, the Marine Surveyor, gives the following instructions for making Amherst: “It is proper to make the land between Double island in Lat. $16^{\circ} 53' N.$, and the small islet in Lat. $16^{\circ} 3' N.$, which is about $1\frac{1}{2}$ miles southward of the Pagoda, as, without this precaution, the strong tides may sweep a ship past the buoy that is placed at the point of the reef, and carry her on the Goodwin Sand. When $1\frac{1}{2}$ or 2 miles westward of this small islet, and if then the Reef buoy is seen bearing about N.N.E., endeavour to approach it on the bearing of about N.E., and anchor at about a cable's length north-westward of it, in $4\frac{1}{2}$ or 5 fathoms at low water. The depths outside will vary from 9 to 13 fathoms, and when about three-quarters of a mile S.W. of the buoy, there are overfalls from 9 to 14 fathoms, quickly shoaling to 7 fathoms at the entrance between the Reef buoy and the Goodwin sand. It is almost indispensable to anchor in the situation mentioned above, to wait for a row-boat and pilot, as the channel is narrow, the bottom very uneven, and the soundings no guide. If the wind be from the southward or westward, high water is the time to weigh, or just at the commencement of the ebb; but if it be from northward or north-eastward, the last quarter of the flood is the proper time to weigh, in order to have a weak tide under lee, and be enabled to keep the row-boat on the port bow, while she proceeds along the sand and showing the depth of water by a flag. The extremity of the reef being very near the buoy, no ship must pass eastward of the latter. The anchorage at Amherst will admit several ships, but must be avoided by large vessels in the S.W. Monsoon (being open to all winds from S.S.W. by W. to N.W.), when a considerable swell sets in through the gaps of the reef.”

CAPTAIN MAITLAND, R.N., says that a vessel should anchor at $1\frac{1}{2}$ miles from Green island, with the pagoda on Amherst point, showing clear of it to the northward; thereby enabling pilots to come off during a flood-tide, by pulling along shore to the southward, and also giving plenty of room to weigh—a matter of some difficulty and danger in the strong tides off the Reef buoy close to the rocks and shoals. He also states that a pilot station is on the island.

As a summary of the foregoing it may be remarked, that it is advisable, generally,

* MR. DAVY says:—“It may be useful to mention the extraordinary ripples so frequently to be met with in the upper parts of the Bay of Bengal, and near the entrance to the Strait of Malacca. These ripples resemble an impetuous tide bubbling and breaking in front of an obstruction, and yet, from the observations that have been made upon them, they appear not to have the effect of current, nor in any way to throw a ship out of her reckoning. They are most frequently met with in calm weather or in light winds; often they have the appearance of a dangerous shoal, rippling and surging with much force, and advancing towards the ship against a single-reef-top-sail breeze at the rate of 2 or 3 knots an hour. In striking against the ship, the water often surges over the hammocks of small vessels, and fills the decks with water; in passing to windward, they may be traced to a considerable distance.

to approach Amherst on the parallel of 16° N.; when on this parallel, in $96^{\circ} 30'$, the Zingaat mountains will be seen in clear weather. If soundings of 11 fathoms are obtained, a vessel will be on the Martaban coast; but if the crease to 6 or 7 fathoms, she will be on the edge of the banks fronting the Rangoon river or the adjacent coast. If the coast about Amherst be made during the S.W. Monsoon, which is the stormy season, commencing in May and terminating in October (the rest of the year being made up by N.E. winds, calms, and clear weather), there is good anchorage off the shore at from 5 to 10 miles distance, and continues for about 100 miles southward of the port. A ship sailing from Amherst in the S.W. Monsoon, before obtaining an offing, may probably be obliged to anchor two or three times during the flood-tide, with the risk of riding very hard, or perhaps losing her cable by the heavy sea.

KALEGOUK ISLAND.—From Cape Kyai-kami (Amherst point) to the north end of Kalegouk island the distance is 30 miles. Double island has already been noticed; the shore behind it is low and fronted by a shallow flat, for which vessels should always keep westward of the island. At about 6 miles from Double island, in a south-easterly direction, are two patches of rocks above water at about 1 mile from shore; in the channel between these and the land are soundings of 5 fathoms, but as the projecting point of the coast has a reef extending from it a short distance, it will be prudent to keep outside them; the depth at a very little distance ward of these rocks is 8 and 9 fathoms. The current hereabout, at 7 miles from the land, was observed by CAPTAIN ROSS, of the Indian Navy (1828), to flow westward at the rate of 4 knots an hour, and to increase in strength as he approached Amherst.

Kalegouk island is an island $5\frac{1}{2}$ miles long, in a N. by W. and S. by E. direction, and not more than a mile wide in its broadest part, its north end, whence it extends to a point at its south end. Steep point, in the centre of the island, on its eastern side is in Lat. $15^{\circ} 33'$ N. On Woodstock hill, 200 feet high, and $1\frac{1}{4}$ miles from its northern end, were some remarkable trees in 1862. DR. MACPHERSON says—Kalegouk island is composed of primary rock, the superstratum being a rich mixture of a porous soil, composed of sand and vegetable mould. Its formation is very peculiar, the northern and southern portions differing considerably. The northern portion of the western side is composed of a long granite ridge, with an average perpendicular drop to the sea. The eastern side descends to the shore in gentle or abrupt slopes, while the western is broken into isolated hills, with level, well-raised interspaces, forming three bays. Quarry bay, where the stones were quarried for the Alaguada lighthouse, is the deepest; the beach is sandy, but at ebb tide an extensive mud flat, covered in places with mangroves, is exposed, the somewhat narrow channel between the island and the mainland tending to the accumulation of mud. Both sides of the island are broken into bays. To the west, Retreat bay, Sea bay, and Fish bays, have beautiful hard, sandy beaches, well protected by hills on each side, and open to the ocean in front, with a fine rolling surf on the shore, and only divided from one another by projecting rocky points, and from the corresponding bays on the eastern side by well-raised necks of land, sloping eastward west, free from all swampy ground, and ascending north and south to the hills which divide the bays. The eastern bays look on the distant mainland, rising to a bold outline on the horizon. These very much resemble the western bays; in fact

According to an island having the form of a parallelogram, situated

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on the horizon. These very much resemble the western days; in fact, since

ly by the mud uncovering at half-tides, the rise and fall at spring-tides being 2 feet. All the bays on the eastern side are perfectly protected from the south-east Monsoon, as are the bays on the western side during the north-east Monsoon; the entire island is clothed with fine primeval forest, with trees of immense dimensions and height. Water of an excellent quality is procurable at a depth of 15 feet; and a perennial spring of sweet water flows through the centre of the island."

At the south end of Kalegouk island is an islet, one-third of a mile long, named Cavendish, surrounded by a reef which projects from its south-west side about a quarter of a mile. In the narrow channel between these islands the depth is 8 and 7 fathoms.

The west shore of Kalegouk has not been surveyed; it is believed to be lined by a reef, and should not therefore be approached nearer than the depth of 11 or 10 fathoms. The east shore has shoal water from it to a moderate distance, beyond which are soundings of 5 and 6 fathoms.

At the north end of Kalegouk, and separated from it by a very narrow channel of 8 fathoms, through which the tide flows to the north-west at the rate of 5 knots an hour, causing a heavy race, commences the Galloper sand, a shoal extending thence 6 miles to the N. by E. in the direction of Pulo Crocic, a small islet situated about a mile from the mainland. This sand is dry at low tide over a considerable portion of its surface, other parts having a depth of not more than 6 to 12 feet, and its edges are moderately steep; consequently it should be very cautiously approached. The channel between its north end and Pulo Crocic is rather more than a mile wide, and has soundings in it of 5 to 10 fathoms; it is called North channel, the South channel being round Cavendish island, at the south end of Kalegouk.

The channel between Kalegouk and the shore is 4 to 5 miles wide, and the soundings midway are about 8 fathoms. Here vessels may anchor and find good shelter from all but southerly winds; the best place is said to be off the highest part of the island in 6 or 7 fathoms. Ingress and egress are easy. The North channel is very rarely used, being narrow.

When running for Kalegouk anchorage, give Cavendish island a berth of about a mile, and when it bears W.N.W., haul to the northward and pass up to the anchorage. The shore of Kalegouk island should have a moderate berth given to it.

According to MR. N. ICELY, R.N., who surveyed this anchorage in 1830, vessels drawing 10 feet may be laid on shore for repair at North creek, on the east side of the island, at about a mile from its north point. Wood and some fruit may be procured, and three or four tons of water per day in the dry season at Mahomed's well in Freshwater bay. Buffaloes and rice can be obtained from Dermonjai creek, on the mainland opposite the middle of the island.

COAST OF TANASSERIM, &c.—From Kalegouk island southward to Lat. 2° N., including the Mergui Archipelago, there are no ports frequented by foreign vessels, and as this coast is but very little known, no thorough survey of it (except one of the Mergui islands by COM. LLOYD, 1828) having yet been made, it seems superfluous to attempt a description of it, especially as the harbours are all of such a character that they cannot be entered without a pilot. We therefore conclude our description of the east coast of the Bay of Bengal with some remarks upon Penang.

PENANG.—Penang is an island having the form of a parallelogram, situated

between Latitudes $5^{\circ} 16'$ and $5^{\circ} 28'$ N. and Longitudes $100^{\circ} 10'$ and $100^{\circ} 20'$ E. It is very lofty, West hill, in the northern part of the island, its most elevated part, being 2713 feet above the sea. On the east side of the island is Georgetown, where a considerable trade is carried on with Singapore, and various ports of Eastern India. Fort Cornwallis is in Lat. $5^{\circ} 24' 30''$ N. and Long. $100^{\circ} 20' 10''$ E.*

The channel between Penang island and the shore is from 8 to 2 miles wide, the latter being the width of the channel opposite the town. The greater part of this space is occupied by the Great Kra Flat, an extensive shoal of 3 to 9 feet, which runs off from the main land in the direction of the island: this bank appears to be of a changeable character, as the South channel, the channel between it and the island, was found in 1863 to be about 10 feet less in depth than when it was surveyed by LIEUT. WOODS, R.N., in 1832—hence it will not be prudent to attempt to enter Penang harbour by this channel without a pilot. We believe that the edges of the sands are marked by fishing stakes and beacons.

The anchorage at Penang is off the town in 9 to 12 fathoms, and there is protection from all winds except those from north-westward. The best berth for large vessels is said to be at about a quarter of a mile south-eastward from the fort in about 10 fathoms; small vessels anchor nearer the town in 3 to 4 fathoms. The harbour has an extent of $1\frac{1}{2}$ to 2 miles; the fort point is nearly steep, having 5 to 9 fathoms immediately off it, in the middle are 12 to 14 fathoms, and the soundings off the main decrease from 7 to $1\frac{1}{2}$ fathoms. Ships of war anchor in 7 to 10 fathoms half a mile northward of the fort.

The best route to Penang anchorage is from the north-westward. The north shore of the island is high and bold, and has a shoal extending out from it 1 to 2 miles, on the edge of which are soundings of 3 to 4 fathoms; hence it should not be closely approached, nor should a large ship get nearer the coast of the main land than 2 miles, on account of the shallow flat extending from it. The soundings throughout this, the North channel, are $4\frac{1}{2}$ and 5 fathoms, deepening to 9 and 10 fathoms in the vicinity of Georgetown. The South channel in 1832 was safe for vessels drawing under 17 feet; the depth, as already observed, is said to have become considerably reduced.

* This is considered to be a well-determined position, and has been taken as a secondary meridian in determining the position of various places in the Bay of Bengal and Strait of Malacca. A shipmaster bound to Penang should have the Admiralty chart (No. 1366) at hand for reference.

PRINCE EDWARD I^{LS}

Nautic Miles



PRINCE EDWARD
ISLAND



Lat. about
46° 45' S.

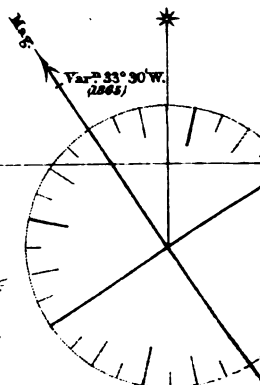
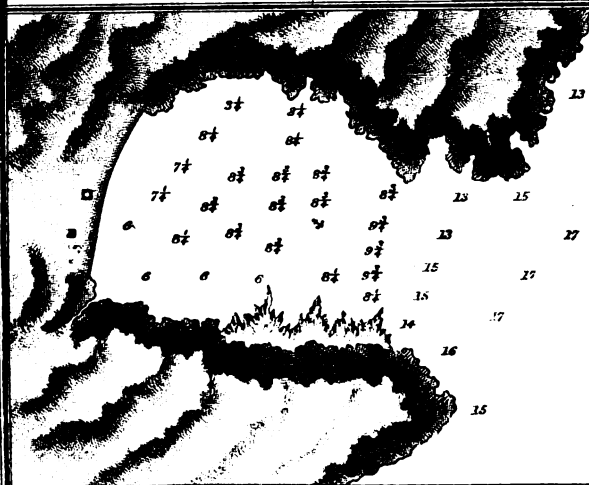
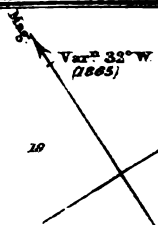
The Prince

MARION

ISLAND

Long. about
37° 36' E.

Cascade



SHIP BAY

[POSSESSION L. CROZET]

One Cable

Soundings in Fathoms

PART III.

SAILING DIRECTIONS

FOR THE

ISLANDS IN THE INDIAN OCEAN.

PRINCE EDWARD ISLANDS.*

THE two lofty islands known as the **PRINCE EDWARD**, are situated about 1000 miles from the continent of Africa, in a south-east direction from Algoa bay, in about Lat. $46^{\circ} 50' S.$, and Long. $37^{\circ} 36' E.$ They lie in a N.N.E. and S.S.W. direction, and are distant from each other 12 to 13 miles, the channel between being apparently clear of danger, excepting such rocks as may be off the shores on either side. The south-western and larger island is named Marion, from the Frenchman, **MARION DU FRENE**, who discovered it in 1772; the more northerly island bears the name of **PRINCE EDWARD**.† **CAPTAIN COOK** considered the larger island to be about 45 miles in circuit, and its centre to be in Lat. $46^{\circ} 53' S.$, Long. $37^{\circ} 46' E.$;‡ the smaller island in Lat. $46^{\circ} 40' S.$, Long. $38^{\circ} 8' E.$, and about 27 miles in circuit. They have not been surveyed, so it is not known if a bank of soundings surrounds them to any distance; and they are believed to contain no place of safe anchorage.

CAPTAIN COOK's report of these islands is as follows:—"We passed midway through the channel between the islands, and could not discover, with the assistance of our best glasses, tree or shrub on either of them. They seemed to have a rocky and bold shore; and, excepting the south-east parts, where the land is rather low and flat, a surface composed of barren mountains, which rise to a considerable height, and whose summits and sides were covered with snow, which in many places

* So named by **CAPTAIN COOK**, in honour of the Duke of Kent, the father of Her Majesty.

† See Chart of Prince Edward Islands.

‡ **COOK** found the longitude of Cape Town to be $18^{\circ} 32' 10'' E.$, which is $6' 10''$ too much to the east, according to the most recent observations; hence rectifying the positions of Prince Edward islands as given by **COOK**, we find the centre of the western (Marion) island to be $37^{\circ} 39' 50'' E.$, and of the eastern (Prince Edward) island to be $38^{\circ} 1' 50'' E.$

M. CECILLE made the Prince rock in Lat. $46^{\circ} 45' S.$, Long. $37^{\circ} 36' 4'' E.$ (see "Extrait du Rapport," &c. &c., par **M. CECILLE**, Capitaine du Vaisseau, Envoyée dans l'hémisphère Austral à la protection de la pêche de la baleine, 1837-1839), in which position it is placed in the French chart No. 955. **CECILLE**'s Longitude appears to be a mean between that of **COOK** and **ROSS** and is probably correct.

seemed to be of a considerable depth. The south-east parts had a much greater quantity on them than the rest; owing, probably, to the sun acting for a less space of time on these than on the north and north-west parts. The ground, where it was not hid by the snow, from the various shades it exhibited, may be supposed to be covered with moss, or perhaps such a coarse grass as is found in some parts of the Falkland islands. On the north side of each of the islands is a detached rock; that near the south island is shaped like a tower, and appeared to be at some distance from the shore. As we passed along, a quantity of sea-weed was seen, and the colour of the water indicated soundings. There was no appearance of an inlet, unless near the rock just mentioned; and that, from its smallness, did not promise a good anchoring-place.*

Prince Edward islands have since been visited by various navigators; among others by M. CECILLE, of the French ship *Heroine*, in 1838; and subsequently by CAPTAIN J. C. ROSS, R.N., with the *Erebus* and *Terror*, in 1840, when on his Antarctic voyage.†

M. CECILLE says, that "at 2 miles E.S.E. from the north cape of the larger or western island, there is a very high and remarkable rock, which I have named the 'Prince': it is much darker than the rock on the coast off which it stands, and is visible at a great distance. From the northward its summit appears larger than its base; from the north-east it appears like a tower—as it does from the eastward also, but in the latter view with the summit cut off in an inclined line: it is at a short distance from the coast, which appeared hereabouts fit for landing. In order to examine the western shore of the island, we sailed along at a distance of 1 or 2 miles, from the north to the south cape. At 7 miles E. 27° S. from the 'Prince,' we found before us a bank of kelp, extending at right angles with the shore about 3 miles. The *Heroine* was put about, and after working round the bank, we approached the coast again to resume our operations. In all probability there is sufficient water under the kelp, at least I think so, for it appears to be of the same nature as that which surrounds Tristan da Cunha and the Falkland islands—some pieces of which are 40 fathoms in length. It is not rare to find kelp at the depth of 25 to 30 fathoms; but it is also found on rocks at less depth, and I therefore did not think fit to cross this marine forest, and time would not permit of our sending a boat to sound. We met with another bank of the same kind extending a mile to seaward from the eastern point. The coast which from the north cape to this point trends in a direct line E. 40° S. and W. 40° N. now suddenly bends to the S.S.W. We found a considerable waterfall at about 2 miles in this direction, tumbling from the heights to the flat shore beneath. We kept continually sounding with 12 to 15 fathoms along our track without finding any bottom. The coast we passed rises abruptly towards the mountains, presenting no sandy beach, bay, landing-place, nor anchorage whatever; neither could we form any correct opinion of the height of this mountainous island, the summit of which was concealed by clouds. The heights were capped with snow, and we observed much more on the southern than on the northern part of the island, in consequence of its being less exposed to the sun. Not a tree or bush of any kind was seen; and the soil seemed dry and arid, but there

* "A Voyage to the Pacific Ocean, for making Discoveries in the Southern Hemisphere, under the Direction of CAPTAINS COOK, CLERKE, and GORE, in H.M. ships *Resolution* and *Discovery*, in the years 1776-1780." Vol. I., p. 53, second edition, 1785.

† "Voyage of Discovery in the Southern and Antarctic Regions, years 1838-1843, by CAPTAIN SIR J. C. ROSS, R.N.

appeared a green and red moss, resembling that on the Crozet islands, covering the pyramidal-shaped rocks—which at a distance had the appearance of trees.

"The eastern island is much smaller than that just mentioned, and has a very remarkable rock at its northern extremity. The entire length of the island did not appear to extend more than 5 miles from north to south, although longer from north-west to south-east; it is neither so elevated as the other, nor covered to the same extent with snow."

CAPTAIN ROSS describes the islands as follows:—"The weather was so hazy that we could not perceive the land until we found ourselves within 2 or 3 miles of the southern point of the larger island. Sailing close along its south-eastern side, and at about 1 mile south of the east cape, we sounded in 86 fathoms, fine sand, coral, and corallines. This line of coast is composed of black, perpendicular, volcanic cliffs, much worn away by the action of the waves. We observed two or three conical hills, like the small craters of a volcano, of a deep red colour, whether arising from an oxide of iron, or vegetable matter, we could not discern. The south cape has a perpendicular face, the termination of a long terrace-like projection from the foot of the hills. The mountains in the centre of the island rise to a considerable height; but their summits being enveloped in mist, we could not determine their elevation, although we could see they were partially covered with snow. We imagined we could distinguish small trees; still of this there is considerable doubt.

"Long lines of seaweed extended 2 or 3 miles from the shore beyond the east cape, whilst strong eddies of tide, occasioned probably by their meeting at this point, seemed to indicate concealed dangers, and darkness now coming on, we hauled off for the night, having first seen a small cove a short distance to the northward, where we hoped to be able to land the next morning. This part of the coast was populated by vast numbers of penguins, in groups of many thousands each, and other kinds of sea-birds were abundant. Some seals that were playing in the surf about the small detached rocks were pronounced to be of the fur species (*Arctocephalus Falklandicus*), by those well acquainted with them; it is not improbable that on the western coast some of their haunts, or, as the sealers term them, 'rookeries,' might be found.

"The soundings during the night were very irregular. A dredge put overboard for a short time in 95 fathoms, at about 5 or 6 miles east of the island, came up quite full of a small white coral, and between 30 and 40 different kinds of marine animals, corallines, flustræ, and sponges. At daylight in the morning we found that we had been carried so far to leeward by a strong tide, or more probably a current, and so heavy a swell prevailed from the westward, the forerunner of the coming gale, that I reluctantly gave up my intention of landing, rather than lose any more time in hopeless endeavours, and bore away for the Crozets.

"There did not seem to be any bay along the north-eastern or south-eastern coast where a ship could find anchorage, unless it be just to the northward of the east cape, where we supposed we saw a small sandy beach between two extensive patches of seaweed; nor did COMMANDER CROZIER see any as he passed along the shore the next day in the *Terror*. He mentioned a remarkable detached tower-shaped rock, at some distance off the north cape. This promontory he found by good observation to be in Lat. $46^{\circ} 53' S.$, and Long. $37^{\circ} 33' E.$, agreeing very nearly with COOK in the latitude, but differing considerably in the longitude. In the *Erebus* we were unfortunate in not getting observations near the southern part of the island; nor could we approach the smaller north-eastern island sufficiently near to see any creeks or bays; but I was afterwards told that sealers sometimes anchor at a place

called Cave bay, on its east side, in Lat. $46^{\circ} 40' S.$, with the N.E. point N.E. by E.; the Cave, W.N.W.; and Mary's point S.W. $\frac{1}{2}$ S. in 8 or 10 fathoms water."

THE CROZET ISLANDS.*

The **CROZETS** are situated between Lat. 46° and $46^{\circ} 37' S.$, Long. $50^{\circ} 52' 20' E.$ —on the direct track of vessels bound to the Australian colonies. The westernmost of the group is **Hog island**; the easternmost, **East island**; the largest has received the name of **Possession island**; besides these, there are **Twelve Apostles** to the north, and **Penguin islands** to the south. Their positions will be seen by reference to the chart. They have not been surveyed, but are supposed to contain but one place of anchorage—viz., **Ship bay**, at the south-east end of Possession island, where vessels may ride in tolerable security from all winds except those from the south-eastward, to which quarter the bay is open. The group is named after M. CROZET, commander of the French ship *Le Crozet*, who discovered the islands in 1773.

The only known sunken danger among the Crozets is a reef upon which the *Heroine* usually breaks, situated about midway between Hog island and the island eastward from it, named Penguin; this reef is named *Heroine breakers*, from the French ship commanded by M. CECILLE. On the west and north sides of Possession island there are some detached rocks.

In Ship bay—the small bay at the south-east end of Possession island—the depth decreases from 17 fathoms at the entrance to 6 fathoms close to the shore at the south end near the watering-place. The best place to anchor is in the middle of the bay, in 10 fathoms, but care is required to keep clear of the rocks jutting out from the shore; the north shore of the bay is probably clear of sunken rocks.

The Crozet islands were examined in 1838 by M. CECILLE, of the French ship *Le Crozet*, in command of the *Heroine*, and from his published report† the following is translated:—

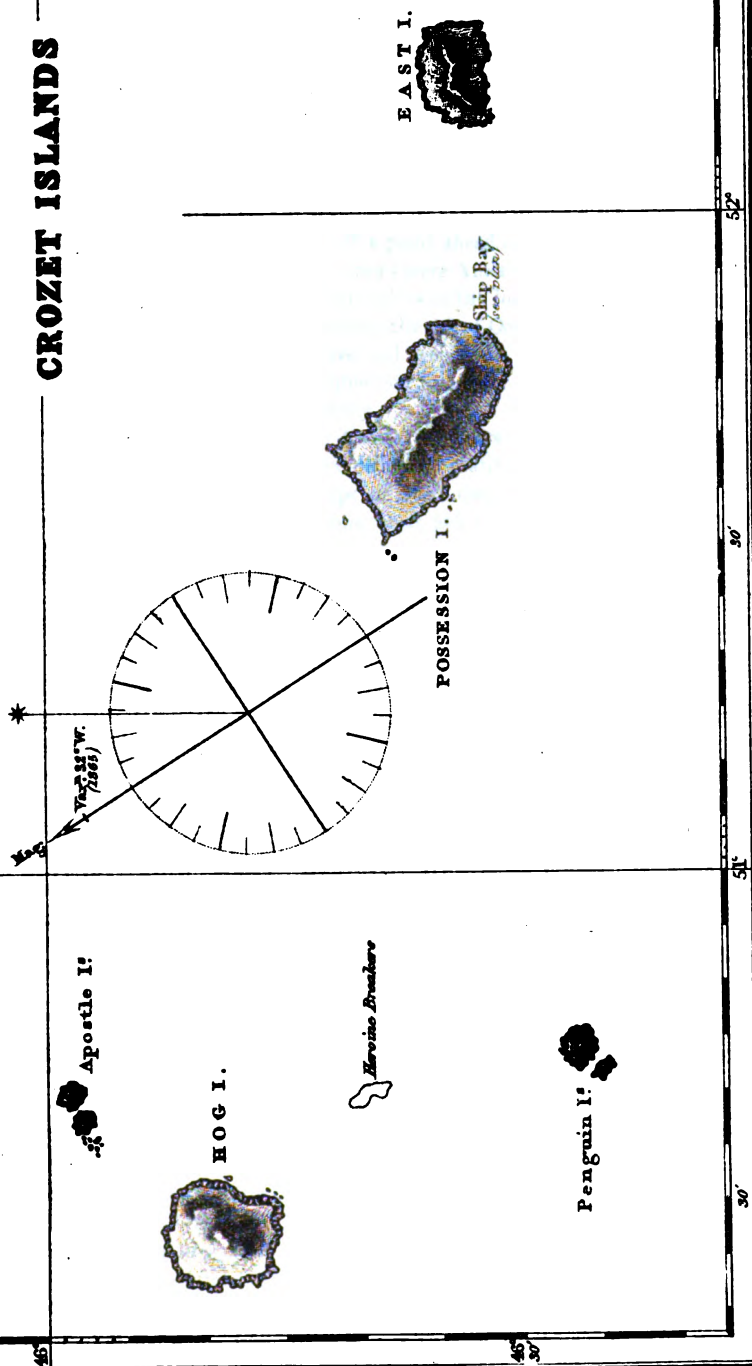
"We began our task in the N.W., with land which we have since found to be a part of Hog island; and running southward along the western shore of it, at a distant, we satisfied ourselves that it was inaccessible. Having reached its southern extreme, the Twelve Apostles (a group of rocky islets) bore N. 25° E.; at that time, breakers were reported at a considerable distance bearing S. 50° E. We then turned along the eastern coast of Hog island, and ascertained correctly that the western coast of that island and the Twelve Apostles offered no shelter for vessels. We then retraced our course to examine the dangerous breakers which had been reported, and which we had lost sight of, and at 11h. they were three miles W. of us. At midday we were enabled to obtain tolerably good observations, notwithstanding the horizon was not perfectly clear, and the sea was very high. We fixed the relative positions of the three islands, as well as the dangerous reef, which was still in sight.

"We then steered for the eastern group. At 4h. P.M. we perceived an island only more elevated but of much larger proportions than those we had visited, which we concluded to be Possession island. At 6h. P.M. we neared a large

* See Chart of the Crozets, and Plan of Ship Bay.

† Extrait du rapport, &c., par M. CECILLE, to which reference has already been made.

CROZET ISLANDS



LONDON, James Inray & Son.



rated rock to the N.W. of the island, and not far from the shore; from this rock we were enabled to see distinctly the whole of this steep coast entirely exposed to the wind, and against which the sea broke with all its fury."

CAPTAIN CECILLE was unable to continue his exploration that day, being compelled to stand off; but he made the land again next day, when he says:—"We approached the perforated rock in order to proceed with our survey of the eastern coast.

"We had been for some time keeping a southern course along the land, when, on the 23rd of November, at 3h., we perceived off a point ahead of us two boats coming to meet us; they were soon on board. The crews were Americans, each being commanded by a captain of that nation, who informed us of the loss of their two vessels, the *Atlas* and *Colossus*, on Possession island, on the 4th of October preceding; they also told us that the passage-boat, *Bordelais*, had been lying in Ship bay since the 6th of November. We proceeded thither, intending to anchor at the entrance of the bay, where we found her engaged in the fishery.

"The resources of the *Heroïne* offered to CAPTAINS BARNUM and RANDALL, as well as twenty-five of their crews, were accepted with gratitude. I took them on board in order to transfer them to any ships of their own country that I might happen to meet at the different fishing-stations, or at any of the English colonies of Australia where there are consuls. My first care on arriving at the anchorage was to cause a correct survey of Ship bay to be made, so as to enable us to fix its position, hitherto so badly known,—a service which was performed by MM. FOURNIER and D'UBRAYE, in the course of the day.

"The Crozet islands, situated between Lat. $46^{\circ} 9'$ and $46^{\circ} 34'$ S., Long. $50^{\circ} 24'$ and $52^{\circ} 20'$ E., are five in number, and are divided into two groups. The largest of the western group is Hog island, which is mountainous and high; the coast in many places steep, without any bay or anchorage for ships. The only parts at all accessible, and that with difficulty, are a few places on the eastern coast. It abounds with wild hogs and seals. At the distance of nine or ten miles E. 40° S. from the southern point of this island is a dangerous reef, which appeared to extend about a cable's length. It blew a gale all night, which made the danger formidable.

"About eight or nine miles to the N.E. of Hog island are the Twelve Apostles, which, strictly speaking, are connected together. Formed by two islets of moderate height, separated by a narrow channel and surrounded by ten or twelve small rocks, they appeared inaccessible on all sides. A danger is reported to lie three miles S.E. of the Apostles, but we could not see it.

"The most southerly of the Crozets is Penguin island, formed by two very elevated islets—close together. It is six miles in circumference, and has the appearance of a sugar-loaf when seen from the N.E. It abounds with seals.

"The eastern group of the Crozet islands is composed of Possession island and East island. On the S.E. of the former island is a small bay, about a quarter of a mile in depth, and about half that in width, called Ship (Navire) bay. It is situated at the termination of a deep valley, from whence a stream of delicious water runs into the sea. Being open to the E. and S.E. winds, which seldom blow with much violence, but sufficiently so as to produce a high sea and considerable surf, it is then very dangerous; but these winds rarely blow between November and the end of February. The N.W. wind, which comes down the valley, is very strong; and when the N.E. and S.W. winds, which blow along the coast, are strong, the

surf breaks violently, and renders communication with the land very difficult. Vessels intending to remain here any time should ride with strong chains secured to the rocks on the shores of the bay, with the strongest chain to starboard, on account of the sea. Ship bay is the best place of shelter, and the most frequented by fishermen; water is easily obtained there. Its Lat. is $46^{\circ} 26' 18''$ S., Long. $51^{\circ} 50'$ E.

"Two miles to the northward of Ship bay is the bay of Chaloupe, which offers no shelter except for boats. Three miles farther to the northward is America bay, moderately large. A ship anchored in 8 fathoms water at two cables length from a rock on the starboard side of the bay on entering, is tolerably protected from any wind between north and south, by the west; the bottom is sand and rock. It is not advisable to stay long at this anchorage; good water is found in a small river at the bottom of the bay. Three miles farther north is Hebe bay, where a vessel of that name was lost in 1831. It is small, and only fit for boats, which may find shelter under the lee of a rock in the middle of it. The western coast, with the exception of a reef lying three or four miles off the western point of Possession island, is clear of danger; but as the sea there runs extremely high, it should be carefully avoided under a light wind or with uncertain weather.

"East island, the most eastern of all the islands is very high and steep, access to it being only attained by a very small bay, situated on its N.W. part. It is not favourable for fishing, although seals in great numbers find more shelter on its southern side than on any of the other islands. All these islands are plainly visible in clear weather at the distance of twenty to twenty-five leagues; but, like Prince Edward islands, they are totally destitute of trees or bushes. Being nearly always covered with snow, the only vegetation is grass and a very hard sort of hollow-stemmed moss, which grows on a soil everywhere marshy, as well as on the sides of the mountains. This moss is of a reddish colour, and when squeezed emits a juice of the same colour. The islands are an asylum for a prodigious number of birds of several species, and three kinds of penguins—viz., the royal, the tufted, and the common."

The Crozets were subsequently visited in 1840 by CAPTAIN SIR JAMES CLARK Ross, R.N., when on his Antarctic Voyage of Discovery in the *Erebus* and *Terror*, and from his observations we make the following extract:—

"Land was seen at daylight bearing E. by S. at the distance of 10 miles. It proved to be Penguin or Inaccessible island, and well deserves either of the names it bears, for it was literally covered with penguins on all the ledges of its rugged shores, nor could we anywhere see a point on which it would be possible to land.

"'Pig or Hog island' of the sealers, was soon afterwards seen to the northward. It is the westernmost island of the group, and presented a much more agreeable aspect, but the weather being unfavourable, and its eastern, or lee side, having many dangerous reefs and detached rocks off it, we did not venture nearer than 2 or 3 leagues; but after passing close to Inaccessible island, we shaped a course for the southern extreme of Possession island, which we had been informed extended as far as the 47th deg. of lat. During the night the wind increased to a strong breeze from the westward, with thick weather, and we were obliged to carry a heavy press of sail to clear the land under our lee, which we had scarcely accomplished when a south-westerly gale came on.

"April 27. Although still very foggy at times, we were enabled to bear away at

0 A.M., and having passed over the assigned position of Possession island, we saw the land at 5 P.M. through the haze, 5 or 6 miles distant, but daylight was now most gone; we nevertheless stood towards it, until darkness closed the scene, when the ship was hauled off for the night.

"April 28. The morning was more clear, when as the day broke between 6 and 7 o'clock, we perceived the lofty mountains of East island 4 or 5 leagues directly to windward of us, so much had we been carried to the eastward during the night. The whole day was spent in beating up against the current and strong westerly breeze, and at sunset we were still several miles from the shore. I could not but regret this serious loss of time, but having appointed Possession island our first rendezvous, until the end of this month, in case of parting from the *Terror*, I wished to communicate with one or other of the sealing parties, to ascertain whether they had seen her off the islands. I was still more anxious to land the provisions which I had on board for the winter stock of those people who might have been in much want of them. We therefore continued beating to windward all night, and at daylight, the fog having cleared away, we had a good view of this perfect mountain mass of volcanic land; its shores, bold and precipitous with many projecting rocks, which seem to have been formed by the unceasing action of the waves cutting away the softer parts, and with the exception of a single beach of some extent, on the north-east part of the island, affording no place where either a habitation could be built, or a boat land.

"This beach appearing to us the only favourable spot for the sealing party, we fired several guns as we stood close in to the shore, and by these means attracted their notice, for we soon afterwards observed by our glasses a large fire on the east side of the bay, which the people had made to point out to us their location. We were still too far to leeward for them to venture off to us, and after beating to windward until 2 P.M., when just as we could have fetched into the bay, the wind suddenly increased to a strong gale, and the violent gusts that rushed along the almost perpendicular coast-line, raising the spoon-drift in clouds over us, reduced us to a close-reefed main topsail and storm staysails, under which, when within half a mile of the shore, we wore and stood off again, seeing the utter hopelessness of communicating with the party until the return of more moderate weather. We were greatly disappointed at being thus defeated; but these frequent repulses only made us more determined to do our utmost to effect the objects we had in view; and although we were driven by the gale and current far away to leeward, yet, towards evening, when it abated, we began to maintain our ground, and, by carrying a heavy press of sail throughout the night, we found ourselves the next morning (April 30) several miles to windward of East island, and had Possession island distinctly in sight on our weather bow. Knowing the greater facility of communicating with this land for reason of the shelter its extent affords from the strong westerly gales that blow most continually except at this period of the year, and as the larger establishment of sealers was on this island, I preferred beating up to it as the weather was fine, and we were making good way, rather than run down to the leeward party at the risk of being again unable to land at their station. Soon after noon it fell quite calm; and, after firing a few guns, we observed a white flag hoisted on a pole by the party in America bay; we were at this time about 5 miles from the shore, and directly between Possession and East islands; the weather was still too unsettled for a boat to come off to us. While lying becalmed in this passage we obtained soundings in

85 fathoms, on a bank of sand, shells, and corallines. At dusk, on a breeze springing up from the north-west, we stood off to sea for the night.

"May 1. It blew hard from the north-westward with so dense a haze that we saw only during a partial clearing, and when within 4 miles of Dark head, a glimpse of the high perforated rock that stands out more than a mile from the coast to the westward, and is an unerring mark, by which the cape may be distinguished. As we bore away close along the shore we got into smooth water, but passing 'Windy bay,' the squalls that came down the valleys compelled us to lower our topsails and keep them down until we had passed the opening.

"The remarkable 'Red Crag,' near which the flag had been displayed yesterday, came in sight, and guided us to America bay, where we saw the party on the point launching their boat. Their superintendent came on board, and he, as well as the boat's crew, looked more like Esquimaux than civilized beings, but filthy in their dress and persons than any I had ever before seen. Their clothes were generally soaked with oil, and smelt most offensive; they wore boots of penguin skin with the feathers turned inwards. They told us that the weather had been so tempestuous that until yesterday they had not been able to launch a boat for several weeks; they had, therefore, been very unsuccessful at the Sea Elephant fishery, and were disappointed to find they were not to be removed to Pig island for the winter, which they describe as being so overrun with these animals, that, in their own words, 'you can hardly land for them.' The breed was left by CAPTAIN DISTANCE in 1834, and in less than six years have increased in an incredible manner, although great numbers are every year killed by the sea-elephants only for present subsistence, but salted down for supplies on their voyages from the cape. Some goats had been landed from an American ship some years ago on Possession island, and were also thriving on the long coarse grass with which the island abounds, but still maintained their domestic state, under the protection of the party. The party consisted in all of 11 men, one of whom had been on the island for several years; they seemed to have no wish to return to the Cape of Good Hope, but were quite contented, having plenty of food. The tongue flippers, and part of the skin of the sea elephant, are eaten by them, and they get a great abundance of rock fish (probably a *cottus* or *notothenia*,) about the size of a small cod, with a very large head, which they preserve by drying on the rocks. The sea-birds, in the breeding season, may be collected by boat-loads, and are an excellent food, particularly that of the albatross, which averages above a pound in weight, and the young birds, when first taken from the nest, are described as being quite delicious; it is possible, however, they may have acquired the Esquimaux taste as well as their habits. They described the soil as being very fertile, but they have never planted potatoes nor other vegetable, although they have seen them thriving here, as the temperature is never very low. Wild ducks were numerous in a lake on the top of the Red Crag, that dogs, trained for the purpose, get them any number whenever they are wanted.

"They had no plan of the island, and their information on this subject was very and unsatisfactory; they stated it to be 20 miles long, and 10 miles broad, with three bays on its east side, in which ships may anchor, but the western coast was unapproachable by ships of any size, on account of the heavy swell that comes in upon its shores: a boat belonging to this party and all the crew were lost there, whilst in search of sea elephants. In America bay, Lively bay,

bay, vessels at anchor are well protected from the prevailing winds, but must leave the two latter immediately on the springing up of an easterly breeze, as America bay is the only one where there is room for a ship to beat out. These winds are said to be of rare occurrence, so much so, that the French frigate *Heroine*, which was sent to examine this group of islands, remained the whole period of her stay, above five weeks, moored in Ship bay; since then, however, two English whalers were wrecked in the same bay, by trying to ride out an easterly gale.

"We were told that there was every indication of an easterly wind, which is more frequent just at this time of the year, and the height of the barometer seemed to confirm his opinion, or I should have anchored for a few hours to have examined the bay; but convinced from the nature of its formation that it could be of no use as a magnetic station, and being anxious to rejoin the *Terror* as soon as possible at our next rendezvous, we bore away with the intention of laying down as much of the coast-line of the island as we could before dark.

"Like the rest of the group, it is evidently of igneous origin; near the tops of some of the hills we could perceive short basaltic columns, and two or three appearances of extinct craters. The coast is high and precipitous at the north end—and *irregularly stratified*; along its eastern shore it is more broken into small bays, and we observed several cataracts issuing from the more extensive green patches upon the hill sides, and dashing over the black cliffs into the sea beneath.

"The remarkable Dark head, at the northern extreme of the island, is in Lat. $46^{\circ} 19' S.$, Long. $51^{\circ} 53' E.$; the southern point is in Lat. $46^{\circ} 28' S.$, and Long. $51^{\circ} 56' E.$; the variation of the compass, $35^{\circ} 13' W.$ The centre of East island is in Lat. $46^{\circ} 27' S.$, and Long. $52^{\circ} 14' E.$ These results, though sufficient for all the purposes of navigation, were not obtained with exactness, owing to the unfavourable state of the weather for observations.

"**Detached Rocks.**—Leaving the south end of Possession island at 4 P.M., we steered close along the southern coast of East island. Though not more than 3 or 4 miles in diameter, its loftiest pinnacles attain a height of at least 4000 feet, and the precipices of its shores in some places rise several hundred feet perpendicularly from the sea. Nearly every cape has its detached rock extending off it from $\frac{1}{2}$ a mile to 2 miles; one of these near Bull bay lies still farther off, and being considerably inclined, in one point of view, resembles a ship under a press of sail; hence its appellation 'Ship rock.' Another, near the south-eastern extreme, is called 'Church rock,' from another fancied similarity; but the most remarkable of them all is the perforated rock to the westward of the north cape of Possession island, through which we were told a small vessel might sail."

HEARD OR McDONALD ISLANDS.

This is a group of islands situated southward of Kerguelen island, in about Lat. $53^{\circ} S.$ and Longitudes 72° to $74^{\circ} E.$ Until 1853 their existence was not known, as but few vessels had hitherto sailed in so high a latitude on the route to Australia. They generally bear the name of McDonald, but they should properly be called Heard islands, as it will be seen from the following remarks that CAPTAIN HEARD had priority of discovery over CAPTAIN McDONALD. The following extracts from the *Mercantile Marine Magazine*, 1858 and 1865, contain all that is known of them:—

"These islands are directly in the way of vessels that take the composite track of

53° S. to the Australian colonies, and were discovered almost immediately after the 'diggings' called up a new class of ships, to take the shortest route in the shortest possible time, to that land of gold, where every eager adventurer expected to make his fortune and return in an incredibly short time a Croesus. Now, if we mistake not, the following will be found to be the result of discovery :—

"Nov. 1853.—CAPT. HEARD, of the American ship *Oriental*, saw
Lat. 53° 10' S., Long. 74° 10' to 74° 40' E.—*Maury's Sailing Direction*

"Jan. 1854.—CAPT. McDONALD, of the *Samarang*, discovered two islands
1st—in Lat. 53° S., Long. 72° 35' E.

2nd—in Lat. 53° 3' S., Long. 73° 31' E.

"Dec. 1854.—Extract from the log of the *Earl of Eglinton*, CAPT. J. S. H.
Nov. 30th—Lat. 51° 21' S., Long. 70° 1' E., strong breeze from N.N.W. w

Dec. 1st.—Lat. 53° 1' S., Long. 75° 30' E., strong breeze from W.N.W. w

"Steering S.E., southerly, at 2 A.M., on the 1st December, just as day was breaking, land was observed right ahead; all hands were immediately called, the studding sails that were set on both sides hauled in, and we rounded close to the N.W. shore—after passing two rocks off the western point: we hauled in 3 to 4 miles of the shore, which was covered with snow, and from 50 to 80 fathoms. No shrub nor vestige of verdure was to be observed. That we were near the station of numerous ocean fowl was evident, since they quite shaded us over the water.

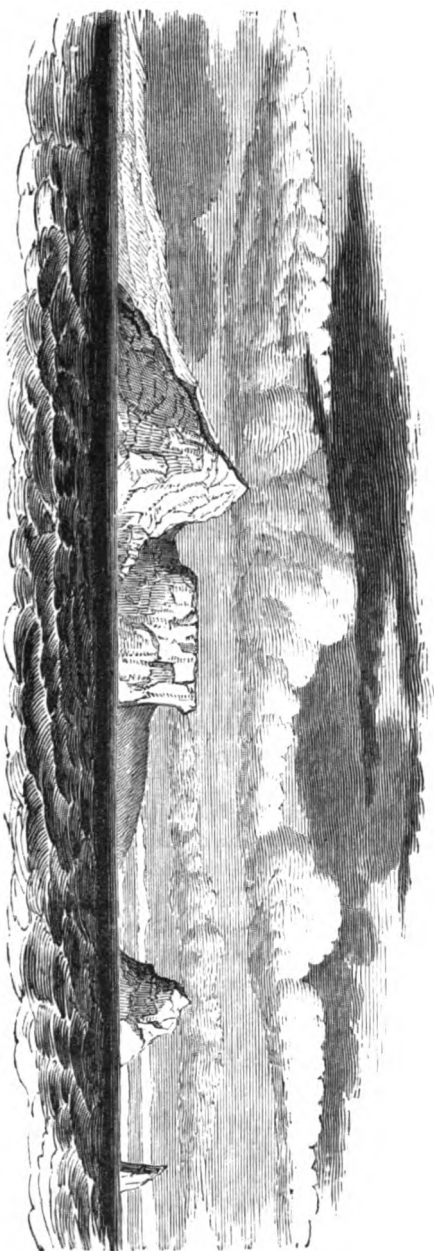
"A large conical mount on the northern end resembled in height and appearance the Peak of Pico (Western isles)—also a table land, in appearance like Table Mountain in the Cape Colony, and as seen from Table bay. Although the weather was so foggy we lost the extreme end in the distance, and a large quantity of snow lay on the ice. Calculating the position from excellent sights on the previous noon, as was the case at noon of that day, the N.W. end lies in Lat. 52° 53' S., and Long. 73° 50' E. The island appeared from 15 to 20 miles in a N.W. and S.E. direction; but as we were so far from land in the distance, it may extend beyond that length.

"Dec. 1854.—CAPT. J. ATTWAYE, of the *Herald of the Morning*, reports in his log as follows :—

"Dec. 3.—I discovered an island, and sounded in 73 fathoms, on black sand, a harbour about 10 miles distant, good to view, but exposed to westerly winds. The next day, the 4th, a small island, distant from the larger one about 10 miles, and a steep rock about a mile from it; the large island about 40 miles, and about 9 miles long. I had good observations when close to and sailing round the sides of the island. I give the middle of the large island Lat. 53° 10' S., Long. 74° 36' E. Longitudes deduced from chronometers, which leaving the Cape of Good Hope on the 18th November were found to be correct.

"Dec. 1854.—CAPT. REES, of the *Lincluden Castle*, gives the following account:

"Dec. 4th, at 8 A.M., fine clear morning, to my great astonishment, we discovered something very like an island. At 10 A.M. we passed within 3 miles of the island, apparently about 4 or 5 miles in circumference, and 400 to 500 fathoms deep. Detached from the island, about a mile to the westward, stood a high rock



THE HEARD OR McDONALD ISLANDS.
(From a sketch by JAMES S. HUTTON, of the "Bart of Eglington," Dec. 1st, 1854.)

shape of a sugar-loaf, higher than the island. I could see it plainly from 18 miles distant. The position of the island by good observations is Lat. 53° 50' S., Long. 72° 50' E. I named it Gray island.

"When abreast of this island, high land was discovered to the S.E., covered with snow, the highest peak capped with clouds. At noon we were within 7 or 8 miles of the N.W. point; from this point the land trended to the S.W. as far as we could see, the land high and bold. We sailed along the north side two hours and then returned at the rate of 10 knots. In passing along the north side, I saw an opening between two high hills, very like a fine harbour; there appeared a good bay open to N.W. winds. We passed two rocky islands, about 6 or 7 miles apart, the larger one, apparently quite barren. The large island presented a magnificent spectacle; the sun shone brilliantly on its snow covering, and its highest peak was lost in the clouds. I could see the high land plainly at sundown, 50 miles distant. Lat. of N.W. end 53° 2' S., Long. 73° 20' E. Lat. of S.E. end 53° 12', Long. 72° 50' E. I named this Dunn Island.

"These islands would appear to have become, shortly after their discovery, a resort of whalers, as we learn from the *Mauritius Commercial Gazette* that CAPT. ROGERS, having received intimation concerning them, proceeded from Kerguelen, as soon as the season would permit, in the ship *Corinthian*, to the neighbourhood, and found land, but whether a continent or island he could not tell. He returned to Kerguelen, and having procured tenders, again started to look for new land. Arrived there with the *Corinthian*, *Atlas*, and *Mechanic*, in 1855, sending CAPT. BROWN, of the *Atlas*, on shore to look for a harbour. CAPT. ROGERS, at the same time, sailed under easy canvas along the land, making observations upon the coast. Finally, they discovered a small creek in Lat. (according to CAPT. ROGERS, a good observer) 53° 00' S., Long. 73° 31' E. CAPT. BROWN says it is in Long. (according to his chronometer) 73° 00'. CAPT. ROGERS, while looking from a small promontory, he saw at once elephants and sea leopards, and filled 100,000 barrels with oil.

"CAPT. ROGERS sailed along the N.E. side of this island, about 30 miles, and discovered one small harbour, where he anchored the *Atlas* and *Corinthian*. This seems to be an unsafe harbour. He lay ten days, he says, in great danger from the S.E. gale blowing.

"A reef of rocks W. by N. (true), 40 to 42 miles from the N.E. end of the island.

"The mainland itself seems to be covered with ice and perpetual snow, and can only become a whaling station, as there is not a blade of grass to be seen during the height of summer.

"CAPT. MEYER, of the *La Rochelle*, from Hamburg, is the next who recorded the discovery of islands hereabout:—

"On the morning of January 10th, 1857, with a fresh breeze from the N.E., the *La Rochelle* was pursuing her voyage in the Great Southern Ocean near the Cape of Good Hope, 53° S., at the rate of 11 knots an hour. The rain was almost incessant, and the atmosphere very foggy, so that there was scarcely a hope of getting a good observation that day. Towards mid-day, however, the fog and mist partially cleared, when, at no great distance from the ship, a sugar-loaf rock was seen, and at the same instant a saddle-shaped island. At 0h. 15m. P.M., they bore

compass, distant from 2 to 2½ miles; shortly afterwards the look-out announced a second island to leeward, the summit of which stood out above the clouds surrounding its base; it bore S. by E., while the first island lay N.N.W. from us, whereupon the course was changed from S.E. to S.

"At 1h. 6m. P.M., we had a clear sky, and an altitude of the sun was taken, for a reduction to the meridian; again, at 2h. 38m. P.M., we had another observation, and at 5h. 30m. a third; from these, combined with our courses and bearings, we determined the following positions:—

	Lat. S.	Long. E.
The Sugar-loaf rock	53° 8' 4	72° 23' 7
The North extremity of the larger island . . .	53° 13'	72° 44'
The Peak near the north end ditto . . .	53° 17' 5	72° 56'
The South extremity ditto . . .	53° 50'	73° 6' 8

"The middle of the strait separating the two islands is in about Lat. 53° 10' S., Long. 72° 36' E. of Greenwich, and while in it we experienced a strong set (P tidal) to the S.S.W.-ward; there was also a difficulty in keeping clear of the floating ice, of which it was full.

"As already observed, the first island, as seen from a ship to the westward of it at the distance of 2 or 3 miles, appears saddle-shaped; but on steering south the two peaks open out more, leading us to think that a small arm of the sea separates them. The loftiest peak was found by observation to be 286 feet high, and the island about 4½ miles in extent, N. by W. ¼ W. and S. by E. ¼ E.

"As we sailed along the southern and greater island, we could distinguish at about 4 miles S.E.-ward of its northern extremity a peak higher than that just mentioned. The coast appeared to be steeper and more broken to the south, where it terminates in its loftiest height, 1000 feet. The entire length of the island was 36 miles,* and at about a third of this distance from the northern end was a small bay, near which was a large islet. As evening drew on we were at its S.W. extremity, whence it stretched 20 miles to the eastward, which we had passed by 8 P.M., and at 8 P.M. the whole group had disappeared below the horizon.

"The land wore a wintery and truly antarctic aspect; ice-clad mountains rose high into the clouds; and only here and there was the naked iron-bound coast visible, with isolated patches of green showing through the snow, while in a few places the melting of the latter was productive of a waterfall tumbling from crag to crag. The only signs of life in these frozen regions were immense flocks of birds, among which were recognised the penguin and the albatross.

"February, 1858.—Lastly, we have CAPT. CUBINS, of the *Caribou*, making the north extreme of one of the islands in Lat. 53° 1' S., Long. 73° 7' E., and giving the following description:—

"On February 22nd, wind westerly, brisk gale with snow squalls; at 10.33 A.M. in a clear between the squalls, I fancied I saw land to the southward; took in studding-sails, shortened sail, and stood towards it. At 1.30 P.M. hove to abreast an island, with the centre bearing S.S.W., about 12 miles; lowered a lifeboat, and sent

* Another account in the *Neue Münchener Zeitung* states, that the greater island is 10 German miles from N. to S., and about 12 German miles E. and W. (The German mile is about 4½ miles English.) And the group lies between Lat. 53° 8' S., Long. 72° 24' E., and Lat. 53° 47' S., Long. 72° 40' E. of Greenwich. These islands were named the *King Max* by CAPT. MEYER, on the supposition that he was the first to discover them.

her to the land. I afterwards stood in to about nine miles off shore, and got no ground with 120 fathoms of line. The island appeared to be in a S.E. and N.W. direction, about 25 miles, its southern extreme trending to the S.W., forming a deep bight on its western side, which was entirely snow-clad, and gave it the appearance of a great barrier of ice. The greater part of the island was covered with snow; there was a remarkable group of high rocks lying off to the N.E. from the S.E. part of the island, apparently 6 or 7 miles, and on the N.W. extreme an iceberg aground. The island was cloud-capped, but I think that its greatest elevation could not be less than 450 feet above the level of the sea. While hove to, awaiting our boat's return, I was astonished to see vessels at anchor in a bay, we having opened it through drifting to the S.E. One of the vessels got under weigh, when I stood towards it; it proved to be the American schooner *Oxford*, of Fairhaven. They put out a boat, and the master came on board; he told me they called it Kurds island, and that it was discovered by them eighteen months before. He seemed annoyed that my boat had landed, and advised me to go and leave her behind, saying she would never return; but I told him I would never leave her while I had another boat to seek for her. I was very anxious, for it was then sundown, and darkness coming on fast; but while speaking, the look-out at the masthead reported the boat in sight. He then became more communicative, and told me they were after oil; that the shores of the island swarmed with sea elephants, and that they had sent to America from the island since the discovery 25,000 barrels of oil. The island was bold on the N.E. side, and no hidden dangers; and the bay where the vessels lay was a fine bay, or natural harbour, with good anchorage; no sunken dangers, with 12 to 20 fathoms all over, and sheltered from all winds except a north-easterly, with a fine river of fresh water at the head of it. He also told me that there was another island west of Kurds, distance some 30 miles, and another E.S.E. 70 miles, both of which he had seen, but never landed on them. My own officers that went in the boat confirmed his statement of the sea elephants, and of the island being well watered; there were penguins and other birds in myriads, and on an island about a mile apart from the main appeared to be a great mound of guano. Whilst lying-to I went to look at my abstract, and it made me shudder to think that only twelve months before I ran past the island at midnight in a heavy gale of wind, not more than four or five miles distant, ignorant of its existence. My greatest wish on sending my boat to the island was to find out if there were any shipwrecked persons on it whom I might relieve. It was entirely of volcanic origin, my officers having found the surface composed of ashes. I made the northern extreme of the island in Lat. 53°1 S., Long. 73°7 E.—good chronometers.

"From these accounts, we come to the following conclusion: that there can be no doubt the observations of CAPTAINS HEARD, McDONALD, HUTTON, ATTWAYE, REES, ROGERS, MEYER, and CUBINS, refer to the same group of islands—but the *difference of position* requires a few remarks.

"The positions given by CAPT. ATTWAYE coincide with those of CAPTAIN HEARD; and are we therefore to conclude that they refer to islands not seen by CAPTAINS McDONALD, HUTTON, REES, MEYER, and ROGERS? We think we are scarcely warranted in such a conclusion. Something must be allowed for the estimation of distance from the islands; and as all persons are not equally gifted in this respect, we may say the differences in the latitude are not large. But of the longitude, the dif-

ference of the extremes is $2^{\circ} 26'$, equivalent to 88 miles on the parallel of 53° . Now, from the general description, by all parties, of the characteristic features of the land, we believe we are warranted in saying that there is *one small island near to which is a large pinnacle rock; S.E. of this small island is a much larger one, and separating them there is a navigable channel, when free from ice*, and we therefore draw the inference that the discrepancy in position as regards longitude arises partly from calculation, but more largely from *error of chronometers*, a subject which does not sufficiently receive the attention of captains. Two very important articles, the first—'On the Variation in the Rates of Chronometers,'* and the second—'On the Importance of Testing Chronometers before they are used at Sea,† written by JOHN HARTNUP, Esq., F.R.S.A., Superintendent of the Liverpool Observatory, are recommended for careful perusal, and captains will there see to what errors they are subjected. We may say, then, that the position of these islands is only approximately known, and caution is requisite in sailing near the parallel of 53° S. between Long. 72° and 75° E.; but taking the mean of HUTTON's, REES', MEYER's, and CUBINS' reports, we have for the North part of the larger island, Lat. $53^{\circ} 3'$ S., Long. $73^{\circ} 15'$ E.;—and for its south end (mean of REES' and MEYER's observations) Lat. $53^{\circ} 31'$ S., Long. $73^{\circ} 28'$ E.

"We may here incidentally mention, that it is by no means impossible that shoals and rocks may be met more to the northward and eastward, as the following account will show:—

'CAPTAIN INGLIS, of the *Gauntlet*, of Liverpool, passed Kerguelen island on the 11th November, 1853, in Lat. 53° S. He here encountered continual snow-storms for a fortnight, accompanied by N. and N.E. winds. In Lat. $50^{\circ} 50'$ S., Long. $77^{\circ} 30'$ E., he passed over a bank of shoal water, the water suddenly becoming of a muddy appearance, and he has no doubt but that he passed within a very short distance of some hitherto undiscovered shoal, or island, as the water became perfectly smooth; but, in consequence of the heavy fall of snow, CAPTAIN INGLIS was unable to make such minute observations as he otherwise would have done. This shoal, or island, was observed by the crew and passengers as well as by the captain, who called them to witness the discovery he had made. Observing the blue water ran to the S.E. off the shoal, he steered away direct S. for one hour, going 13 knots, and then dropped suddenly into blue water. CAPTAIN INGLIS strongly recommends all navigators running from England to Australia, to keep a look-out when they arrive in this latitude.'

KERGUELEN ISLAND.

This large island, situated between Lat. $48^{\circ} 40'$ and $50^{\circ} 0'$ S., and Long. $68^{\circ} 40'$ and $70^{\circ} 40'$ E., was discovered by M. DE KERGUELEN in 1772. It has not been surveyed, and the only part of it of which we have any knowledge is the eastern coast, where the irregularity of the coast line forms several large bays of great depth, affording good and secure anchorage. Christmas harbour, a small inlet under cape Français, the north end of the island, was surveyed by CAPTAIN SIR JAMES CLARK ROSS, R.N., in 1840, and observed to be in Lat. $48^{\circ} 41'$ S. and Long. $69^{\circ} 3'$ E. Some islets lie off the north and west shores of the island at, in some instances, 15 miles from it,—and one, named Solitary island, is even at a greater

* "Mer. Mar. Mag.," vol. i. p. 401-6.

† Ibid., vol. iv. p. 32-40.

distance; hence, in foggy weather, more than ordinary care is required when approaching it on this side.

Kerguelen island is seated upon a bank of soundings, the extent of which is uncertain. CAPTAIN ROSS, R.N., mentions that in his approach to the island from the Cape of Good Hope, he obtained soundings of 145, 120, and 115 fathoms, fine black sand and small stones, at from 25 to 15 miles westward from Bligh's Cap,* and subsequently in the run from that islet to cape François had 70 to 80 fathoms, rocky bottom. In his attempt to enter Christmas harbour a heavy gale drove him from the land in a north-easterly direction, and afterwards, when regaining the land, a connected series of soundings was obtained on the bank, which was found to extend above 100 miles from the cape; the bottom consisted of black sand and rock. To this bank the name of Erebus was given, from one of the ships of the Expedition.

In the direction of E. by S. (*mag. P*) from cape François, distant 15 or 16 miles, there is a dangerous reef, named Terror reef, upon which the sea breaks.

Cape François, the north-east point of Kerguelen island, is a striking object from sea, being very bold and making in terraces; it is also surmounted by a conical hill 1200 feet high, having a crater-shaped summit. Immediately under cape François, on its south-east side, is Christmas harbour (previously mentioned), one of the best places of anchorage in the island, and so named by CAPTAIN COOK because he anchored there on December 25th, 1776.

Christmas Harbour is safe and commodious, and affords good anchorage in every part. It is about 2 miles in extent, N.W. and S.E., and three-quarters of a mile wide at the entrance, which rapidly decreases towards its head; the depth is 32 to 4 fathoms, on fine black sand. The head of the harbour is separated from the west coast of the island only by a low, narrow isthmus, scarcely a mile across, consisting of low ridges with intervening swampy ground and two lakes. When at anchor just outside the harbour in 45 fathoms, black sand, CAPTAIN COOK observed that the flood-tide came from S.E., at the rate of 2 miles an hour at least. Abundance of fresh water can be obtained here, but no wood. CAPTAIN COOK says: "The situation alone is sufficient to distinguish this harbour from any of the other inlets; and, to make it more remarkable, its south point terminates in a high rock, which is perforated quite through, so as to appear like the arch of a bridge. We saw none like this upon the whole coast. The harbour has another distinguishing mark within, from a single stone or rock, of a vast size, which lies on the top of a hill on the south side, near its bottom; and opposite this, on the north side, there is another hill, much like it, but smaller. There is a small beach at its bottom, where we commonly landed, and behind it some gently rising ground, on the top of which there is a large pool of fresh water. The land on both sides of it is high. The shores are steep, and the bottom is everywhere a fine dark sand, except in some places close to the shore, where there are beds of seaweed, which always grows on rocky ground. The head of the harbour lies open only to two points of the compass, and even these are covered by islands in the offing, so that no sea can fall in to hurt a ship. The appearances on shore confirmed this, for we found grass growing close to high water mark, which is a sure sign of a pacific harbour."†

* Observed by CAPTAIN COOK to be in Lat. $48^{\circ} 29' S.$, and Long. $68^{\circ} 40' E.$ It is probably the northernmost of the islets off the N.-W. shore of the island.

† The arched rock mentioned by CAPTAIN COOK is 150 feet high, and the base of the arch is 100 feet across; it is wholly composed of basalt. The Table Mountain, on the north side of the

Cumberland Bay.—From Christmas harbour, cape Cumberland, the north point of Cumberland bay, is distant about 3 miles in a southerly direction; between, the irregularity of the coast line forms two bays, named Foul Haven and Mussel,* and the headland which divides the bays is a wall of basalt almost perpendicular, having deep water at a short distance from its base, as CAPTAIN COOK, when coasting along, seldom struck ground with a line of 50 or 60 fathoms. Cape Cumberland is a bold headland, with a small but moderately high basaltic islet off it, known as the Sentry Box, in consequence of a rock on its summit bearing a striking resemblance to a sentry box; eastward of this islet, about 2 miles, and separated by a channel more than 40 fathoms deep, there is a cluster of small islets and rocks with broken ground about them.

The south point of the bay, named point Pringle, is distant from cape Cumberland about two miles in a southerly direction. It is composed of basalt.

Cumberland bay is a narrow inlet, trending in a general direction of W. by S. for about 12 miles. Its head is separated from the western coast of the island only by a narrow isthmus of moderate height; at this end of the bay there is a creek having a depth of 10 to 3 fathoms, beyond which is a swampy valley; at two miles from the head of the creek is a lake $1\frac{1}{2}$ miles long and nearly half a mile broad, filling up a pass in the mountains which rise above it to the height of about 2500 feet. On this isthmus several loose pieces of coal have been found.†

When proceeding up Cumberland bay two inlets will be perceived at about 7 miles from the entrance, situated nearly opposite each other; that on the south shore runs into the land $1\frac{1}{2}$ miles, is a mile broad in its widest part, but only one-third of a mile broad at its entrance; its soundings are unknown. The northern inlet is not so large as the southern, and is said to have a depth of about 6 fathoms.

Cumberland bay has not been sounded, nor have its shores been examined with that care and attention which would enable us to say if there are any sunken rocks off them. It is believed to be very deep in mid-channel, an impression conveyed by the bold cliffs on each side of it. The anchorages are probably superior to those of Christmas harbour, as they are not exposed to such violent winds; but they are not so ready of access, and can only be reached during clear and moderate weather.

White Bay.—In a S. by W. direction from point Pringle (about 4 miles) is White Bay point, the extreme eastern end of the south shore of an extensive bay, named by

harbour, is 1351 feet high; its top has the form of a crater. Beds of coal exist on the south shore of the harbour, and several fossil trees have been dug up, which prove that ages ago the island must have been well wooded; now, it is quite bare of even shrubs, almost the only vegetation consisting of grass. DR. HOOKER, the botanist to the expedition under CAPTAIN SIR JAMES CLARK ROSS, R.N., mentions a valuable kind of cabbage which grows on the island. "To a crew long confined to salt provisions, or, indeed, to human beings under any circumstances, this is a most important vegetable, for it possesses all the essentially good qualities of its English namesake, whilst from its containing a great abundance of essential oil, it never produces heartburn nor any of those disagreeable sensations which our pot-herbs are apt to do. It abounds near the sea, and ascends the hills to their summits. The leaves form heads of the size of a good cabbage-lettuce, generally terminating an ascending or prostrate stalk, and the spike of flowers, borne on a leafy stem, rises from below the head, and is often two feet high. The root tastes like horse-radish, and the young leaves or hearts resemble in flavour coarse mustard-and-cress. For one hundred and thirty days our crews required no fresh vegetable but this, which was for nine weeks regularly served out with the salt beef or pork, during which time there was no sickness on board."

* CAPTAIN COOK considered that these bays might possibly afford good shelter to shipping.

† Beds of coal evidently exist in Kerguelen island, but whether in sufficient quantity to be useful to steamers has yet to be proved. Some of that discovered was very light and friable, with a beautiful black glossy fracture, and, like cannel coal, did not soil the fingers.

CAPTAIN COOK White bay, because of some white spots of land or rock he saw at the bottom of it. Off this point there are several rocks above and under water.

White bay contains many small bays and coves, which doubtless afford good anchorage, and may be run for, if proper care be exercised. Loom and Teal bays, two small inlets on the north shore just within the entrance, are said to have a depth of about 7 fathoms.

Howes Foreland, &c.—From Pringle point to Howes foreland the distance is about 11 miles in a S.E. $\frac{1}{2}$ E. direction. This is a projecting point of land joined to the shore by a low isthmus; the bay between White bay and this point, or that immediately westward of this point, is called Repulse bay,—CAPTAIN COOK having at first supposed the point to be an island, and attempted to pass southward of it. Some rocks and breakers lie near this point on its north-west side, and two islands, separated from it by a navigable channel, are situated $4\frac{1}{2}$ miles south-eastward from it.

Howes foreland is of moderate height, and hilly. The coast is low, with rocky points projecting from it, between which are little coves with sandy beaches.

Rhode Bay.—The entrance to this bay is 7 to 10 miles southward from the extremity of Howes foreland, and is fronted by rocks and extensive beds of weed. The bay has two branches that run in W.S.W. and W.N.W. from 15 to 18 miles, and its head is separated from Whale bay only by an isthmus not more than three-quarters of a mile broad, across which a boat may be hauled, and so save a détour of 50 miles, if wishing to go into Hillsborough bay, of which Whale bay is the north-western branch.

Rhode bay is almost unknown, but is believed to contain several good harbours. The depth at its head is reported to be 25 to 18 fathoms.

The beds of weed just mentioned appear from the following remarks of CAPTAIN COOK to be in deep water. He says—"As soon as we were clear of the rocks and islands off Howes foreland I gave orders to steer S.E. by S. (*true*) along the coast. But before these orders could be carried into execution, we discovered the whole sea before us to be chequered with large beds of rock-weed, which we knew to be fast to the bottom, and to grow on rocky shoals. I had often found a great depth of water on such shoals; and I had as often found rocks that have raised their heads nearly to the surface of the water. It is always dangerous, therefore, to sail over them before they are well examined; but more especially when there is no surge of the sea to discover the danger. This was the case at present, for the sea was as smooth as a mill-pond. Consequently, we endeavoured to avoid them, by steering through the winding channels by which they were separated; we kept the lead continually going, but never struck ground with a line of 60 fathoms. This circumstance increased the danger, as we could not anchor, whatever necessity there might be for it. After running in this manner above an hour, we discovered a lurking rock just even with the surface of the sea; it bore N.E. $\frac{1}{2}$ E. (*true*) distant 3 or 4 miles, and lay in the middle of one of these large beds of weeds. This was a sufficient warning to make us use every precaution to prevent our coming upon them.

"We were now across the mouth of a large bay (Rhode bay) that lies about 8 miles to the southward of Howes foreland. In and before the entrance of this bay are several low islands, rocks, and those beds of sea-weed; but there seemed to be winding channels between them. After continuing our course half an hour longer, we were so much embarrassed by these shoals that I resolved to haul off to the

eastward, as the likeliest means of extricating ourselves from the danger that threatened us. But so far was this from answering the intended purpose, that it brought us into more. I therefore found it absolutely necessary to secure the ships, if possible, in some place before night, especially as the weather had now become hazy, and a fog was apprehended. Seeing some inlets to the S.W. of us, I ordered CAPTAIN CLERKE, as the *Discovery* drew less water than the *Resolution*, to lead in for the shore; which was accordingly done.

"In standing in, it was not possible to avoid running over the edges of some of the shoals, on which we found from 10 to 20 fathoms water; and the moment we were over had no ground at the depth of 50 fathoms. After making a few boards to weather a spit that ran out from an island on our lee, CAPTAIN CLERKE made the signal for having discovered a harbour, which was afterwards named Port Palliser."

Port Palliser.—This harbour is situated in Lat. $49^{\circ} 3' S.$, and about Long. $69^{\circ} 37' E.$ It has a general direction of W.S.W. (*true*) for about 5 miles, and is not more than a mile broad at the entrance, whence it gradually narrows towards its head. The soundings are very irregular, from 37 to 10 fathoms, on fine sand, except under the beds of sea-weed, which in many places extend from the shore nearly half channel over. The shores on each side are rocky and barren. In and outside the entrance there are several islands, rocks, and sunken dangers, between which and the north head of the harbour is the navigable channel, through which CAPTAIN COOK sailed when he was here in 1776. His anchorage was in 15 fathoms, fine dark sand, at about three-quarters of a mile from the shore, with the north point of the harbour bearing N. by E. $\frac{1}{2}$ E. distant 1 mile, and the small islands in the entrance from East to S.E. (*true bearings*). A little cove in the north point of the harbour is named Penguin cove. This port appears to be well sheltered from the prevailing southerly and westerly winds.

CAPTAIN RHODES, 1799, says—"If bound to port Palliser from Christmas harbour, leave the islands off that harbour on the port hand, and steer S.E. by S. along the land at a distance of about 3 or 4 leagues. This course will carry you between the beds of kelp and sea-weed that lie off the coast; and when you have run the distance of 17 miles from cape François, Howes foreland will bear S.W. distant 7 or 8 miles; at the same time, a ledge of rocks may be seen from the deck bearing N.E., distant 5 or 6 miles. You may then steer South to S. by W., until you have run about 15 miles, leaving several small islands on your port hand, when you will open the bay in which port Palliser is situated, which may be known by a small round island off Penguin cove, which forms the harbour. Leave this island on the port hand, and the course is W. by N., where there is a good anchorage in from 7 to 9 fathoms water. (*All compass bearings.*)" *

CAPTAIN COOK observes—"In getting out to sea from port Palliser we had to steer through the winding channels amongst the shoals. However, we ventured to run over some of them, on which we never found less than 18 fathoms, and often did not strike ground with 24; so that, had it not been for the sea-weed growing upon all of them, they would not have been discovered."

* The variation in 1776 was observed by CAPTAIN COOK to be $27^{\circ} 46' W.$ It is now about $32^{\circ} W.$ CAPTAIN RHODES visited many of the harbours in Hillsborough bay, and gave names to them. He is said to have explored not fewer than fifty inlets or coves, where ships of any tonnage might ride in perfect safety in the most tempestuous seasons.

Hillsborough Bay.—Between Howes foreland and mount Campbell, a distance of about 40 miles, the coast bends inwards and forms a large bay, named by CAPTAIN RHODES Hillsborough bay, after his vessel the *Hillsborough*. It contains many harbours and anchoring places, the situations of which can be best seen by a reference to the chart. A prodigious quantity of weed (*Jucus giganteus*) grows all over it, some of which is of enormous length, though the stem is not much thicker than a man's thumb. The only description of this bay is the following by CAPTAIN RHODES, dated 1799; the *bearings are magnetic*, and have reference to the variation of that year, which was about $27^{\circ} 45'$ W. :—

"From port Palliser to cape Henry, the north head of Hillsborough bay, the course is S. by W., and the distance 12 or 13 miles. On leaving port Palliser steer E.S.E. until you are beyond all the beds of kelp, and then the above course will carry you clear of all dangers until you arrive off cape Henry. This cape is on an island, and forms a high bluff headland, and there are several smaller islands and rocks both north and south of the cape. Between port Palliser and cape Henry there are seven different bays, of considerable extent, with coves that form good harbours, all trending in from W. to W.N.W.

"From Howes foreland, or any of the projecting points or headlands that form the several bays and inlets between it and cape Henry, mount Campbell may be seen, as also the low land of cape Digby. The mountain has a round top, is of a moderate elevation, and may be seen, in clear weather, at 15 or 16 leagues' distance. In running down the coast, mount Campbell will be discovered some time before you raise the low land of the cape, which forms its termination at $1\frac{1}{2}$ miles from it; it is distant from any other mountain 7 or 8 miles, and bears from Howes foreland S.E.; mount Campbell and cape Digby are the best guides into Hillsborough bay.*

"When arrived off cape Henry, you will open Whale bay, so named from the great numbers of whales that frequent the place at a certain season of the year. In the mouth of this bay is a small reef, which always shows itself, and lies about 6 miles S. by W. from cape Henry. You may go on either side of the reef; but if intending to enter Hillsborough bay, steer for the group of islands which lies to the S.S.W. of the reef, and about 3 miles from it. You may anchor within those islands, in any depth from 20 to 7 fathoms on good holding ground. There are here several inlets and coves, which afford good harbours. Keep those islands on the starboard hand, and you will soon shut in mount Campbell,—and Seal island will be on with cape Daniel and the south head of Hillsborough bay: then steer S.W. until you raise a small reef which lies in the middle of the bay, near the entrance of Hunter's sound. Here you will have from 36 to 42 fathoms on a soft muddy bottom.

"Leave this reef on the port hand and steer W. by N.; this course will carry you to Winter harbour, which is distant from the group of islands 14 miles. You will here find a safe and good harbour, where you may anchor in from 7 to 9 fathoms.

"When the western extreme of the island bears north, you will then be shut in and entirely landlocked; here you will have from 15 to 25 fathoms on a soft muddy

* "The land here is low and level: the mountains ending about five leagues from the low point, a great extent of low land is left, on which mount Campbell is situated, about four miles from the foot of the mountains, and one from the sea coast. These mountains have considerable elevation, as also have most of the inland ones. They seemed to be composed of naked rocks, whose summits were capped with snow. Nor did the valleys appear to greater advantage. To whatever quarter we directed our glasses, nothing but sterility was to be seen."—CAPTAIN COOK.

bottom; but when you advance 4 or 5 miles farther up the sound, you will find from 70 to 100 fathoms near Raven and Duck islands.

“**Whale Bay**, to the northward of Hunter sound, affords several good harbours.

“**Irish Bay** lies to the southward of Winter harbour, and likewise affords some very good harbours.

“**Foundry Branch**, so named from the great quantity of iron ore and limestone found there, contains many inlets and coves, in which ships may anchor protected from all winds or weather. This branch lies S.E., about 13 miles from Winter harbour.

“**Elizabeth Harbour** bears E. by S. from Winter harbour; there is good anchorage in it, in from 4 to 9 fathoms water. There is a reef in the mouth of it, which you may pass on either side in perfect safety, and will not find less than 9 or 10 fathoms until well within the reef.

“**Betsy Cove**, which lies in the head of Accessible bay, is an excellent harbour, and has from 5 to 7 fathoms water over a tough blue clay. It is the southernmost harbour in the coast north of cape Digby, and is about 8 miles from it.

“When passing cape Digby, it will be necessary to give it a berth of 3 miles, to clear the spit that runs out from it to nearly that distance.”

When approaching cape Digby (cape Sandwich of the Admiralty chart, No. 2398) from the north-westward, CAPTAIN COOK first struck the bottom in 18 fathoms, fine sand, and after a run along the land for about 3 miles, sounded again and had 13 fathoms, when seeing the shoal water jutting out from the cape he hauled off about 3 miles, and increased the depth to 25 fathoms. This depth was continued and the bottom of fine sand prevailed, till the cape bore West (*true*) distant 6 miles, when the water increased to 26 fathoms, and soundings were immediately afterwards lost.

Cape Digby is in Lat. $49^{\circ} 23' S.$, and Long. $70^{\circ} 34' E.$ From this point the land trends W. by S. $\frac{1}{4}$ S. 12 or 15 miles to a low point named point Charlotte, which is the southernmost of the low coast. At 18 miles from cape Digby, in the direction of S.W. by W. $\frac{1}{4}$ W., there is a moderately high projecting point, named Prince of Wales's foreland; and 18 miles beyond that in the same direction is cape George, in Lat. $49^{\circ} 54' S.$, and Long. $70^{\circ} 13' E.$, which was considered by CAPTAIN COOK to be the southernmost point of the island.

CAPTAIN COOK, in his concluding remarks on Kerguelen island, says—

“Between point Charlotte and Prince of Wales's foreland, where the country to the south-west began again to be hilly, is a deep inlet, which was called **Royal Sound**. It runs in West (*true*), quite to the foot of the mountains which bound it on the south-west, as the low land before mentioned does on the north. There are islands lying in the entrance, and others higher up, so far as we could distinguish. As we advanced to the southward, we observed, on the south-west side of Prince of Wales's foreland, another inlet into Royal Sound; and it then appeared that the foreland was the east point of a large island lying in the mouth of it. There are several small islands in this inlet, and one about a league to the southward of Prince of Wales's foreland.

“All the land on the south-west side of Royal Sound, quite to cape George, is composed of elevated hills, that rise directly from the sea, one behind another, to a considerable height. Most of the summits were capped with snow, and they appeared as naked and barren as any we had seen. The smallest vestige of a tree or shrub was not discoverable, either inland or on the coast; and I think I may venture to

pronounce that the country produces none. The low land about cape Digby, when examined through our glasses, resembled the rest of the low land we had before met with; that is, it appeared to be partly naked and partly covered with a green turf. The shore is composed of sandy beaches, on which were many penguins and other oceanic birds; and an immense number of shags kept perpetually flying about the ships as we sailed along.

"Being desirous of getting the length of cape George, to be assured whether it was the most southerly point of the whole land, I continued to stretch to the south, under all the sail we could carry, till half-past seven o'clock; when, seeing no likelihood of accomplishing my design, as the wind had, by this time, shifted to W.S.W., the very direction in which we wanted to go, I took advantage of the shifting of the wind, and stood away from the coast.

"At this time cape George bore S. 53° W. (*true*), distant about seven leagues. A small island that lies off the pitch of the cape, was the only land we could see to the south of it; and we were further confirmed that there was no more in that quarter by a south-west swell, which we met as soon as we brought the cape to bear in this direction.

"But we have still a stronger proof that no part of this land can extend much, if at all, to the southward of cape George,—and that is, CAPTAIN FURNEAUX's track in February, 1773, after his separation from me during my late voyage. His log-book is now lying before me; and I find from it that he crossed the meridian of this land only about 17 leagues to the southward of cape George, a distance at which it may very well be seen in clear weather. This seems to have been the case when CAPTAIN FURNEAUX passed it, for his log-book makes no mention of fogs or hazy weather; on the contrary, it expressly tells us that, when in this situation, they had it in their power to make observations, both for latitude and longitude, on board his ship; so that, if this land extends farther south than cape George, it would have been scarcely possible that he should have passed without seeing it."

AMSTERDAM ISLAND.

AMSTERDAM ISLAND, discovered by ANTHONIO VAN DIEMEN, June 18, 1633,* is only about 4 miles across, and 2891 feet high; it is situate in Lat. 37° 58' 30" S., and Long. 77° 34' 44" E.† It has not been surveyed. Anchorage may probably be obtained off its south side, as VLAMMING, the Dutch navigator, is reported to have anchored there in 1696 in 16 fathoms, black sand, at about a cannon-shot from the shore, and to have subsequently landed and made an unsuccessful search for water. The only descriptions we have of the island are the following:—

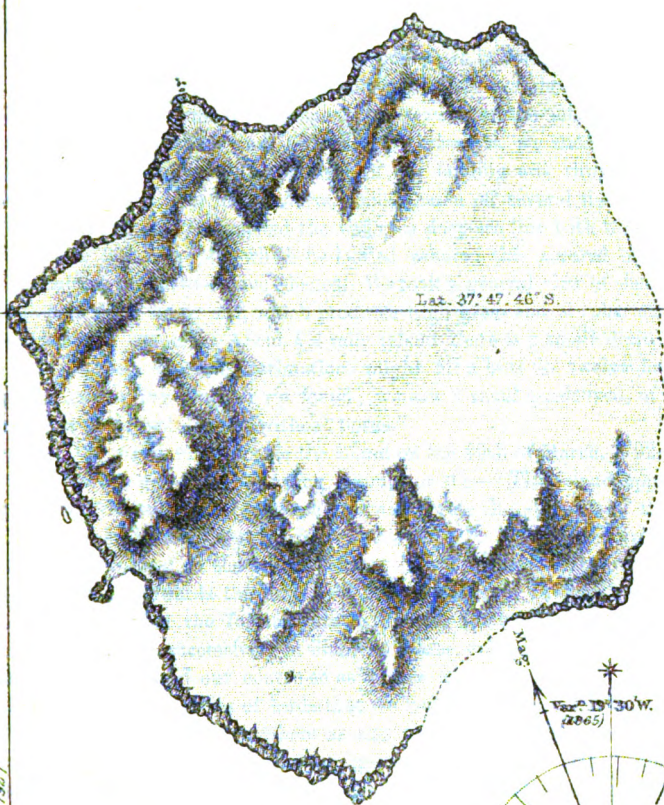
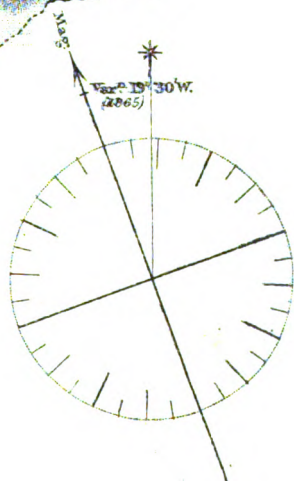
MR. JOHN WANE, midshipman of the *Morse* in 1770, writes: "This island, at the distance of 3 or 4 miles, appears to be small, and of a moderate height, but, on a nearer approach, the fog clearing away, we observed it to be very high land, of a

* See a very interesting article upon the discovery of this island in the "Nautical Magazine," 1854, contributed by M. L. C. D. VAN DYK, of Amsterdam, who maintains that the island should properly be named New Amsterdam.

† This is according to the observations of the Austrian frigate *Norara* in 1857; the point of observation was not stated, but we suppose it to be on its S.E. side. The highest summit of the island was found to be 2891 feet, the second highest 2661 feet; the length of the south coast 22,359 feet, and of the western shore 5607 feet. In the "Australia Directory," vol. i., published by the Admiralty, the position of the island is stated to be Lat. 37° 52' S., Long. 77° 35' E.; D'ENTRECASTEUX determined the west point of the island to be in Lat. 37° 47' 46" S., Long. 77° 26' 5" E., which is evidently incorrect.

SKETCH OF
AMSTERDAM I?

Nautic Miles
0 Cables 1 2



Long. 77° 25' 5\" E. (D. Entrecasteaux, 1792.)

The Austrian frigate 'Novara' in 1857 made the island (point of observation not stated, but we suppose on the south shore) in Lat. 37° 58' 30\" S. Long. 77° 34' 44\" E.

pyramidal shape, and about 12 miles in circumference. Ships that go the outward passage to India mostly make Amsterdam, but seldom see the height of it, on account of the weather being generally hazy. The *Morse* sent her boat on shore, in which I went, and, to the best of my remembrance, the particulars are as follows: We sailed round the island, but found no place to land, on account of the rocks, which are almost perpendicular, and rather inclining over the sea, and at a great height above the surface of the water. There are a great number of these extending round it, for the space of $\frac{1}{4}$ of a mile, having about 2 feet water on them. You have soundings off the island, but very uneven, except on the north part, where they are more regular and free from rocks. Ships may anchor there in 7 fathoms, sandy ground, distant off the rocks 1 mile,—but not with safety, as there is a high swell, and it generally blows hard. We came to a grapnel, to leeward of the island, with a determination to land if possible, and, after several attempts, we succeeded, but with great difficulty and danger. The method of our landing was thus: One of the crew swam ashore, and after many efforts, being beaten off several times by seas, he ascended the rocks; this man carried the end of a deep-sea line with him, the other end being made fast to a rope, which he hauled ashore; this secured our landing, which we could not otherwise have effected. We took a general view of the place, and found it to be a light sandy soil, which produces high grass and shrubs, with which the whole island is covered. About $\frac{1}{2}$ a mile inland there is a small drain of water issuing out of a rock, which, by estimation, might fill a butt in twelve hours, and this was the only spring of water we found; we saw a small quadruped, of the size and shape of a goat, spotted, and without horns."

ADMIRAL D'ENTRECASTREUX made the island on the 29th of March, 1792, and the writer of his voyage gives the following account of it:—"The island appeared in the distance covered with thick clouds, above which rose the summits of the mountains. We were sufficiently near it, about four o'clock, to distinguish perfectly that these clouds were formed on the island, whence issued a smoke that almost entirely covered it, especially towards the north; flames were seen in different points, and it was soon discovered that the forests were in a blaze: the traces of the fire and the smoke, which appeared successively in different places, exhibited the progress of the conflagration. We shaped our course so as to pass as near as possible to windward of the island; the same species of birds that we had seen a few hours before we got sight of it were flying in great numbers around the rocks, which served them as a retreat. A great many seals were swimming in the midst of the large heaps of seaweeds detached from the coast, the south side of which we ranged along, at the distance of above $\frac{1}{2}$ a mile. This steep coast is very safe. The sea followed its direction, and would have apprised us of the danger of approaching it, had it been skirted by shoals. Rocks inclined about 50° from north to south (and which I took to be composed of strata of free-stone) formed the mountains to the S.W., and exhibited great declivities as far as the sea-shore. Farther on to the south were seen horizontal strata of the same species of stone: thence issued a small rivulet, the waters of which fell into the sea, forming a cascade. Perpendicular surfaces of rock exhibited, on a large scale, those strange forms known under the denomination of *Lusi*. We observed a thin smoke issue in puffs from a small subterraneous aperture, at a little distance from the shore. The mountains slope towards the S.E., so that, in favourable weather, it would be easy to land on that side. We here saw some little rivulets, which, after a meandering course, mix their waters with those of the sea."

Dr. KARL SCHREZER, in the narrative of the *Novara's* voyage, says :—"The first view of Amsterdam island greatly resembles that of St. Paul. Our course was directed to its south-east side, along the acclivities of which pyramids of loose stones were visible, resembling those on St. Paul, but more numerous and of larger dimensions, the entire island seeming altogether on a much larger scale and more lofty. On the west side we observed rocky precipices of from 1000 to 2000 feet in height, fissured with deep clefts and rents, whereas on the south and south-east sides these presented a more gradual slope. For above an hour we steered along the shore, which rose sheer out of the water, without being able to detect a single point at which it was possible to disembark so as to scramble up to the high ground. The entire eastern side is hemmed around with steep abrupt precipices of 150 to 200 feet high, not unlike skilfully constructed bastions, and clothed with long thick grass. As we drew near, we could plainly discern in the watercourses that descend upon the upper slope—radiating, as it were, from all sides of the highest peak, which was enveloped in clouds—numerous streams of water, each pouring through a rift like a thread of silver; after which, precipitating itself over the steep precipices on the shore, it washed like a small torrent over terraces and banks of lava, till it was lost in the sea. If these streams are swollen by heavy rains in winter they may form waterfalls, as mentioned by early navigators, which must impart a far less pleasing character to the landscape. Two small patches of dazzling white, like fresh-fallen snow, which were visible high above the slope, we could not make out with the utmost power of our glasses. The green colour which enveloped the entire island seemed to indicate the existence of grass vegetation resembling that of St. Paul. A nearer approach showed the south-eastern point, which at a distance presented the appearance of a low headland jutting out into the sea, to be a small detached rock; while the shore (so far as the eye could reach) rose like a wall to a height of from 150 to 200 feet. After rowing some distance we found a smooth spot between two reefs, which projected above the level of the sea like a breakwater, and at once let go the boat's anchor. At this spot we succeeded in effecting a landing, and afterwards with great difficulty climbed to the summit of the island."

ST. PAUL ISLAND.

ST. PAUL.—At about 40 miles almost due South (*true*) from Amsterdam island is the island of St. Paul, which is 820 feet high, and visible from a distance of 50 to 60 miles. It was surveyed in 1853 by CAPTAIN DENHAM, R.N., who determined the position of the north side of the entrance to the crater to be Lat. $38^{\circ} 42' 45''$ S., and Long. $77^{\circ} 35' 4''$ E.*

Some care is required when approaching Amsterdam and St. Paul islands in winter, because of the strong gales and thick weather that then prevail. The colour of the water affords no certain indications of their vicinity, and the sea-weed they produce is drifted to leeward in small patches by the prevailing north-easterly current.

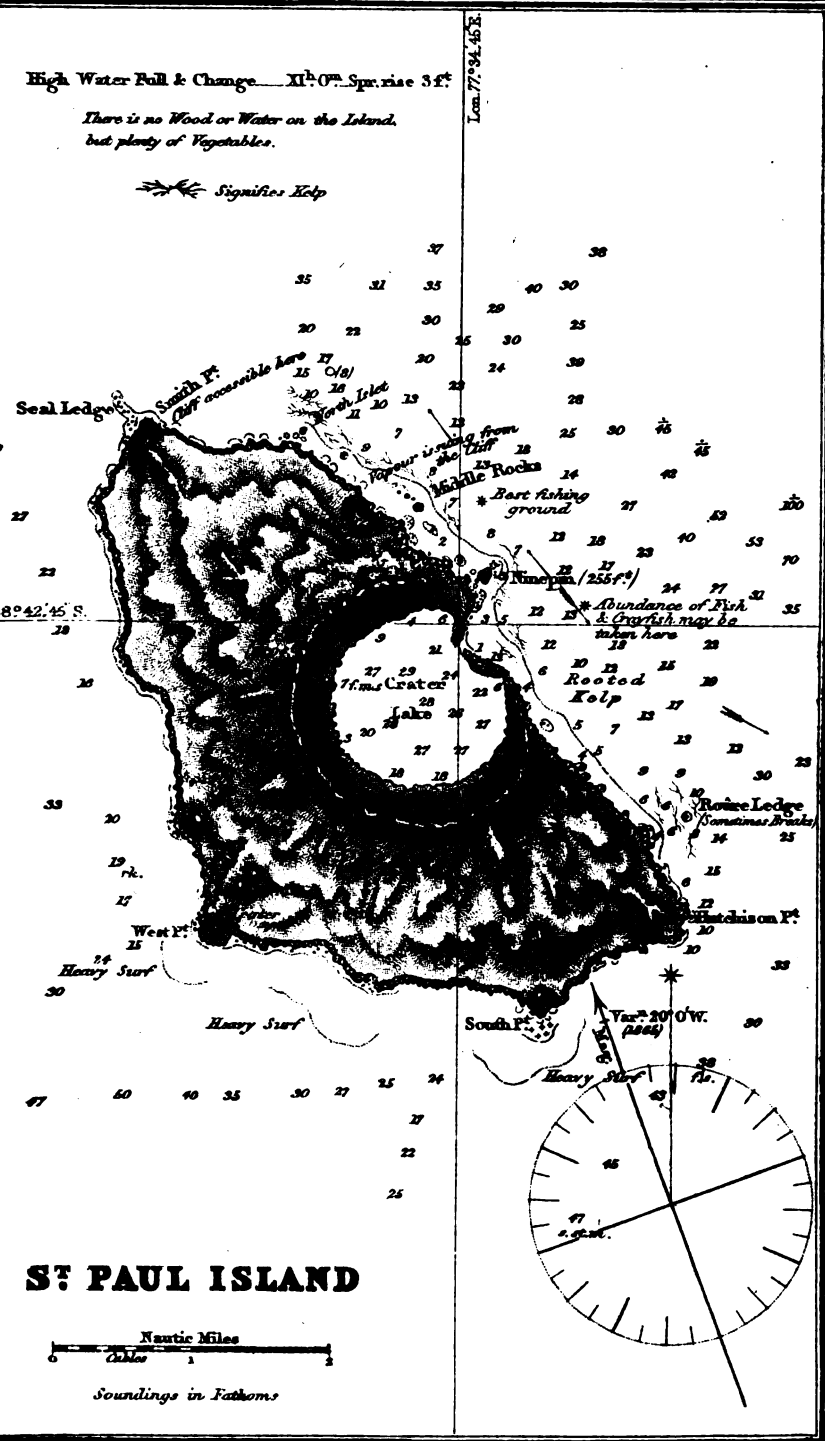
* Depending upon the accuracy of the meridian distance from the Cape Observatory, which is assumed to be in Long. $18^{\circ} 28' 45''$ E., the meridian distance was $59^{\circ} 6' 59''$ E. This differs slightly from a previous determination of CAPTAIN BLACKWOOD, R.N., in 1842, who ascertained the position of the Nine Pin Rock, on the north side of the entrance to the crater, to be Lat. $38^{\circ} 44' 40''$ S., and Long. $77^{\circ} 37' 40''$ E. The *Novara*, in 1857, determined the position of a small pyramid of stones on a little eminence north of the huts of the colonists to be Lat. $38^{\circ} 42' 55''$ S., Long. $77^{\circ} 31' 16''$ E. This longitude was obtained by meridian distances from the Cape and Madras, the observatory at the former place being estimated to be in Long. $18^{\circ} 28' 45''$, and that at the latter $80^{\circ} 14' 19''$ E.

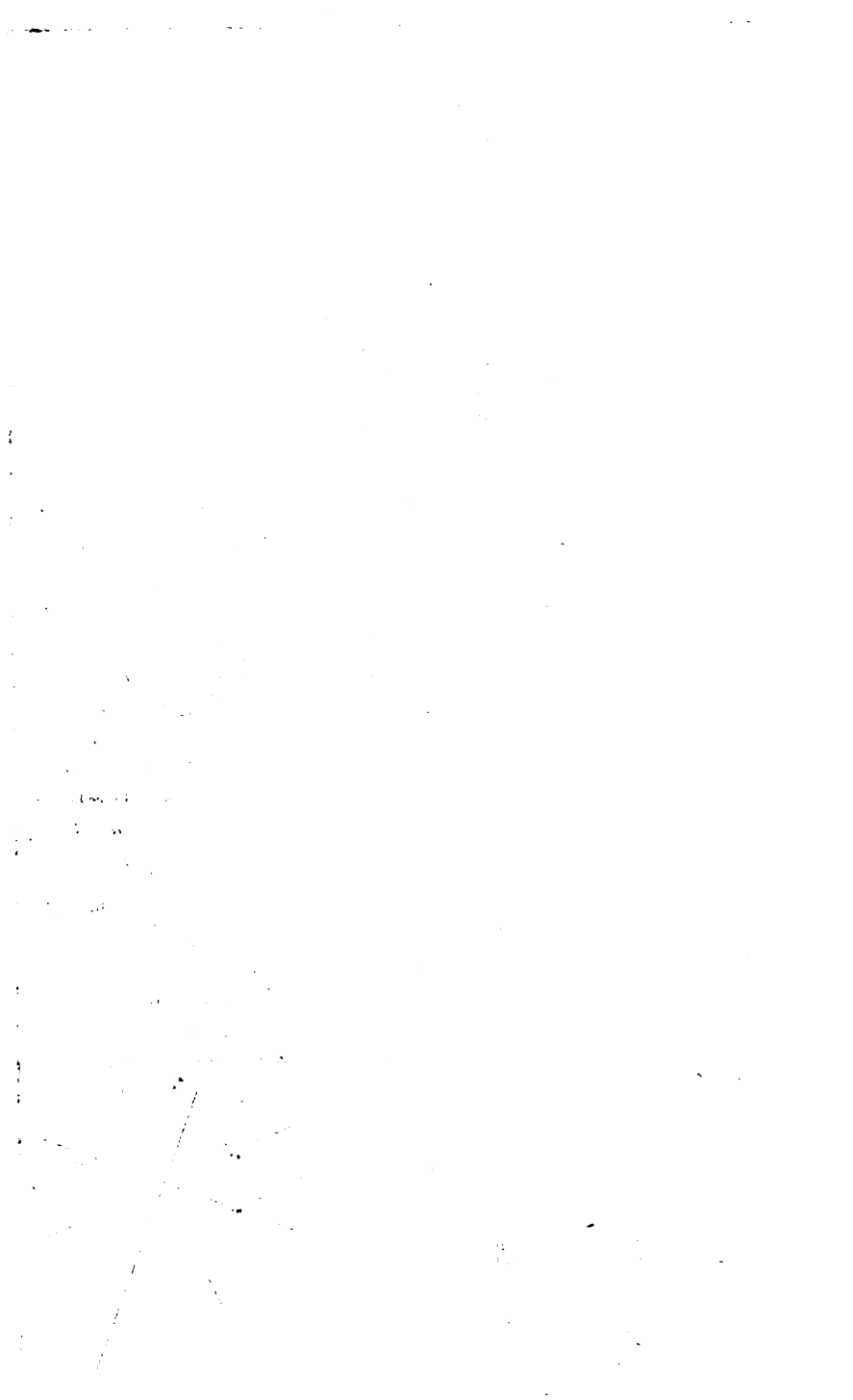
[INDIAN OCEAN]

High Water Fall & Change XII^h 0^m Spr. rise 3 f.

There is no Wood or Water on the Island,
but plenty of Vegetables.

 Signifies Kelp





St. Paul is only $2\frac{3}{4}$ miles in extent from N.W. to S.E., and $1\frac{1}{4}$ miles across. Like Amsterdam island it is volcanic. When viewed from the eastward, it appears to be only a ruined crater, with the sides (north and south) sloping gradually to the sea. It is on this side of the island that the entrance to the Crater lake is found, which, if the bar fronting it were deep enough to permit vessels to cross, would be a very valuable harbour, well protected from all but easterly winds; it is in shape nearly circular, has very steep sides, and a depth varying from 16 to 29 fathoms. There is a peculiar shaped rock, 80 or 90 feet high, at the north side of the entrance to the Crater lake, which from its form has obtained the name of Ninepin rock. Along the north-east shore of the island there are some detached rocks above and under water, none of which are probably more than $\frac{1}{4}$ of a mile from the cliffs; and there is a rock (12 feet under the surface) named Roure ledge, three cables' length from shore, at about three-quarters of a mile N.N.E. from Hutchison point, the south-east point of the island; upon the latter rock the sea occasionally breaks.

The south and west sides of St. Paul island have not been closely examined, but are believed to be free from outlying rocks. It was noticed by the surveyors that the sea broke heavily in places at from a quarter to half a mile from the south shore, which they suspected might be upon ledges projecting from the coast. A ledge of rocks projects three cables' length northward from Smith point (the north point of the island), and has a depth of 20 fathoms almost close to it.

The anchorage at St. Paul's is off the eastern coast, fronting the entrance to the Crater lake, in soundings of from 14 to 30 fathoms, on a bottom of fine black sand, resembling gunpowder. When CAPTAIN DENHAM, R.N., was here in 1853, he anchored in 31 fathoms, at about $1\frac{1}{4}$ miles N.E. $\frac{1}{3}$ E. from the south point of the island, and considered it a well-sheltered position, with the wind from S.W. to N.W. (west about), and sufficiently convenient to permit of slipping in case of an easterly gale; but it was subject to the disquietude of swell which comes round the northern and southern points, and across which the prevailing westerly wind will cause the ship to ride. CAPTAIN DENHAM subsequently anchored nearer the island in 14 fathoms, fine black, compact sand, with the Ninepin rock bearing N.W. a quarter of a mile,—at which position the two rocky islets on the northern trend of the island were in one with each other, and the causeway gap leading into the Crater lake West half a mile nearly.

CAPTAIN DENHAM says:—"When at St. Paul's, we had reason to ascribe the excess of variation found on shore as compared with that resulting from azimuths observed on board, to some magnetic disturbance in the heterogeneous structure of this volcanic island. Indeed, when a fragment of the surrounding rocky heaps, such as from the causeway between the sea and the crater, was held within six inches of the needle, an attraction was discernible. The magnetic variation on shore $23\frac{1}{2}^{\circ}$ W. that afloat came out $19\frac{1}{4}^{\circ}$ W.

"The tide gauge series up to, and three tides over, the full-moon phase, shows that it is high-water on full and change of the moon at 11h. 30m., and that the tidal range is four feet.*

"The island is of a triangular form, with its base trending N.N.W. $\frac{1}{3}$ W. (*true*).

* The hour of high water, both at full and new moon, was found by the *Novara* in 1857 to be 1h. 10m. P.M. According to LORD MACARTNEY, the tide rises at full and new moon, between 8 and 9 feet perpendicular. A northerly wind always causes the highest tide, the current of which is from S.E. by S. to N.W. by N., and has a velocity of about three miles an hour.

2½ miles, from the middle of which base the apex of the triangle is 1½ miles at right angles, and constituting the western projection; the whole range of its seaboard extending over little more of linear measurement than 6 nautical miles,—with a table top, and sides of steep acclivity, the summits of which are severally elevated from 740 to 860 feet above the sea.

“It is very well known that a remarkable volcanic phenomenon is displayed at this island. A circular crater, which, when originally formed, must have occupied a space bordering upon the eastern margin of the island, forms an extensive basin of ocean, the ridge of it gradually declining down to the sea towards the S.E. quarter. In Vlaming’s time, who visited the island in 1696, this ridge was still a few feet above the sea, as represented in a view by him preserved by Valentyn. By whatever means it may have been effected (perhaps by the washing of the sea), there is now a breach 600 yards across, through which a boat may pass into the basin. The deepest water in the channel is 8 feet at high water.

“The passage is rendered sometimes for a day or two dangerous by the breaking of the bay swell upon it; such may be looked for at the full and change of the moon. When once across this bar (a distance of but half a cable from deep water to deep water), a magnificent floating dock of lake-like surface is entered as deep as 29 fathoms, with steep margin all round. The diameter of this nearly circular sheet of water is about two-thirds of a mile, and is encompassed by the steep sides of the crater, the ridge of which, in its highest part, is from 700 to 800 feet above the level of the water. A rank grass flourishes on the sides of the crater, much interspersed with rocky fragments; but the absence of any natural production at this island for the use of man, excepting fish, and the conviction that there should be no reliance on the periodical visits of a single vessel from Réunion, has induced the few residents on the island employed there to terrace up every lodgment of soil on the slopes of the crater. In the midst of the rocky crags of the island, their little terrace gardens are refreshing to the eye, and gratifying proofs of the ingenuity of man in turning to the best account he can even the most niggardly of nature’s gifts. The produce more than compensates the toil, affording even a surplus to exchange with passing ships for groceries, &c. Each of these garden plots consists of about fifty square yards; they are terraced up by ponderous blocks of lava, each of which may become loose and fall, like another avalanche, when disturbed; and they require a flight of steps to be formed, perhaps winding abruptly among the rocks for hundreds of feet, to admit of communication round their almost vertical sides, or from a boat beneath them in the basin. I found evidence of the genial soil and climate regarding our European vegetables; and this period (January) being its summer season, the peas, cabbages, carrots, turnips, potatoes, and artichokes, were in perfection, and the wheat was in full ear; but there is no indigenous vegetable except wild celery and the rank grass, such as we observed at Tristan da Cunha. Nor are there any animals on the island except those imported, which run wild, and are shot or snared at pleasure. These consist of sheep, goats, pigs, cats, and mios. The oxen, together with pigs, fowls, and rabbits, are kept at the little settlement.

“The island for several years has ceased to be the resort of seals and sea-elephants, excepting a dozen or so in the course of a season; a whale or two would also pass within gun-shot of the cliffs. The only systematic fishery carried on is along the eastern margin of the island, by hook and line, for the take of a species of cod and mullet to salt down, and which are much esteemed and in large demand at Réunion.

The presence of man has scared off the seals, &c. of which **VLAMMING** the discoverer, and succeeding voyagers, among whom was **SIR JOHN BARROW**, witnessed the existence.

"At several places along the high-water mark round the northern side of the basin of ocean water, vapour was seen by our party curling out, and the heated stones hissing as the tiny wave lost itself against them. And no wonder, for they, as well as their clayey bedding, were too hot to be handled. Here boiling heat prevailed, but on moving off a boat's length the temperature of the surface water was the same as the air, 67° ; and the water at the bottom, 38 fathoms deep, stood at 52° temperature. We waited for the fall of tide below the mean level, and then we found the pools of water which had been two or three hours covered with salt water, with vapour floating, now full of boiling chalybeate water. Here we were enabled over and over to realize the singular operation of tossing the fish from the water in which it was hooked to that which forthwith boiled it. Indeed, this can be done at any time, excepting at high-tide intervals. Thus may be boiled eggs and potatoes without the trouble of making a fire or using a kettle! The island is evidently charged with subterraneous fire and volcanic gases, and yet no eruption or convulsion has been experienced by the residents, and the two minor craters on the back slope of the island are perfectly inactive. November to March forms the summer season; June to September are the coldest, and in every respect the winter months; and it is in the winter season only that thunder and lightning occur, and then so rarely as to happen but once in the season.

"The climate has proved remarkably healthy to Europeans; the two great drawbacks to more than a few settling on the island is the total absence of fuel and fresh water.

"While the ground and features favourable for anchoring and access lie upon the east side of this island, it is happily, too, the aspect upon which the wind seldom blows; a gale from the east has only occurred three times during the last six years. The prevailing wind is from north, veering every three or four days west about to south and back again. But what renders an inshore anchorage unsafe is the setting in of rollers from S.E. At the full and change of the moon days such will occur at all seasons, and as a calm attends these rollers, a sailing vessel would be in imminent peril. When the sunken rock, lying about one and a half cables off the S.E. point, with not more than 12 feet of water on it, breaks, which it did (and regularly does) a few hours before the off-shore or long-shore breeze dies away, a vessel should trip and take an offing.

"The island is well fixed as to geographical position, and, to or fro, it depends upon latitude, and look-out for making it, being situated about midway of the east and west track, which for 6300 miles separates the Cape of Good Hope and Tasmania. The navigation round this island merely requires a quarter of a mile berth to be given to the actual heads. The anchorage is at once beacons by the remarkable Ninepin islet, close to the north side of the crater,—and 21 fathoms will indicate a sufficient distance off shore, say three-quarters of a mile. The upper half of the island is so frequently shrouded by fog, that an angle of elevation for distance must not be looked to.

"The tide sets round St. Paul island, turning and returning according to the rise and fall on the shore. An occasional confluence of streams will take place off each point, producing, as the wind and outer sea may happen to be with or against each

other, an ebullition like breakers. The actual definable and important course of tidal stream, worth the mariner's attention at this island, is in regular operation along its roadstead; here he may expect a one knot set of flood to the N.W. for six hours, beginning at two hours flood; and three-quarter knot set of ebb to the S.E. for six hours, beginning at two hours ebb. The knowledge of this tidal action may be the means of saving a ship in the always possible exigency of having to slip with the wind on shore. In moderate weather, a ship as regularly and sensibly indicates the set of tide at this anchorage as if she were at Spithead; but under a strong breeze from seaward she would be wind-rodé. Then the tidal establishment—i.e., time of high water on full and change of the moon—must be resorted to, and which being XI, the high water hour for the day or night in question is attained; and according as it is herein stated, that the flood and ebb stream at the anchorage sympathises with the actual flow or ebb upon the shore, so will the master of a ship be able to answer his first and most natural question—‘How shall I cast my ship so as to take the tide upon my lee-bow, to aid my clawing off this lee shore?’ It will be obvious that on the choice of tack, with reference to tidal set, the rescue of his ship will depend; and surely it will be worth while to turn so palpable a tidal advantage to account.”

An officer of the *Hindostan*, in 1774, says—“The Crater lake forms a regular ellipse. The circumference round the water's edge is 2980 yards, or nearly $1\frac{1}{2}$ miles. By taking the perpendicular height of the surrounding sides at 700 feet, and the angle of their inclination at 65° , the circumference of this crater will be 2 miles 160 yards. The average height of the sides being taken at 700 feet, the depth of water at 29 fathoms, or 174 feet, the whole depth of the crater is 874 feet. The entrance into the lake, about 25 yards wide, is formed by two narrow causeways or ridges of rocks that run out from two peaks which terminate the sides of the crater, one on each side; that on the right is 743 feet high. At its foot, on the causeway, there is a hot spring, where the thermometer stood at 212° , at which were boiled some fish; and this is the general standard of heat at all the springs round the water's edge.”

CAPTAIN VLAMMING, the Dutch navigator, landed here in 1696, and described the north-east point of the island as a low slip of land which gradually decreased in height to the water's edge, in appearance not unlike the Bill of Portland. “On the north side there is no ground, it is all rocky, with a heavy swell rolling in from the sea; on that side you see a fall of water.” The island was at that time so covered with wood, rushes, and thick canes, entangled together, that one could not in a day go any great distance, being obliged to creep under the shrubs and clamber over the trees, which stood close together, some of them being so thick as a man's waist. The soil was noticed also to be a fenny land, about 3 feet thick, and under it were stones like burnt pumice; it was also very loose, and the trees not getting sufficient root in the ground, could not grow high. Neither man nor beast were visible, the only evidence of life being a few small birds, like sparrows, a quadruped like a weasel, and another like a fox. The sea was so full of seals and sea-lions, some of them at least 18 feet long, that he says he was obliged to kill some of them to get a passage through when he steered for the shore; the fish, also, were wonderfully abundant.

MR. JOHN HENRY COX anchored here in 20 fathoms, black sand like wet gunpowder, in 1789. The following is extracted from his journal:—

"On May 31st we hoisted out our boats, and rowed towards the shore (abreast the ship), which here forms a sort of causeway of large clean pebbles, that has the appearance of being raised by art; in the middle of this causeway we saw an opening (in which a great many seals were playing) about a pistol-shot wide, into a basin or lake; we rowed for this entrance and found a strong tide, at least $2\frac{1}{2}$ knots, running out; and with some difficulty, it being nearly $\frac{3}{4}$ ebb, got the cutter over the bar, which is formed of loose pebbles; we were then in deep water, and smooth as a mill-pond, though the sea ran very high without. We landed on the north side of the entrance, where we found seals innumerable; after killing a great number we went in search of fresh water, and for that purpose began to ascend the only accessible part of the hill; up a considerable way the seals had formed a good path, but beyond this we found the ascent obstructed by large tufts of coarse grass, which, in FLAMMING's time, were 8 or 9 feet asunder, but were now close together, so that we were obliged to return, though it must have been on these heights that he found water; indeed, had we reached the top, and found water, though it might have supplied present expenditure, and in that light would be valuable to a vessel that made any stay here, it would be endless work to attempt watering a ship from hence.

"Sent the cutter ashore sealing; rowed round the basin, which is between 2 and 3 miles in circuit; found 29 fathoms in the middle, and 27 and 28 within 150 yards of the shore, close to 7 and 8 fathoms. The land round the basin is table land, rising in some places almost perpendicularly from the border of the basin, and covered with grass, which gives it a pleasant appearance. As we rowed round, we saw smoke rising amongst the stones, in several places close to the basin; we landed and found the water so hot that we could not bear our hands in it. I had a pocket thermometer with me, which, in the open air, stood at 62° , but when put into the water, at 190° , and then, in about a minute, fell to 185° . Our people, who were ashore sealing, constantly boiled their dinner of fish in some of those springs, which are in all parts close to the basin.

"June the 5th, in the afternoon, blowing hard from N.E., with a great sea, determined to put to sea, and run down under the lee of the island; at 5h. got a spring on our cable to cast, cut the cable close to the splice, and went to sea. We lay in a very good berth to clear the island on either side, but it would be safer for a large ship to lie about two cables' length farther to the eastward, and upon appearance of blowing weather from the eastward, to go to sea immediately, and run to leeward of the island, where she would find smooth water; and as the easterly wind is never of long continuance, she would be sure of soon regaining the anchorage."

REUNION.

General Remarks.—The island of Reunion is situate between Latitudes $20^{\circ} 51\frac{1}{2}'$ and $21^{\circ} 22'$ S., and Longitudes $55^{\circ} 16\frac{1}{2}'$ and $55^{\circ} 53\frac{1}{2}'$ E., and is of an oval form. It is geologically formed by two systems of volcanic mountains of great elevation, one at either extremity of the island. The central point of the most northerly system, the Piton des Neiges, is estimated to be 10,069 feet, and that of the southern system, an active volcano named Piton de Fournaise, or emphatically the volcano, 8613 feet above the sea. These two volcanic centres are connected by a chain of mountains running north and south, which divides the island into two parts, that on

the east side being called the windward (*partie du vent*), and that on the west side, the leeward division (*sous le vent*), in consequence of the prevailing winds in Bourbon being from east to south. There are no plains of any size, and the island is watered by many small rivers, none of which are navigable. There are several lakes, but all of small size with the exception of one, which is said to cover an extent of 40 acres. The island is reported to be deficient in good roads. The soil is very fertile, particularly in the vicinity of the shores, where there are extensive alluvial deposits, which, like the soils in other parts of the island, consist largely of volcanic matter. The cultivated lands form a girdle round the island, and in some parts ascend the mountain slopes to considerably more than 3000 feet above the level of the sea. In 1836 the population was 106,099.

The exports of Reunion are principally sugar, coffee, cloves, dye-woods, and salt-petre; and the imports mainly consist of rice, wheat, oil, wines, cattle, timber, glass, porcelain, &c., with cottons and other manufactured goods.

The coasts of the island are in general but moderately elevated; about them there is an abundance of fish and turtles; they also furnish coral and ambergris. So great is the quantity of fish, that a large portion of the population bordering the shore got their living by fishing, selling the produce, after providing for the consumption of their families, for about 12,000*l.* a-year. The great drawback to the prosperity of the island is the want of good harbours, all the roadsteads being open, so that there is nothing to prevent a vessel being driven on shore by a violent gale from seaward. The principal ports are St. Denis, St. Paul, St. Benoit, and St. Pierre; of these, the first is on the north coast, and the last on the south coast of the island.

The climate of Reunion is healthy and agreeable, especially that of the eastern part of the island. The air is pure and the sky clear, though this tranquillity is sometimes broken by violent hurricanes. The hot and rainy season continues from December to May, when the mean temperature is 80° Fahr.; during the remaining or temperate months, the mean is 76° Fahr. Being on nearly the latitude of Mauritius, the seasons are similar, and have like peculiarities. The island is also exposed to the same winds.—See p. 73.

Reunion was discovered in 1545 by Mascarenhas, a Portuguese navigator, whose name it bore till the French took possession of it in the next century. The English took it in 1810, but it was restored to France in 1815. For many years it was called Bourbon, but on the expulsion of the Bourbons from France its name was changed to Reunion. When first occupied by the French the sides of the mountains were covered with forests which reached even to the shores. The whole of the lower lands have been cleared, but the centre of the island is still covered with its primitive vegetation, which affords forty-one different species of woods serviceable for arts and manufactures.

Lights.—On Point Bel-air, near Saint Suzanne, on the north-west side of the island, there is a lighthouse 66 feet high, which shows a *fixed white* light at 151 feet above the sea, visible 18 miles.

At St. Denis two small *fixed white* lights are shown from the flagstaff on the *Barachois*, at 85 feet above the sea, visible 8 miles. Beyond the distance of 5 miles these lights blend and appear as one.

A small *fixed white* light is also shown from a mast at the landing-place in St. Paul's Bay.

ST. DENIS.—St. Denis is situated at the north extremity of Reunion, and is the capital of the island. In 1836 it had about 12,000 inhabitants. It is seated on a plateau at the mouth of a river of the same name. Most of the houses are of wood, the *Hôtel du Gouvernement* being the only public building of importance.* Here is the residence of the governor of the island. The church is in almost the centre of the town.

The soundings immediately off the rocks surrounding Pointe des Jardins, upon which point the town of St. Denis stands, are $2\frac{1}{2}$ and $3\frac{1}{2}$ fathoms, which rapidly deepen to 20 fathoms, the latter being at not more than half a mile due north from the point. The usual anchorage is north-westward of St. Denis, and during winter in a depth of from 8 to 15 fathoms, but during summer nearer to the shore in about 4 fathoms water. The roadstead is quite open, and cannot be considered safe with violent winds blowing on shore.

Sainte Suzanne.—From Saint Denis to Sainte Suzanne the distance is about 9 miles in an E.S.E. direction. At 6 miles from St. Denis is the small town of Sainte Marie, off which there is an exposed anchorage in 7 to 9 fathoms; thence at about midway to Sainte Suzanne, there is a dangerous rock 6 feet under water, named *Le Cousin*, which is situate 886 feet from the coast, at a little westward of the ravine des Chèvres. This rock is not more than 23 feet in extent, but its situation makes it an important danger to be guarded against, especially as there is a depth of 7 to 13 fathoms immediately outside it,—to keep outside it do not approach the coast nearer than Cape Bernard in one with the church of St. Denis, or keep in deeper soundings than 20 fathoms.

The usual anchorage of Sainte Suzanne is eastward of the town in about 10 fathoms. It is exposed to all winds except those from the shore, and is consequently safe only during fine weather.

St. Benoit.—From Sainte Suzanne the coast trends south-eastward and southward 11 miles to St. Benoit. The anchorage here is in 12 to $16\frac{1}{2}$ fathoms, sand and mud, at $\frac{1}{10}$ of a mile northward of the River Marsouins, and at about the same distance eastward from Point Bourbier. In fine weather or during summer, vessels usually anchor in $12\frac{1}{2}$ fathoms with the buildings on Point Bourbier bearing west, but in winter the greater depth should be selected. It is necessary to be careful in anchoring, because the current may otherwise carry you upon Pointe du Mat, where there is no anchorage.

There is also anchorage in 18 to 20 fathoms at a little south of the River Marsouins, but it is no longer frequented, the ground being very indifferent. In consequence of the difficulty and risk of landing, the jetties have been allowed to fall into decay, and are now entirely destroyed.

St. Rose.—From St. Benoit to the little bay of St. Rose, the distance is nearly 6 miles. The anchorage at this place is in 14 to 18 fathoms, at $\frac{1}{6}$ of a mile from the shore, with the church bearing S.E. $\frac{1}{4}$ S., and is exposed to all winds except those that blow from the land. When leaving it some care is required to avoid the rocks close to the eastern side of the bay.

St. Pierre.—From St. Rose to St. Pierre, along the whole of the south and south-eastern side of the island, there is no anchorage. At St. Pierre the surf is usually

* The position of this building has been observed by the French surveyors to be Lat. $20^{\circ} 51' 48''$ S., and Long. $55^{\circ} 30' 1''$ E. (1864.) CAPTAIN OWEN, R.N., made the town in 1824, in Lat. $20^{\circ} 52' 30''$ S., and Long. $55^{\circ} 31' 39''$ E.

very heavy, and the hardness of the bottom under the thin covering of sand frequently causes the breaking of anchors or chains.

During winter, vessels anchor in 27 to 30 fathoms water at nearly a mile from the shore, in nearly the line of direction of the ravine, with the steeple of the church bearing N.N.E. $\frac{1}{2}$ E.; but during summer in a position nearer the shore, in 23 fathoms, with the church on the same bearing.

The anchorage at St. Pierre is only safe when the wind blows from the land, and it is recommended to be ready to get away immediately the wind veers to the south-westward, for should it then prevail with any strength, nothing could save the vessel from destruction.

Etang Salé.—At nearly 10 miles westward from St. Pierre is the bay of Etang Salé, where is anchorage in about 20 fathoms at $\frac{3}{4}$ of a mile from the shore, with the village bearing E.S.E., and Point Avirons N.E. $\frac{3}{4}$ N. This anchorage is only safe with the wind from the land, consequently all must be ready on board that the ship may be got away immediately the wind begins to blow from the southward, for winds from seaward always send in a very heavy sea. With strong southerly winds a landing at the village is impossible, and at such times is forbidden to be attempted by a flag hoisted on a staff at the shore side. As a rule it is only in very fine weather that a landing can be safely effected.

St. Leu and St. Gillies.—Following the coast northward from Etang Salé, at about 6 miles distance, is the village of St. Leu, off which there is anchorage in about 20 fathoms water; thence to St. Gillies the distance is $7\frac{1}{2}$ miles. At St. Gillies vessels anchor in about 18 fathoms, with the village bearing East $\frac{3}{4}$ of a mile, but it is safe only with winds from the shore.

ST. PAUL.—The bay of St. Paul is 3 miles northward of St. Gillies. The town is considered to be second in importance in the island, as it has a population numbered at 10,000, and boasts of a fine church, a hospital, &c. During the S.E. Monsoon the breeze is generally S.W. in the bay, and vessels anchor in 13 to 19 fathoms at about $\frac{1}{2}$ a mile from the shore, with the flagstaff bearing E.S.E. During winter the winds are generally N.E., and it is then customary to anchor in 16 to 22 fathoms, with the flagstaff bearing S.S.E. The holding-ground throughout is good, especially in the winter anchorage.

The currents are very strong at Points Houssaye and Galets, the south-west and north-east points of the bay of St. Paul, and in general are sufficiently powerful even in a calm to carry a vessel round the latter point. Point Galets is very low, and has not upon it anything sufficiently remarkable to be recognised at a distance; when approaching the bay from the eastward, shipmasters may be certain that they have passed it when they can see the peak of Cimandet in the ravine of the river Galets. The mountains can generally be seen at night, and greatly facilitate the navigation of the bay.

Point Galets, although very low, is steep at its extremity, and has deep water so close to it that a large vessel may pass it at less than a cable's length; thence to St. Denis the distance is 10 miles.

For a general description of the winds, see p. 73.

The following remarks on the anchorages at Réunion, by CAPTAIN BILTON, of the *Rowena*, are extracted from the "Mercantile Marine Magazine," 1865:—

"I shall commence first with the printed form of charter-parties, which runs thus —'The ship having been despatched from Callao, shall proceed to St. Denis,

Réunion, where the agents of the charterer are to have the right of receiving the whole or part of the cargo, and also of sending on the ship with such quantity of guano as they require to any *two* of the nine following points, viz.—

“ ‘St. Paul, St. Pierre, St. Leu, St. Rose, St. Benoit, Le Champ Borne, Le Bois Rouge, St. Suzanne, and St. Marie.’

“ ‘At the three ports the cargo is to be discharged and weighed on shore, at the ship’s expense; the charterers engage to receive it at the average rate of not less than 5 tons per working day.’

“ I will now endeavour to describe the accommodations for discharging cargo at the above-named ports, and as St. Denis is the principal, I shall commence with it.

“ At St. Denis there are four marine establishments, or what would be perhaps termed in England four cargo-boat companies; each company is supposed to have three good boats, that will carry on an average about 13 tons each. The charges for taking the cargo from alongside the ship and landing it, are $7\frac{1}{2}$ francs per ton of 1000 kilogrammes, and $2\frac{1}{2}$ francs per ton for weighing it; ballast is $7\frac{1}{2}$ francs per ton put alongside the ship. Here you can anchor in from 7 to 17 fathoms, according to the season, and as the anchorage is quite exposed to all winds from S.E. round by north to N.W., more or less swell always rolls in, even in the fine season, which often prevents cargo from being landed.

“ At St. Paul there are three boat companies; charges for landing cargo $7\frac{1}{2}$ francs per ton, for weighing $2\frac{1}{2}$ francs per ton; ballast $5\frac{1}{2}$ francs per ton put alongside. This is the only good roadstead in the island, and that only during the fine season, from the middle of April to the middle of November.

“ At St. Leu there is only one boat company; charges for landing cargo $7\frac{1}{2}$ francs per ton, and for weighing $2\frac{1}{2}$ francs; ballast $7\frac{1}{2}$ francs per ton put alongside.

“ At St. Pierre there are six boat companies; charges for landing cargo $7\frac{1}{2}$ francs per ton, and for weighing $2\frac{1}{2}$; ballast $7\frac{1}{2}$ francs per ton put alongside. This is considered to be the worst roadstead about the island; you must anchor in 28 or 30 fathoms, bad ground, close to the shore, and quite exposed to the southerly winds. It is seldom that a ship leaves here without the loss of an anchor and cable or two; and it is a place that a ship is very likely to be sent to, as it is the second town of importance in the island.

“ At St. Rose there is only one boat company; charges for landing cargo $7\frac{1}{2}$ francs per ton, and $2\frac{1}{2}$ francs per ton for weighing. Here you must anchor very near the shore in 12 fathoms, and should a vessel part her cable with an on-shore wind, her destruction is certain. Ballast is very difficult to get; indeed, if a vessel were ordered there to discharge, she would in all probability have to touch at one of the other places for ballast.

At St. Benoit there is one boat company, and two landing places—one at St. Benoit, and the other at port Bourbier—distant $1\frac{1}{2}$ miles from each other. This place, with the exception of St. Pierre, is the very worst part about the island that a ship could be sent to either for loading or discharging a cargo. It is quite open to the drift of the S.E. Trade. We anchored in 14 fathoms, St. Benoit church bearing S.W. by S., port Bourbier W. by N., and port Champ Borne North. We remained there from the 24th May until the 4th July, during which time we only managed to discharge 318 tons of guano; and twice had to slip and put to sea; once from 90 fathoms cable, and were seven days out; the second time from 105 fathoms, and were four days out; but each time we were fortunate enough to re-

cover the anchor and cable. At this delightful *port* the charges for landing cargo are $10\frac{1}{2}$ francs per ton, and $2\frac{1}{2}$ for weighing; ballast $10\frac{1}{2}$ francs per ton put alongside. As St. Benoit is situated in the principal sugar district, the chances are much in favour of a ship being sent there, and during the months of May, June, July, August, and September, you may consider yourself fortunate if you can land cargo twelve days during each month. I was informed at St. Benoit that the cargo boats have been lying bottom up at their anchors for fifteen days, and no communication could be had with the shore during the time. This happened in July; when we arrived there in the month of May, there had not been any communication with the shore for the previous eleven days.

"At Le Champ Borne there is one boat company; charges for landing cargo $7\frac{1}{2}$ francs per ton, and for weighing $2\frac{1}{2}$ francs per ton; ballast $7\frac{1}{2}$ francs per ton put alongside. Here you anchor in about 9 fathoms, quite exposed to the S.E. wind, ground bad.

"At Le Bois Rouge there is one boat company; charges for landing cargo $7\frac{1}{2}$ francs per ton, and for weighing $2\frac{1}{2}$ francs per ton; ballast $5\frac{1}{2}$ to $7\frac{1}{2}$ francs per ton, put alongside. Here you anchor in 8 fathoms, about half a mile from the landing-stage, ground pretty good.

"At St. Suzanne there is one boat company; charges for landing cargo $7\frac{1}{2}$ francs per ton, and for weighing $2\frac{1}{2}$ francs per ton; ballast $5\frac{1}{2}$ to $7\frac{1}{2}$ francs per ton, put alongside. Here you anchor in 8 fathoms, from $\frac{1}{4}$ to $\frac{1}{2}$ mile from the landing stage, good ground, and a little sheltered from the S.E. wind. We discharged 750 tons of guano at this place, and took in 350 tons of ballast in 36 days, during which time there were only three days that we could not work.

"At St. Marie there is one boat company; charges for landing and weighing cargo, and for ballast, the same as at St. Suzanne. Anchorage good, in from 7 to 9 fathoms, half a mile from the shore, well sheltered from the S.E. wind.

"N.B.—It must be understood that each ship must wait her turn for discharging or loading; for example, suppose a ship arriving at St. Suzanne with a full cargo finds other two ships in the roads, one discharging and the other waiting her turn; both these ships must be discharged and ballasted before the new comer commences. This is the regulation at all the ports round the island; port charges are 2 francs per ton on all foreign shipping,* but on French shipping only 30 centimes. When those exorbitant charges were made, I complained about it to CAPTAIN HILL, H.B.M.'s Consul, and he personally waited on the Collector of Customs and the Captain of the Port, and was informed by them, 'that whatever reciprocal arrangements had taken place between England and France, nothing of the sort had yet been extended to the French colonies;' and it is yet a question undecided whether a ship would or would not have to pay port charges at each of the three ports—namely, St. Denis, St. Paul, and St. Pierre, if ordered there to discharge; these are the only places that you can enter, and clear at.

"Having described the facilities for discharging cargo at the various places, I will now give a few hints which may be useful to a stranger bound to St. Denis. Having made the land anywhere on the south-east part of the island, continue your course along its northern shore, which is free from outlying dangers at least within a few cables lengths, and you will see the lighthouse on Point Bel-air, which stands on a high point, and is painted *white*; having passed it, you will next see the flagstaff at St. Denis, which is high, with yards and gaff on it; continue your course and you

will soon see the shipping anchored to the N.W. of it; run down abreast of them, leave-to, and a pilot will be sent off to bring the ship into the roads; but should it be night time, keep to windward of the port until daylight, and then should a pilot not come off, stand in to leeward of the shipping, and anchor in from 7 to 11 fathoms. Provisions of all sorts are very dear. Labourers' wages for working amongst guano are 10 francs per day, and found in provisions. At St. Denis you can procure good tasting pilots, who will remain on board during the time you are shifting ports and discharging cargo; their pay is 10 francs per day.

"In conclusion, I consider that a ship going to Réunion to discharge a cargo of guano ought to have at least 20s. per ton more than what is given for Mauritius; and no guano-laden vessel ought to go there during the bad weather season—say from the end of November to the middle of April, and then they ought to be well bound in ground tackle and in sails."

MAURITIUS.

General Remarks.—Mauritius is an island of an irregular oval form, having an area estimated at 500,000 acres. It is situate about 470 miles eastward of Madagascar, and 90 miles eastward of Reunion. The position of the observatory at Port Louis, the principal port of the island, is estimated to be Lat. 20° 9' 58" S., and long. 57° 29' 30" E.; the latter being the determination of COLONEL LLOYD, the late Surveyor-General.

From whatever direction the island is approached, its appearance is singularly abrupt and picturesque. The land rises rapidly from the coast to the interior, where it forms three chains of mountains from 1800 to 2000* feet in height, intersecting the country in different directions. Except towards the summit these are generally covered with wood, and in many parts cleft into deep ravines, through which numerous rivulets find their way to the low grounds, and terminate in about twenty small rivers, by which the whole line of coast is well watered from the foot of the mountains to the sea. Though, from its mountainous and rugged character, a great part of the interior is not available for any useful purpose, yet extensive plains, several leagues in circumference, are to be found in the high lands; and in the valleys, as well as along the coast, most of the ground is well adapted either for the ordinary purposes of agriculture, or for raising any description of tropical produce. Extensive forests still cover a considerable portion of the districts of Mahébourg, the Savanna, and Flacq, and in the centre of the island are several small lakes.

The soil in many parts is extremely rich, consisting either of a black vegetable mould, or a bed of stiff clay of considerable depth; occasionally the clay is found mixed with iron ore and the débris of volcanic rock. In the neighbourhood of Port Louis, and generally in the immediate vicinity of the sea, there is but a scanty covering of light friable soil over a rocky surface of coralline formation. The whole

* Peter Botte Mountain, over Port Louis, is probably 2600 feet high. This mountain is situated at the junction of the Long Mountain with the range of Les Calebases, and is easily recognised from all directions. When viewed from certain positions, it appears very curiously shaped towards the summit, having the outline of a figure in a very full flowing robe, and representing in the eyes of the colonists a Dutch Doctor of Laws in full costume. It has been rendered famous by the interesting account given by LIEUTENANT TAYLOR, of the Royal Engineers, in the "Transactions of the Royal Geographical Society," of its first ascent by a party of British officers, on September 7th, 1832, when the flag of England was planted on its extreme summit.

coast is surrounded by reefs of coral, with the exception of a few openings, through which vessels can approach the shore; and at these points the various military posts for the defence of the island have been established.

The principal produce of Mauritius is sugar, which is cultivated to the almost total exclusion of coffee, cotton, and indigo, that were previously produced in considerable quantities, the coffee especially being of excellent quality. Wheat and maize are raised in small quantities, with yams, manioc (introduced by the French), potatoes, bananas, and other vegetables. But the island is almost wholly indebted for its supplies of provisions to the ports of India, the Cape of Good Hope, Madagascar, and Reunion. Next to sugar, blackwood or ebony, of which there is an immense supply, is the principal article of export.

The history of the island is briefly as follows. It was discovered in 1505 by the Portuguese. The Dutch took possession of it in 1598, and named it Mauritius in honour of Prince Maurice. In 1644 they made a settlement on it, which was abandoned early in the following century. The French having in 1657 occupied Reunion, sent occasional settlers to Mauritius, and on its evacuation by the Dutch, they established a regular colony in the island in 1715, of which, however, they did not take formal possession till 1721; but the real founder of this important settlement was the justly celebrated M. DE LA BOURDONNAYE, who was appointed governor in 1734. Mauritius had hitherto been neglected for Reunion, and was, at the arrival of the new governor, in the most impoverished and disordered state imaginable. M. DE LA BOURDONNAYE immediately perceived the importance of the island, which its two excellent harbours rendered of the greatest consequence to any European power having, or wishing to have, possessions in India, and he set about its improvement with a zeal, sagacity, and success that have rarely been equalled and never surpassed. Besides extending the culture of the sugar-cane, coffee, cotton, and indigo, he introduced the manioc from South America, and cinnamon, cloves, pepper, &c., from the Dutch islands; though the latter, with the exception of cloves, have not answered expectations.

He fixed the seat of government at Port Louis, which he may be said to have created as well as fortified, and constructed numerous roads, aqueducts, and other useful public works. His administration continued only for eleven years, and in that short space of time he contrived to change the whole aspect of the country and render it a most prosperous and valuable colony. This highly-gifted man, who may justly be considered the founder of Mauritius as a colony, met with a most ungrateful return for his services, for on his return to France, in 1748, he was thrown into the Bastille and imprisoned for more than three years, without, as it turned out, there being the smallest foundation for any one of the charges made against him; he died, the victim of this disgraceful treatment, in 1755. Even after the possessions of France in India had fallen into our hands, Mauritius continued to be of importance to her, and proved how justly M. DE LA BOURDONNAYE had appreciated its capabilities as a naval station. It was estimated that during the first ten years of the great war between England and France, the value of the British vessels captured by privateers and other cruisers from Mauritius amounted to 2,500,000*l*. At length, a formidable armament being sent against it in 1810, it surrendered to our arms, and was definitely ceded to us in 1815.

Mauritius has numerous small dependencies between latitudes 3° and 20° S., and longitudes 50° and 70° E. The chief are the Seychelles,

For a general description of the winds, see p. 74.

It is possible in clear weather to see Mauritius from a great distance, but this is unusual, as the mountains are generally covered with mist. When approached from the north-eastward, shipmasters not unfrequently believe themselves further from the island than they really are, and thus unexpectedly find themselves close to Serpent island or to Round island; some care is therefore requisite in estimating the vessel's position with respect to the land.

When making the island from the eastward on the parallel of 20° , a group of mountains will be seen to the southward, called the Bamboo range, which in clear weather are visible from the distance of 40 or even 50 miles. These mountains, of which the highest is 2042 feet above the level of the sea, surround Grand Port.

The S.W. point of Mauritius, named *cape Brabant*, is a high bluff headland which is probably surrounded by shallow ground to some distance out. On its southern side there is a small island called Fourneau, and another, known as the Ile de Tamarin, lies close to its north side. At the outer extremity of the channel, separating Tamarin island from the cape, the land begins to rise into a high peak called La Morne. The sea rolls against this headland with great force, and after a stormy and tempestuous day breaks against it with immense violence.*

At about a mile northward from cape Brabant there is an islet of triangular shape, named Morne or Hill island, which is seated on the shallow flat extending from cape Brabant along the coast. At low water it may be gained from the shore on foot, as may most of the smaller islets which surround the coast.

Following the coast from cape Brabant, about $4\frac{1}{2}$ miles, we come to two streams named *Great and Little Black rivers*, which have at their entrances a depth of probably 2 to 15 fathoms, rapidly deepening seaward. On the north side of Great Black river there is a military post, where, says the REV. FRANCIS P. FLEMING, "is the most beautiful spot on the island. Encircled by the highest mountains on it, and the scenery interspersed with pretty winding rivulets and picturesquely wooded uplands, the landscape is almost perfect; the seaboard is varied on its surface by the long lines of coral reefs and rollers breaking over them in surf. The atmospheric clarity and the tropical vegetation, the cocoa-nut and other palm trees, and the graceful banana, plantain, and bamboo, which wave their foliage on every side—all lend their charms to the picture."

From Great Black river the distance is 2 miles to *Tamarin bay* along a steep coast covered with brushwood. The strand consists of a fine shingle. Tamarin bay receives the waters of Tamarin and Rempart rivers, and is said to have a depth of 6 to 30 fathoms, the latter being at only a short distance from the shore.

From Tamarin bay to the small rivers *Les Galets* and *Le Dragon* the distance is 4 miles. These streams are insignificant, but form the land lying between them into a narrow point, which separates the adjoining lowlands surrounding Tamarin bay from the steeper slopes of the plains above. The scenery which here opens to the interior is extremely grand; the long rugged spurs of the mountains of La Pierre Rouge rise at this point, and branch out into many irregular features of country, which, like all the high lands of this district, are covered near their bases

* Our description of the shores of Mauritius is far from satisfactory. The island has not been surveyed, and in the absence of a survey it is impossible to give so complete and reliable an account of it as we could desire. The only parts of it that have been examined are Port Louis and Grand Port.

with forest, whilst the summits are bare, uneven, and almost perpendicular peaks of grey and blue basalt rock.

At a mile north of Dragon river is the *river de Belle Isle*, which is fordable even at the mouth. The surrounding district, called the Plains of St. Pierre, is a pretty wooded and picturesque tract of country. All the coast along this part is steep and rugged; the soil is stony, the ground dry and arid, and although more productive in the moister localities, it is still far from being so rich as that in other parts of the island.

From the river de Belle Isle to the bay of *La Petite rivière* (Little river) the distance is $2\frac{1}{2}$ miles. Here a small battery commands and defends the mouth of the river. This stream has at its entrance a depth of possibly 4 to 10 feet.

Point aux Sables is a projection of the coast 3 miles north-eastward of the bay of La Petite Rivière, the shore between consisting of steep and perpendicular precipices which gradually decrease in height towards the point, which is low and surmounted by a small battery; there is also another battery in its immediate vicinity, called Pauline. The land above these precipices is covered with loose stones strewn over the surface, and there are but few trees, if we except some maples and velvet-trees and some tamarinds. Hence to Great River bay the distance is not more than 2 miles.

Great River bay has probably a depth sufficient for vessels of a moderate size. Immediately eastward of it is Port Louis, the capital of the island. On the west point of the bay there is a martello tower, where a small *fixed* light of red colour is shown on a mast as a guide to vessels bound to the port; this light bears S.W. by W. $1\frac{1}{2}$ mile from Fort George at Port Louis.

PORT LOUIS.—The harbour of Port Louis has water sufficient for vessels of the largest size; the soundings in the channel-way, according to the survey of COMMANDER EVANS, R.N., 1819, decreasing from 80 to 16 and 20 feet, the latter being immediately off the town: it is, however, stated that of late years the depth has considerably lessened.* On the north side of the harbour there is an island named Tonnelier, which is surmounted by batteries, and there is also a battery on the south side of the harbour, so that the approach to the town is well defended.

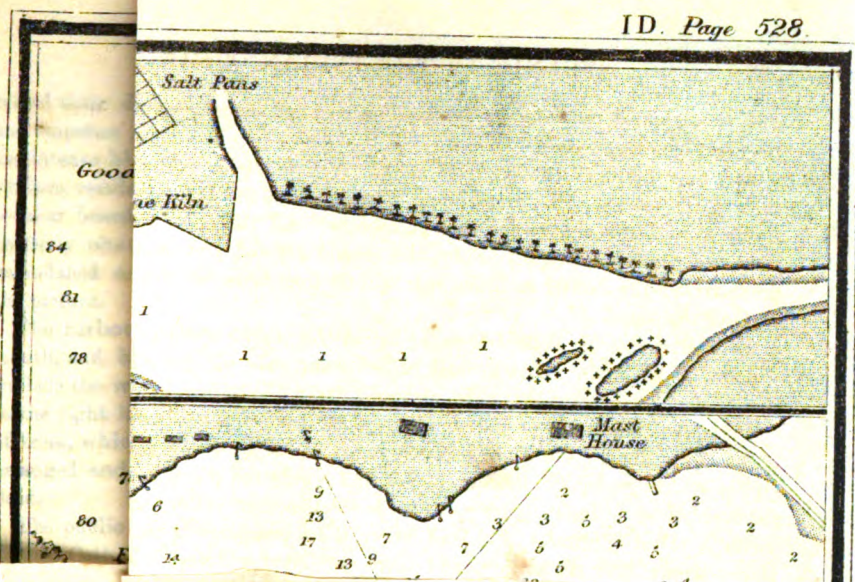
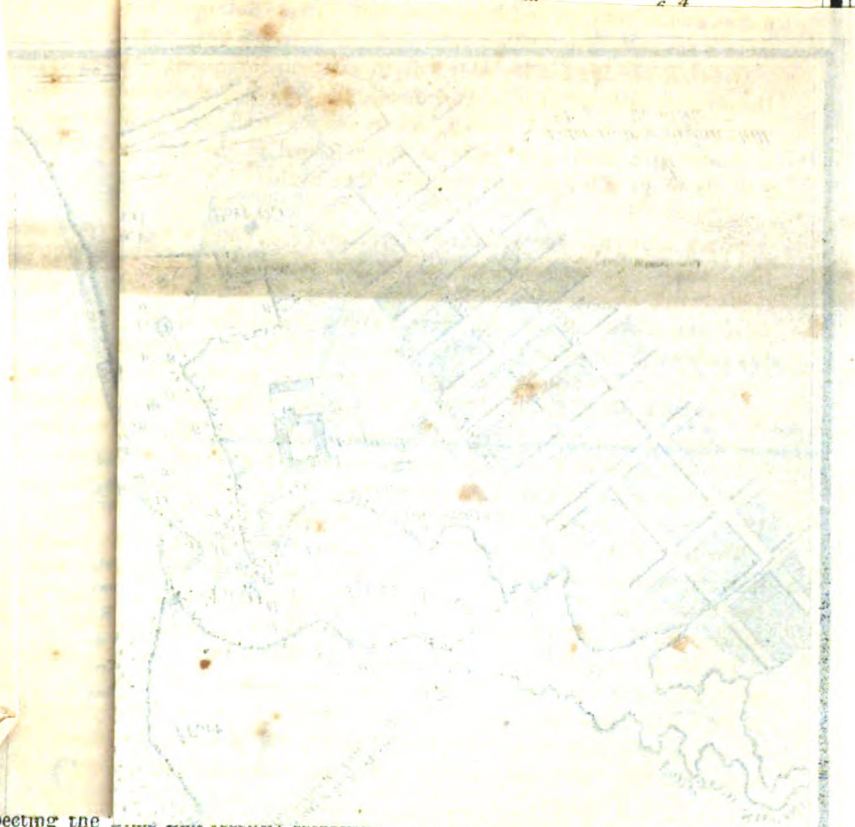
As a guide to vessels making Port Louis, a small *green* light is shown on a mast at the outer angle of Fort George on the western side of Tonnelier island.

It is high water at Port Louis, on the days of full and change of the moon, at $12\frac{1}{2}$ h. Springs rise 3 feet; neaps, $2\frac{1}{4}$ feet; neaps range $1\frac{1}{2}$ foot.

THE REV. FRANCIS P. FLEMING thus writes of Port Louis:—"By natural position and surrounding scenery, few sea-port towns can be found more favoured—save those of Rio Janeiro, in South America; Sydney, in Australia, and Natal, in Africa; there is hardly a harbour in the world which is more picturesque.

The houses rest on a gentle declivity, at the foot of the rugged and grand mountains, which rise from their rear as a striking background to the picture. The bases of these mountains are covered with brushwood and trees, and from the numerous fissures in their rocky faces several rivulets issue forth and trickle down the surface of the blue basalt stone, falling in diminutive cascades where obstacles arise to

* A fresh survey of Port Louis is much needed, and would be a great advantage to the commerce of the island.



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* A fresh survey of Port Louis is much needed, and would be a great advantage to the commerce of the island.

retard their downward progress or to restrain them until they have gathered volume and impetus enough to break over the precipice. The purity of the atmosphere, the intense blue of the cloudless sky, together with the gorgeous tints of tropical verdure, render these mountains, both at their summits and their base, objects of peculiar beauty; the colouring on them, particularly at sunrise and sunset, being perfectly charming; whilst the white buildings of the town, with their green verandahs and trellised windows, harmonise by contrast with the other parts of the picture.

The harbour is wide and expansive, and is well defended by a large battery at its mouth, and by another nearer the town, while the guns of the citadel command and enfilade the whole space around them. On the opposite side from the citadel, and to the right hand on entering the harbour, is seen a long regularly planted avenue of trees, which marks the approach to the cemetery of Père la Chaise, a prettily arranged and carefully tended inclosure dedicated as a sanctuary of the Christian dead.

The public buildings of port Louis are quite without pretension, if we except the Roman Catholic cathedral. The government house, the official residence, which is the most conspicuous edifice on first landing, is a large, square-looking building, useful, commodious, but conspicuously ugly. The barracks are large and commodious, and occupy a commanding site at the extremity of the town. The streets, though wide, are not well drained; the houses are close and badly ventilated, many inclosed in gardens surrounded by high stone walls, and, although they may be thus rendered more private and comfortable to the immediate inmates, they are nevertheless injurious to the place, and completely spoil the uniformity and appearance of the streets. The aspect of the town is, however, pleasing, if viewed from the sea, although a closer acquaintance is not altogether gratifying.

Of the scenery immediately surrounding port Louis, the most striking object is the Pouce mountain, taking its name from the singular resemblance of the final piece of rock at its summit to the human thumb, and which stands 2847 feet above the level of the sea. The lower ascent of this mountain is by no means difficult; it rises by an easy and gradual elevation from the site of the town. At the immediate top, and for some distance below it, it is, however, very precipitous and steep. On reaching this the view is very grand; the whole island lies stretched out below you—ocean-girt on all sides save one, and this is where the yet steeper peaks of the mountains of the Rivière Noire district rise and impede the view of that part of the shore which stands behind them. Directly beneath lies the speckled plateau of white and green dwellings of port Louis, and further on the ships in the harbour. The summit of the mountain is a piece of rock not more than 8 feet square.

On the opposite side of the town from the bazaar, and immediately above the barracks, rises a steep and conical hill called the Long mountain, 996 feet high, on the summit of which stands a signal-staff. This communicates with another on Port Louis mount, also a very commanding position. From these points, by means of a code of Marryat signals, the approach of all vessels to the island is telegraphed; whilst timely notice is likewise given to the inhabitants on the approach of hurricanes or bad weather."

TIME BALL.—On April 19th, 1833, the following public notice was issued respecting the Time Ball recently established at the Observatory: "From the 25th of

April, 1833, a signal will be made from the Tower Observatory on Tuesdays and Fridays, denoting the exact moment of 1h. mean time at Port Louis. Facing the harbour will be seen on the white ground of the Observatory, and about $\frac{1}{2}$ from the top, a large black sphere, which, by a communication from the inside, will disappear exactly at 1h. It will be necessary, therefore, for regulating chronometers, to observe, either with or without a telescope, the exact moment when the black sphere disappears. To give the better notice, a white and blue flag will be hoisted on the tower one hour before the time on the above-mentioned days, and will be lowered at about 12h. 55m. It being almost impossible invariably to avoid error, a white flag will be hoisted on the tower after the observation, provided by any chance an error has been committed."

Directions.—The following official instructions for vessels making port Louis were issued September 22nd, 1856, and bear the signatures of E. C. FROME, R.E., Surveyor-General, and EDWARD KELLY, Harbour Master, Port Louis:—

"A vessel making the island from the eastward (or on the windward side) should give a berth of $2\frac{1}{2}$ miles to the reefs off Ambre island, and should be careful not to approach the revolving light on Flat island on a course northward of N.N.W. $\frac{1}{2}$ W. until Gunner's quoin bears west, when a course may be shaped mid-channel to pass between Gunner's quoin and Flat island.

"Having passed westward of the Quoin, the fixed light on Canonnière point will become visible, and having brought the light on Flat island to bear E.N.E. $\frac{1}{2}$ N., the course may be changed to W.S.W. $\frac{1}{2}$ S., to pass Canonnière point at the distance of about two miles.

"So soon as the fixed light on Canonnière point bears S.E. by S. the vessel may haul up S.W. by S. (with Tamarind mountain in sight a-head, if the night be clear), for the anchorage off port Louis, distant about 10 miles. But, having sailed $6\frac{1}{2}$ miles on this course to abreast of Tombeau bay, the light on Canonnière point will become *red*, at which time the lights on Canonnière point and Flat island will be in line.

"The *red* light at the mouth of Grand river (Great River bay) will now be seen bearing S.S.W., and if the night be clear the Corps de Garde mountain over it, which course of S.S.W. the vessel may now steer for about 3 miles, and when the *green* light of Fort George on Tonnelier island bears S.E. $\frac{1}{2}$ S., the anchor may be dropped on the best anchoring ground outside of the harbour. By standing further towards the Grand River light to the southward the vessel will approach too near the reefs.

"It is, however, generally advisable for the vessel passing Canonnière point to lie to, but making sail occasionally for the purpose of preserving her position, so as to gain the anchorage at daylight, in preference to attempting it at night, by which, in but few cases, has time been saved. Considerable risk, as well as the necessity for anchoring outside, will thus be avoided. After passing Canonnière point, too much caution cannot be taken to prevent the vessel being set within the *red* range of that light before she has run the distance of $6\frac{1}{2}$ miles."

The following further directions for approaching port Louis are by MR. D. WALKER, Harbour Master, and were published September 23rd, 1858:—

"It is by no means generally known that the tides along the edge of the reef and between the islands northward of Mauritius run at times with a velocity of from 5 to 6 miles on the springs. They are equally strong off the Morne and along the

southern coast; their direction is from S.E. to N.W., the flood running to the S.E., and the ebb to the N.W., varying a point or two according to the wind.

"Wherever the reefs extend to a distance from the land, the lead, if carefully attended to, will be a tolerably safe guide in the night; but should the lead be over-hove when standing towards the shore, haul off immediately whilst preparing for a fresh cast, or you may run your ship aground. From 14 to 20 fathoms is generally a safe distance from the reef, but the soundings vary considerably. Of all the vessels that have been run on shore or lost on the coast of Mauritius during the last few years, it is not too much to say that the neglect of the lead was without exception the principal cause. The strength of the currents had also something to do with these accidents, but the neglect of the lead was the most important fact elicited in each inquiry.

"Where there is no coast reef marked on the chart, the shore is generally bold, having deep water to within a cable's length of it.

"Vessels arriving from the eastward and south-eastward, should be careful not to bring the light on Flat island to the northward of N.N.W. $\frac{1}{2}$ W. until Gunner's quoin bears west, when they may pass midway between it and Flat island. This course will lead about $2\frac{1}{2}$ miles clear of the reefs that extend from the north-east end of Mauritius.

"On passing Gabriel island, be careful to give a good berth to a reef that extends about half a mile to the S.S.E. of it; this warning applies more particularly to Cooly ships, which having to be visited by the Surgeon Superintendent at the Lazaret at Flat island, frequently pass much too close to this reef without being aware of its existence, as in very fine weather the sea does not always break on its extreme point.

"When westward of the Quoin, Canonnière point light will be seen. Steer with Flat island light astern bearing N.E. by E. $\frac{1}{2}$ E. until the Canonnière point light bears S.E. by S. (which will carry you clear of the dangerous reef that extends from the point); you may then haul up S.W. by S. till the red light at Grand river is seen, bring it to bear S.S.W., and steer for it on that course until the green light on Tonnelier island bears S.E., when, being over the best ground, you may anchor in from 12 to 16 fathoms. A nearer approach to the red light at Grand river would bring a vessel too near the reefs to the south-westward of the entrance of the harbour.

"Should the night be clear when running down the coast, the western shoulder of the Corps de Garde mountain will be seen in line with the Grand river red light when the latter bears S.S.W.

"Remember especially that after passing Canonnière point on your way to the Bell buoy, the Canonnière point light changes from *white* to *red* if it be brought to bear more northerly than N.E. $\frac{1}{2}$ E. This change will warn you that the vessel is too near the reefs that skirt the coast between Canonnière point and point Piment.

"But this change from white to red is only intended as a guide as far as point Piment, after passing which the red light at Grand river will be the mark to the anchorage. It is not well, however, for a large vessel ever to approach so near the reef as to change the Canonnière point light from white to red. The great object in view in thus arranging the light was the convenience of the numerous coasting vessels belonging to the colony, to whom (knowing the ground as they do) it is most useful. The best mark for keeping clear of the reefs between Canonnière point

and point Piment, by night, is to keep the Flat island light open westward of Canonnier point light, until the red light at Grand river is seen.

"Should you be approaching the Canonnier point light from the westward when it shows white, and steering directly for it, there can be no change of colour; but by attending to the bearing of Flat Island light it will be impossible for you to run on the reef. The barque *Cornwall*, of 947 tons, steering E.N.E. for Canonnier point light, was wrecked on the reef within three-quarters of a mile of the lighthouse, because it was erroneously supposed that the light changed colour on approaching it whenever a vessel was southward of it; whereas it is only when it is brought to bear N.E. $\frac{1}{2}$ E., and northward of that, that the light changes colour.

"When running for the anchorage by day, after passing Canonnier point with Flat island lighthouse bearing N.E. by E. $\frac{1}{2}$ E., bring Tamarind mountain (a conical hill westward of all the other high land) to bear S.W. by S., and steer for it until the Martello tower on the south side of the mouth of Grand river is seen in a line with the western shoulder of the Corps de Garde mountain, bearing S.S.W. This will lead clear of all danger to the anchorage, which is indicated by a floating beacon painted red and white, generally called the Bell buoy, which lies in 12 fathoms on the north side of the mouth of the harbour. Anchor northward of this beacon in from 12 to 20 fathoms.

"When approaching by night from the south-westward, Flat island light bearing N.E. by E. will lead between two and three miles to the westward of the reefs southward of the port, and when the green light on Tonnelier island bears E.S.E., steer for it if the wind be favourable under easy sail. If the night be clear the shipping at the Bell buoy will be seen and afford a good mark. Keep the lead going, and bring the two harbour lights to bear as already described, and anchor.

"During the day, the Gunner's quoin bearing N.E. $\frac{1}{4}$ E. is the best mark.

"It is most inadvisable to attempt anchoring at the Bell buoy after dark, unless well acquainted with the localities; it is far better, with the admirable advantages afforded by the lights for ascertaining a vessel's exact position, to keep under way till daylight; considerable risk will thus be avoided, and as no communication with the shore is permitted till vessels have received pratique, no time is gained by anchoring in the night."

It has been remarked by a shipmaster, that the reefs in the vicinity of the harbour of Port Louis generally show themselves by discoloured water, and that a good look-out should at all times be kept for them. A stranger should not attempt to enter the harbour without a pilot, especially as one can usually be obtained at from two to four miles from the entrance. The wind most frequently blows out of the harbour, and renders it necessary for vessels to warp in. From October to February (when the winds are inclined to vary, and sometimes blow from North and N.W.) the current is liable to run eastward along the north side of the island; at such times vessels may approach Port Louis with facility by coming round the west side of the island. This is the best season for ships crossing from Madagascar to Reunion and Mauritius.

PORT REGULATIONS AND SIGNALS.—The following official notice was issued from the Harbour Master's Office at port Louis, November 30, 1850:—

"1. All vessels above 100 tons burthen shall take a pilot, and receive the assistance that may be sent them from the port office.

"2. All British vessels under 100 tons may be allowed to warp in by their

own means, but they must be moored in the berth pointed out by the harbour-master.

"3. Vessels of every description are to be moored with two bower anchors forward, and from 1st December to 30th April two also astern, with buoys and good buoy-ropes on them; during the other months, one bower anchor astern will be deemed sufficient. Captains and owners shall be obliged at all times to take any additional precautions for the safety of their vessels that the harbour-master may think proper. Pilots, when mooring vessels, must be careful not to overlay other ships' anchors; if possible, to avoid it.

"4. Pilots are not to bring any vessel above the forts until the powder has been taken out; and if time will not permit of its being landed, it must be put into a boat and moored outside the harbour; the powder to be well covered with tarpaulins or sails, and a man left in the boat to guard it; this man is not to be permitted to smoke, or have any fire in the boat. During the time he has the powder in charge, a red flag is to be hoisted on a staff, and kept flying in the bow of the boat.

"5. As soon as a vessel is moored and secured in the berth (or before if necessary), the flying and standing jib-booms, and also the studding-sail booms on the yards, are to be run in, and no spars serving as guess-warp-booms can be allowed while in the harbour. Captains and officers not complying with this regulation must be answerable for any accident which may happen by other vessels hauling in or out, sailing in or out, or towing in or out by the steamer, changing their berths, or by small craft boarding them, or by any other means whatever.

"6. From the 1st day of December to the 30th day of April, all ships and vessels moored in the harbour are to keep their topgallant-yards and masts struck and on deck, that they may be in constant readiness to strike their yards and topmasts on the first order from the harbour-master.

"7. It is expressly forbidden to throw dirt or ballast from vessels in the harbour. A boat will be sent round once a week, or oftener if necessary, to receive the dirt from vessels and carry it away.

"8. When vessels are laid up, the owners are to provide a competent person to take care of them, in default of which one will be provided by the harbour-master at the expense of the said owners.

"9. Coasting vessels cannot be allowed to remain in harbour during the night, without two men at least, as a guard, on board of them.

"10. All captains and officers of vessels moored in the harbour shall be obliged to receive the tow-ropes from any vessel which may be warping in or out, as ordered by the pilot in charge.

"11. Vessels at anchor, or moored in the harbour, are not to scale their guns or fire salutes without leave from the harbour-master.

"12. No vessel is to be smoked for the destruction of rats without having first acquainted the harbour-master, and obtained permission for that purpose.

"13. In the event of an alarm of fire in the harbour or on shore, each vessel shall be obliged to send her buckets, axes, maules, and whatever she may have on board which may be useful in such cases, and also as many men to assist as can be spared.

"14. Vessels requiring hay for the purposes of their voyage cannot be allowed to remain the night at anchor, or on the warps in the harbour, after the hay is on board;

and should they not be ready to proceed immediately to sea, they must run out and anchor at the Bell buoy, to wait until they are.

"15. Neither hay nor cotton can be allowed to remain on the wharf during the day, unless under a special guard; nor can such be suffered, under any circumstances, to remain on the wharf during the night.

"16. Vessels embarking gunpowder must in like manner proceed to sea immediately, or wait outside the harbour until they are ready.

"17. Boats are not allowed to be hauled up or landed on the government wharfs or ways without leave from the harbour-master.

"18. No vessel can be swung preparatory to going to sea until the clearance from the Custom House is produced at the Port Office.

"19. Notice of the departure of vessels shall be given in writing by their respective commanders at the Custom House and Port Office, 48 hours previous to sailing, and a flag shall be hoisted at the maintop-gallant-masthead from the time such notice is given until their departure. English ships to hoist the Jack, and foreigners the small flag of their country.

"20. Vessels that are swung will be allowed to remain 24 hours on the warps belonging to the port, but no longer; if they do not proceed to sea at the expiration of that time, they will have to pay for the use of each of the four warps by which the vessel is secured, the daily charges fixed by the Port Tariff until her final departure. Vessels under 100 tons which are allowed to make use of their own means in swinging, will be charged 20 shillings per day for the time they remain swung above the 24 hours, as allowed to other vessels.

"21. Captains and officers of merchant vessels of all nations are strictly prohibited from hoisting at either mast-head of their respective ships any pendant or anything that can be construed into a pendant, while they remain in this harbour.

"22. From the 1st of December till the 30th of April of each year, all vessels, whether English or foreign, arriving in the harbour of port Louis, shall be authorised to enter and anchor in the harbour, as far up as the line which, during this season is destined to form the north-east boundary of the roadstead of port Louis; ships and vessels thus arriving and anchoring thus high, shall not be liable to any entries, fees, or formalities exigible by the Custom House or Port Office, other than they were formerly subject to, when they could only anchor at the Flag or Bell buoy.

"23. The boundary referred to by the foregoing article, shall be marked out by two flagstaffs erected upon the beach, one on either side of the harbour, indicating a line from the inner point of Isle Tonnelier to the inner point of Fort Blanc, and each of them bearing a yellow flag blazoned with the Royal initials, surmounted by a Crown.

"24. With reference to Art. 9 of Ordinance No. 38 of 1844, a red flag with a swallow tail, will be used to indicate that a vessel arriving has been permitted to communicate with the shore.

"25. In case any ship or other vessel be sunk, stranded, or run on shore in any part of the harbour, port, or roadstead, the owner or owners, or some other person having or pretending to have any property therein, or the commander thereof, shall clear the said port, harbour, or roadstead of such ship or vessel and of all wrecks and parts of the same within the time appointed, in a notice under the hand of the harbour-master requiring them so to do, and in default by such owner or owners, or other persons aforesaid, to obey such orders, such ship or vessel, wrecks and part

of the same, shall be removed in such manner as the harbour-master shall order and direct, and the expenses of removing such ship or vessel, wrecks and part of the same, shall be chargeable to and against the owner or owners of such ship or vessel, or other person aforesaid, independently of the fine and penalties prescribed by the Art. 42 of Ord. No. 38 of the present year.

"BAD-WEATHER SIGNALS:—

"The following Signals will be made from the Flag-staff at the Port Office, and repeated at the Flag-staff of Fort George, on the approach of bad weather.

"Signals to Ships and Vessels in the Harbour.

"A White Flag, with Horizontal Blue Stripes:—Send down top-gallant yards and masts, and prepare for bad weather.

"The Masters of all Ships and Vessels in this Port are required immediately to repair on board their respective Vessels.

"A White Flag with a Blue Cross:—Strike lower yards and topmasts.

"N.B.—This Signal shall be confirmed by a gun at Fort George.

"Signals to Vessels at anchor at the Bell-buoy, and repeated at the Flag-staff of Fort George.

"Red Pendant over a White Flag with Horizontal Blue Stripes:—To indicate the appearance of bad weather or of a hurricane.

"Red Pendant over a White Flag with a Blue Cross:—To indicate that the gale or hurricane has begun.

"Ball over a White Flag with a Blue Cross:—Shall announce to all vessels outside the harbour that the danger of remaining at anchor has become great, and that their safety requires them to put to sea.

"N.B.—This signal shall be confirmed by a gun at Fort George.

"The several ships and vessels are required to answer the above signals by hoisting the Jack of their nation at the main.

"Ships at the Bell buoy can communicate with the Port Office by MAREYAT's signals; the same to be kept flying till answered by the pendant at the Port Flag-staff.

"N.B.—The Captain of the Port desires to impress upon the minds of the masters of vessels arriving at this port during the hurricane season, the necessity of prompt obedience to the above signals.

"All infractions against the Regulations of the Port shall be punished by fine, which shall not be less than 5*l.*, nor more than 50*l.* sterling, and by an imprisonment of from eight days to three months, accumulatively or separately."

Canonnière Point, &c.—At about 9½ miles northward from port Louis is Canonnière point, to which such frequent reference has been made in the instructions for making the port. At 2½ miles from the harbour is Tombeau bay, in which there is probably a depth shoaling from 18 fathoms at the entrance to 2 fathoms close to the shore; and at 1¼ mile northward from this is Turtle bay, which receives the waters of the river Pamplemousses, a stream running about 8 miles into the interior. Hence to Canonnière point the coast trends north-eastward, and at about midway there is a projecting point, named Rocky point.

Canonnière point is low and sandy, and has a battery upon it. The point will be easily recognised by its lighthouse, which stands at the extremity of the headland, in Lat. $20^{\circ} 0' 35''$ S., and Long. $57^{\circ} 35' 24''$ E., and shows a *fixed* light at 38 feet above the sea, visible 10 miles. This building bears S.W. $\frac{1}{2}$ W., nearly 9 miles from the lighthouse on Flat island, and one of the objects of its erection is to indicate the position of a dangerous reef which extends off shore $1\frac{1}{2}$ miles from the point, and to warn vessels from approaching too near the coral reefs north-eastward and south-westward of the point. When seen from the southward *on any bearing northward of N.E. $\frac{1}{2}$ E. the light will appear red*, and thereby give warning to seamen (when within 6 miles of the light) that they are too near the shore.*

On the east side of Canonnière point there is a shallow bay named Great bay, and at nearly 3 miles further eastward is Cape Malheureux, the north point of Mauritius. At $2\frac{1}{2}$ miles N. by E. $\frac{1}{2}$ E. from Cape Malheureux is the islet Gunner's quoin.

Gunner's Quoin.—The Gunner's quoin is an island about a mile long in a W. by N. and E. by S. direction, the highest part of which, the north-western point, is steep and 515 feet above the sea; thence it slopes gradually towards the south-east, where it is terminated by three dangerous rocks named the Carpenters. There are also several dangerous rocks on its north and north-east sides, distant from it about $\frac{1}{2}$ of a mile.

Between the Gunner's quoin and Mauritius there is a good channel of 16 to 37 fathoms water, through which vessels may pass with care. It is necessary to give the mainland a good berth, as there are several shoals off it. The deepest water is at about half a mile from the Quoin, where will be found from 20 to 30 fathoms. It is said that good anchorage may be obtained at about a mile from the shore of Mauritius.

Flat Island.—At 4 miles north-eastward from Gunner's quoin is Flat island, an island of about a mile in extent, the shores of which are rocky, and, with the exception of the south-west side, bordered by sunken rocks. Its south-western extremity is steep and rugged; the remainder of its surface is flat and comparatively smooth. At its south-east end there is a small islet, named Gabriel island, which is separated from it by a narrow channel, too shallow to be navigable.

At $\frac{1}{2}$ of a mile N.N.E. from Flat island there is an isolated rock 172 feet high, named Pigeon house. The channel between probably has a depth of 2 to $3\frac{1}{2}$ fathoms; but it is very unsafe, and never used by vessels.

The lighthouse on Flat island stands on the south-west angle, the highest land of the island, in Lat. $19^{\circ} 53' 26''$, and Long. $57^{\circ} 41' 12''$, and shows a light revolving in one minute, during which period it appears bright for 20 seconds. It is 365 feet above the sea, and visible from the deck of an ordinary vessel at the distance of 25 miles. In addition to the lighthouse there is a telegraph station on the island, and also a flagstaff.

In Palisade bay, at the western side of Flat island, small vessels occasionally anchor in about 10 fathoms, and obtain shelter from easterly winds. And vessels may also anchor on the south-west side of Gabriel island in a similar depth, but great care is necessary to avoid a dangerous sunken reef extending from the south end of the island to a distance probably of half a mile.

* COLONEL LLOYD, Surveyor-General of the island, says, "The breakers on the north-west coast of Mauritius can generally be heard from the distance of 8 miles, and should not be approached nearer than the depth of 15 fathoms."

The channel between Flat island and Gunner's quoin is the channel generally used by vessels bound to port Louis from the north-eastward. It is quite safe, but it is necessary to guard against the sunken reef off the south end of Gabriel island and the rocks off the north-east side of Gunner's quoin.

Round Island.—This island is situate $11\frac{1}{2}$ miles E.N.E. $\frac{1}{2}$ E. from the Gunner's quoin; $13\frac{1}{2}$ miles E.N.E. $\frac{1}{2}$ E. from cape Malheureux; and 7 miles E. $\frac{1}{2}$ N. from Flat island. Its position is estimated to be Lat. $19^{\circ} 50' 34''$, and Long. $57^{\circ} 47' 56''$. It is about three-quarters of a mile in extent, 1049 feet high, and has soundings on its western side of from 4 to 25 fathoms, the latter being at about a mile off. It may be passed on the east side, and also on the south side at the distance of a mile. In the event of a calm, anchorage may be obtained in 15 fathoms at half a mile from the shore, with the island bearing S.W., and the reef of Serpent island North distant three-quarters of a mile.* In clear weather the island may be seen from a distance of 20 to 30 miles.

Vessels sometimes pass between Round island and Flat island, but should not approach the latter nor the Pigeon House rock within the distance of a mile.

Serpent Island.—Serpent island is a large rock of whitish colour, situate north-eastward from Round island $1\frac{1}{2}$ miles. A reef extends from its east side about $\frac{1}{2}$ of a mile, rendering a near approach unadvisable; indeed, it is said that vessels should give the north and east sides of the island a berth of at least one mile.

In the channel separating Serpent island from Round island there is probably a depth of 23 fathoms, but it is not advisable to attempt this passage at the risk of being becalmed, and also on account of two dangerous reefs, one of which is $1\frac{1}{2}$ miles westward of Serpent island, and the other half a mile N.W. of Round island; the latter breaks only when the sea runs high. If obliged to run through this channel, pass midway between the reefs, or at about $\frac{2}{3}$ of a mile southward from that of Serpent island, which is always visible by its breakers.

Currents, &c.—The flood runs between the islands just described (Gunner's quoin, Serpent island, &c.) N.E. and the ebb S.W. The stream is very rapid, averaging from 3 to 4 miles an hour, which must be allowed for; during the S.E. Monsoon in June, July, and August, the stream sometimes runs 6 miles with the flood, and the ebb occasions an equally heavy race between the Gunner's quoin and the north end of Mauritius.

It may be remarked here that, as a rule, a vessel making Mauritius in the evening, and in hazy weather, should not run between the islands in the night; but in clear weather, as they are visible at a great distance, she may pass in safety between Flat island and Gunner's quoin.

M. D'APPRÈS DE MANNEVILLETTE says, "Great care is requisite when approaching the north-east end of Mauritius, because dangerous reefs project from several places nearly a league into the sea. Round island appears like a haystack, and can be seen from a distance of about 30 miles in clear weather, and is visible, when viewed from the north-eastward, sooner than Mauritius, especially in cloudy weather, or when the horizon is hazy. If a ship pass outside all the islands, with the wind far to the southward, she will have to work in after-wards; it is therefore proper to work in southward of Round island, keeping at

* It has been stated that the channel between Round island and Serpent island is unsafe, there being numerous reefs about; although in other respects it is sufficiently deep for large vessels.

more than half a league from it, to give a berth to the reef projecting from its west side.

"If a ship, in passing through the channel among the islands, experience a calm, she ought to anchor with a stream or kedge, in 15 or 20 fathoms gravel or coral, which is the common ground here; this will prevent her being driven by currents on the reefs joining Flat island, or being carried between it and Round island, where are several shoals, particularly a ledge extending nearly 3 miles to the north-westward from Round island. This ledge, which has no breakers on it but when the sea runs high, renders this channel narrow and dangerous; a ship may, notwithstanding, pass through it without accident, but if she fall to leeward of Round island, it is safest to pass outside of Flat island also, keeping about $1\frac{1}{2}$ miles from it, then steer for the west end of Gunner's quoin and Canonnier point."

Flacq Bay.—From cape Malheureux, the north point of Mauritius, the coast trends to the south-eastward, and for about 12 miles is fronted by extensive and dangerous banks, upon which are seated some irregularly-shaped coral islands, named Ambre; it then trends round to the southward 7 miles to Flacq bay, where is one of the oldest settlements on the island, and the district is one of the best cultivated; it was originally settled by the Dutch. Here is a military station. The sugar from Flacq is conveyed to port Louis by *chasse-marées* or *gaulettes*, large lugger-boats decked over, and able to hold a great number of bags stowed below. A passage which exists between the reefs and the shore at the mouth of the river enables them to run in close to the coast, and take their cargoes on board with very little trouble.

At $8\frac{1}{2}$ miles southward from Flacq bay is the outlet of Great river, or Rivière Sud-Est, where is also a military station.* Adjacent to this river lie the Deer islands, and another rocky islet called Roche island; these are small coral islands formed as the surrounding reefs, but separated and detached from them. On the south side of the river rise the first abutments of the Bamboo range of mountains, the highest peak of which is estimated to be 2042 feet above the sea.

GRAND PORT.—Succeeding the outlet of Great river or, as it is termed by the colonists, Rivière Sud-Est, is the large bay forming Grand port, which is the only harbour on the east side of the island. It is at Grand port that the town of Mahebourg is situate, which is a small town of but little commercial importance. All this part of the coast is fronted by reefs, and the approach to Mahebourg is rendered difficult to strangers by the windings of the three channels by which it is approached; the assistance of a pilot is therefore essential at all times.

Grand port is but little frequented, as it is on the windward side of the island, and the trade-wind generally blows into it, which increases the difficulty of leaving it. On the days of full and change of the moon there are breezes at times from the land, which permit a vessel to get out of the harbour. The reefs forming the channels generally show themselves by the colour of the water; when within, there is usually a smooth sea, the reefs forming an excellent natural breakwater.

* The shore in the vicinity of Great river is covered with large stones, the surfaces of which are pierced with numerous circular holes about a foot or fifteen inches in diameter, and nearly to the same depth; these are also found on the land in the interior of the island, and appear as though the boiling matter of which they were first formed had suddenly cooled and left large bubbles of air burst on its surface.—FLEMING'S *Mauritius*.

Light.—A lighthouse has recently been erected on Isle aux Fouquets, on the edge of the reef, at half a mile north of the southern entrance of Grand port. The tower from base to vane is 84 feet high, and as well as the buildings adjacent to it, is coloured white; it marks the southern entrance to Grand port, and stands at about $4\frac{1}{2}$ cables' length E.N.E. from Isle Passe, and 3 miles from the coast of Mauritius; its position is Lat. $20^{\circ} 24' 10''$ S.; Long. $57^{\circ} 45' 9''$ E. The light, *fixed*, is 108 feet above the sea, and visible from a distance of 16 miles.

Directions.—In reference to the light on Isle aux Fouquets, the following instructions were officially issued in 1863. The magnetic variation allowed was $9^{\circ} 25'$ W.

"A Government pilot in a few months will be stationed at the newly erected light-house, and will board vessels bound to Grand port on their making the usual signals. Vessels bound to Grand port may approach the light, when bearing from N. by E. round by north to W. by S.; and when about 2 miles from it should heave-to for the pilot, with the vessel's head off-shore.

"Should it be desired to get shelter, approach the light under easy sail till at about three-quarters of a mile from it, avoiding the shoal patch of 6 fathoms water off Laverdie point, the extreme of the coral reef bounding the south side of entrance to Grand port; then steer so as to round Isle Passe at the distance of half a mile, as a spit runs out from its south side for about a cable's length; when haul to the northward and anchor in 18 to 20 fathoms. It is not recommended to attempt to enter without a pilot, except in cases of extreme necessity.

"A vessel from the southward bound to port Louis, round the north end of the island of Mauritius (the usual track), should, after sighting Grand port light, steer so as to pass it at a distance of 4 miles; when at that distance, with the light bearing W. by S., a N.N.E. $\frac{1}{2}$ E. course for 9 miles, if the weather be clear, will bring a vessel in sight of Flat island *revolving* light, bearing about N. by W. $\frac{1}{2}$ W.; the course can then be shaped as required.

"A vessel from the northward having Flat island light on a N.N.W. bearing, should be careful after sighting Grand port light, not to bring it, when at a distance of less than 8 miles, on a more southerly bearing than S.W. by W. $\frac{1}{2}$ W., or she will be too near the coast reef northward of the light.

"The coast reef bounding Grand port is bordered by a bank of irregular soundings extending some distance seaward; the lead, if carefully attended to, will prove a tolerable guide in thick weather.

"Vessels bound into Grand port should not approach it at night, but should heave-to well southward of the light, as the drift is to the northward, and much time will be lost in working back. Isle Passe, on the north side of the entrance, is easily known by the battery and other buildings on it. At times the rollers block the channel, although the depth is from 14 to 22 fathoms; and generally the reefs on either side are perfectly visible from aloft. The rise of tide is 3 feet."

The following additional instructions by the late COLONEL LLOYD, C.E., Surveyor-General of the island, dated 1849, may still be of service:—

"*North Entrance.*—A vessel intending to enter Grand port, or Mahebourg, by the northern entrance, must keep Bamboo peak bearing West by compass until Rocky island is made, which is surmounted by a beacon visible at 5 miles' distance. This rock is situate at the extremity of the reef, and forms the northern arm of this entrance to Grand port; it should be passed $\frac{1}{2}$ of a mile to the southward. A

S.W. $\frac{1}{4}$ W. course must then be steered about 2 miles, when on the port bow a remarkable isolated breaker, named the Diamond, will be visible opposite another entrance to Grand Port, called Danish Channel. Having brought this breaker to bear S.S.W. $\frac{1}{2}$ of a mile, steer W. $\frac{1}{2}$ S. about one mile, when a bluff hill will be seen on the port bow, stretching to seaward, surmounted by a curious black rock, and at the foot of its leeward extremity there is a battery. This is called the Devil's point, and so soon as the black rock bears W.S.W. distant one mile, steer S.W. by S. $\frac{1}{2}$ S. for about $1\frac{1}{2}$ miles, passing the Devil's point $\frac{2}{3}$ of a mile from the battery, and bring up in 9 or 10 fathoms, sand and gravel, the Devil's point bearing N.W. $\frac{1}{4}$ W., and Bamboo peak N.W. $\frac{3}{4}$ N.

"When passing the Devil's point take care to keep closer to the reef on the port-hand than to the land, as there are two large banks $\frac{1}{2}$ of a mile from the shore, with only 2 or 3 fathoms water over them.

"By following the above directions, and not approaching the reefs on either side of the channel within less than $\frac{1}{4}$ of a mile, a vessel may be taken to the above safe anchorage without risk.

"It would not be advisable to attempt going any further towards Mahebourg without being well acquainted with the intricate channels and shoals, or without having a colonial pilot on board.

"*Eastern, or Isle Passe Entrance.*—The eastern entrance to port Royal is less intricate than the above, in preference to which it is recommended. It is situate about 9 miles S.W. by S. of the northern entrance, and can be easily made out by the Isle Passe rock, which forms the northern arm of its entrance, as well as by a remarkable bluff mountain, 1583 feet high, inshore immediately opposite, named the Lion's Head, which, in making the pass, must be kept on a N.N.E. $\frac{1}{4}$ E. bearing.

"The Isle Passe will be easily recognised; it is the southernmost of several small rocks or islands bordering the reef, and is covered with houses, fortifications, &c.,—there is also a flagstaff near its centre.

"When entering the channel keep the Lion's Head bearing N.N.E. $\frac{1}{4}$ E. as above, until the centre of the Isle Passe bears E. by N. distant $\frac{1}{4}$ mile; then steer for the rock of the Devil's point, which will bear E.N.E., and after running $\frac{2}{3}$ of a mile bring up in about 13 fathoms, sand and gravel, the Isle Passe bearing south, and the Lion's Head S.W. $\frac{1}{4}$ W. It is not advisable to go further without a pilot.

"*Danish Passage.*—The Danish passage, already mentioned, bearing W.N.W. $\frac{1}{4}$ W. from Bamboo peak, cannot be recommended on account of the small depth of water at its mouth (3 fathoms), which occasions a heavy cross sea, sometimes breaking from point to point. If, however, this entrance be attempted, when off the mouth of the channel keep as close as possible to the northern point, in order to avoid a large coral bank in the centre of the pass, on which there are only $2\frac{1}{2}$ fathoms; steer $\frac{2}{3}$ of a point to the southward of Bamboo peak for about a mile, when the Diamond rock will be right ahead; pass it on either side at a cable's length, and as Bamboo peak is brought to bear W.N.W. $\frac{1}{4}$ W., steer W. $\frac{1}{2}$ S. to make the Devil's point, and follow the directions given above for the northern entrance to pass that point to the anchorage."

South Shore of Mauritius.—From Grand port the coast trends W. by S., and forms the south shore of Mauritius, in which there are no harbours, it being rendered almost inaccessible by the coral reef which borders almost the whole of it, the only exceptions being the immediate channels of the rivers. This

bars all approach to the shore save for vessels of small tonnage and a shallow draught of water; but many of these, called *chasse-marées*, trade round the coast of this district for the transport of sugar to port Louis—at one part between cape Brabant and Le Cap the reef rises to an elevation of fifteen feet above the water. At $6\frac{1}{2}$ miles eastward of point Brabant is the river Citron, where vessels of 200 tons have been built, the wood being here plentiful, whilst the rivers on the south coast of the island being generally navigable at their mouths, render this particular district a favourite resort for those engaged in this occupation. Between the river Citron and cape Brabant the charts represent a little inlet, named Cape bay, which is merely the outlet of a stream known as the Cape river; the depth at the entrance to this bay is probably 8 fathoms. Port Savanna, a similar bay, is in Long. $57^{\circ} 30'$, and nearly midway between Grand port and cape Brabant.

RODRIGUES.

General Remarks.—This is an irregularly-shaped island of considerable altitude, which can probably be seen from a distance of 30 to 40 miles in clear weather. It is about 18 miles long from east to west, and $6\frac{1}{2}$ miles across in its broadest part. It possesses two harbours of sufficient depth to admit vessels, of which that on its north-eastern side bears the name of Mathurin bay, and that on the south side, Sea Turtle Pen; the latter is seldom frequented, being considered too intricate for strangers. Reefs extend around the island, and have their outer edge at least 5 miles from it, in some places probably as much as 7 miles, excepting at its north-eastern part, where it is believed that they do not run off more than half a mile, a statement having been made that there is a depth of 25 to 17 fathoms at that distance from this side of the island. The position of the centre of the island is estimated to be Lat. $19^{\circ} 41' S.$, and Long. $63^{\circ} 25' E.$

Rodrigues has not been surveyed, and we are chiefly indebted to the old chart of M. D'APRÈS for the foregoing details. Statements have been made that the reefs surrounding the island extend many miles from it, but it is generally believed that 7 miles is their utmost limit.* When approaching the north-east side of the island no bottom can be obtained at the distance of 3 miles from it; thence it decreases in

* MR. D. WALES, Harbour-master at port Louis, Mauritius, in some remarks addressed to the Editor of the "Nautical Magazine," which were published at Mauritius in 1860, is of opinion that the reef extends southward of Rodrigues about 12 miles, an opinion he arrived at during the evidence given by the master, officers, and crew of the *Nusser Sultan*, before the Marine Court of Inquiry into the cause of the loss of that vessel; and also from a bird's-eye view of the dangers on the north, west, and south sides of the island, which he obtained from one of the highest of its mountain peaks. He says: "Although I don't pretend to state with accuracy the distance of the extreme broken water southward from the nearest shore, yet I can safely assert that it appeared to me to be nearly double the distance from the land, as compared with the reef to the northward off Palm Tree point. Now, the reef off Palm Tree point is laid down in M. D'APRÈS' chart as extending $6\frac{1}{2}$ miles from the nearest shore, which is known to be nearly correct, from which I infer that if the reef to the northward is 6 miles from the land, that on the south side is nearly double that distance." And this opinion he retains, notwithstanding the triangulation of SIR J. MARSHALL, of H.M.S. *Isis*, which would tend to prove that the distance is not more than 6 miles.

The Marine Court of Inquiry, alluded to in the preceding paragraph, advised ship-masters to give Rodrigues a wide berth at night, as they could not regard it otherwise than very dangerous land to approach at any time, and especially when there is cause for doubting the accuracy of the vessel's position. They considered it quite unnecessary to follow the usual custom of sighting it when bound to Mauritius for the purpose of verifying chronometers, believing it to be far better to get into the parallel of Round island, and thence steer directly for it, particularly as the coast of Mauritius is now so well lighted that it is difficult to mention any land that can be made by night or day with more safety and less risk by vessels coming from the eastward.

depth from 45 to 17 fathoms, the latter being, as already mentioned, at half a mile from the shore—further westward the soundings are more gradual. But few vessels frequent the island, there being no inducement beyond getting a supply of fresh water.

Mathurin Bay.—The following instructions for Mathurin bay, by **LIEUTENANT GRUBB**, of the Bombay Marine, were written many years since (in 1810), and are still the only information we possess of the harbour. It is, perhaps, scarcely necessary to add that as they are not modern, they should be followed with the care which a shipmaster should always exercise when guided by uncertain information.

"The road or harbour is called Mathurin bay, and near the middle of the island and south from the roadstead, there is a remarkable peak which answers as a guide. Vessels may stand in shore to 18 or 16 fathoms, but the bottom in general consists of coral rocks, though in some spots of sand and mud. There is a small level spot of land between two hills, with some houses, where a resident and some soldiers were usually stationed. An extensive shoal, known as the Middle ground, fronts the harbour, on some parts of which there are 3, 2, and $1\frac{1}{2}$ fathoms, with gaps of 6, 7, or 8 fathoms between the shoal patches. The harbour is in general good holding ground, the bottom being a mixture of sand and mud. The tide rises about six feet, and it is high water on the days of full and change of the moon at 1h. 45m.; the flood runs to the eastward and the ebb to the westward at the rate of about 2 miles per hour.

"There are two channels for entering or leaving the harbour; the eastern one being only about 250 yards in breadth, renders it very intricate for large ships. The western or leeward channel is free from danger, being about $\frac{1}{4}$ of a mile in breadth, and is formed by a small shoal of $2\frac{1}{2}$ fathoms on the edge of the Middle ground, and a rocky patch of $3\frac{1}{2}$ fathoms to the westward; this channel, being far to leeward, should only be used by vessels going out of the harbour. There is another channel over the Middle ground, of the same breadth, which was used for bringing in ships previous to the survey of the harbour; but this was often attended with danger from violent gusts of wind from the valleys, rendering a ship liable to miss stays when near the reef, where she might be on the rocks before the anchor could bring her up. Ships, therefore, should always go in by the eastern and out by the western channel.

"**Eastern Channel.**—If a ship have occasion to touch here she must go in by the Eastern channel, and after having made the east or north-east part of the island, may stand in within $1\frac{1}{2}$ miles of the reef, and coast along it at this distance until Booby island is seen, which bring to bear W. $\frac{3}{4}$ S.,* and steer towards it with this bearing, keeping a good look-out for the peak, which will bear about S.S.W. $\frac{1}{4}$ W. when first seen. Steer for Booby island till the peak bears S. by W. $\frac{1}{4}$ W., or about two ships' length open eastward of the White rock (a rock close to the shore, whitened to make it conspicuous), then Diamond island will be just touching Diamond point, and the vessel will be at the entrance of the channel with the peak S. by W. $\frac{1}{4}$ W.; Booby island W. $\frac{1}{4}$ S.; and Diamond island touching, or a little on with Diamond point,—steer in W. by S. $\frac{1}{4}$ S. until the peak and White rock are in one (observing not to open Diamond island with the point); then haul up S.W. $\frac{1}{4}$ W. or

* Variation 10° W. in 1810. It is now $7^{\circ} 35'$ W.

S.W., keeping a good look-out on the port bow for a $2\frac{1}{2}$ fathom shoal, which is generally visible. When Diamond island is open with Diamond point you are within the shoals, and may run down to the westward, and anchor in 12 or $12\frac{1}{2}$ fathoms sand and mud, with the peak bearing from S. $\frac{1}{2}$ W. to S. $\frac{1}{2}$ E., and Diamond island between two knobs or hummocks near the point, which is the most convenient berth for watering.

“ Western Channel.—The wind is too scant to sail out by the Eastern Channel, a ship leaving the anchorage, should, therefore, use the Western Channel, and so soon as the anchor is weighed for that purpose, get her head round to W.N.W. and run down till the peak bears S. by E. nearly, then haul up N. by W. or N. $\frac{1}{2}$ W. (observing how the tide sets you, so as to keep the peak bearing S. 10° E.), and when the north-east point of the island is open with the east point of the bay, you are clear of all the shoals, and will have 16 or 17 fathoms water. A rocky patch of $3\frac{1}{2}$ fathoms has been discovered nearly in the middle of the Western Channel, and was marked in 1810 by a blue buoy. The peak just opened westward of the large house leads a ship between the rocky patch and the western extremity of the middle ground.

“ When sailing into or out of this harbour, a good look-out from the fore or foretop-sail yard is advisable, for the shoal coral reefs may often be easily seen when the water is clear; a boat ahead is also a necessary precaution for those who are unacquainted.

“ The soundings decrease regularly from 30 fathoms, 2 or 3 miles off, to 8 or 9 fathoms, within a cable’s length of the reef.”

For a general description of the winds, see p. 74.

To the foregoing remarks on Rodrigues may be added the following extracts from a description of the island by EDWARD HIGGIN, Esq., read at a meeting of the Royal Geographical Society, London, June 26, 1848 :—

“ The island is one of the dependencies of Great Britain, and at present within the jurisdiction of the government of the Mauritius. It is situated in Lat. $19^{\circ} 30' S.$, Long. $63^{\circ} 50' E.$, within the tropics, and under the influence of the S.E. Trade-winds.

“ The land extends in a nearly due east and west direction for about 12 miles, with coral reefs running out about 3 miles more at the western end. The width varies from 3 to 6 miles, the narrowest part being towards the east, where the cliffs rise abruptly from the shore, with deep water immediately outside a barrier reef. The appearance of the island is striking from the ocean. A central peak of granite rises from amidst a group of hills, divided from each other by valleys running north and south.

“ The chief substance of the land is granite, with beds of overlying sandstone and limestone. Masses of red and grey granite are met with, which appear to have been subject to igneous action, and are much disintegrated. The subsoil appeared generally to be clay, a stiff gravelly earth, with a fine loam on the surface; but the rapid growth of vegetation in such a climate prevents a cursory examination, such as mine, from being worth much.

“ The mildness of the climate equals or exceeds that of the Mauritius. The island is of too small an extent to feel the influence of ‘land and sea breezes,’ but the steady trade-wind keeps the temperature cool and equable. The same cause produces great humidity, the quantity of rain that falls being very great.

“ There are springs of excellent water in the interior, but on the coast the natives

are dependent on the water coming down the rivulets, which, after rain, is charged with calcareous matter, or tinged with iron, and in summer not unfrequently falls altogether. Several small cascades are found on the northern side. The chief stream falls over a rock about 60 feet high, and shortly after enters the sea at the port of Mathurin.

"From the hilly nature of the land, the rain which falls is soon restored to the ocean: an hour after a shower has fallen the thundering of the cascades may be heard some distance, but the disturbance soon ceases, and a tiny streamlet alone remains.

"The 'port of Mathurin,' as the harbour is called, is merely a sheltered roadstead to leeward of the island, with the anchoring ground some $\frac{3}{4}$ of a mile from the shore. There is a deep and tolerably large basin, with 13 to 15 fathoms water (the sides of which are formed by precipitous coral reefs, over which the breakers roll incessantly,) where small vessels anchor; but it would hardly be safe for large vessels; and CAPTAIN KELLY, of H.M.S. *Conway*, when on an exploring expedition in 1844, preferred anchoring his ship outside the reefs in 35 fathoms. An opening in the reef enables boats to go backwards and forwards without much danger from the surf.

"There is but a small tidal rise, the variation being from 5 to 6 feet between high and low water. After a hurricane, storm-waves break on the shore, but I found without the damaging effects which result from them in the Mauritius."

EAST COAST OF MADAGASCAR.

ON the east coast of Madagascar, from cape St. Mary, its south point, to cape Amber, its north extremity, an extent comprised between Latitudes $25^{\circ} 36'$ and 12° S., there are but few ports frequented by foreign shipping. The shore has in general only a moderate elevation, and is usually well-wooded; towards the northern end of the island it becomes bolder. The edge of the bank of soundings seldom lies at a further distance from the land than 4 to 8 miles, and is immediately succeeded by deep water.

The most healthy part of this coast appears to be the neighbourhood of Fort Dauphin, whence it gradually becomes less healthy as you proceed northward.

The east coast of Madagascar has been only imperfectly surveyed, and some parts of it still remain unexplored. ADMIRAL OWEN, R.N., was employed in surveying this coast from 1823 to 1826, and much of the information we possess of it is derived from his examination. Since 1826 some of the ports have been surveyed by French officers, and we believe a thorough survey of the coast is at present (1865) being carried on by M. GERMAIN, of the French Navy.

Cape St. Mary, the south extremity of Madagascar, is in Lat. $25^{\circ} 39'$ S. and Long. $45^{\circ} 7'$ E. From this cape eastward to fort Dauphin along the south shore of Madagascar (which is in general mountainous and with a bold coast), the depths are 40 to 50 fathoms at four to five miles from the land, on a bank of regular soundings, the outer edge of which has not been traced.

Fort Dauphin.—At 110 miles eastward from cape St. Mary, following the coast,

is the small bay of fort Dauphin, in the western part of which there is anchorage in 6 to 3 fathoms, under protection of the reef extending from the point. Here was formerly a French settlement, abandoned in consequence of the hostility of the natives, and unhealthiness of the climate in the rainy season. The anchorage is now seldom visited by foreign shipping, and the fort is, we believe, in ruins.

The bay of fort Dauphin, or Tolonghare, is about 8 miles in extent from point to point; the coast-line falls in about 4 miles from a straight line joining the two points. The eastern point, named Itapere, is surrounded by a reef, and has a rock off it at the distance of about three-quarters of a mile; in the channel between, the old chart of M. MENGAUD DE LA HAGE, represents a depth of $4\frac{1}{2}$ to 15 fathoms. This rock is said to be a very good mark for the point, as the sea always breaks upon it. The village of Itapere is in a little rocky cove at $1\frac{1}{2}$ miles from the extremity of the point.

The west point of the bay of fort Dauphin is even land, and the country behind is mountainous; it is surrounded by a reef, which juts out in a north-easterly direction a considerable distance; eastward of this point the bottom, in a depth of 10 to 16 fathoms, is rocky, consisting principally of coral. On the south-west side of the point is Gallions bay, which is fronted by a reef.

When bound to fort Dauphin it is recommended to make the land northward of it, in about Lat. 24° S., because of the strong southerly currents which *are said* to flow at the rate of 40 to 50 miles per day. To avoid their effect during the night in approaching the bay, if the weather permit, and you meet with a sandy bottom, it is advisable to anchor, unless the breeze is sufficiently strong to enable you to withstand their force. These violent currents are occasioned by the winds, which the French have called *fort Dauphin winds*; they prevail the whole year from the N.E., and extend about 30 miles from the coast; they are first met with between the 22nd and 23rd parallels, where they have scarcely any force, but grow stronger on the 24th parallel. A ship once to leeward of fort Dauphin cannot possibly enter the harbour: the mountains, which are extremely lofty in this part of Madagascar, are probably the cause of these local winds. M. MENGAUD DE LA HAGE observed that these winds experience a revolution about the full and change of the moon, when they are from the West,—or it is calm for two or three days; at this time he recommends shipmasters to leave fort Dauphin, taking advantage of this change, as at other times it is difficult to get away. This officer likewise mentions a reef in Lat. $24^{\circ} 22'$ S., extending 4 miles from the shore, which is so steep that at less than half a mile from its edge is a depth of 40 fathoms; and he is of opinion that there may be other dangers thereabout which are not inserted in charts.

When the land in Lat. 24° S. is first seen a chain of very lofty mountains comes into view, supposed to be not less than 10,800 feet high; and in Lat. $24^{\circ} 15'$ to $24^{\circ} 18'$ S. a hummock, in the form of a sugar loaf, is distinguished amidst some sand-hills on the sea-shore. Then ranging along the shore at $2\frac{1}{2}$ leagues distance, a reef may be perceived in Lat. $24^{\circ} 22'$ S., which projects to a considerable distance from the land (*see* the preceding paragraph); and a little further southward you discover, through St. Lucia islands, some small rocky shoals under water, at a considerable distance from the coast, between Latitudes $24^{\circ} 35'$ S. and $24^{\circ} 45'$ S. Continuing to sail along at the same distance a point will come into sight, S.W. by W. appearing at first to stand by itself, with two hummocks more flat than round, and after this another, with hummocks of the same shape; these two points

have been often taken for point Itapere, which is the next, or third in order, having sharp-pointed hummocks upon it. When you come near the second point, ranging along the coast at $1\frac{1}{2}$ league's distance, there are shoals, some of which extend about two miles from the shore; it is therefore advisable to give the shore an offing of 5 or 6 miles, or even more. Arrived at point Itapere you will be in front of the bay of fort Dauphin.*

If obliged to anchor in the bay of fort Dauphin in consequence of daylight failing before the roadstead is reached, some care is required to choose the ground as it is not all of the same quality. Water may be obtained at the landing-place by digging in the sand, but there are plentiful springs of good water at a small distance inland.

Ranoufoutsy Bay.—At a short distance from fort Dauphin bay is the little bay of Ranoufoutsy, which is open to winds from S. to S.E. The holding ground is not good, and the anchorage is very bad; hence it is never frequented by foreign vessels, although such necessaries as ships require may be obtained there with facility.

Loucan, or St. Claire Bay.—This little place is about midway between fort Dauphin bay and that of St. Lucia. It offers excellent anchorage, has good shelter, and the water is as smooth in it as in a basin, but, unfortunately, its depth is only sufficient for vessels of 50 or 60 tons. Some sunken rocks render the entrance dangerous.

St. Lucia, or Mangafafa.—At about 15 miles northward from fort Dauphin following the coast, is the bay of St. Lucia, or Mangafafa, which is protected from eastward by a chain of islets and reefs, under shelter of which vessels anchor in 8 to 4 fathoms, sand and mud. Of this place it is useless to attempt a description, for no shipmaster should attempt to run into it without having a chart of it at hand for reference.

Menintingue, or Ambatoube.†—This river is 32 miles northward from St. Lucia, and in approaching it from southward some care is required to avoid a sunken rock at a mile from the shore; distant 7 miles from St. Lucia. The Menintingue is

* "The province of Anoesi extends along the south-east coast of Madagascar from the river Manambato, in Lat. $24^{\circ} 84'$ S., to that of Mandrerai, in about Lat. $25^{\circ} 30'$ S. Its mean breadth is 6 to 7 leagues, and its superficial extent about 160 square leagues. It is bounded on the north and north-east sides by the valley of Amboule; on the north-west and west by the mountains of Antandroui, a barren and waterless country; on the south-west by the river Mandrerai; and on the south and south-east by the sea. This country presents an imposing aspect to the navigator coasting along it. Its high and fantastically shaped mountains rise abruptly at a league from the shore; thick forests cover their sides and approach the sea, from which they are separated by a strip of sand—this, when viewed from a distance, shows the line of coast by its whiteness. The interior consists of a vast plain, which surrounds on all sides a mountainous chain. Along the coast, an extent of 20 to 25 leagues, there are numerous creeks, but no harbour sufficiently capacious and of good anchorage enough to accommodate large vessels. The three principal anchorages are St. Lucia, Fort Dauphin, and Ranoufoutsy.

† Fort Dauphin is very much exposed to winds from E.S.E. This anchorage is formed by a chain of reefs which extends out from the extremity of the peninsula on the south side of the bay of Tolonghare, and protects the anchorage in great measure from the swell of the sea, but not entirely, as the sea is sometimes very heavy there during the prevalence of E.S.E. winds, but smooth with other winds, even with those from N.E., which blow nearly all the year with great violence. The bottom is of sand, with coral ridges, which greatly damage the ground tackle; another inconvenience is the difficulty of its approaches, sea and land breezes being unknown, and rendering towage necessary during the morning calms. Schooners alone can get under way with N.E. winds; the anchorage is very near the land, and landing is easier than at St. Lucia. The bay is easily recognised by a rock at its east part, upon which the sea breaks even in the calmest weather, and throws up the surf from it in the form of a column of water spouted by a whale; this rock is distant from point Itapere about half a mile, and the channel between is navigated by the natives, who never sail seaward of it, being deterred by superstitious feelings; it is named by them, Maroulefou."—M. ALBRAND, 1820.

† Probably the Manambato South, of the Admiralty chart, No. 877.

barred by rocks, and is consequently not navigable by sea-going vessels. At a little southward of it there is a small sandy bay in the rocks, where a landing may be effected in fine weather. The village is 5 miles inland.

Chandervina.—This large river is 30 miles northward of the Menintingue, and, like that river, is so barred by rocks that no vessel can enter it. At a quarter of a mile from it, and commencing at the entrance, there is a chain of reefs which runs northward, parallel to the coast, for about a mile; and leaves between it and the shore an anchorage approachable either round the north or south end of the reefs. The landing-place is near the river, in the northern part of a little bay sheltered by rocks. At nearly 3 miles from the land, south-eastward from the river, are three rocks above water, which are a useful mark for the anchorage: between them and the shore is a safe passage. The anchorage is in $14\frac{1}{2}$ fathoms, sand, with these rocks bearing S. 25° W., and a mountain in the interior having a summit like a bale (*ballot*) W.N.W.

Manamboul—25 miles northward of the river Chandervina, is one of the best landing-places on the coast, and the anchorage is excellent. The usual riding is in $15\frac{1}{2}$ fathoms, with an inland mountain, shaped like a saddle, bearing about W. by N. The landing is a little south of this, in a little bay formed by the trending of the coast and some rocks which jut outward from it.

Massianaka.—This river is 9 miles northward from Manamboul, and is so barred with rocks and breakers at the entrance that it cannot be entered. The landing-place is at Ecouen, 2 miles south of the river, where are some rocks jutting out from the shore. The anchorage off Ecouen is in $15\frac{1}{2}$ fathoms, sand and coral; good holding ground.

Vengendrane.—Nine miles northward from Massianaka river following the coast, is another barred stream, named Vengendrane, which will be recognised by a small but conspicuous hill on its south shore, having upon it a walled village. This village is an outpost of the Hovas, who have succeeded in maintaining themselves there, although surrounded by their enemies the Malagese. A white flag is usually hoisted at the fort.

Emanahiva, or Mananghara.—This large river is 7 miles northward from the Vengendrane, and in about Lat. $22^{\circ} 57'$ S. It is barred, and can only be entered in fine weather during a smooth sea: usually the breakers are so very heavy that communication with the shore is impossible. The bar is a changeable one, and it is customary for the natives to signal vessels the direction of the channel. The anchorage is in 15 to 16 fathoms sand, at about 2 miles outside the entrance, on good holding ground. At 6 miles northward from the Emanahiva there is an excellent landing-place under shelter of a chain of reefs which projects a quarter of a mile from the coast, and runs parallel to the shore. This chain of reefs is intersected by numerous channels, through which boats can pass. It is probable that a small vessel might find shelter behind these reefs.

Farafangane.—From the Emanahiva to the river Farafangane the distance is about 14 miles along a well-wooded coast; at about midway there is or was a large isolated tree shaped like a mushroom, and, being on a hill, very conspicuous;—and southward of this tree is a remarkable mountain, the summit of which is a plateau having a peaked hill at each end. The river is very large, and during the rainy season brings down so much soil that the sea for three miles outside it is dyed yellow. The anchorage is in 15 to 18 fathoms, sand, in a direction due East from it; it is

often difficult to enter this river, the bar being a changeable one, and the breakers almost always extremely heavy. The river can be easily recognised by vessels approaching from seaward, the country immediately north of it being thinly strewn with trees as if planted, among which may be seen several that are very lofty; while south of it the shore is well wooded and the trees are higher.

Mahitzi.—At a few miles northward of the river Farafangane is the river Mahitzi, of which we possess no description. Its position is indicated by a cluster of trees, and the anchorage off it is at 5 miles from the land in $14\frac{1}{2}$ fathoms, sand and coral, with these trees bearing due West.

It may be here repeated (*see* description of Fort Dauphin), that shipmasters bound to the south-east coast of Madagascar should always make the land north of their destination, because the prevailing north-easterly winds occasion a strong southerly current, having a flow sometimes of not less than 40 miles per day. If bound to Farafangane river, unacquainted with it, and desirous not to make it at night, it will be prudent to endeavour to sight the land in Lat. $22^{\circ} 6' S.$, where will be perceived two hummocks which are nearer the sea than any other parts of the high land bordering the coast; these, if left a little to the southward as you approach them, will carry you into view of the establishment of Matatane on the sea-shore, opposite which is anchorage in 13 to 14 fathoms, bottom interspersed with coral. Four miles southward from Matatane is a sandy shore covered with trees, and 10 miles further southward is the river Mahitzi.

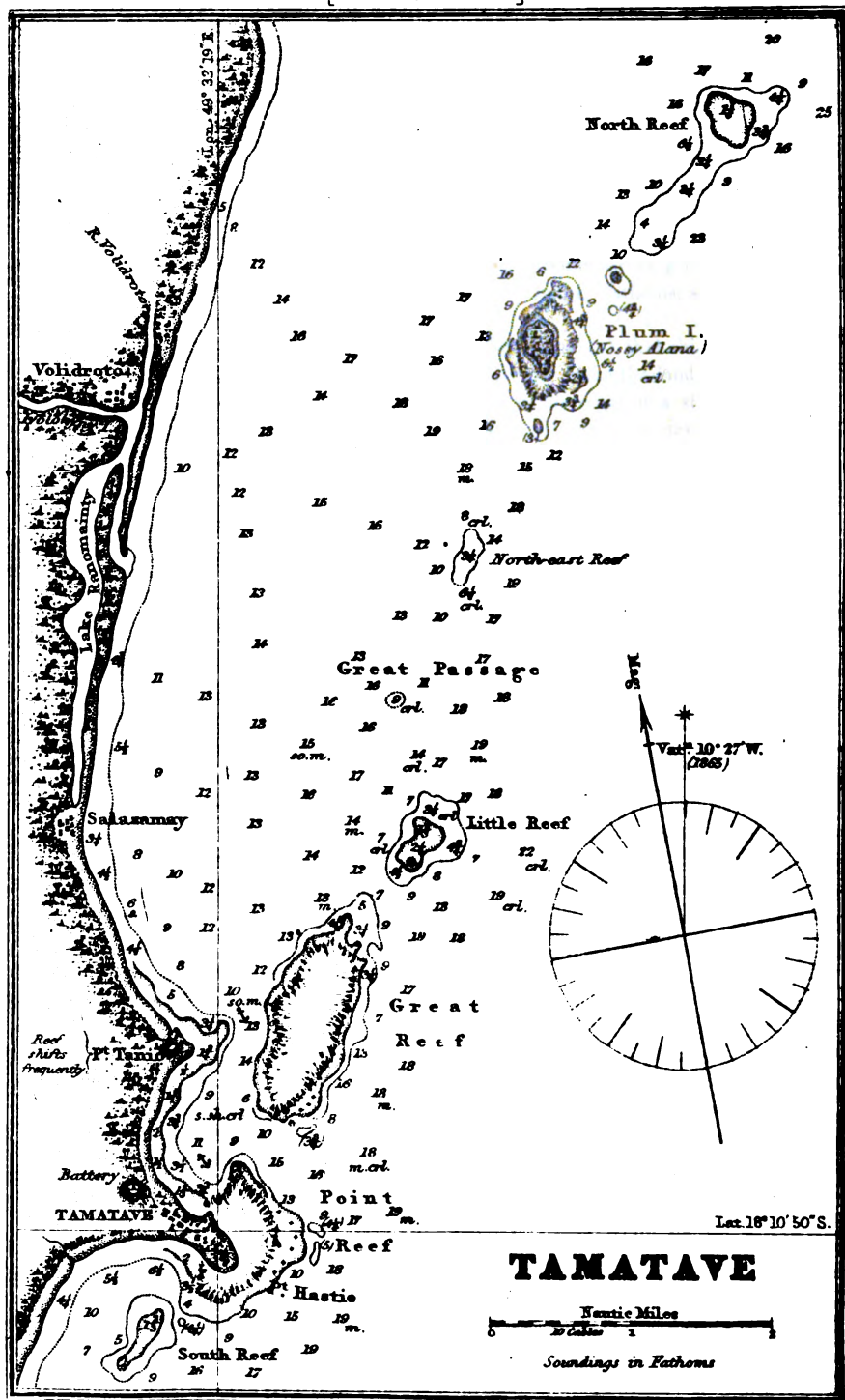
Manooroo.—From the river Mahitzi northward to Manooroo, a distance of about 160 miles, the coast is almost unknown, as it is never visited by foreign vessels. This town is in Lat. $19^{\circ} 55' S.$, and it is said that there is anchorage off it under protection of some reefs. It is probable that refreshments of various kinds may be procured here.

From Manooroo to Tamatave, a distance of 110 miles, there is no town resorted to by foreign ships. The coast immediately south of Tamatave is low and well wooded; it has a general direction of N.N.E. and S.S.W. The first range of remarkable hills is situated at about 15 miles from the sea, and consists of elevated land which runs S.W. and N.E., and apparently terminates in about $18^{\circ} 15' S.$, after which the hills become lower, and scattered more irregularly.

Nossy Domballa.—At about 16 miles southward from Tamatave there is a small islet named Nossy Domballa, or Fong, the position of which is Lat. $18^{\circ} 26' 40'' S.$, and Long. $49^{\circ} 29' 19'' E.$; it is $3\frac{1}{2}$ miles from the shore, consists of sand and coral, is very low, and covered irregularly with vegetation. In size it is not more than 1000 feet across, and its southern part is much higher than its northern, by which it may readily be distinguished from Nossy Alana (Plum island,) 23 miles northward of it, immediately it comes into view, which will be from a distance of about 10 miles. A reef surrounding the island extends seaward about a cable's length. Landing can be made on the north-west part of the island in fine weather.

At about half a mile southward from Nossy Domballa there is a reef, or rather an islet, of sand surrounded by coral, having an extent of nearly three-quarters of a mile North and South. The passage between it and Nossy Domballa is very confined and dangerous, and should never be attempted even in the finest weather.

Nossy Domballa, and the reef south of it, are very steep on their eastern side. The only known sunken danger in their vicinity is a coral reef of $4\frac{1}{2}$ fathoms, situated about a mile northward from the island. Between the island and the coast



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the depth is 15, 16, and 18 fathoms, and at a mile seaward from it there is no bottom at 20 fathoms.

Nossy Faho.—At $7\frac{1}{2}$ miles, in a N. by E. direction from Nossy Domballa, and opposite a gentle projection of the coast named point Vatte, is a reef called Nossy Faho, lying N.N.E. and S.S.W. $1\frac{1}{2}$ miles, the edges of which are probably steep. Its centre is in Lat. $18^{\circ} 19' S.$, and Long. $49^{\circ} 31' 9'' E.$ At 3 cables' length from its north end the depth is 8 fathoms; and at a mile from it, in the same direction, about 30 fathoms. It consists of coral, sand, and broken shells, and in time will probably become covered with vegetation.

From Nossy Faho to Tamatave the coast is believed to be clear of danger, but is of such a character that no landing can be effected upon it. At a little northward from Nossy Faho, on the shore side, there is a large village, named Yvondroo, standing on the left bank of a river, the entrance to which is obstructed by a bar of sand to the distance of a cable's length from the coast.

Along the coast from Nossy Domballa to Tamatave there is no creek nor any place of shelter into which a vessel may run in case of need. The currents off it are often very strong. In July, 1862, the French ship *Perle*, anchored on the north-west side of Nossy Domballa, was driven from her anchor by the sole force of the current, and carried in half an hour more than a mile to the northward; and in September, 1863, the current was observed to run southward at a rate of 2 miles an hour before a strong breeze from the N.N.E.

TAMATAVE, or TAOMASINA.—This is a large town of probably 10,000 inhabitants, built upon a low sandy point, named Hastie, situated in Lat. $18^{\circ} 10' 50'' S.$, and Long. $49^{\circ} 32' 19'' E.$ * It is protected by a fort north of the city, and on point Tanio, one mile further northward, are the ruins of another fort. The principal trade is in cattle. Water is scarce, and difficult to get. It is said that poultry and fruits are the only supplies that can be obtained.

Point Hastie is surrounded by a reef which has an extent of about a mile North and South, and runs out seaward from the land nearly half a mile. The northern part of this reef consists of a bank of sand and coral, having a depth over it of 16 feet at a cable's length from its rocky part. The sea does not always break upon this reef, but as, during the ebb, the current flows southward with some strength, it frequently causes vessels to ground upon the bank, and these afterwards become wrecked upon the coral part of the reef.

The landing at Tamatave is north-westward of the reef surrounding point Hastie, in a little creek under the reef. A head of coral, situated a short distance westward from the edge of the reef, must be cautiously avoided.

At half a mile south-westward from point Hastie is the centre of the south reef of Tamatave, upon which (the centre) is a depth of not more than 10 feet at low tide. During the North East Monsoon the sea is much smoother here than northward of point Hastie.

Great Reef.—At half a mile north-eastward from the reef surrounding point Hastie is the south end of the Great reef, which has an extent of about $1\frac{1}{2}$ miles S.S.W. and N.N.E. It is through the channel between these reefs that vessels approach the anchorage of Tamatave, where is a depth of 6 to 13 fathoms, mud.

* Dependent upon the accuracy of the Longitude of the *Hôtel du Gouvernement* at St. Denis, Reunion, determined to be $55^{\circ} 30' 1'' E.$ See the article on "Reunion."

The direction of the channel is N.W. and S.E. (*true*), occasioned by a coral bank of about 4 fathoms, detached from the south-east side of the Great reef. In this channel the depth is 8 to 15 fathoms, mud and coral—the mark to sail through it is point Tanio, situated $1\frac{1}{2}$ miles northward of the town, and having a cluster of trees upon it, bearing N.W. by N.

The anchorage at Tamatave is within the Great reef in $6\frac{1}{2}$ to $10\frac{1}{2}$ fathoms, mud, with the flagstaff of the fort bearing W. by S. $\frac{1}{4}$ S.; the ship should be moored W. by S. and E. by N. There is also anchorage in $9\frac{1}{2}$ to 13 fathoms, soft mud, between point Tanio and the Great reef, but it is more exposed than that nearer the town;—the bearings are point Tanio W. by S.; and the flagstaff of the fort, S.W. $\frac{1}{4}$ S.

Little Reef.—At about half a mile north-eastward from the north end of the Great reef, is the south end of the Little reef, which thence extends north-eastward nearly three-quarters of a mile. Upon this reef there is a head of coral awaah, or nearly so, at low water, but in other respects the soundings are 13 to 27 feet. Its edge is steep, there being 8 to 14 fathoms almost close to it. In the channel between the reefs the soundings are $7\frac{1}{2}$ to 10 fathoms, but it is not a safe passage owing to the absence of a leading mark, and the strong current and heavy sea which generally prevail.

North-East Reef.—At $1\frac{1}{2}$ mile in a N.N.E. direction from the Little reef is the south end of the North-East reef,—a reef half a mile in extent N.N.E. $\frac{1}{4}$ E., and S.S.W. $\frac{1}{4}$ W. It has a depth over it at low tide of 18 to 20 feet, and its edges are steep, especially that to seaward, where from 11 fathoms the lead soon drops into 18 fathoms.

The channel between the Little and North-East reefs is named the Great Passage, to distinguish it from that between the Great reef and point Hastie, which is known to the natives as the Little Passage. The depth is 18 to 9 fathoms, the latter being in the middle of the channel. The only available mark appears to be point Tanio kept between the bearings of S.W. $\frac{1}{4}$ S. and S.W. $\frac{3}{4}$ W. (S. 33° W. and S. 43° W. *true*), until point Hastie, remarkable by its edging of trees, bears S. by W. $\frac{1}{4}$ W., when the northern anchorage of Tamatave, between point Tanio and the Great reef, may be run for.

Nossy Alana, or Plum Island.—This small island is distant $6\frac{1}{2}$ miles from point Hastie in a N.N.E. $\frac{3}{4}$ E. direction, and about $2\frac{1}{2}$ miles from the shore. It is rather more than $\frac{1}{2}$ of a mile long North and South, and about $\frac{1}{2}$ of a mile in breadth East and West, and is rendered remarkable by the lofty and regular vegetation which covers it. The island and the trees are sufficiently lofty to be visible from a distance of 15 miles; hence they form a very useful mark for vessels bound to Tamatave or Foule point from the south-eastward, or during the season of southerly winds. Around the island is a coral reef which extends outward about a cable's length on all sides but the N.W., in which part boats may land in fair weather. The soundings between the island and the coast are 11 to 18 fathoms.*

* M. D'APRES DE MANNEVILLETTE, 1757, says: "Three leagues to the N.N.E. of Nossy Alana there is a rocky bank with breakers; at $1\frac{1}{2}$ league further on the same bearing there is a shoal with 3 fathoms water upon it; and one league to the N.N.E. of this there is another with 4 fathoms upon it; these dangers are only one league distant from the shore." These shoals were unsuccessfully sought for in 1863, by M. GERMAIN of the French Imperial Navy, and in addition none of the local traders of whom he inquired knew of their existence. In March, 1867, CAPTAIN ESTIENNE, of the *Marie Eugénie*, stated that he had met with a shoal of about 16 feet water in

North Reef.—At about a mile N.E. $\frac{3}{4}$ E. from Nossy Alana is the south end of the North reef, which thence extends in the same direction $1\frac{1}{2}$ miles. The soundings upon it are $4\frac{1}{2}$ fathoms to 7 feet, the latter being at two miles from the island. In the channel between the south end of the reef and the island there are two shoal spots of 16 and 27 feet.

From point Tanio the coast of the main land runs nearly North and South (*true*) ; it is low and wooded towards the shore. Some marshes and lakes commence at two or three miles from Tamatave, and ultimately join the river Ivolahyny, the entrance to which is so changeable that it cannot be navigated. The shore throughout is safe, and with a depth of not less than $7\frac{1}{2}$ fathoms at a $\frac{1}{2}$ of a mile from it.

Currents.—The currents along the coast follow the direction of the wind, but in the roadstead they are influenced by the tides. During the season of southerly winds their flow is almost constantly northward between the shore and Great reef.

Tamatave to Foule Point.—From Nossy Alana to Foule point the coast increases in height as you recede from Tamatave, and is well wooded. The country in the interior rises gradually into four distinct chains of mountains, of which the last one can be seen from a great distance. There are many small streams flowing easterly to the sea, which are a great impediment to the land communication between Tamatave and Foule point, and as they have but a slight fall they render the country very unhealthy during the rainy season.

When sailing along the coast northward from Tamatave, the Mamelles de Natte (in Lat. $17^{\circ} 47'$ S., and Long. $49^{\circ} 34'$ E., and distant from Nossy Alana about 17 miles) are a very valuable landmark. They consist of a mountain of no very great elevation, at about three miles from the shore, the summit of which forms in two small hills; the name Natte is from a village at its base. Between these and the shore are two similar hills of less elevation. The Mamelles de Natte are serviceable as a guide for Foule point, 3 leagues northward from them, because when East (*true*) from them Nossy Alana is not visible; if then, directly this island disappears under the horizon, on a bearing of S.W. $\frac{1}{4}$ S., the Mamelles at the time bearing W.N.W., a course of N. $\frac{1}{4}$ W. may be steered for Foule point.* The coast in the vicinity of Foule point is foul to the distance of one or two cables' length.

FOULE POINT, or Maroufolotra.—This is a large village on point Rafalah, in Lat. $17^{\circ} 39' 45''$ S., and Long. $49^{\circ} 37' 29''$ E., where a considerable trade is carried on in cattle, rice, and timber. At a little westward from the village is a fort of no great strength. Good water may be procured from a stream south of the village, if drawn at some distance from the mouth, where it is made brackish by the sea.

Point Rafalah ends at $1\frac{1}{4}$ mile south from Maroufolotra, in white sandhills covered with wood, which are sufficiently high to be visible from a distance of 15 miles. A reef extends from it in a N.N.E. direction rather more than 2 miles, and terminates $1\frac{1}{2}$ miles N.E. by E. from the village; its seaward edge is at about half a mile from the shore, and is believed to be not very steep, hence this part of the coast should have a

Lat. $17^{\circ} 58'$ S., Long. $49^{\circ} 40'$ E., which is near the position of the southernmost of the three rocks mentioned by M. D'APRES. As, notwithstanding the unsuccessful search for these rocks by M. GERMAIN, some of them may exist (small reefs of coral are always very difficult to find), it will be prudent for shipmasters sailing between Tamatave and Foule point to keep a good look-out for them.

* These instructions should be followed only during the season of S.E. winds, for in the season of N.E. winds the land should not be made southward of the port to which you may be bound.

berth of not less than a mile. The western edge of the reef forms with the shore a creek in which small vessels may anchor in $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms; but the bottom there is so bad, so irregular, and so rocky, that it is not recommended to vessels having only hempen cables.

The anchorage at Foule point is good only during the fine season (from April to October), at which time winds from S. to S.E. prevail. It is completely exposed to winds from northward, and the bottom is not good for holding. When running for this anchorage, the extremity of the reef extending from point Rafalah should have a berth given to it of at least a quarter of a mile, on account of an isolated patch of 20 feet water; having cleared which, the course may be altered to south-westward, and the vessel brought up in 8 to $6\frac{1}{2}$ fathoms, sand and mud, at rather more than three-quarters of a mile from the village, with the extremity of the reef bearing E. $\frac{1}{2}$ S.; the custom-house at the east end of the village S.S.W. $\frac{1}{2}$ W.; the sandhills at the south end of point Rafalah S. by W. $\frac{1}{3}$ W.; and the mast on the battery S.W. $\frac{3}{4}$ W. The vessel should be moored E. by N. and W. by S., and if it is intended to remain some time, a third anchor should be carried out to the N.W.

At about 4 miles N.N.E. $\frac{1}{2}$ E. from point Rafalah, and 3 miles eastward from point Andrafet, there is a small bank of $6\frac{1}{2}$ fathoms, having at a quarter of a mile seaward from it a depth of 11 to 16 fathoms.

From **Foule Point to Fenoarivo**, a distance of 18 miles, the coast is bordered with rocks which extend about half a mile; its general direction is N. $\frac{1}{2}$ W. and S. $\frac{1}{2}$ E. A village named Mahambo, in Lat. $17^{\circ} 29' 40''$ S., and Long. $49^{\circ} 35' 29''$ E., has a fort half a mile westward from it; hence the coast runs W.N.W. to the river Sirt, and between are three small points surrounded by reefs. In the little bay formed by the second and third of these points, small vessels may anchor in $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms, at a short distance northward of the village, with the mast of the fort bearing W. $\frac{1}{2}$ S. The outer roadstead is thickly strewn with banks, of which that most dangerous is at about a mile N.N.E. $\frac{1}{2}$ E. from the fort, and half a mile from the entrance of the river Azafo. Upon all this part of the coast the depths at a corresponding distance from the land are less than those south of Foule point; at a mile from the shore the soundings are scarcely 8 fathoms.

At 5 miles northward of Mahambo is point Takondro, a moderately high and wooded projection of the coast, which may be passed at the distance of half a mile by vessels approaching Fenoarivo from southward.

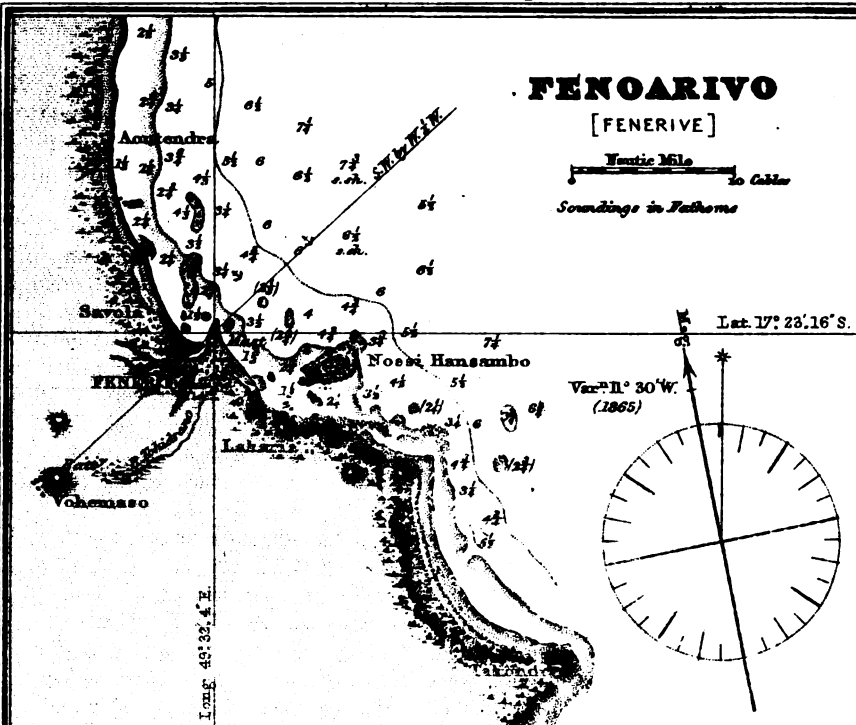
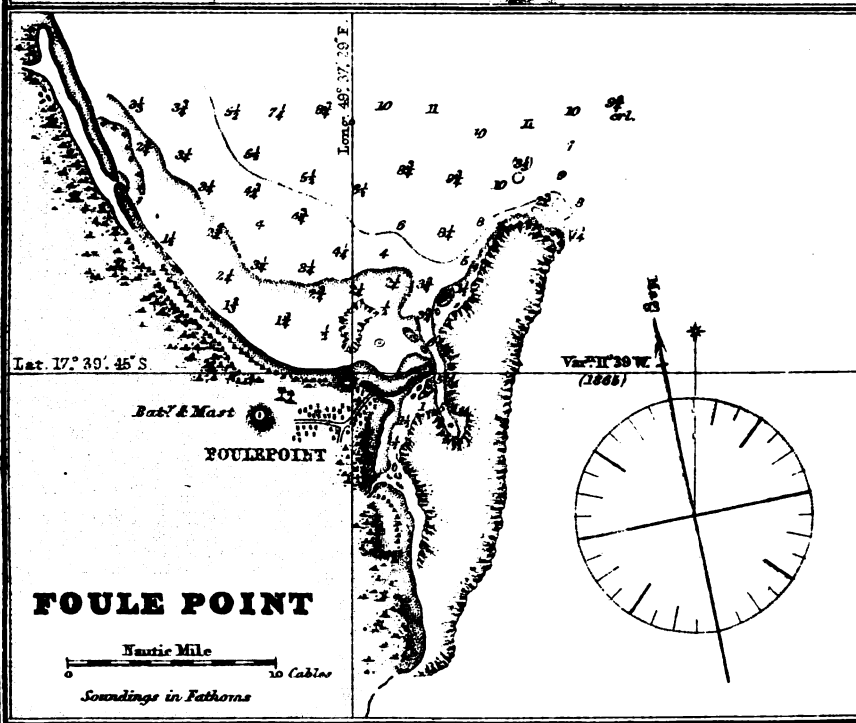
FENOARIVO (FENERIVE) is a large village in Lat. $17^{\circ} 23' 16''$ S., and Long. $49^{\circ} 32' 4''$ E., having on its western side a little river the water of which is lost at a short distance inland. The trade is chiefly in rice, the landing being too difficult to permit the shipment of cattle. At $1\frac{1}{2}$ miles south-westward from the village is a battery on a hill, said to be in ruins.

At a short distance south-eastward from the village there is a small island at a quarter of a mile from the shore, named Nossy Ilansambo, which is covered with trees, but being so close to the land, and of but very moderate elevation, it cannot be distinguished as an island beyond 3 or 4 miles. Around the island there is a reef, which extends from it two cables' length to the N.E.; between it and the shore, and also westward of it, are several shoals of 8 to 12 feet; hence vessels cannot anchor under its shelter. The coast eastward and westward of the island should have a wide berth given to it.

FENOARIVO

[FENERIVE]

Nautic Mile
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Soundings in Fathoms

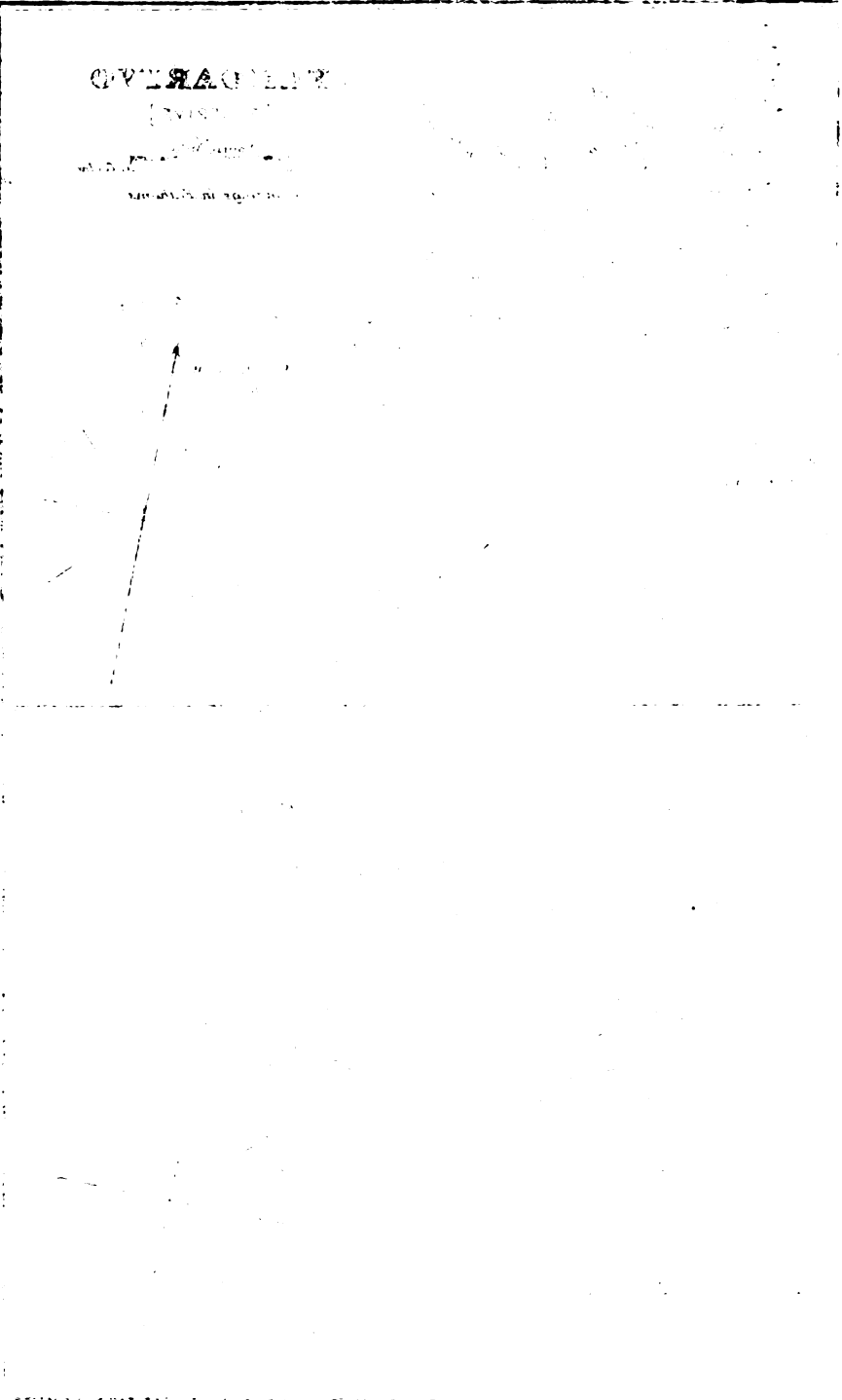


OVERLAP

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The anchorage of Fenoarivo is safe only during the fine season (from April to October), when vessels may anchor in $4\frac{1}{2}$ fathoms, muddy sand,—at a little north of the line, the masts of the battery and custom-house in one. In winter the anchorage is further out, in 6 fathoms, sand and gravel, with the two masts in one, and the extremity of point Tokondro open of Nossy Ilansambo. The roadstead is quite open to winds from northward and eastward.

River Manangory—From Fenoarivo a low and but little wooded coast trends to the N.N.W. The river Manangory, in Lat. $17^{\circ} 13' 30''$ S., is one of the largest and deepest on this side of Madagascar, but is inaccessible, its mouth being closed by a sand bank. Northward of this river the hills advance to the sea and form a projecting point, after which the shore has a N.N.E. direction about 8 miles; the hills then increase considerably in altitude, and the shore is lined with reefs to about 2 cables' length out, beyond which are regular soundings, and a depth of about $7\frac{1}{2}$ fathoms at a mile from the beach. At 25 miles from the river Manangory is point Ansiraka or Larrée, in the channel of Nossy Bourah (Island St. Mary).

NOSSY BOURAH (ISLAND ST. MARY).—The south end, point Blevée, of this island, is in Lat. $17^{\circ} 7'$ S., and Long. $49^{\circ} 54'$ E. It is a very narrow island, having an extent of nearly 30 miles in a direction parallel to the coast, from which it is distant 13 miles, excepting near its centre, where a point of land projects from Madagascar and narrows the channel to only 4 miles. Its vegetation is dense, giving the island an extremely attractive appearance, but unfortunately making it very unhealthy. The south point is formed by a small flat islet, named Nattes, separated from it by a narrow channel only deep enough for boats; from this islet a reef extends $1\frac{1}{2}$ mile to the S.W. by S., South, and S.E. Point Albrand, the north end of the island, has a reef extending from it about half a mile. The east and west shores of the island are fronted by a reef, in the former instance to the distance (seaward) of $2\frac{1}{2}$ or 3 miles. This reef is, we believe, so steep, that from it the lead falls at once into 11 or 15 fathoms. A rock, named Whale rock (or Ankoraka) is two miles from the eastern shore; its position is about Lat. $16^{\circ} 55' 30''$ S.; Long. $50^{\circ} 4'$ E.

The principal anchorage is on the west side of the island off Madame island, at about 8 miles from point Blevée. When running for it from southward, the coast of Nossy Bourah should be approached as closely as the soundings permit, until the vessel is westward of a white tower (Whaler's tower) erected upon a small rock, from which a *small light* is occasionally exhibited (1864). Madame island, with its houses and buildings, will now be perceived at less than a mile distant. Some care is required in the selection of the anchorage, a 10-feet head of coral having been discovered in it so recently as 1849; the best place is in $16\frac{1}{2}$ fathoms, sand, shells, and coral, with the jetty of Madame island in one with the jetty of the large island. At the anchorage the flag-staff of the island bears S. 13° E.; the church and the extremities of the two jetties S. 32° E.; Sorcier's point, a little hill north of the village of Ambodifotra, which is easily recognised, N. 67° E., and the Whaler's tower, S. 34° W. Or a vessel may anchor in 18 or 20 fathoms with Madame island bearing S. by W. $\frac{1}{4}$ W., and point Ansiraka nearly N. by E. $\frac{1}{4}$ E., about 3 leagues.

From northward the anchorage off Madame island is easily gained, and there is no difficulty in recognising the settlement, as it is about 10 miles southward

from point Ansiraka, and with the exception of Antsarak, is the only place where there are buildings of masonry. Antsarak is 13 miles northward of Madame island, and about 8 miles from point Albrand, the north extremity of Nossy Bourah.

Port St. Mary.—Madame island is in Lat. $17^{\circ} 0' 10''$ S., Long. $49^{\circ} 57' 5''$ E. It has an extent of not more than a cable's length, and is surrounded by a reef to the distance of a cable's length, upon which is a smaller islet joined to it by a dike. The port will not admit vessels drawing more than 10 feet, and these, on account of the numerous heads of coral scattered about, must be navigated by some one having local knowledge. Water of indifferent quality may be procured in abundance. Provisions and fruits are scarce and dear. The forests are being so rapidly cleared that timber is difficult to obtain. Attempts have been made to introduce the sugar-cane, but without success. The settlement is very unhealthy, but is still held by the French, on account of its important geographical position.

Channel of Nossy Bourah.—The channel separating Nossy Bourah from the shore is about 30 miles long, and from 17 to 32 fathoms deep. In nearly its centre a low point of land, named Ansiraka or Larrée, juts out 9 miles from the coast of Madagascar, and narrows the channel considerably. This land can be seen only from a distance of 10 miles. On the north side of this point vessels may anchor during the southerly Monsoon, at about a mile from the village, where fresh provisions may be obtained in abundance.

In Nossy Bourah channel the currents are strong, and frequently in the direction of the wind; in the narrow part of the channel, where its breadth is confined by point Larrée, their force is considerable. Their direction is generally northward.

Tintingue, or Tangtang.—This bay is situated on the north side of point Ansiraka, at about 10 miles north-westward from its extremity. It is 3 miles in extent, and has a depth of 7 to 3 fathoms, but is so much enumbered with shoals that no one should attempt to enter it without a pilot. When within, a ship is in a perfectly secure anchorage, well sheltered from almost all winds.

ANTONGIL BAY (MANGHABES BAY).—From the north end of Nossy Bourah the coast of Madagascar runs northward 30 miles to cape Belloues, the south point of the extensive bay of Antongil, from which Durnford Noss, its south-eastern point, is distant about 24 miles in an easterly direction. Between these two points the bay extends northward 40 miles, with a width of 23 to 15 miles. The soundings at the entrance are 40 and 35 fathoms, which decrease gradually to port Choiseul at the head of the bay, where the depth is 13 and 10 fathoms. The coast from Durnford Noss eastward is bordered by a reef to the distance, seaward, of 2 or 3 miles, upon which are two islets—that near Durnford Noss bearing the name of Behentou, and that 6 miles more eastward, Nepatte. As this part of the entrance of the bay does not appear to have been thoroughly examined, it will be prudent to give it a wide berth when passing.

Port Choiseul is an excellent anchorage, where vessels ride in 7 to 5 fathoms, immediately westward of the entrance to the river Tungumbaly, and close to the village of Maran Seetzy. The river is barred, and can only be navigated by boats: the bar has 6 to 9 feet upon it, and within it for a short distance is a depth of 24 feet, which is succeeded by 10 to 7 feet, and less.

At $1\frac{1}{2}$ miles southward from port Choiseul, and almost fronting the river Tungumbaly, is an island named Marosse, whence wood and water may be procured with

facility. Southward of this island are some islets, or rocks, the furthestmost being 4 miles from it. The anchorage westward of the island is known as Hastie road; the depth at a mile from it is 12 fathoms, mud. Vessels may also anchor at a similar distance north-eastward from it, in 14 and 15 fathoms.

During the southerly Monsoon, Antongil bay may be approached from the southward, either eastward or westward of Nosay Bourah; but in the northerly Monsoon, it should be run for direct. When running up the bay, either shore may be taken as may be convenient, provided such a berth be given it as will clear all outlying dangers. When leaving the bay and bound northward, steer along the eastern shore, taking advantage of favourable breezes, with the ebb-tide; if necessary, vessels may anchor southward of Behentou.

Veninguebe Bay.—At about 3 miles northward of Nepatte island, is a small bay named Veninguebe, in Lat. $15^{\circ} 54'$, and Long. $50^{\circ} 15' E$. It is a rocky place, unsafe for large ships, but contains anchorage in 7 fathoms, under shelter of the reef at the entrance. The *Gloire* was wrecked on this reef in 1761, when leaving the bay.

N'gony.—From Veninguebe bay the coast of Madagascar trends N.N.E. (*true*) 40 miles to N'gony or cape East, in Lat. $15^{\circ} 16' S$., off which is a small islet seated upon the reef projecting from the coast; all this coast is fronted with reefs, and should consequently have a good berth given to it. N'gony road $1\frac{1}{2}$ miles north of the islet, is an anchorage between the reefs; it is about half a mile wide, and has soundings of 8 to 5 fathoms, except in its southern part, where the depth at a mile within the entrance is 4 and $3\frac{1}{2}$ fathoms. The shelter in this inner part is from all winds but those from north-eastward; protection from eastward being afforded by the reef extending out from cape East, and from northward by the reef in the north part of the bay. The seaward edge of the reefs is steep, the soundings close to it being 7 to 14 fathoms.

In the northern part of N'gony bay is the town of N'gabè, on the south shore of a large river, the entrance to which is barred. In the southern part of the bay is the town of N'gony.

From cape East the shore of Madagascar, northward as far as cape Amber, is rocky and fronted with coral reefs to the distance seaward of four miles in some places. The land is generally high and uneven, except near the sea; in some places it is level and of moderate height. In Lat. $18^{\circ} 20' S$. is Vohemar bay, fronted with reefs, and with soundings inside of 18 to 10 feet, access to which is difficult for strangers. Northward of this, 4 or 5 miles, is Manambetoo, a large village.

Andrava Bay.—At 22 miles northward from Vohemar bay is Andrava bay, in Lat. $18^{\circ} 55' S$., which is about $1\frac{1}{2}$ miles in extent, of circular form, and with an island in the middle of the entrance. This island has a reef jutting out from its north and south extremities, leaving a channel on either side of 4 to 9 fathoms. The bay is open to North and N.E. winds, but in its southern part there is probably shelter from easterly winds in 4 or 5 fathoms, at about three-quarters of a mile south-westward of Berry Head, its eastern point. In this part the soundings rapidly become shallow.

PORT LEVEN.—Northward of Andrava bay, about a mile, is the south end of a

reef, which thence extends northward 7 miles, and has upon it several islands; of these the northernmost and largest is named How. This reef is separated from the reef lining the shore by a channel 9 to 6 fathoms deep, bearing the name of port Leven. On the western side of the northern entrance to this channel is Manambeedy island, surrounded and connected to the shore by a reef; close to the south side of this island is a bay in the reef, in which the depth is 6 to 3 fathoms. Port Leven is $1\frac{1}{2}$ miles wide at the entrance, and continues of this width for about 2 miles, when it begins gradually to narrow, and thence continues southward with a width of $\frac{1}{2}$ a mile for another two miles; the depths are 8 to 7 fathoms throughout the harbour, except in the bay in the reef on the south side of Manambeedy, just alluded to; and there is a coral head of 3 fathoms in mid-channel of the harbour. The course into the harbour is S. by W. for $2\frac{1}{2}$ or 3 miles, then S. $\frac{1}{2}$ E. through the upper or inner harbour, where is shelter from all winds; vessels may also anchor on the south side of Manambeedy island, and be in perfect security.

An excellent mark for this part of the coast is Mount Amber, a high mountain in the interior, the centre of which is in Lat. $12^{\circ} 35' S$. It extends north and south several miles, and can be seen from a great distance.

Port Leven was visited in 1849 by M. BOLLE, of the French navy. The following description is chiefly from his report:—

“The north-east part of Madagascar is remarkable for its indented coast, and for its numerous bays, containing excellent anchorage. Port Leven consists of a narrow channel of $6\frac{1}{2}$ to 8 fathoms, having an opening to the south at the cape forming the north side of Andrava bay. On its eastern side are a number of islets on the reef, and on its western side is the reef which borders the coast; the port is, therefore, between these two reefs. When bound to the port from seaward, it is necessary to make the land south of Andrava bay, to avoid the effect of the northerly set of the current. A good mark to seek for is Pouce mountain, a lofty mountain in the interior, 6 miles southward of Port Looké, the summit of which will be recognised by its resemblance to an eagle's beak, and by its having a deep cleft on its right side; this should be brought to bear W. by N., and it will lead to Andrava bay, approaching which the reddish land forming the south point of the bay will be recognised. In 1849 there were two large trees, the only trees visible on this land; when first seen they were supposed to be a tower or a high rock.

“The Leven islands are low, and covered with high shrubs; but How and Manambeedy, the two largest isles, have trees upon them. The anchorage may be approached either from southward or northward; the southern channel, between Point Liverpool and Manampaha islet, is, however, so tortuous, narrow, and full of dangers, that it should be attempted only by those having a good knowledge of its intricacies, and, even then, a man should be aloft to point out the coral heads; the north channel is, consequently, the better of the two for large ships.

“Whether making Barracouta islet direct, or first making Andrava (? Berry head), and thence coasting to Barracouta, care must be taken that the ship be not carried to the northward, in which direction the current always runs in the offing, but especially so towards evening, as the wind veers to the southward; a day or two may otherwise be lost.

“When up with Barracouta, and having passed it at the distance of 3 cables, make for North islet, which is but a few yards above the sea level, of a dark colour, and easily seen. Passing to the north-eastward of North islet, do not approach it

nearer than 4 cables ; after which you will soon make out the entrance to the North channel between the reefs eastward of Manambeedy island, and those westward of North islet ; for this channel you may steer, bearing in mind that these reefs, which are continued on each side of the channel, are equally dangerous, and must not be approached too closely ; therefore, when beating in, keep sounding. The anchorage is in mid-channel, 1 mile to the westward of, and abreast the, north point of How island ; this point is sandy, and uncovers for a considerable distance at low water.

“ The Little Middle bank, though sandy on the surface, is based on coral, as are most of the obstructions in the channel.

“ If the wind be not favourable for beating in during the latter part of the day, it were better to anchor outside for the night, and wait the next mid-day breezes.

“ There is another anchorage at port Leven ; it is in mid-channel between Mooree, How, and Shatta islands,—abreast of and scarcely $\frac{1}{2}$ of a mile eastward of the centre of Mooree. Here there is good shelter, and all parts of the bay are within easy reach—especially the sandy beach on the main opposite Manambeedy, where landing is easiest. A vessel intending to stay at port Leven for any length of time should select this anchorage ; but if merely calling for a day or so, the anchorage between How and Manambeedy islands (previously mentioned), is sufficiently safe—especially during the fine season.

“ On the west side of the channel there is a bay between Manambeedy island and the main, which would give good shelter even to frigates, but it is difficult of access,—contracted at the entrance, and therefore dangerous. The reef, extending to some distance southward of the south point of Manambeedy, is broken into *many* separate knolls, between which there are good depths of water, but these are not easily distinguished ;—therefore, if intending to anchor in this bay for repairs or other purposes, the channel must be buoyed to the north and south. The reef on the south side of the bay—and which also fringes the mainland—does not consist of knolls, and at low water is nearly bare throughout its whole length. On the other hand, the reef on the north side of the bay is always under water, and must be approached with great caution ;—above all, avoid placing a buoy on a knoll, leaving others unmarked to the southward. In the bay the bottom is of black sand, covered with *algæ*.

“ Manambeedy island is girt with rocks, projecting in knolls from the coral bank which surrounds it on every side. The island is low, gently undulating, and covered with clumps of trees. At low water the south shore is a strand of sand, with an admixture of mud.

“ How island is sandy, and well wooded at the north end ; this wood burns well, and makes good charcoal. The south and east ends of the island are higher than any other part,—but are chiefly dry ridges or hillocks wholly destitute of verdure (1854).

“ The surface of the other islands is irregular and covered with briars, which render them difficult of access. Shatta island abounds in large bats—peculiarly delicious in a culinary sense. Mooree island is surrounded by mangroves, and is scarcely above the level of the water.

“ The most remarkable point on the coast, in the vicinity of the anchorage, is cape Artémise, formed by a hummock slightly elevated above a plain covered with palms and other (less important) trees. This hummock, at most not more than 65 feet

high, overlooks the bay, and is the only point visible in every direction. At its base, on the N.W. side, there is a pool of stagnant and muddy water.

"Fresh water is not readily procured near the shores during the dry season, though it must be abundant enough during the rains; still there must be water not far distant, for the sustenance of the wild cattle.

"Tree hill, not far from Bird island, is close to the shore, and from this point the land rises into small ranges of hills, which finally unite with the mountains in the interior.

"Point Liverpool is formed by a chain of hillocks, commencing with a pointed hill in the south; towards the north point, as well as in the interior and in Andrava bay, the hills decrease in altitude, and finally disappear.

"The current along the main is always towards the north; but in the N. channel, between How and Manambeedy islands, the flood tide runs in the opposite direction.

"Boating is no easy task, owing to the innumerable heads of coral in every part of the channel, near the coast, and around the islands; during the day there is also at times a chopping sea, very fatiguing to the rowers; landing is always difficult, but generally impossible at low water.

"The prevalent S.E. wind is tolerably fresh during the day; it hauls to the southward in the evening and during the night,—occasionally interrupted by squalls from the land."

PORT LOOKÉ, or LOUQUEZ, is an inlet at about 8 miles westward from port Leven. Its direction is S.S.W., and the soundings are 17 to 9 and 3 fathoms on a very rugged bottom. The channel lies between reefs, is only half a mile wide, and very irregular in its general direction, so that great care is required when running to the inner anchorage. The extent of the harbour is nearly 8 miles, but the greater part of it is too shallow for vessels of moderate size, hence such proceed not further than perhaps 4 miles from the entrance; the soundings in this part are of sand. The shelter is almost landlocked, as the port is closed to all winds except those from N.N.E. The entrance between the reefs is only half a mile wide, is 17 to 30 fathoms deep, and at 2 miles outside it there is no bottom at 100 fathoms.

When approaching port Looké from eastward, it is necessary to be careful and not mistake a bay between it and Manambeedy islet for the port; from the possibility of this error occurring this bay is named False port. At 4 miles outside the entrance of port Looké, and at a short distance from the coast, there is a large island named Kahoomby; it is joined to the shore by a reef, and from it a reef borders the coast as far as the entrance to the port.

Ambavaranou (PORT RIGNY).—From port Looké the coast trends N. $\frac{1}{2}$ W. 22 miles to a large inlet named Ambavaranou, the entrance to which may be recognised by a white sandy mount on the shore at about 2 miles south of it and by Whale islet, a large rock $1\frac{1}{2}$ miles N. by E. from it, upon which the sea breaks even during calm weather. The channel is one-third of a mile broad, and more than 13 fathoms deep; it is bounded on the north by the south end of an island named Cuvillier, and on the south by a point of moderate height, from which a reef projects a short distance; on this reef outside the harbour there is a small islet. At a very little within the entrance, off the north shore, there is an island named Oyster island, northward of which the water is all shallow. The soundings in the inlet for $2\frac{1}{2}$ miles

from the entrance are 13 to $6\frac{1}{2}$ fathoms on a very irregular bottom; they then become shallow, and navigation to the head of the inlet can only be accomplished by boats.

The mark by which vessels should enter Ambavaranou inlet is the south point of Oyster island in one with a cliffy mount, bearing W. $\frac{1}{4}$ S. (S. $87^{\circ} 55'$ W. *true*). As the island is approached the course should be directed to W. by S. $\frac{3}{4}$ S., as that will lead up the inlet clear of the extensive reef which occupies the whole of its southern part; anchor where most convenient. Care should be taken when running in to keep closer to the north than the south side of entrance, that side being deeper.

During the greater part of the year the currents outside the inlet run with great strength to the N.W.; yet while the N.E. Monsoon prevails it is not unusual to find a current setting to the S.S.E. at the rate of half a mile an hour.

BRITISH SOUND.—This magnificent harbour is 15 miles north-westward from Ambavaranou inlet, and 17 miles southward from cape Amber, the north extremity of Madagascar, Clarence island, at its entrance, being in Lat. $12^{\circ} 13' 8''$ S., and Long. $49^{\circ} 23' 4''$ E. Its extent is 7 to 11 miles, and the irregularity of its shores forms several bays, named Irish, English, Scotch, and Welsh pool, in all of which there is good anchorage, according to the draught of the ship, well sheltered from all winds. At about 3 miles within the sound is a small islet situated in mid-channel, named Langour or Chapman rock, close to the rocks surrounding which is a depth of 10 and 7 fathoms; and in other parts of the sound are islets at various distances from the land. Welsh pool, in the south-west corner of the sound, is probably dangerous for the greater part of its extent, as the natives report that it contains many banks of coral rocks, generally awash at low tide, but between and among which the bottom is of soft mud.

The entrance to British sound is not more than $\frac{1}{2}$ a mile wide, as it is much contracted by Clarence island (Nosy Volane), situated nearly in mid-channel, on the south side of which is the navigable channel, the passage north of it being filled up by a reef; in this navigable channel are soundings of 14 to 26 fathoms on a very irregular bottom. When entering it will be prudent to keep over to the south shore, as the French chart of the sound represents a reef extending a short distance southward from Clarence island. When in the sound and up with Chapman rock, a berth may be selected for anchoring.*

Diego Suarez Bay.—From Clarence island the coast immediately northward of British sound is fronted by a reef, on the edge of which are some islets, the southernmost bearing the name of Diego, and that next to it to northward, Suarez. An inlet in this reef, 4 miles from Clarence island, is called Diego Suarez bay; it has not been surveyed, nor is it known if its soundings are sufficient to accommodate vessels.

Cape Amber.—From British sound an indented coast succeeds to cape Amber, the north extremity of Madagascar, situated in Lat. $11^{\circ} 57' 30''$ S., and Long. $49^{\circ} 19'$ E. This cape is represented as comparatively low land, having some

* British Sound is named Diego Suarez bay by the French, and Mahazaba by the natives. In the French chart, No. 861, the native names for its bays are given—Irish (*Pirats*), English (*Phou Abutch*), and Scotch (*P'zoa*). A considerable trade is carried on between the sound and Antananarivo and Iboina, where cattle are plentiful.

rocky islets off it at a moderate distance, but connected to it by a reef. At a short distance from these islets are soundings of 15 fathoms, increasing rapidly to 25 fathoms, soon after which is no bottom at 100 fathoms. The depth at a short distance from the coast between British sound and the cape is 18 to 20 fathoms.*

A conspicuous object, when making this part of Madagascar from northward or eastward, is the lofty Amber mountain, in Lat. $12^{\circ} 35' S.$, and Long. $49^{\circ} 11' E.$, or 23 miles south-westward from the entrance to British sound; it is a regular, sloping mountain, extending several miles north and south, and visible many miles at sea. Another mountain, Windsor Castle, between the head of British sound and the western coast of Madagascar, of less elevation than mount Amber, is also an important landmark; between Windsor Castle and the cape are also several conical hills, which gradually decrease in height as they advance northward.

CARGADOS CARAJOS.

This is a reef $31\frac{1}{2}$ miles long, the south end of which is in about Lat. $16^{\circ} 50' S.$, and Long. $59^{\circ} 34' E.$, whence it extends in a crescent form in a N.N.E.-ly direction. Its eastern side formed no portion of the survey by SIR EDWARD BELCHER, and all that is known of that part of it is derived from a sketch by LIEUTENANT MUDGE, in 1825, who passed through the reef from westward by means of boats, as no vessel could venture to approach it. There is said to be a good port on this side of the reef for small vessels, the entrance to which is in Lat. $16^{\circ} 30' S.$, but during the eastern trade-winds it is unapproachable. At its south end there is a small island, named Coo, from some cocoa trees growing upon it. In nearly its centre there are two islets, Avocare and Mapare, of which the latter is just within the eastern edge of the reef; and at its north end there is a small island named Establishment island, where a few fishermen from Mauritius reside during the fishing season. Some parts of it become dry at low tide; these are mainly in the middle, and in the southern parts of the reef.

The above remarks apply only to the main body of the Cargados Carajos reef, but there are several detached islets and patches of reef off its western and northern sides, which with the reef itself occupy a space extending from Lat. $16^{\circ} 50' S.$, and Long. $59^{\circ} 34' E.$, to Lat. $16^{\circ} 15' S.$, and Long. $59^{\circ} 40\frac{1}{2}' E.$, the latter being the position of an islet (the northernmost of the group) named Albatrossa. This island is distant $10\frac{1}{4}$ miles North from the north end of the main reef, from which it is separated by soundings of 15 to 12 fathoms. North island lies $2\frac{1}{4}$ miles N.E. $\frac{1}{4}$ E. from the north end of the reef, and at $2\frac{1}{4}$ miles on the same bearing from North island, there is probably a reef, breakers having been seen in that direction. A reef also lies 1 mile due South from North island, with Establishment island bearing S.W. $\frac{1}{2}$ W. distant 3 miles.

It is impossible, by any written description, to convey an adequate idea of the

* The master of the *Elphinstone* says: "Cape Amber is a low level point, and cannot be seen more than 5 leagues from an Indiaman's poop, but about 3 miles southward of it the land rises to a moderate height; ships making the land hereabout late in the day should pay attention to this circumstance, as this land may be mistaken for the cape itself, which might occasion ships not to give it a sufficient berth if bound to the westward. There are some rocks eastward of the cape, upon which the sea breaks very high, and there is a very strong rippling off the pitch of the cape. The current experienced in the day on which we passed cape Amber was W.N.W. 52 miles."

Cargados Carajos reefs; reference should, therefore, be made to the chart of them.* Let it suffice, therefore, to say that there is anchorage under the west side of Establishment island in 8 to 12 fathoms, and that vessels may also anchor on the west side of the south end of the reef in 15 to 13 fathoms on sand (the depth here must, on no account, be decreased to less than 11 fathoms); protection from the eastward being furnished, in both instances, by the main body of the reef.

The bank of soundings upon which the Cargados Carajos reefs are based extends from them in a N.N.E. direction to a distance of probably 20 miles; that shown on the chart extends from them about 15 miles to the westward and northward, deepening gradually to 32 fathoms at this limit; its actual extent is unknown. The eastern edge of the main reef is steep, and believed to have a depth of not less than 32 to 34 fathoms within a quarter or half a mile of it.

But little, if any, fresh water can be procured from the islets of the Cargados Carajos, and that only of very inferior quality.

MR. HENRY DAVEY, R.N., has described the Cargados Carajos as follows:—

"Immediately in the track of vessels from the Mauritius to India are the group of reefs named Cargados Carajos. The south end of this group bears from Cannonier's point, Mauritius, N.E. by N. about 220 miles; it is, therefore, necessary that the track should be well to the southward to effect the windward passage. The current generally runs to the N.W., directly on the islands at the rate of from 1 to $2\frac{1}{2}$ miles per hour; and should night intervene while yet to the southward, it would be extremely hazardous to attempt to pass to windward. Indeed, in all cases it is advisable to avoid crossing the parallel of these dangers during the night, which can be easily avoided by regulating the time of sailing from port Louis.

"In H.M.S. *Hyacinth*, we sailed from port Louis, at 1h. P.M. of 13th August, 1833, and keeping a good full to the Trade, which was from E.S.E. to E., just fetched the south island sufficiently early on the morning of the 15th to enable us to get sights for the chronometers; we also got a noon observation for the latitude; these gave, for the Latitude of south extreme, $16^{\circ} 53' S.$, and Longitude $2^{\circ} E.$ of flag-staff on Tonnelier island, port Louis.†

"The morning was fine and clear, with a moderate breeze; and when land was reported, the only objects visible were the tops of four cocoa-nut trees, the wreck of a ship, and broken water to the N.E. as far as the eye could reach; we were distant at this time from the nearest broken water, which was the very south extreme, certainly not more than 10 miles, which may be considered a sufficient reason for avoiding this dangerous vicinity by night. We were quickly up with the south point, and ran under the lee of the island to the anchorage abreast the cocoa-nut trees, where we hove to, and despatched a boat to examine the wreck; from the south point to the anchorage the shore may be approached to within half a mile in 9 fathoms water. The south or main island is of sand, very low, and almost destitute of verdure, nearly 9 leagues in length, in a N.E. by N. direction, and is intersected by several boat-channels, which are mostly dry at low water. The island on

* See the survey of the reef by CAPT. SIR EDWARD BELCHER, R.N., 1846; published by the Admiralty (No. 1881).

† The flag-staff on Tonnelier island is nearly a mile westward of the Observatory, Port Louis, which is considered to be in Long. $51^{\circ} 29' 30'' E.$; hence, according to MR. DAVEY, the longitude of the south end of the Cargados Carajos is about $50^{\circ} 28' 30'' E.$, which places the reef $5\frac{1}{2}$ miles westward of the position determined by SIR EDWARD BELCHER, R.N.

the windward side is fronted by a broad coral reef, over which the sea breaks with great force, presenting a continued line of heavy breakers reaching to the most distant verge of the horizon. Like most other coral reefs, it is remarkably steep; the lead is therefore of little use, and a vessel once within the influence of this terrific danger is without hope. Between the reef and the island is a lagoon of shoal water, about three miles in length; close to this, at the distance of two or three miles from the south point, was the wreck before-mentioned. She was a vessel apparently of about 600 tons, had evidently run on the rocks during the night, and most probably was a wreck as soon as danger became known; she was well up on the reef, with her bottom out, and her anchors at the bow with cables bent. The cables were of coir, from which circumstance, together with her not having any name on her stern, it may be inferred that she was an Arab vessel.

"At 1h. P.M., we made sail from the anchorage, and had to keep away to pass westward of the Baleine shoal; this shoal always shows itself by the swell or sea breaking on it; we passed about a quarter of a mile outside of it, and hauled up for Frigate island, this we passed at a moderate distance, as well as Pearl island, from which we hauled to the Trade, but passed far to leeward of Albatross island. These islands, which are not high, bound the main island to the N.W. and N., the whole being situated at the south end of an extensive bank, on which we sounded during the night, in 20 to 50 fathoms; and on the following noon, in Lat. $13^{\circ} 20' S.$, Long. $61^{\circ} 30' E.$, had 85 fathoms; the soundings were on coral, sand, and shell. Supposing the last cast (85 fathoms) to have been on the edge of the bank, it will give a distance of 80 leagues N.E. by N. from the south point of the main island, and 68 leagues for the extent of the bank to the N.E. of Albatross island."

NAZARETH BANK.

Soundings of 16 to 37 fathoms have been obtained on a bank situated 60 to 180 miles north-eastward from the Cargados Carajos reefs. This bank is frequently crossed by vessels from the Seychelles and India bound to Mauritius. It is believed that there are no dangers on it, and that the least depth of water is as mentioned, 16 fathoms. It has not been examined, and its extent is therefore uncertain, but its southern part is considered to be in Lat. $15^{\circ} 21' S.$, Long. $60^{\circ} 21' E.$; its eastern part in Lat. $14^{\circ} 30' S.$, Long. $61^{\circ} 36' E.$; and its northern part in Lat. $13^{\circ} 30' S.$, Long. $60^{\circ} 51' E.$;—its western limit is unknown.

CAPTAIN F. MORESBY, R.N.,* says:—"Nazareth bank is separated by deep water from the Cargados Carajos reefs, but the extent of the deep sea I have not been able to ascertain; it must, however, be narrow. The colour of the water indicates when a ship is between the banks. Between this bank and that of the Saya de Malha the current sets to the westward with great rapidity. I have passed it on the meridian of $57^{\circ} 30' E.$ to $59^{\circ} 10' E.$ several times, and at all seasons of the year, experiencing a westerly current of from 25 to 50 miles in the 24 hours, when on the succeeding and preceding days after passing the parallel of deep water between the banks we had the usual westerly current of from 10 to 20 miles in the day."

* N.B.—CAPT. F. MORESBY'S longitudes depend on Port Louis being $57^{\circ} 23' E.$, and Mahé (Seychelles) $55^{\circ} 32' 24'' E.$; both of which are within 2' of more recent determinations; this correction, however, cannot well be applied to the respective longitudes of the different islands, as they are a mean between chronometric and lunar observations.

SAYA DE MALHA BANK.

The Saya de Malha bank commences in Lat. $11^{\circ} 39' S.$, Long. $61^{\circ} 54' E.$, and continues in a north-westerly direction, somewhat in the form of the letter S as far as Lat. $8^{\circ} 40' S.$, Long. $60^{\circ} E.$ It is narrow in width, and has soundings upon it of from 26 to 9 fathoms. Its eastern edge is very steep, there being no bottom, sounding in 175 fathoms, at only a short distance from it;—its extent in a westerly direction is unknown, as the surveyors did not prolong their examination so far as the 100 fathoms line.

In HORSBURGH's *East India Directory*, 1864, it is stated that "various ships which have crossed the bank and recorded their soundings, give them from $6\frac{1}{2}$ to 75 fathoms, according to their position on it. The following are the positions of some of the shoaler parts of it :

$6\frac{1}{2}$	fathoms in	Lat. $9^{\circ} 21' S.$,	Long. $60^{\circ} 14' E.$	
				$9^{\circ} 47'$ " $61^{\circ} 21'$
$6\frac{1}{2}$ to 8	do. "			to " to
				$9^{\circ} 50'$ " $61^{\circ} 29'$
7 to 10	do. "			$9^{\circ} 3'$ " $60^{\circ} 43'$
9	do. "			$8^{\circ} 35'$ " $59^{\circ} 58\frac{1}{2}'$
				$9^{\circ} 45'$ " $60^{\circ} 32'$
10	do. "			$8^{\circ} 42'$ " $63^{\circ} 10'$
				$10^{\circ} 30'$ " $61^{\circ} 50'$
12	do. "			$8^{\circ} 30'$ " $60^{\circ} 0'$
				$8^{\circ} 19'$ " $60^{\circ} 0'$

" Navigators are still left in a state of uncertainty as to whether any part of this bank is dangerous; but as the *Cornwallis* had 7 fathoms,—the *Northumberland* 7 fathoms on another part,—the *Preston* only $6\frac{1}{2}$ fathoms, coral rock, on a different part,—and the *Colombo* $6\frac{1}{2}$ fathoms on the eastern edge,—caution ought certainly to be used by those who happen to get near this bank; more so, as a navigator of the Mauritius states that there are dangers on its southern extremity, where a ship would be liable to strike on some of the coral patches; and the *Elize*, French schooner, is said to have been in 4 fathoms, close to breakers on this part of the bank."

CAPTAIN F. Moresby, R.N., says: "It being now ascertained that on the north-west extremity of the Saya de Malha bank numbers of coral patches exist, between which there are no soundings, I am inclined to believe that off the north-west extremity of the Saya de Malha bank it is precisely *under water*, what those coral islands which are scarcely elevated *above water*, now appear. At no distant time it is probable islands will rise similar to the sand-banks of Cargados Carajos; the débris of coral, shells, and madrepore will form in the lagoons, which are encircled by reefs. There is in one place, as I have marked, only $3\frac{1}{2}$ fathoms, and the next cast 30 or 40 fathoms. This is the case with all the reefs. I have seen islands as it were forming the sand-bank, assuming in twenty-four hours a different shape, sometimes two feet above the level of high water, at others awash. A log of wood or large branch of coral broken by the violence of the ocean, and thrown on the sand gives these banks their first stability; from this moment they gradually become the deposit of the ocean. First, the resort of turtle, next of birds, that bring the seeds of

trees, and the first cocoa-nut that lodges is the germ from which in ten or fifteen years the island will be covered. I directed an officer, whom I sent from the Seychelles in a Colonial schooner, to ascertain the north and south limits. The weather proving bad, with a heavy breaking swell, he did not think it safe to heave-to hourly to sound. He struck ground first on the parallel of $8^{\circ} 50' S.$, Long. $60^{\circ} 10' E.$, 38 fathoms, sand, broken coral, and shells. Shortly after, steering S.S.W. he had 10 and 11 fathoms, then no bottom with 45 fathoms; the sea appeared to break to the north-west. Thus he passed the Galebea rocks, and lost soundings off the western limits. Since that period I have inquired of every person whose veracity I could trust, and amongst those who are not to be doubted are the *RODOULS*. On the north-west extremity they found $3\frac{1}{2}$ fathoms. The day was fine, and they sounded in 5, $5\frac{1}{2}$, and 7 fathoms. This has been corroborated to me by more than one. *LIEUT. HAY*, in the *Wizard*, has sounded the Saya de Malha bank, particularly on the north-west extremity. The soundings he found, with those I have before mentioned, and others given in *HORSBURGH'S* Directory, as marked in my chart, will, I think, place the Saya de Malha and the coral patches off the north-west extremity with great precision.

"*M. MONDOR* reports that he anchored on the Saya de Malha bank in $3\frac{1}{2}$ fathoms, close to a small sandy island covered with birds. This is another instance of the power of fancy. It was nearly dark, and he left his anchorage before daylight, at the break of which he could not discover the island. Probably it was one of those fields of spawn so frequently met with in these seas, having the appearance of sand-banks scarcely covered with water, over which myriads of birds are on the wing. The sea breaks in several places during violent weather. It therefore behoves large ships to navigate with the utmost caution, and choose a route clear of lurking dangers, if it is in their power.

"The edges of the Malha bank to the eastward and northward are steep, as are all the coral reefs in this Archipelago."

TROMELIN ISLAND.

This is a small pear-shaped island, the narrow end of which faces N.N.W., situated, according to *CAPTAIN OWEN*, R.N., in Lat. $15^{\circ} 53' 12'' S.$, and Long. $54^{\circ} 36' 27'' E.$ It was discovered by the *Diane* in 1722, but appears to bear the name of Tromelin from the master of the *Diligente*, who landed in 1776, and rescued the survivors of the crew of the *Utile*, which was wrecked upon it in 1761. It is a flat sandy island, 15 feet above the water, nearly one-third of a mile long from N.N.W. to S.S.E., and about two furlongs in width.* From it a reef projects three-quarters of a mile to the S.S.E. It has not been surveyed.

CAPTAIN F. MORESBY, R.N., says: "This island I sent a schooner to reconnoitre in September, 1821, a wreck having been seen upon it. Its Latitude is $15^{\circ} 51' 45'' S.$, Longitude (by chronometer rated at port Louis) $54^{\circ} 33' 45'' E.$, but by sun and moon $54^{\circ} 38' E.$ The island is very low and sterile, with a reef extending from the south point, and is about three-quarters of a mile in length; the north point appears to be a steep sand-bank, up which the sea rolled a considerable distance.

* According to the sketch of the island in the Admiralty Chart (No. 677) it appears to be $1\frac{1}{2}$ miles long and 9-tenths of a mile broad.

We kept the deep-sea lead constantly going, both on approaching it on the south-east and leaving it on the north-west, without gaining bottom."

GALEGA ISLAND.

This island is about 11 miles long in a N.W. and S.E. direction, and not more than a mile broad. It is very low, and appears from a distance like two islands, there being a gap in the middle through which the sea flows at high tide. A reef surrounds it, and there is almost always a heavy surf, rendering a landing difficult. When examined by H.M.S. *Clorinde*, in 1811, the north end was found to be in Lat. $10^{\circ} 20' S.$, Long. $56^{\circ} 37' E.$; and the south end in Lat. $10^{\circ} 31' S.$, Long. $56^{\circ} 40' E.$ It has not been surveyed.

CAPTAIN F. MORESBY, R.N., says: "I landed on the extreme north-west point on August 29th, 1822, and found its Latitude to be $10^{\circ} 21' 30'' S.$, and Long. $56^{\circ} 32' E.$ I had not time to examine its south-east point, but I take it to extend far more eastward than its breadth would admit, as stated by HORSBURGH on the authority of CAPTAIN BRIGGS, H.M.S. *Clorinde*,—that is, it extends in a N.W. and S.E. direction, the easternmost reefs being at least in Long. $56^{\circ} 42' E.$ I give its position from a nine days' run to Mauritius, when the chronometers were verified. A schooner was at anchor when I visited it, under the lee of the north-west point, in 8 fathoms, at two cables' length from the shore. The island is low, but the trees on it may be seen from a distance of about 15 miles."

FARQUHAR ISLANDS.

This is a group of islands consisting of two large and ten small ones, situate about 135 miles from Cape Amber, the north point of Madagascar, in a N.E. $\frac{1}{2}$ E. direction. They have not been surveyed. They have been described as "an elliptical chain of low islets and reefs, extending N.E. and S.W. 6 or 8 leagues, having a basin in the centre, with 7 or 8 feet water on the bar leading to it at the north part of the chain, where is good ground for anchoring. The soil of the islands consists of decayed coral, on which grow trees of small size. Turtle and fish of various kinds are plentiful, and some fresh water may be obtained by digging. The tide sets about N.E. and S.W., and rises 4 or 5 feet."

CAPTAIN F. MORESBY, R.N., anchored off the northern part of the Farquhar islands in 1822, in 17 fathoms, sand, and made the anchorage in Lat. $10^{\circ} 7' S.$ by good observations, and Long. $51^{\circ} 5' E.$ by three chronometers. He made the extreme of North reef in Lat. $10^{\circ} 6' S.$ and Long. $51^{\circ} 7\frac{1}{2}' E.$; North-west island (in sight of the ship) Lat. $10^{\circ} 11' S.$ and Long. $50^{\circ} 59' E.$; south extreme, Lat. $10^{\circ} 26' S.$ and Long. $50^{\circ} 54' E.$ The wind was fresh from the S.E.; the flood-tide ran N.N.E. $1\frac{1}{2}$ miles per hour, and the ebb to the S.W.*

* HORSBURGH's Directory, 1864, p. 196. The islands are so inserted on the Admiralty Chart, No. 677, and these positions may be considered to be approximately correct. Being but little above the surface, they are very dangerous, and it is necessary to be more than ordinarily vigilant when in their vicinity. We are unable to reconcile these positions of CAPT. MORESBY, R.N., with the following extract from the "Nautical Magazine," 1842, p. 680, where he says, "Farquhar islands, north point in Lat. $10^{\circ} 6' 30'' S.$, Long. by sun and moon $50^{\circ} 40' 30'' E.$; south point in Lat. $10^{\circ} 24' S.$ These islands I sent LIEUT. HAY to visit in May, 1821, in the *Eliza*, colonial schooner; he refitted in a small harbour on the south-west side of the north island. Vessels

Rajaswarre Breakers, in Lat. $11^{\circ} 25' S.$ and Long. $52^{\circ} 2' E.$, are believed not to exist, otherwise they must be frequently seen by some of the numerous vessels that adopt the Farquhar passage as their route to India. The following is a copy of the report of discovery made by the master of the *Stree Rajah Rajaswarre*:—

"November 21st, 1858, at 7h. 30m. P.M. Slight and variable breezes from the S.E.-ward, the evening very fine and beautifully clear, and the vessel going about 2 knots an hour; passed quite close to a reef or bank, but more probably a reef,—a line of tremendous breakers rolling in from the eastward, and just reaching the ship in their spent state, causing her to roll and heel over very much; it appeared to extend in a N.N.E. direction about a mile, the sea all round the ship indicating the approach to danger. I am sorry I could not sound, my anxiety to get the vessel out of danger as speedily as possible, in the first instance, preventing my so doing, and as we were only a quarter of an hour in the confused sea, there was no time to spare."

MCLEOD BANK.

This is a bank of soundings situated about 40 miles N.W.-ward from the Farquhar islands, in about Lat. $9^{\circ} 54' S.$ and Long. $50^{\circ} 25' E.$ It was discovered in 1818 by CAPTAIN D. MCLEOD, of the *Marquis of Huntley*, with the *Duke of York* in company, bound to Bombay from Mauritius. Its extent is uncertain, and it is considered probable that the Farquhars, Providence, and St. Pierre islands are all seated on a bank of soundings of which this may be a portion; from this remark it will be seen that it has not been surveyed. The following is the report of discovery:—

"Steering N. by E., with a light breeze at S.S.W., the rocks were observed under the ship's bottom at 7h. A.M., when we sounded in 10 fathoms. The breeze being light and the water clear, we stood on till $7\frac{1}{2}$ h. A.M., in 10, $10\frac{1}{2}$, 11, and 13 fathoms, then hove to and sent two cutters, one to the northward, which deepened soundings gradually from 13 to 40 fathoms at about $1\frac{1}{4}$ miles from the ship, and then lost bottom at 40 fathoms. The other cutter, which went eastward, deepened soundings from 13 to 20 fathoms, and then had no ground at 30 fathoms at about a mile from the ship. The *Duke of York* hove to, bearing S.S.W. $\frac{1}{2}$ W. about 2 miles distant, and obtained bottom in 10, 13, and 17 fathoms. At $8\frac{1}{2}$ h. A.M. we bore away and steered N. by E., keeping a cutter ahead of the ship until $9\frac{1}{2}$ h. A.M., having run 4 or 5 miles N. by E. from 7h. A.M. when we first sounded; after $9\frac{1}{2}$ h. A.M. we got no soundings at 75 and 105 fathoms. When hove to on the bank at 7h. A.M. we were in Lat. $9^{\circ} 57' S.$, deduced from observations at noon, and Long. $50^{\circ} 18\frac{1}{2}' E.$ by chronometers measured from lunar observations. The mean result of various lunar observations taken before and since the 28th March, measured to the position in 13 fathoms, places that part of the bank in Long. $50^{\circ} 20' E.$, latitude stated as above; and the last soundings of 40 fathoms in Lat. $9^{\circ} 53' S.$, and on the same meridian.

drawing 10 feet water can enter it; there is good anchorage also off this harbour in 10 fathoms, sand and shells. The Farquhars consist of several small islands, generally surrounded by coral reefs.

"The foregoing is LIEUT. HAY's report; but as this island was again seen by LIEUT. HAY on March 12th, 1822, then commanding the *Wizard*, in company with the *Menai*, whose signal I had made to look out for it, I am enabled to give its exact position, taking its bearings from St. Pierre, where, on March 13th, the following day, I had excellent observations—viz., in Long. $50^{\circ} 54' E.$, and as such I have indicated it on my chart. Water may be procured by digging pits; there is also a fishing establishment."

Probably this bank is not dangerous, as the ship appeared to pass over the shoalest part, by the water deepening all round, but there were not means of forming a correct opinion of its extent. During the morning no appearance of shoal water or breakers could be discerned from the mast-head, but only ridges of strong rippings at short distances from each other, in one of which the boat found the water much agitated, but no ground was got at 40 fathoms; here the current was found setting strongly to N.E., and when out of the rippling it appeared to set weakly to N.N.W. While in soundings, the ship was surrounded by many sharks and rock cod, several of which we caught, and the bottom seemed to be white coral rocks in ridges, with apparently deep chasms between them; but from the regularity of the soundings, this must have been occasioned by the various colours of the coral."

ST. PIERRE ISLAND.

This is a small island, having an extent of not more than $1\frac{1}{2}$ miles, situated, according to CAPTAIN F. MORESBY, R.N., in Lat. $9^{\circ} 20' S.$, and Long. $50^{\circ} 54' E.$ by chronometer.* It is very low, and of peculiar form, being cavernous, through which the sea is thrown to a great height, giving it the appearance of whales blowing, when the island is first made. Its formation is different from the neighbouring islands, as it has a thin bed of soil resting on rock which is neither granite nor limestone. The anchorage for small vessels is close to the reef, the bank not extending a cable's length from it. It has not been surveyed.

A reef is inserted in the Admiralty Chart, No. 677, in Lat. $9^{\circ} 12' S.$, and Long. $50^{\circ} 51' E.$, or at about 8 miles north-westward from St. Pierre, and 20 miles westward from Providence island. The authority for placing it on the chart is M. VAILHEU, of the French ship-of-war, *Madagascar*, 1834. We possess no particulars of it.

PROVIDENCE ISLAND.

This small, low island has an extent of about 2 miles from North to South, and of only one-third of a mile from East to West. It is composed of sand and coral, or white madrepore, and has such a moderate elevation that at high water, equinoctial tides, the sea flows over it. Its north part is, or was, covered with cocoa-nut trees, and its south part with a spongy tree resembling the European fig-tree—this is straight, and 40 or 50 feet high, with joints like the bamboo, 6 feet from each other, and its fruit is not unlike small mangoes. Fresh water is abundant by digging. Turtle, land-crabs, and rats are numerous. The anchorage is inside the island at half a mile from the shore, on uneven ground consisting of sand and gravel.

According to CAPTAIN F. MORESBY, R.N., the island bears E.N.E. (*mag.*) from St. Pierre, distant 18 miles, and its north point is in Lat. $9^{\circ} 10' S.$, and Long. $51^{\circ} 9' E.$ by chronometer. It is high water on the days of full and change of the moon at 3h. 30m. p.m.; the rise of tide is 8 feet.

Providence island is surrounded by a reef, the edges of which are said to be so steep that but little, if any, warning of its vicinity is given by the lead. This reef is said to extend 25 to 30 miles from the island in a S.S.W. direction, or as far as Lat. $9^{\circ} 35' S.$ and Long. $51^{\circ} 3' E.$ In 1769, the French frigate *L'Heureuse* was wrecked on the

* By observations of the sun and moon in Long. $51^{\circ} 15' E.$ —CAPTAIN F. MORESBY, R.N.

south part of this reef, and the commander reported that it had a breadth of about 2 leagues, and that it was wholly occupied with banks of sand and coral, several of which were above water; so that at low tide it was scarcely passable by a canoe, nor even at high tide unless with great care. The crew escaped to a dry sand just within the edge of the reef, and eventually reached Providence island, whence by means of their boat they afterwards escaped to Madagascar. Providence island and reef have not been surveyed.

Wizard Breakers.—At about 20 miles N. by E. from Providence island, breakers were observed by LIEUT. HAY, of the *Wizard*, in 1821. The position, according to the Admiralty Chart, No. 677, is Lat. $8^{\circ} 50' S.$, and Long. $51^{\circ} 12' E.$ They have not been surveyed.

St. Lawrence.—This island, said to be in Lat. $9^{\circ} 37' S.$, and Long. $50^{\circ} 20' E.$, is believed to have no existence, being in all probability only the dry sandbank at the south end of Providence reef, upon which the crew of the *Heureuse* were saved, or possibly even St. Pierre island.

CAPTAIN F. MORESBY, R.N., has remarked:—"In the neighbourhood of the Farquhar and Providence islands the currents set generally to the westward, their velocity being accelerated by the winds. Strong rippings frequently occur; when we experienced these, a change of current has sometimes taken place. I have seen the surface of the ocean in light winds appear for a considerable space to be much agitated, and I at first thought it was occasioned by uneven ground and overfalls, but I could not obtain soundings; and by a boat steadied with a pitch-kettle to 140 fathoms of line, could only observe a slight surface current. A pendant 3 fathoms below drew the contrary way, but not strong, or sufficiently so to cause the violent and partial agitation of the ocean. Should a stranger to these circumstances observe them in passing, it is more than probable he would report some undefined dangers."

ALPHONSE, ST. FRANCIS, AND BIJOUTIER.

This is a group of islands, the north point of the northern island of which (Alphonse island) is in Lat. $6^{\circ} 59' 30'' S.$, and Long $52^{\circ} 41' E.$ by chronometer, or $52^{\circ} 45\frac{1}{2}' E.$ by observations of sun and moon, according to CAPTAIN F. MORESBY, R.N. His remarks are—"I rounded this point at a quarter of a mile from the reef, which extends half a mile from the point. The extreme southern point is fast rising into an island of greater extent than Alphonse. On March 15th, 1822, we were in latitude at noon $7^{\circ} 14' 30'' S.$, this island bearing East (*true*) from us, and the reef still further south, so that between Latitudes $6^{\circ} 59' 30'' S.$ and $7^{\circ} 20' S.$ dangerous reefs nearly unite North and South Alphonse. There is a passage, but it is very intricate and dangerous; the currents are strong and uncertain. I remained off Alphonse turning turtle two days, and was obliged to carry sail to keep under the lee of the island, the currents setting strongly to the eastward."

These islands are known as the Alphonse islands. They are all low, and upon them are or were some trees and shrubs. South Alphonse is estimated to be about 12 miles southward from the northern island; it is but little above the water, and is surrounded by a reef which causes heavy breakers, especially when the wind blows with strength. The reef upon which this group of islands is seated, like all the coral reefs in the Indian ocean, is very steep, especially on its eastern side, the lead consequently gives but little indication of its vicinity.

The two southern of the Alphonse islands were named St. Francis and Bijoutier by CAPTAIN OWEN, R.N., who considered the centre of Alphonse island to be in Lat. $7^{\circ} 0' 30''$ S., and Long. $52^{\circ} 47' 45''$ E. The Alphonse islands derive their name from the commander of the *Lys*, who discovered them in 1730.* None of the islands have been surveyed.

AMIRANTE ISLANDS.

These islands are considered to be nine in number, but as they have not been surveyed, and according to M. VAILHEU, the commander of the French ship-of-war *Madagascar*, in 1834, there is an additional island (King Ross) the number must be regarded as uncertain. The names of the known islands, reckoning from the northernmost, are African, Eagle, Daros, St. Joseph, Poivre, Etoile, Roches, Bordeuse, Marie Louise, and Neuf. The islands scarcely differ from each other, being usually from $1\frac{1}{2}$ to 2 miles long. Situated on coral reefs, the débris of which, and shells, have formed their first soil, their elevation does not exceed 20 feet; they are crowned with trees (*mapor wood*), and various shrubs of a spongy nature that attain the height of 25 or 30 feet. Cocoa-nut trees are abundant. Water may generally be procured by sinking 12 or 15 feet. Fish and turtle are plentiful. As but very little is known of these islands, they should be avoided, especially by large vessels, the masters of which have no reason to visit them. The frequency of calms during several months, with the velocity and uncertain run of the currents, added to the want of good anchorage, makes it advisable not to approach them unless compelled by necessity. The seasons partake of the same changes as at the Seychelles, but the currents are more variable.

African.—This island (appearing as two when the tide is up) is situated in Lat. $4^{\circ} 53' 30''$ S., and Long. $53^{\circ} 33'$ E., according to CAPTAIN OWEN, R.N.† It is low, and of but small extent, its length being not more than 2 miles from North to South. Its peculiar appearance of two islands arises from its formation in two hummocks, joined together by a reef which is dry only at low water; the southern portion is the larger. It is so little above the surface, probably not more than 4 feet, that it can be considered little better than a dry reef; at high water, spring-tides, the sea almost covers it. There is little, if any, vegetation except a few shrubs. It abounds with turtle and sea-fowl, and is destitute of fresh water.

On August 25th, 1801, the armed tender *Spitfire* struck on the southern part of the reef surrounding African island, having only just previously sounded with 20 fathoms of line without getting bottom; the swell soon after drove her over the reef into a sort of sandy basin in the reef. The east side of the island was described by the commander of that ship as "surrounded by breakers. On the west side of the island there is a safe and commodious anchorage in a bay formed by the extremes of the islands, and the reefs which join them. We could find no fresh water, although we dug to the depth of 40 feet." This anchorage can be safe only during the S.E. Monsoon.

* "Alphonse island is 3 miles in length from north to south, and there are two low sandy islets 4 or 5 leagues southward from it, upon a reef several leagues in extent. There are no soundings at a mile from the shore."—*Commander's Report of Discovery*.

† M. TRICAULT, of the French Imperial Navy, observed, in October, 1864, the position of the northernmost of the African islands to be in Lat. $4^{\circ} 53'$ S. and Long. $53^{\circ} 32' 9''$ E. (depending upon the meridian of St. Denis, Réunion), which closely corresponds with this determination by CAPTAIN OWEN, R.N. Four trees were growing on the island in that year.

A bank of 5 to 9 fathoms is said to extend 4 or 5 miles southward from African island; and the Admiralty chart (No. 677) represents the channel between African and Eagle islands (8 to 10 miles wide), as free from danger, and with a depth of 18 to 22 fathoms; although a reef has been reported to exist in nearly mid-channel at about 4 miles N.W. by N. from the latter island. The *Mary* is stated, in "HORSBURGH'S Directory 1864," to have safely passed through this channel.

Eagle.—This low, sandy island, about $\frac{1}{2}$ of a mile across, is situated in Lat. $5^{\circ} 8' S.$, and Long. $53^{\circ} 32' E.$ according to the Admiralty Chart (No. 677); but $53^{\circ} 22' 30'' E.$, following CAPTAIN F. MORESBY, R.N., 1821.* It is, or was, covered with shrubs, and is destitute of fresh water.

At two or three miles from the north and east sides of Eagle island there are reefs, on which the sea breaks heavily, especially with the wind on shore. The channel between these reefs and the island, although said to have a depth of 9 to 14 fathoms, cannot be considered safe for a large vessel, in our imperfect knowledge of the hydrography of the island. This island is named Remire by the French.

A bank of 6 to 14 fathoms is represented on the Admiralty Chart as extending in a S. by W. direction from Eagle island, 16 miles towards Daros island, approaching that island to within the distance of 4 miles. As a shoal spot of 12 feet is inserted at the extremity of this bank, the passage between the islands must be regarded as dangerous to strangers. LIEUTENANT HAY, R.N., is reported to have had $4\frac{1}{2}$ fathoms in 1821, on rocky bottom, at 12 miles N. by W. from Daros island, which would be in nearly mid-channel, whence he steered N.W. 3 miles, and was off the bank.

Daros.—A small, low, sandy island, in Lat. $5^{\circ} 27' S.$, and about Long. $53^{\circ} 27' E.$, which, like the other islands, is surrounded by a reef. Between it and the reef, extending westward from St. Joseph island, there is a narrow but dangerous channel, having probably a depth of about 12 fathoms.

St. Joseph.—At 5 or 6 miles E.S.E. from Daros is St. Joseph, another small, low island, surrounded by a reef. Its position, according to CAPT. F. MORESBY, R.N., is Lat. $5^{\circ} 29' S.$, and Long. $53^{\circ} 29' E.$; LIEUTENANT RUSSELL, R.N., observed the Lat. $5^{\circ} 26' S.$, and the longitude corresponded to CAPT. F. MORESBY'S.

Poivre.—Situated in Lat. $5^{\circ} 43' S.$, and Long. $53^{\circ} 21' E.$ This low, sandy islet has a small islet off its south-east point, and together they occupy an extent of less than a mile. The reef upon which they are seated extends from them some distance, and we believe has a depth of not less than 8 fathoms close to its edge.

When steering northward from Poivre island, a good look-out must be maintained for a small reef dry at low water, situated 4 to 8 miles N. by W. from the island. Generally it shows itself by breakers. Its position is uncertain.

Etoile.—At about 14 miles in a W.S.W. direction from Poivre island is Etoile island, low and sandy, and covered with bushes. It is about half a mile in extent, and the reef upon which it is seated projects from it southward about a mile. Its position is estimated to be Lat. $5^{\circ} 50' S.$, and Long. $53^{\circ} 8' E.$; CAPTAIN F. MORESBY, R.N., considers its Latitude to be $5^{\circ} 57' S.$

According to M. JEHENNE, of the French ship *Prévoyante*, Etoile island has an extent of not more than half a mile, and is only about 8 feet high, being little else than a dry coral reef. It is bare of verdure, with the exception of a few marine

* LIEUT. RUSSELL, R.N., 1820, observed the Longitude $53^{\circ} 21' E.$

plants. Its formation appears to be white sand on coral. A bank of soundings surrounds it on all sides, apparently to the distance of $1\frac{1}{2}$ or 2 miles, upon which, with the island bearing N.E., the depth is 8 to 10 fathoms; this bank is thickly strewn with coral patches, upon which the soundings are probably less.

In a N.N.W. direction from Etoile island (distance not stated) there is a bank upon which the sea breaks. And, according to M. VAILHEU, of the French ship-of-war *Madagascar*, 1834, there is an island, which he named King Ross, situated about 15 miles W.S.W. from Etoile, in Lat. $5^{\circ} 57' S.$, and Long. $52^{\circ} 56' E.$

Roches.—This island is in Lat. $5^{\circ} 40' 15'' S.$, and Long. $53^{\circ} 42' E.$, being distant about 18 miles* east from Poivre and 12 miles south from St. Joseph. It is low and sandy, about $3\frac{1}{2}$ miles long in an east and west direction, and very narrow. On its north and south sides there is anchorage, which may be taken according to the prevailing wind. A reef surrounds it, and stretches from its eastern end about 8 miles towards the N.E., and from its western end about 4 miles to the S.W. M. D'APRÈS DE MANNEVILLETTÉ says: "The eastern edge of the reef of Roches island extends north and south about 7 miles, and the south edge of it (running along the south coast of the island, and at half a league westward of its south-west point) W. by S. and E. by N. about 11 miles." In HORSBURGH's Directory it is stated that "the island has a bank extending around it about four leagues to the north or N.W., and two leagues to the east, with only $2\frac{1}{2}$ fathoms on it in this part, and mostly from 5 to 13 fathoms to the N.W.; but in a southerly direction the bank extends only a short distance from the island."

† **Bordense.**—According to M. JEHENNE, this island is in Lat. $6^{\circ} 5' 33'' S.$, and Long. $52^{\circ} 56' 47'' E.$, the latter depending upon the correctness of the longitude assigned to Etoile island.† It is not more than one-third of a mile in extent, and has such moderate elevation that the sea in rough weather almost flows over it; there are, consequently, no trees upon it, but only a few small shrubs. From its west side a reef extends two-thirds of a mile, and another reef runs out from its east side 100 to 150 feet. The bank upon which the island is seated lies in an East to E.N.E. direction, is about 2 miles in extent, and has a depth over it of $8\frac{1}{2}$ to 13 fathoms, sand and coral.

According to M. VAILHEU, there is a reef of $1\frac{1}{2}$ fathoms at about 7 miles N.N.E. from Roches island, and also a reef at about 5 miles S.W. from the island.

Marie Louise.—This small sandy island is in Lat. $6^{\circ} 12' S.$ and Long. $58^{\circ} 18' E.$ It is possibly $1\frac{1}{2}$ miles in diameter, and is surrounded by a reef, on which, at two miles westward from the island, there is a depth of $3\frac{1}{2}$ fathoms. In the channel (about seven miles wide) between this island and Neuf there is a depth of 12, 15, and 17 fathoms;‡ CAPTAIN MORESBY, R.N., passed through this channel in 1821, and on a N.E. course for three miles had regular soundings of 17 fathoms.

Neuf, the southernmost of the Amirante islands, is in Lat. $6^{\circ} 13' 15'' S.$ and Long. $53^{\circ} 12' 15'' E.$ Its formation is similar to that of the other islands, but it is perhaps smaller. It is or was covered with wood, and is seated on a coral reef.

* CAPTAIN F. MORESBY, R.N., says 22 miles.

† In the Admiralty Chart (No. 677) it is placed in Lat. $6^{\circ} 12' S.$, and Long. $52^{\circ} 56' E.$, on the authority of M. VAILHEU, of the French ship *Madagascar*. M. JEHENNE does not give the longitude of Etoile Island.

‡ M. DU ROULAN, 1770, says, 25 to 30 fathoms, and that soundings are lost at a little southward of the channel.

M. DU ROSLAN states that he had soundings of 9 to 15 fathoms, rocky bottom, within a league of its south side.

Of Neuf, Marie Louise, and Bordeuse, it may be remarked that they are of sand crowned with trees, and environed, except a few small openings, by coral reefs. Seals of a large size resort to them. There is anchorage in some places amidst these islands; but it is advisable to use only a chain cable, the ground being rocky. The white sandy bottom can generally be distinguished from the coral patches, while in a depth of from 12 to 15 fathoms.

FORTUNE BANK.

This bank of soundings, according to the Admiralty Chart (No. 677), is situated in Lat. $7^{\circ} 15' S.$ and Long. $57^{\circ} 10' E.$ It was discovered on May 31st, 1770, by CAPTAIN COMPTON, of the *Verelst*; and on 14th September, 1771, soundings were again obtained upon it by M. DE KERGUELEN of the *Fortune*, who attached the name of his vessel to it, believing that it had been till then unknown; this name it still bears on the charts. In 1861 COMMANDER DE HORSEY, of H.M.S. *Brisk*, passed eastward of its assigned position, and obtained no bottom with a line of 50 and 49 fathoms. It has not been surveyed; its extent, soundings, and position are consequently uncertain. The following reports contain all that is known of the bank:—

CAPTAIN COMPTON says, "On the 30th May, 1770, I was in Lat. $7^{\circ} 24' S.$, and Long., east from St. Mary's island, Madagascar, $7^{\circ} 44'$. I supposed that we were on a bank, but did not sound till at about a quarter before 1h. P.M., when we had 15 fathoms, coral rocks, then 14 fathoms for several casts. It was very fine weather, and I could not see the least appearance of shoals or breakers from the mast head; the water was very smooth. I then steered N.E. $\frac{1}{4}$ E., which was almost close to the wind, going about 4 knots; by a quarter past 1h. P.M., we had shoaled to 12 fathoms, and continued that depth till 2h. P.M., when we deepened to 14 fathoms for a few casts, and shoaled again to 12 fathoms. From 2h. 30m. till 3h. P.M., we had very regular soundings of 11 fathoms, then for half an hour regular soundings of $10\frac{1}{2}$ fathoms, when we lost bottom, as we could get no soundings as fast as we could pass the line along, sounding 20, 50, and 100 fathoms. Though the north-east edge be steep, we supposed the south-west part to shoalen gradually as the water was observed to be discoloured so early as at 8h. and also at 10h. A.M. the preceding day. Immediately after losing soundings the water returned to its proper colour, and also the usual swell. All the time we were in soundings we had great numbers of ground sharks. The north-east end of the shoal we found to be in Lat. $7^{\circ} 11' S.$, and Long. $7^{\circ} 54'$ east from St. Mary's island."*

M. DE KERGUELEN says, "On leaving Mauritius, September 13th, 1771, I made my course, *corrected North*, to traverse the archipelago northward of the island; in the night between the 18th and 19th, at about 1h. A.M., there was a violent squall of rain and wind, with thunder and lightning; at 11h. P.M. we had no ground, but on sounding during the squall we found only 30 fathoms, and had on the next cast only 19 fathoms, rocky ground. I stood on the other tack under a foresail till I had got

* The south point of St. Mary's island, Madagascar, has recently (1864) been determined to be in about Long. $49^{\circ} 54' E.$; hence, with the meridian distance from St. Mary's, the Longitude will be about $57^{\circ} 49' E.$, according to CAPT. COMPTON's observation.

my anchor ready, and shoalened the water to 17, 15, and 14 fathoms, sand, when, being apprehensive of driving upon some sand-bank, I anchored, and veered out 100 fathoms of cable; the ship brought up and rode fast during the squall, which lasted till 2h. A.M. I continued at anchor all night, and we were surrounded at that time with sharks, of which we caught about fifty, and with a prodigious number of crabs, with which the sea was covered; the multitude of sharks about us made the sea luminous as breakers. At length day came and relieved our uneasiness, when we saw neither land nor rock. On weighing anchor I let the vessel drive, and continued sounding for a long time; I had 14, then 20, 25, and 28 fathoms, and then at once no ground. The bank lies N.W. and S.E., and is in Lat. $7^{\circ} 16' S.$, and Long. $58^{\circ} 10' E.$ ”*

The *Surat Castle* crossed the bank from the southward, on the 22nd of February, 1789. The longitude by lunar observations was found to be $57^{\circ} 38' E.$ The first cast of the lead was 15 fathoms, whence in the run over the bank they were irregular, being from 15 to 10 fathoms, the latter being the least depth found. There was an appearance of breakers on the western edge of the bank. The bottom consisted of coral rocks and coloured shells, and there were large white spots towards the north end of it, and many rippings around it.

In 1817 the *Sir Stephen Lushington* struck soundings upon Fortune bank, and for a distance of 7 miles obtained bottom in 10 to 12 fathoms, steering at the time due East; coral rock and sand were plainly visible under the ship, and as far as could be discerned from the mast-head to the northward and southward. At noon the depth was 38 fathoms, and soon after soundings were lost. The Latitude was found to be $7^{\circ} 7' S.$, and the meridian distance eastward from Coetivy island, by chronometer, was 31', which, supposing the longitude of the island, as determined by M. TRICAULT (*see* p. 574), to be correct, places the bank in $56^{\circ} 53' E.$; this differs only 3' from the determination of M. BRIDET, and but $4\frac{1}{2}'$ from the result arrived at by CAPTAIN INNES.

CAPTAIN J. INNES, of the *Abercrombie Robinson*, in April, 1830, reported that he carried regular soundings of 10 to 17 fathoms for a distance of 5 or 6 miles over what he supposed to be the north-west edge of Fortune bank, steering at the time N. by E. The latitude was found to be $7^{\circ} 6' S.$, and longitude by lunar observations $56^{\circ} 31' E.$; but by chronometers, $56^{\circ} 49' 30'' E.$

M. BRIDET, of the French ship *Nisus*, a lieutenant in the Imperial Navy, obtained soundings on the bank in 1857, and reported its centre to be in Lat. $7^{\circ} 6' 45'' S.$, and Long. $56^{\circ} 56' E.$, and that its extent was only $3\frac{1}{2}$ miles† from North to South. The depth was not stated, nor were any further particulars furnished.

CAPTAIN F. MORESBY, R.N., says: “Fortune bank lies due East from Coetivy 14 leagues. The least water that has been found by the small vessels which frequent the Seychelles is 9 fathoms; they describe it as having the same extent North and South as Coetivy and the southern sand-banks, and from three to four leagues broad. Between the bank and Coetivy there is no bottom at 100 fathoms.”

To the above it may be added, that CAPTAIN TAYLOR, of the ship *Simlah*, when

* This longitude is rejected by DALRYMPLE, who (in a foot-note) says—
 “M. D'APRES places it in Lat. $7^{\circ} 30' S.$ } In Long. $54^{\circ} 48' E.$ from Paris (equivalent to $57^{\circ} 8' E.$
 The CHEVALIER GRENIER { $7^{\circ} 22' S.$ } from Greenwich), or $1^{\circ} 2'$ further West than M. DE
 { $7^{\circ} 42' S.$ } KERGUELEN.”

† M. D'APRES considered the extent of the bank to be 3 leagues.

at Coetivy island in 1848, was informed by a resident on the island that the depth on the north end of Fortune bank is only 2 fathoms.

COETIVY ISLAND.

This small sandy island was discovered by M. DE COETIVY in 1771. It is situated in about Lat. $7^{\circ} 10' 56''$ S., and Long. $56^{\circ} 19' E.$,* according to the observations of MR. RUSSELL, R.N., of H.M.S. *Topaze*, who visited it in 1820, and from whose published plan it appears to be not more than $3\frac{1}{4}$ miles long from E.N.E. to W.S.W., and about half a mile broad; on this plan of the island is also shown a reef, partially dry at low water, extending $2\frac{1}{2}$ miles in a westerly direction from its west end, and another reef $1\frac{1}{2}$ miles easterly from its east end. The island has not been surveyed; our information respecting it is therefore necessarily imperfect. When discovered in 1771 it appeared (viewing it from a distance of about 6 miles), to be covered with trees, excepting its south side, which was bare.

CAPTAIN F. MORESBY, R.N., says:—"Coetivy island is low and sandy, and has an extent from S.W. by S. to N.E. by N. of about $7\frac{1}{2}$ miles. Off the north and north-west points, in the South-east Monsoon, there is good anchorage in from 7 to 17 fathoms on a bank of sand extending half a mile from the shore. Water may be procured close to this anchorage. We found turtle in abundance. The reef extends far to the southward."

MR. TAYLOR, of the ship *Simlah*, 1848, reports:—"Being in want of water I anchored off the small island of Coetivy in $5\frac{1}{2}$ fathoms, with the large tope of cocoa-nut trees directly over the flagstaff, bearing E. $\frac{1}{2}$ N.; north extreme of the island N.E. $\frac{1}{2}$ N. and south extreme S.S.W., and found good water close to the anchorage. From the south-west point of the island a coral reef extends, as I was told by a person residing on the island, 9 miles, on which the sea constantly breaks; it certainly broke as far as the eye could reach from the poop of the ship. From the north end of the island there extends a reef about $2\frac{1}{2}$ miles, on which the sea breaks when there is any swell.

"In the event of a shipmaster wishing to anchor at Coetivy I would recommend his rounding the island at the north point, at 3 miles distance at least, and to be careful of not standing too far to the south-west, as there are some shoal patches south-westward of the anchorage. By keeping an officer on the fore-topsail or top-yard, these will always be seen in time to avoid them."

We consider it probable that Coetivy island may be seated on a bank of soundings of considerable extent, of which Fortune bank may form a part, as M. LESPORT, of the French ship *Constant*, 1844, is reported to have obtained soundings of 11, 20, and 30 fathoms, sounding for a distance of 10 miles S.W. to N.E., at about 10 miles W.N.W. from the island.

CONSTANT BANK.

This bank is inserted in the chart on the authority of M. LESPORT, just mentioned. The report is:—"Continuing her course towards the N.E. the *Constant*

* M. TRICAULT, of the French Imperial Navy, made the N.E. end in 1864 in Long. $56^{\circ} 22' 9'' E.$ He describes the island as about $5\frac{1}{4}$ miles long from N.N.E. to S.S.W., and one mile broad. At $2\frac{1}{4}$ miles seaward from this end of the island there was no apparent danger. The longitude was measured from St. Denis, Réunion.

discovered, on the 7th December, 1844, another bank, on which she sounded several times, working across it by estimation. A boat which was sent to find the shoalest part of it had nothing less than 11 fathoms, the bottom being principally coral. At noon CAPTAIN LESPORT returned to the shoal part of the bank, when he determined its position, which he has given as Lat. $6^{\circ} 19' 30''$ S., and Long. $56^{\circ} 18'$ and $56^{\circ} 15' 54''$ E., deduced from two chronometers regulated at Mauritius. This second bank appeared from 12 to 15 miles from North to South, and from 18 to 20 miles from East to West."

The Admiralty Chart (No. 677) shows a line of soundings in a south-east direction from the Seychelles, by COMMANDER DE HORSEY, of H.M.S. *Brisk*, 1861, who succeeded in obtaining bottom at 36 and 40 fathoms, rock, at a short distance eastward of the position assigned to this bank, so that its existence may be considered in some degree confirmed.

PLATTE ISLAND.

This low flat island was discovered by M. DU ROSLAN in 1770, who described it as about 3 miles in circumference, and surrounded by a reef which appeared to run off from it about a mile in a northerly direction. CAPTAIN F. MORESBY, R.N., visited it in 1822, and observed it to be in Lat. $5^{\circ} 48' 30''$ S., and Long. $55^{\circ} 27'$ E. He says:—"Passing it at 3 miles from its east side I found no bottom at 100 fathoms, but off its south-west end a bank of sand and coral extends 4 or 5 leagues, having upon it from 5 to 12 fathoms. From the north end of the island a reef extends 4 or 5 miles W.N.W., and also a mile E.S.E. from the north point. Vessels anchor off an opening in the reefs on the south-west side. The island is a mile in length, and is, in all respects, what is denominated a coral island."*

In the Admiralty Chart (No. 677) a reef of 14 feet is inserted in Lat. $6^{\circ} 8'$ S., and Long. $55^{\circ} 24'$ E., on the authority of M. VAILHEU, of the French ship *Madagascar*, 1834. Its position is about 15 miles S. by W. from Platte island.

SEYCHELLES ARCHIPELAGO.

This archipelago of islands is situated between Latitudes $3^{\circ} 40'$ and $4^{\circ} 50'$ S., and Longitudes $55^{\circ} 15'$ and $56^{\circ} 5'$ E.† They are seated on an extensive bank of soundings which, commencing in Long. $54^{\circ} 5'$ E., extends eastward beyond the meridian of $57^{\circ} 5'$ E., but how far has not been ascertained;‡ nor is its southern limit known, as it is probable that the Constant bank, Platte island, and even Coetivy island, are all on a bank of soundings, forming a portion of the Seychelles bank. The northern edge of the bank is in Lat. $3^{\circ} 40'$ S. The islands are about twenty-five in number, and the largest, Mahé, is the seat of Government; the town on the east side of the

* In 1829, this island was reserved by the Government of the Seychelles for the use of vessels infected with contagious diseases.

† The Seychelles were discovered in 1743 by M. LAZARUS PICAUT, and named by him Mahé islands, from M. MAHE DE LA BOURDONNAIS, then Governor of Mauritius. The largest of the islands alone retains the name.

‡ M. TRICAULT, of the French Imperial Navy, obtained soundings of $11\frac{1}{2}$ to 17 fathoms in December, 1864, when crossing the east part of Seychelles bank from southward. Latitudes from $3^{\circ} 11'$ to $3^{\circ} 8' 8''$ S., and Long. $57^{\circ} 5' 9''$ E. The track was as nearly as possible North (true).

island is in Lat. $4^{\circ} 37' 30''$ S., and Long. $55^{\circ} 30' 9''$ E., according to the observations of CAPTAIN OWEN, R.N., 1825.*

The Seychelles islands are of primitive rock, and generally high excepting the more distant islets, which are of sand and coral, and only a few feet above high-water mark. The larger islands are well watered by innumerable small streams, and several still possess a quantity of good timber fit for shipbuilding and other useful purposes. The climate is considered healthy, particularly for children; and although the thermometer usually stands from 82° to 84° throughout the year, yet the heat in the day is seldom felt to be oppressive in the shade, and the evenings are particularly pleasant and cool.†

The South-east Trade-wind prevails here from May to November, at which season vessels make their passage hence to Mauritius in about twenty days on an average, and from Mauritius to Seychelles in seven days. During the other months the winds are variable; principally, however, from the S.W. and N.W.; at this period fourteen days is a common run from Mauritius to Mahé. Hurricanes are rare, but from the beginning of December to the middle of April the inhabitants do not like sending their vessels to Mauritius.

It rains at the Seychelles most during the months of October, November, December, and January.

The only fruits very common in the islands are plantains and pine-apples, though many other tropical fruits may occasionally be obtained. The Seychelles are most famed for the *cocos-de-mer*. Vegetables are scarce, the pumpkin and sweet-potato being the commonest. Fish is plentiful, and only one kind poisonous—namely, the sardine, or sprat. The flesh of the hawk's-bill turtle (that species whose scales are tortoise-shell) is never eaten; they are generally taken from May to the latter end of October, and are extremely valuable, being the sole source of revenue to many families. Green turtle are common from November to April. Supplies for shipping are not abundant, but might become so if vessels frequently touched here. There are no venomous snakes or wild beasts, and scarcely any game.

CAPTAIN F. MORESBY, R.N., says, "From the salubrity of the climate, as well as from the absence of destructive hurricanes, the Seychelles must ever be of importance to those nations having possession of or trading to India. Their position for commercial intercourse with the coast of Africa, as well as Madagascar (for in both Monsoons small vessels have a leading wind to and from Cape Amber), give them a

* This closely corresponds with the observations of MESSRS. CLOUE and LEBLANC, of the French ship *Berceau*, 1864—namely, $55^{\circ} 30' 21''$ E.; with those of MR. RUSSELL, of the *Topaze*, 1820, who made the town in Long. $55^{\circ} 31'$ E. by lunars; and with those of CAPTAIN F. MORESBY, 1821, who determined the anchorage of St. Anne (two miles eastward from the town) to be in Long. $55^{\circ} 32' 45''$ E.; hence the longitude of Mahé may be considered as well determined.

The ABBE ROCHON in 1768 observed the S.W. end of St. Anne island to be in Lat. $4^{\circ} 28'$ S., and Long. $55^{\circ} 35'$ E.; and M. PARIS, of the French ship *Favorite*, in 1830, determined the same point to be in Lat. $4^{\circ} 36' 22''$ S., and Long. $55^{\circ} 29' 27''$ E. We do not know from what meridian this last position by M. PARIS was measured, but if from the Cape of Good Hope (supposed at that time to be in Long. $18^{\circ} 23' 36''$ E., but subsequently determined to be in Long. $18^{\circ} 28' 45''$ E.), it will be necessary to add $5' 9''$, which will make it $55^{\circ} 34' 36''$ E. This point of St. Anne island is three miles eastward from the town; hence by these observations the latter will be in longitude about $55^{\circ} 32'$ E., a result differing but little from the longitude previously given.

† See an interesting article on the Seychelles in the "Nautical Magazine," 1839, by G. HARRISON, Esq.

facility of communication, which neither Réunion nor Mauritius possesses; and should it ever become an object to watch the Mozambique channel, or look to the Portuguese or Imaum of Muscat's possessions, Mahé is the place where a squadron would be within a few days' sail, where water and refreshments are easily attainable, and where, during the hurricane months on the coast of Madagascar, or the unhealthy months on the African side, the finest season prevails."

Mahé.—This island is about 16 miles long in a N.N.W. and S.S.E. direction, and 5 miles broad in its widest part—the north end. It is of very irregular shape and nearly 2000 feet high, with lofty, jutting, perpendicular, cliffy peaks, intersected freely by ravines, and plentifully supplied therefrom by water. It is crowned with wood, and may generally be seen from the distance of 36 or 40 miles. The soil is reddish, consisting principally of a decomposed granite, well adapted for vegetable production, and well watered by the streams, natural as well as artificial, from the ravines.

On the west side of the island there are two islets close to the shore, named Therese and Conception, of which the latter is the westernmost; and according to the chart of CAPTAIN OWEN, there is also a reef at a short distance from its south point. During the S.E. Monsoon there is good anchorage on the west side of Mahé, but heavy gusts come from the high land at a time when the winds are moderate and steady on the east side of the island.

PORT VICTORIA is situated on the east side of Mahé, and is formed by a group of islets $1\frac{1}{2}$ to 3 miles from shore, the two largest of which are named St. Anne and Cerf; the former is most to the north, and it is immediately westward of this islet that vessels anchor. The town is at the entrance to a valley formed by a chain of high mountains, bristling with rugged rocks, and surmounted by large trees; the most elevated of this range of mountains is termed Morne Blanc. The houses are built entirely of wood; they consist solely of a ground floor, and are generally surrounded by fruit-trees within a palisade.* In the roadstead there is accommodation for thirty or forty vessels, but there is not sufficient room to allow all these to select their berths.

The port and roadstead of Mahé were surveyed in 1825 by CAPTAIN OWEN, R.N., and again in 1846 by MM. CLOUÉ and LEBLANC, of the French ship *Berceau*. From these surveys it appears that the coast of Mahé is bordered by a coral reef, which extends out so much as a mile in some places, and that there are three islets on this reef in the vicinity of point Rue (the east point of the island, which forms the south side of the South-east channel to the roadstead); these islets are named Anonyme, Brulée, and Southeast; the latter, which is also the largest, is close to the shore.† Opposite the town there is a channel through the reef in a South-west direction to the shore, having a depth of 12 to 5 fathoms; this channel is called the Inner roadstead.

* CAPT. F. MORESBY, R.N., wrote in 1821:—"Mahé is without fortifications, and easy to defend, from its precipitous hills and deep ravines; nor could ships approach sufficiently near the town to fire effectually without entering the port, which is narrow and intricate. The trade is carried on in a few small schooners to Mauritius, exporting cotton, cocoa-nut oil, tortoise-shells, &c. The language of the country is French."

† These islets must be very carefully approached, a sunken rock having been reported to be situated at about half a mile eastward from Brulée, the smallest islet. In the Admiralty Chart (No. 721) a rock named Azof is inserted at about a mile northward of this islet,—possibly it is the same rock.

The islands forming the east side of the outer roadstead are surrounded by a coral reef, which connects them more or less together. St. Anne, the largest island, is separated from the others by a narrow channel of 4 to 5 fathoms.

The outer roadstead has a depth of 8 to 10 fathoms on ground good for holding, but there are several coral patches of less than 4 fathoms scattered about, which it is necessary to carefully avoid. The shelter is from all winds but those which come from northward. The best anchorage is said to be in 8 to 13 fathoms, sand, with the centre of St. Anne island bearing east, distant three-quarters of a mile, and the town of Mahé W.S.W. The approach to this anchorage is round the north end of St. Anne, the S.E. channel (between Cerf island and the shore) being intricate and dangerous.

In the inner roadstead the bottom is of white sand, good for holding. If of less than 18 feet draught vessels may run into this roadstead from the outer roadstead by keeping open an avenue of trees situated a little to the left of the city,—which avenue will be immediately recognised as it rises at once from the sea, and has a house at its termination. Strangers require a pilot.

CAPTAIN F. MORESBY, R.N., says:—"It seldom blows fresh at this roadstead, and never hard. In the S.E. Monsoon, heavy gusts come from the land, in which the wind varies. In this season ships may conveniently lie between St. Anne and Moyenne islands."*

Mahé was visited by CAPTAIN SIR E. BELCHER, R.N., in 1842, who reported as follows:—"Owing to the transparency of the water, all absolute dangers are visible, and the port or inner harbour may be safely resorted to, where vessels intending to remain any time will find the water smoother and without that swell which renders the outer anchorage (by reason of a heavy ground swell constantly turning in) very unpleasant. We also found the anchorage near St. Anne's rocky, but the pipeclay between the rocks holds well. I would advise any vessel anchoring near that island to run out the stream-anchor astern in the direction of the swell; otherwise, upon any sudden flaw off shore during the night, she may be subjected to a sudden fit of rolling before it can be remedied; and kedges at that moment are liable to injure men as well as boats.

"Although situated so near the equator, the Seychelles do not experience a high temperature; the range is very limited, and the only atmospheric changes which are remarked are the N.W. Monsoons, or gales accompanied by lightning and heavy rains. The hurricanes of Mauritius rarely reach these limits. The two Monsoons, S.E. and N.W., observe nearly the same periods and character as those of Hindostan. The S.E. Monsoon, or dry season, commences in April and terminates in November. The N.W. Monsoon, or rainy season, commences in November and terminates in March. Sometimes, however, the breezes from the south-east die away, and are succeeded by variables, accompanied by rain, but never of long duration."

Silhouette and North Islands.—At 11 miles from the west point of Mahé island, in a N.N.W. direction, is the south end of a high round island, 3 miles across, named Silhouette; and at nearly 4 miles northward of this is North island, also lofty, but of smaller extent. Silhouette is considered to be the most elevated of the Seychelles; it has or had upon it an abundance of timber. It is difficult to land on both these islands.

* It seems possible that there is a mistake here, and CAPTAIN MORESBY meant "N.W. Monsoon."

In the passage between Silhouette and North islands, the shoalest water is about 14 fathoms, and in that between the islands and Mahé about 30 fathoms.

Praslin.—This island is distant from Mahé about 23 miles in a north-easterly direction, its west point being in Lat. $4^{\circ} 17' 24''$ S., and Long. $55^{\circ} 44' 9''$ E. It is very irregular in outline, and of about the same height as Mahé, but it is not intersected by so many deep ravines. The anchorage is on the north-east side of the island, under an islet named Curieuse, which protects it from northerly winds. **Curieuse** is about a mile in extent and of moderate elevation compared with Praslin; its shores are bold, except that which faces the south-east. The anchorage is in the channel formed by this islet and Praslin, and is sufficiently commodious to accommodate a number of vessels, which can ride here at all seasons of the year; the depth is 4 to 10 fathoms.

When at anchor under Curieuse islet, if in a large ship, it will be necessary to avoid a 4-fathoms coral patch lying about half a mile from its south-east shore. From this patch a detached rock off the south-east end of Curieuse is said to bear N. by W., and St. Pierre islet S.S.E. $\frac{1}{2}$ E.

Dangers between Mahe and Praslin.—At about four miles northward from the anchorage at Mahé are two rocks, named **BRISANS** (or the Breakers), which bear from each other S.E. $\frac{1}{2}$ E., and N.W. $\frac{1}{2}$ W. At three-quarters of a mile N. by W. from the northern Brisans there is a small coral patch of 6 fathoms. The **MAMMELLES**, 40 feet high, is distant $4\frac{1}{2}$ miles N.E. $\frac{3}{4}$ E. from the Brisans, and 15 miles W.S.W. from the south-east end of Praslin; between it and the Brisans the ground is uneven, as from 7 fathoms the lead will drop into 13 and 15 fathoms. At a musket-shot from the Mammelles there is a rock, 6 feet under the surface, upon which the sea generally breaks, but in calm still weather it is difficult to be seen;—a sunken rock also lies at two ships' length from the north end of the Mammelles. Half way between the Mammelles and Praslin are the **MADGE** rocks, two dangerous rocks covered at high tide, distant from each other between two and three cables' length N.E. and S.W.;—in the South-east Monsoon the sea generally breaks high upon them; but to CAPTAIN F. MORESBY, R.N., who passed them in 1821 within two cables' length, the southernmost appeared now and then above water, and the position of the northernmost was only indicated by the reflux of the sea;—the marks for these rocks are the highest point of St. Anne in one with the Mammelles; the south point of La Digue E.; and Silhouette W. $\frac{3}{4}$ S. The **TROMPEUSE**, a bed of rocks, E. by N. $\frac{1}{4}$ N., 3 miles from the Madge rocks, has obtained the name (*trompeuse*—deceitful), from having been frequently taken for the Madge rocks. North-eastward from Trompeuse are two islets named the **COUSINS**, and the channel between is said to be so full of rocks that a vessel cannot pass in safety; but between the Cousins there is a safe channel, and also between the North Cousin and the reef extending from Praslin. The **BALEINE** or **WHALE** rocks are said to lie at about $2\frac{1}{2}$ miles N. $\frac{3}{4}$ W. from the North Cousin, with Miller's point, the west end of Praslin (near which is a sunken rock) bearing E. $\frac{1}{4}$ S. $1\frac{1}{2}$ mile; Booby islet N.E. by N. $2\frac{1}{2}$ miles; and the highest part of Aride islet N. $\frac{3}{4}$ E. 5 miles.

CAPTAIN F. MORESBY says:—"The Baleine is a small dangerous rock, covered at high tides. I sought for this rock, but not having any decisive marks could not find it; it is, however, frequently seen, and generally awash at half-tide. W.N.W. from the North Cousin there is a coral patch half a mile distant, having $2\frac{1}{2}$, 3, and 4 fathoms upon it. I passed between this patch and the Baleine, steering for Booby

islet, and left on the starboard hand a coral patch of 4 fathoms, situated half way between Booby islet and the north-west point of Praslin. When Booby and Aride islets are in one, bearing N. $\frac{1}{2}$ W., Mary Anne island being just open of Curieuse islet, a ship may haul up with safety to anchor or pass between Curieuse and Praslin.*

Reciffe.—This island is only about $1\frac{1}{2}$ miles in length, but of not less than 150 feet in height. It has a remarkable rock, like a building, on its summit, which is white in colour, owing to the almost innumerable birds that resort to it. Its position is about 18 miles eastward from port Victoria, being in Lat. $4^{\circ} 34' 48''$ S., and Long. $55^{\circ} 50' 9''$ E. The *Menai*, CAPTAIN F. MORSEBY, anchored here in 1821, at about $1\frac{1}{2}$ miles N.N.W. from the island, in 17 fathoms, sand and shells.

Frigate Island.—The centre of Frigate island, the easternmost of the Seychelles, is in Lat. $4^{\circ} 35' 12''$ S., and Long. $56^{\circ} 1' 9''$ E. This island is about $2\frac{1}{2}$ miles long, and 550 feet high; it should be cautiously approached, because a reef of rocks lies off its south-east end, and there is also probably a reef off its north end. Ships running for port Victoria in hazy weather will pass this island before Mahé comes into view, and will even sometimes reach so far as Reciffe island. The island is inhabited, and has anchorage under its lee.

Lelot Island is a small islet on the south-west side of Frigate island, from which it is distant about 2 miles. In the channel between, the depth is 15 to 19 fathoms; some sunken rocks are inserted in CAPTAIN OWEN'S chart close to Lelot; in other respects the channel appears safe.

Chimney Rocks.—At about 8 miles N.N.W. $\frac{1}{4}$ W. from Frigate island there is a bed of rocks called the Chimneys, situated nearly midway between Frigate and La Digue Islands;† and W.N.W. $1\frac{1}{2}$ miles from these is a dangerous rock, covered at half-tide, named in OWEN'S chart RENOMMÉE, but in the French chart (No. 1205) LE CAUMAN; in the channel between the depth is 15 to 20 fathoms. The ALLIGATOR and SHARK are situated 4 miles W. $\frac{1}{2}$ S. from the south point of La Digue, and at nearly 3 miles S. $\frac{1}{2}$ W. from the south end of Praslin. These comprise all the known rocks between Frigate and Reciffe islands on the south, and Praslin and La Digue islands on the north; but there are reasons for believing that the channel has not been sufficiently explored.

La Digue is about 3 miles in extent, and its highest part is in Lat. $4^{\circ} 21' 12''$ S., and Long. $55^{\circ} 55' 9''$ E. It is surrounded by a reef, and landing is difficult. The channel between this island and Praslin is about 3 miles wide, and has a general depth of 13 to 15 fathoms, but there are two dangerous rocks in mid-channel, distant from each other nearly a mile in a S.S.E. and N.N.W. direction, which are covered at half-tide. CAPTAIN F. MORSEBY sounded round the southernmost rock, and had a depth of 6 fathoms at a boat's length from it, and 12 fathoms at a ship's length, and recommended that an attempt to pass between them be avoided until the passage is better known.

In the direction of S.S.W., or 3 miles from the Round island (joined to the east end of Praslin by a coral reef), there are two rocks above water, named REQUIEMS,

* There appears to be a mistake here, for in CAPTAIN OWEN'S chart Mary Anne island is eastward of Félicité island, and we should say not visible from the position alluded to.

† At about $1\frac{1}{2}$ miles eastward and north-eastward from the Chimneys are said to be some rocks upon which the French frigate *Régénère* was nearly lost. These rocks are not inserted in any chart (French or English) that we have seen, and we suspect that they have been mistaken for the Chimneys.

which bear from each other about N.N.E. and S.S.W., distant two or three cables' length. The south point of La Digue, in one with the south point of Mary Anne island, will lead to them.*

Félicité, Mary Anne, and the Sisters are some small islands situated north-eastward from La Digue. The position of the north peak of Mary Anne, the easternmost island, is Lat. $4^{\circ} 19' 24''$ S. and Long. $56^{\circ} 0' 39''$ E. At the south-east end of Félicité island there is a detached rock. A rock above water, named AVE MARIA, lies between these islands and Praslin, at about $1\frac{1}{2}$ miles eastward from the latter, and is reported to have a shoal projecting south-westward from it about a cable's length; this rock has a depth of about 11 fathoms in its immediate vicinity.

Between the Sisters and Praslin the ground is very uneven and rocky, the depth being from 6 to 25 fathoms. The channel between the Sisters and Félicité is reported to be safe, the only known danger being a bed of rocks, partly under water, which extends southward from the Sisters.

In the vicinity of the Sisters, two rocks are inserted in charts, on the authority of M. VAILHEU of the French ship *Madagascar*, 1834. The first is 8 feet under the surface, and its position is about 2 miles N.W. from the western Sister; the second, named Mellow, also under water, is 5 miles North from the same island. The existence of these rocks requires confirmation.

Dennis is the north-easternmost of the Seychelles; its centre is in Lat. $3^{\circ} 48' 12''$ S., and Long. $55^{\circ} 43' 21''$ E. This island is about $1\frac{1}{2}$ miles in extent North and South, and has or had several thatched habitations on its northern side; it is very low, covered with trees, and may be seen from a ship's deck about 12 miles. CAPTAIN F. MORESBY says:—"A reef appeared to project from its southern end, nearly a mile, with discoloured water beyond it; and a coral bank or spit extends from it to the northward 2 miles, upon which we shoaled suddenly, and found 3 to 5 fathoms, and there may be less water upon some of the patches. In approaching the island from the south-eastward, the soundings at 3 and 4 leagues' distance are from 25 to 30 fathoms, sand, coral, and shells; and when the island bears from S.W. to S. 4 miles, you are off the spit that stretches out from its northern extreme. If you suddenly shoal under 10 fathoms when passing, immediately haul out to the northward or N.E. From 10 fathoms the soundings gradually deepen as you stand to the N.W., and the bank slopes down to 40 fathoms when the island disappears from the deck. As this island is near the north-east extremity of the great bank of soundings which circumscribes the Seychelles archipelago, it is convenient for a ship to sight it when proceeding by the southern passage for the Arabian gulf, there being no known danger to be met with when steering for it in the night if the lead be kept going, which will give timely warning of an approach to it from any direction."

Bird or Sea-Cow.—This, the northernmost of the Seychelles, is a small, low, sandy island, of not more than 1 mile in extent North and South, and very narrow. Its centre is in Lat. $3^{\circ} 45' 42''$ S., and Long. $55^{\circ} 15' 39''$ E. Upon it there are or were a few shrubs. A coral reef which surrounds it is said to extend from it about $1\frac{1}{2}$ miles. The island has been described as but little else than a coral reef surmounted by dry sand; and it is also stated that a bank extends from its south end, upon which is a depth of 9 fathoms, sand and coral, at 6 miles distance from it. If so unfortunate as to be lost on this island, it is probable that water may be obtained

* We suspect that these are the Alligator and Shark rocks, already mentioned.

by sinking a pit in the sand, the crew of the *Hirondelle*, a wrecked French ship, having sustained life by this means.

Reefs and Shoals.—The great Seychelles bank has not been fully explored, and it is probable that there are shoals upon it which have yet to be inserted in charts. The *ANDROMACHE* shoal is a shoal of 5 to 20 fathoms, situated in the north-western part of the bank, in Lat. $3^{\circ} 50' S.$, and Long. $54^{\circ} 53' E.$; it was discovered by H.M.S. *Andromache*, in 1835, and its extent, and the possibility of there being less water than 5 fathoms, were not ascertained. The *SWAN*, a shoal discovered by a whaling ship of that name in 1824, situated in about Lat. $4^{\circ} S.$, and Long. $54^{\circ} 37' E.$, is reported to be 5 to 6 miles in extent, and to have soundings upon it of 3 to 9 fathoms on coral.* The *DUPONT*, a shoal of $3\frac{1}{2}$ fathoms, in Lat. $4^{\circ} 15' S.$, and Long. $54^{\circ} 28' E.$, is inserted in charts upon the authority of M. DUPONT. In the eastern part of the Seychelles bank, the brig *Zoroaster* is reported to have passed over a coral bank, in about Lat. $5^{\circ} S.$, and Long. $56^{\circ} 40' E.$, sounding in 7 fathoms; it was believed that there was shoaler water in the neighbourhood.

Upon the Seychelles bank the depths are generally from 14 to 45 fathoms, but there is less water in some parts. As before observed, its eastern and southern limits have not been ascertained. The soundings at about 20 miles eastward from Frigate island are reported to be 8, 10, and 12 fathoms for a considerable distance; but this does not agree with CAPTAIN OWEN's chart, in which the depth is shown to be 22 to 50 fathoms. The *Mary* is said to have had 11 fathoms, rock, at about 18 leagues eastward from Mahé, in a part of the bank where 30 fathoms is supposed to be the average depth. A patch of $3\frac{1}{2}$ fathoms, which may be identical with the Dupont shoal, is also reported to be situated on the edge of the bank, in a direction due West from Silhouette; but it was sought for unsuccessfully by the *Wizard*, in 1821.

KEELING ISLANDS.

Keeling Islands.—This group of islets occupies an extent of nearly 8 miles; they are about twenty in number, and the largest is 5 miles long. All are very narrow, and most of them are separated only by narrow channels sufficiently shallow to be fordable at low tide; there is, however, one exception to this rule, and it is where Horsburgh island, the northern isle, is separated from Direction island by the deep channel forming port Refuge. This deep channel leads into the basin in the centre of the lagoon, where is anchorage in 5 or 4 fathoms on coral, or sand and clay, according to the locality. Every island is so thickly covered with cocoa-nut trees that it is difficult to make way through them. About nine varieties of other trees are found intermixed with these, palm trees, &c.; but, comparatively speaking, these form only a very small part of the verdure of the islands. Fresh water is easily obtainable in all parts of the islands at about two feet below the surface,—the springs rising and falling with the tide; the difference between high and low water in the basin being about 5 feet. A line of shelving rock, extending outwards from fifty to a hundred yards, surrounds the outer or sea-front of all the islands. The surf is very violent at high tide, but at low water a person may wade to the edge of the

* The *SWAN* may not be the only shoal in this vicinity. In the original report the position given was Lat. $3^{\circ} 55' S.$ to $4^{\circ} 1' S.$, and Long. $54^{\circ} 42' E.$ This part of the Seychelles bank has not been examined.

margin of this coral bank, and absolutely look down into an unfathomable sea. So small is the base of the group compared with its upper surface, and so little do the sides diverge from the perpendicular line.

It was attempted to form a settlement on these islands many years ago, under the charge of CAPTAIN J. C. ROSS, with the view to afford supplies to India and China vessels. The settlement flourished a short time, and, after various vicissitudes, was abandoned.

The position of the south-west point of Direction island, the north-east island of the group, is, according to ADMIRAL FITZROY, who surveyed the islands in 1836, Lat. $12^{\circ} 5' 40''$ S., and Long. $96^{\circ} 53'$ E.

The **North Keeling**, an island similar in appearance and in formation to those just described, is distant N. $2^{\circ} 30'$ W. (*true*) 14 miles from the west end of Horsburgh island, the northernmost of the cluster. It is not more than a mile in extent, is surrounded by a coral reef, and encloses a lagoon.

ADMIRAL FITZROY has thus described these islands :—

“When the islands came into view we saw them right ahead, distant about 16 miles. A long but broken line of cocoa palm trees, and a heavy surf breaking upon a low, white beach, rising not many feet above the foaming water, was all we could discern till within 5 miles of the larger Keeling (there are two distinct groups); and then we made out a number of low islets nowhere more than thirty feet above the sea, covered with palm trees, and encircling a large shallow lagoon. We picked our way into port Refuge (the only harbour), passing cautiously between patches of coral rock, clearly visible to an eye at the masthead, and anchored in a safe, though not the best berth. We subsequently sent out our boats in all directions, though there was so much wind almost each day as materially to impede surveying. Soundings on the seaward sides of the islands could seldom be obtained, but two moderate days were eagerly taken advantage of to go round the whole group in a boat, and get the few deep soundings which are given in the plan. The two principal islands (considering the whole southern group as one island) lie north and south of each other, 15 miles apart; and as soundings were obtained 2 miles north of the large island, it may be inferred, I think, that the sea is not so deep between the two as it is in other directions. Only a mile from the southern extreme of the South Keeling I could get no bottom with more than 1000 fathoms of line.

“The southern cluster of islets encircle a shallow lagoon of an oval form, about 9 miles long and 6 wide. The islands are mere skeletons, little better than coral reefs, on which broken coral and dust have been driven by sea and wind till enough has been accumulated to afford place and nourishment for thousands of cocoa palms. The outer edges of the islands are considerably higher than the inner, but nowhere exceed about thirty feet above the mean level of the sea. The lagoon is shallow, and almost filled with branching corals and coral sand. The small northern island is about a mile in diameter, a strip of low coral land, almost surrounding a small lagoon, and thickly covered with cocoa-nut trees.”

Another description of the islands is as follows:—“Port Refuge has only one entrance for ships, which is at the northern part of the lagoon, and the navigable channel is only half a mile wide; this is bounded on the west side by Horsburgh island, the northernmost of the chain, and considerably detached from the others, and by Direction island on the east side. Straggling rocks, and an extensive reef, called Turk reef, stretch from Horsburgh island to the S.E. and S. $1\frac{1}{4}$ miles, and

to the S.S.W. $3\frac{1}{4}$ miles, uniting with Ross island, which forms the west side of the harbour, and is 5 miles in length. Scott island is in the form of a crescent, and lies at the S.E. angle of the harbour, the south and west sides of which are bounded by the coral reef. From the north end of Scott island, the east side of the harbour is encircled by a close succession of small isles, stretching to Clunie island, which approaches near to Direction island, there being only a few islets between them. This coral chain of islands, or rather *wall*, in the middle of the ocean, is elevated only from 3 to 10 feet above the sea at high water spring-tides. Most of the isles are covered with cocoa-nut trees, and two other species,—one of them soft, white, and spongy—the other heavy, hard, dark-looking, timber. The cocoa-nuts contiguous to the sea have a saline taste, and are small; but those in the middle of the islands are good. The beaches abound with land crabs, aquatic birds, and turtle.

“Soundings will be got suddenly when on a transit-line joining the two islands that form it, and when inside about a mile, having brought the north extreme of Direction island to bear about E.N.E.; you should cast anchor in 4 or 5 fathoms in the outer anchorage, which is perfectly smooth, and not proceed farther until you have examined the channels leading to the east or west harbours inside. These harbours are separated by a large rocky shoal in the middle of the port, called Dymoke shoal, or Middle ground, having on it from $1\frac{1}{4}$ to $2\frac{1}{2}$ fathoms water. The southern extremity of the port also is very shoal. The outer anchorage is sufficiently capacious to contain a great number of ships, but is in some parts spotted with *mushroom* coral, which may easily be avoided in anchoring, as the water is very clear. The bar, or flat, inside the outer anchorage, is extensive, also spotted widely with coral, and all the rocks are of this substance.

“Ships drawing above 18 feet should not attempt to sail in over the bar; but if on an emergency they do so, the coral patches may be avoided by a careful person on the foreyard directing the ship's course. These patches are elevated two or three feet above the natural level of the bottom, and being of the mushroom species, of a darkish colour, are easily discerned at a considerable distance, as the water is extremely clear, and the sandy bottom of snowy whiteness.

“Ships drawing about 21 or 22 feet, intending to go inside, may warp over the bar, and afterwards choose either the Eastern or Western harbours at discretion, taking care to avoid Dymoke shoal, which is an extensive coral flat with overfalls near its edges, and (lying on a dark bottom) is not easily discernible. The depths on the bar are 3 to $3\frac{1}{2}$ fathoms, and the best track is a little nearer to the islands (on the eastern side) than mid-channel, the depth increasing when over the bar from 4 to 6 fathoms,—avoiding the corally heads in approaching the inner harbour on either side of Dymoke shoal.”

CHRISTMAS ISLAND.

Christmas Island, the north end of which is situated in Lat. $10^{\circ} 27' S.$, and about Long. $105^{\circ} 33' E.$, is an island 10 miles across, of square form, and of sufficient elevation to be visible from a distance of nearly 40 miles. It is precipitous all round, and no bottom was obtained at a cable's length from shore, sounding with a line 100 fathoms long; there is consequently no anchorage off the cliffs. It is possible to land on its north-west side on a beach composed of white sand and coral. The only animals it supports are probably wild hogs.

LACCADIVH ISLANDS.

This archipelago of islands and banks is situated between Lat. 10° and $13^{\circ} 50' N.$, Long. $71^{\circ} 45'$ and $74^{\circ} E.$ * They are in general so low as to be visible only at a very short distance; hence the greatest care is necessary when approaching any of them. Many of the islands are surrounded by a steep coral reef, at a short distance from which soundings are lost in the depth of 100 fathoms. The islands were surveyed by LIEUTENANTS MORESBY, SELBY, and TAYLOR of the Indian Navy, 1828—1848; they may be traversed with safety in fine weather, provided a good look-out is maintained, and the large chart (the result of the survey) is at hand for reference.†

Cora-divh is the northernmost of the Laccadivhs. It is a bank of 23 to 30 and 48 fathoms, extending between Lat. $13^{\circ} 34'$ and $13^{\circ} 52' N.$, and between Long. $72^{\circ} 4'$ and $72^{\circ} 14' E.$ Its average width is about 5 miles, and close to it there is no bottom at the depth of 100 fathoms. The shoalest part appears to be near its north-east edge, where soundings of 23 and 24 fathoms prevail for some distance. The bank is composed of sand, decayed coral and broken shells.

Sesostris Bank (a bank of 11 to 63 fathoms) is situated between Lat. $13^{\circ} 0'$ and $13^{\circ} 14' N.$, Long. $71^{\circ} 52'$ and $72^{\circ} 5' E.$ It is about 10 miles wide in its broadest (the western) part, whence it tapers to a point in a south-east direction; it is in this, the narrow part, that the shoalest water, 11 fathoms, is found. Soundings of 12 and 13 fathoms may also be obtained near its north-eastern edge. The bank is very steep, there being no bottom at 100 fathoms close to it all round.

Munyal-Par (BASSAS DE PEDRO OR PADUA BANK).—This extensive bank extends from Lat. $12^{\circ} 30'$ to Lat. $13^{\circ} 37' N.$, between the longitudes of $72^{\circ} 16'$ and $72^{\circ} 44' E.$ It is nowhere more than 14 miles wide (in the middle only 7 miles), and has upon its soundings of 21 to 34 fathoms, sand, decayed coral and shells, being similar in its formation to Cora-divh and Sesostris banks. The northern end of the bank appears to be its shoalest part. Close to it all round there is no bottom at 100 fathoms.

Beleapani (CHERBANIANI REEF) extends from Lat. $12^{\circ} 16'$ to $12^{\circ} 24' N.$, its centre being in Long. $71^{\circ} 53' E.$ It consists of coral rocks, mostly visible at low water, and is so steep that at half a mile from it there is no ground at 100 fathoms. Upon it are two sand-banks dry at low tide. This reef is very dangerous, as the sea does not always break upon it; high breakers have, however, been seen in its western part, when the sea was otherwise smooth. It is high water on the days of full and change of the moon at 10h.; springs rise 7 feet and neaps 4 feet. During the survey the flood was observed to flow to the north-eastward.

Chereapani (BYRAMGORE REEF).—This very dangerous reef extends from Lat. $11^{\circ} 48'$ to Lat. $11^{\circ} 59' N.$, and between Long. $71^{\circ} 44'$ and $71^{\circ} 50' E.$; it consequently has an extent of about 11 miles. For about two miles from its north end there are soundings over it of 4 and 6 fathoms, but all the remaining part of the

* The longitudes in our description of this archipelago of islands are dependent upon Bombay Observatory, recently ascertained to be in Long. $72^{\circ} 48' 4'' E.$ This is considered to be a well-determined position, and has been taken as a meridian in determining the longitudes of many places on the west coast of India, coast of Arabia, and islands in the Indian Ocean. Bombay (Kolaba) lighthouse is in Long. $72^{\circ} 43' 0'' E.$; and Bombay Flagstaff is $1' 35''$ east of the observatory, consequently in Long. $72^{\circ} 49' 39.5'' E.$

† Published by the Hydrographic Office, Admiralty, No. 93. See also the plan of the Laccadivhs in the sheet of Plans of Islands in the Indian Ocean, published by Messrs. Imray & Son.

reef consists of coral rocks, more or less near the surface of the water. When the reef was examined by **LIEUTENANTS SELBY and TAYLOR**, the flood was observed to flow over it in a N.E. direction. "The bank, which is very steep, closely surrounds the reef, except to the N.E., where it projects 3 miles beyond it, with soundings from 4 to 8 fathoms. The coral rocks forming the reef are just discernible at low water, and the bottom is distinctly visible on the bank; but, as there are no soundings near this or the *Beleapani*, the approach to them is very dangerous, as the noise of the surf would not be heard unless a ship were to leeward in calm weather; and the current frequently sets 12 or 15 miles during the night, in uncertain directions, although usually between S.E. and S.W. during the months of February, March, and April."

Betra-Par is a coral reef extending between Lat. $11^{\circ} 28'$ and $11^{\circ} 35' N.$, Long. $72^{\circ} 6'$ and $72^{\circ} 10' E.$ In its northern part there is a low sandy islet having trees upon it (1848); and near its south-eastern edge is another, in the immediate vicinity of which are some rocks above water causing heavy breakers in tempestuous weather. There is said to be a gap in the reef close under the south side of the principal islet, where boats may lie for a short time, the depth being 2 fathoms. The reef is believed to be very steep, although in the chart a sounding of 12 fathoms is inserted close to its south end, and another of 39 fathoms immediately off its eastern side at two miles from its north end; its western side has not been sounded.

Chitlao is a small, low islet in Lat. $11^{\circ} 41' N.$, Long. $72^{\circ} 41\frac{1}{2}' E.$ A reef extends from its western side about $1\frac{1}{2}$ miles, almost close to the edge of which is deep water. Its eastern side is very steep, there being no bottom at 70 fathoms at half a mile off. During the examination of the islet the flood was observed to set N.E. by E.

Kutan.—This islet is $2\frac{1}{2}$ miles long N.N.W. and S.S.E., and has a reef extending about $1\frac{1}{2}$ miles from its west side. The island and the reef are both steep, there being no bottom immediately off them at 90 fathoms. Position: Lat. $11^{\circ} 28' N.$, Long. $72^{\circ} 58' E.$ When the survey was in progress the flood-tide was observed to flow E.N.E.

Peremul-Par is a sandy islet in Lat. $11^{\circ} 9' N.$, Long. $71^{\circ} 59' E.$ —(observations for latitude not good). It is situated at about two miles within the north-east end of a triangular-shaped reef, having an extent of about 7 miles, the base of which faces the north. The soundings close to the north-west side of the reef are 6 to 25 fathoms; other parts of it do not appear to have been examined.

Aucutta, Bingaro, Tingaro.—These three islands are seated on a reef which extends from Lat. $10^{\circ} 48' N.$, Long. $72^{\circ} 7' E.$ to Lat. $10^{\circ} 56' N.$, Long. $72^{\circ} 19' E.$ Aucutta, the westernmost island, is about 3 miles long N.E. by N. and S.W. by S., and half a mile broad. It is, or was, inhabited, and in 1848 there were cocoa-nut trees upon it. A small islet, named Calpooty, lies a mile from its south point, to which it is joined by a reef; and it is said that there are soundings at a short distance southward from this islet. "From Calpooty a coral reef projects westward and north-westward in the form of a semicircle, distant $1\frac{1}{2}$ miles from the west side of Aucutta, and joins to the bank at its north end. On the edge of the reef, directly west from the northern extremity of the island, are soundings where a vessel might anchor in case of necessity, but the bottom is of coral rock."

Bingaro and Tingaro (the former is the westernmost and distant 6 miles from Aucutta) are two small islets surrounded by a coral reef. They are separated from Aucutta by soundings of 5 to 15 fathoms, where vessels may anchor if necessary.

The edges of the reef upon which Aucutta, Bingaro, and Tingaro are seated, are probably steep, like those of other reefs of the Laccadivhs. They do not appear to have been sounded, except at a short distance eastward from Aucutta, where no bottom was obtained at 100 fathoms.

Cardamum is an island 4 miles long N. $\frac{1}{2}$ E. and S. $\frac{1}{2}$ W. and scarcely a mile wide. Its centre is in Lat. $11^{\circ} 13' N.$, Long. $72^{\circ} 44' E.$ A coral reef surrounds it, stretching off from its west side about 2 miles. It is said that there are soundings of 16 and 20 fathoms near the south point of its reef, or at about midway between the island and Ameni, an island 5 miles S.S.W. from it. Cardamum has not been thoroughly surveyed.

Ameni is a small island in Lat. $11^{\circ} 5' N.$, Long. $72^{\circ} 41' E.$ It is of circular form, about $1\frac{1}{2}$ miles across, and surrounded by a reef which on all sides except the south-west extends out nearly a mile; on this side, the depth at a very short distance from it is 8 to 15 fathoms.

Pittie.—In Lat. $10^{\circ} 45' N.$, Long. $72^{\circ} 31' E.$ is Pittie, a small sandy islet, or bank, so little above the sea that during heavy tempestuous weather it is flooded. It is destitute of verdure, and generally covered with birds. HORSBURGH says, "On the east side of the bank, there is a black rock resembling a wreck. This sandy islet or bank seems to present an area of not more than two acres, and is probably in part inundated during the S.W. Monsoon. From Pittie, an extensive rocky bank of soundings projects 3 leagues to the N.W. towards Tingaro, and about 7 leagues N.E. towards Ameni; hence it stretches southward nearly on the meridian of Cabrutee, within 4 leagues of that island. The soundings on this bank, so far as it has been examined, are from 6 to 20 fathoms." It is believed that a deep water channel separates the bank from Ameni.

Cabrutee.—This island is about $2\frac{1}{2}$ miles long N.E. and S.W., and 1 mile broad, and is, or was, covered with cocoa-nut trees; its position is Lat. $10^{\circ} 30' N.$, Long. $72^{\circ} 37\frac{1}{2}' E.$ Its east side is, we believe, clear of danger, but not so its north-western and southern sides, whence a reef projects westerly $2\frac{1}{2}$ miles. At the north-east end of the island there is an opening in the reef, and openings occur also in other parts which are navigated by the native vessels. At the south-west end of the island there is a coral spot on the extremity of the reef where a vessel may anchor if necessary, with a chain fixed to a small anchor. During the examination of the island the tide was observed to have a velocity of two miles an hour.* Water may be procured on the island.

Seuheli-Par.—At about 32 miles from Cabrutee in a south-westerly direction, is the north-eastern end of an extensive reef, named Seuheli-Par, the edges of which are believed to be steep, like those of all the reefs hitherto described. This, the south-westernmost of the Laccadivhs, is situated between Latitudes $9^{\circ} 57\frac{1}{2}'$ and $10^{\circ} 6' N.$, Longitudes $72^{\circ} 7\frac{1}{2}'$ and $72^{\circ} 16' E.$; it is very dangerous, as it cannot be seen beyond a very moderate distance, and the currents in its vicinity are strong, especially on the days of full and change of the moon, when the rise of tide is about 6 feet. Many of the black rocks are said to be of considerable height above the water. Upon the reef are two low islets, $6\frac{1}{2}$ miles apart N.N.E. and S.S.W., named

* It may here be observed that usually the currents among the Laccadivhs do not set directly upon the islands, but generally along them, or along the edges of the reefs, which lessens the danger to be apprehended in calms.

Seuveli and Seuheli; of these, the former is situated at its north-eastern end, and the latter at its eastern side in nearly the middle of the reef. These islands are not inhabited, except in the fine season, when they are resorted to by the natives of the other islands for fishing. The water procured from them by digging is brackish and unfit for use. On Seuveli a kind of soft wood may be cut for fuel; the trees on Seuheli are cocoa-nut, yielding fruit of a saline quality, and very unpalatable.

From Seuveli a coral spit extends out about a mile in a northerly direction, with soundings upon it of 5 to 12 fathoms. It is here apparently that the only known passage over the reef is to be found, leading to Seuheli; it is navigable solely by boats.

On the chart of the *Laccadivhs* (to which reference has been made) it is remarked that from a distance of 20 miles westward of the Seuheli-Par no dangers were visible,—we supposed in the direction of the reef; there is consequently, we think, no reason for supposing that there are other reefs in the vicinity of its western side, nevertheless the following will be a caution to shipmasters approaching it from westward:—"April 9th, 1804. At 11 o'clock P.M. the ship *Anne*, from the Red Sea, struck on a reef, and bilged before day-light. From the wreck, Seuveli, the northernmost island, bore E.S.E. 4 or 5 leagues, and Seuheli-Par S.E. about 6 leagues; the reef from S.W. to E.N.E. being 10 or 12 miles in extent." *HORSBURGH* has observed in reference to this report, that the distance estimated from the wreck to the islands is certainly too great, for they could not be discerned so far; but if the bearings are tolerably correct the reef upon which the wreck occurred is farther from the islands than hitherto supposed.

Micalpeni Bank lies between Latitudes $11^{\circ} 10'$ and $11^{\circ} 15' N.$, Longitudes $73^{\circ} 55'$ and $73^{\circ} 59' E.$, and has consequently an extent of about 5 miles; but this is uncertain, as the *Premier*, in 1835, is said to have sounded in 9 to $3\frac{3}{4}$ fathoms in Lat. $11^{\circ} 16' N.$ when she supposed herself northward of the bank.* It is wholly composed of sharp coral rocks, and according to *LIEUTENANT MORESBY* has a depth over it of 7 to 15 fathoms. It is probable that the sea breaks upon it in heavy tempestuous weather.

Underoo is a small low island about $3\frac{1}{2}$ miles long East and West and $1\frac{1}{4}$ broad, the centre of which is in Latitude $10^{\circ} 47' N.$, Longitude $73^{\circ} 40' E.$; it is, or was, covered with cocoa-nut trees, and is said to afford tolerable water. The island is seated on a reef of coral, through which there is but one known passage, and this is only navigable by boats. From it a coral bank, having over it a general depth of 7 to 9 fathoms, extends 8 miles to the northward, and about the same distance to the north-eastward: there is, however, upon it a spot of 10 and 12 fathoms, sand, at about a mile northward from the island, where vessels may anchor. The edges of the bank are steep, and at a short distance southward from the island is deep water. The island and bank are situated between Latitudes $10^{\circ} 46'$ and $10^{\circ} 55' N.$, Longitudes $73^{\circ} 34\frac{1}{2}'$ and $73^{\circ} 46' E.$

Kalpeni.—Between Latitudes $10^{\circ} 3'$ and $10^{\circ} 9\frac{1}{2}' N.$, Longitudes $73^{\circ} 33'$ and $73^{\circ} 37' E.$ is Kalpeni bank, upon the eastern side of which are two low islets; of these the southern and largest is named Kalpeni, the northern Cheria. These two islands are joined together at low water by a dry reef, and close to the south-west

* If we suppose a small error in latitude, the vessel obtained soundings on the bank itself; but the depth, $3\frac{3}{4}$ fathoms, is much less water than was found by *LIEUT. MORESBY* during his survey in 1828, or by *CAPT. McCLELLAN*, who anchored upon it in 1790 in 6 to $6\frac{1}{2}$ fathoms.

end of Kalpeni are two islets. Some of the rocks on the west part of the bank are above water. According to CAPTAIN McCLEUER, 1790, Kalpeni bank is steep on the outside, with high breakers, and there are no soundings till close to the surf; through one part of it there is a narrow channel with only $1\frac{1}{2}$ and 2 fathoms water, and from 3 to 4 fathoms on the coral flat inside. The boats of the natives lie at the south-west part of the island, nearly south from the gap or channel in the reef, about miles distant. The southern island, where are a few small villages, is well planted with cocoa-nut trees, and has soundings off its south end of 9 or 10 fathoms, coral. Kalpeni is the south-easternmost of the Laccadivhs.

Minicoy.—Although this island is nearer the Maldivhs than the Laccadivhs, it is considered to belong to the latter; its centre is in Lat. $8^{\circ} 17' N.$, Long. $73^{\circ} 3' E.$; it is consequently distant from Kalpeni 108 miles in a S. by W. $\frac{1}{2}$ W. (*true*) direction. It is $6\frac{1}{2}$ miles long and half a mile broad, and so low that it cannot be seen from a distance exceeding 6 to 10 miles; upon it are cocoa-nut trees, and it is said to be well peopled. From its north-west side a reef extends 3 to 5 miles. On the reef near the west point of the island there is an islet with trees upon it, and at the north end of the island there is a narrow and intricate passage through the reef having a depth of about 2 fathoms. Within the edge of the reef is deeper water, as small vessels may there anchor in $2\frac{1}{2}$ and 3 fathoms on coral.

MALDIVH ISLANDS.

The following description of this group of islands is by COMMANDER MORESBY of the Indian Navy, 1839, who with LIEUT. POWELL, also of the Indian Navy, surveyed the Maldivhs during the years 1834–6. All the longitudes depend upon that assigned to Bombay Observatory, namely, $72^{\circ} 48' 4''\cdot 5 E.$ *

“Navigators in general are not aware, more particularly those coming from Europe, that the whole group of the Maldivh islands are inhabited by a civilized race of people, who carry on a considerable trade with the British possessions in India; more particularly Bengal, Ceylon, and the Malabar coast, as also to the Red Sea; and are expert navigators and sailors. Schools for teaching navigation are on some of the islands. They make and repair nautical instruments, such as the astrolabe and quadrant. On one occasion I was much surprised in seeing a wooden sextant very neatly made by them; the glasses and telescopes had been fitted from old instruments; they copy our nautical tables, generally using our figures, and translate the rules in our navigation books into their own language. They are an inoffensive, timid people, and there appears far less crime among them than with more polished nations; murder is not known among them, nor is theft or drunkenness; being strict Mohammedans, they are forbidden the use of spirituous liquors, which could be easily made from the fermented juice of the cocoa-nut tree, which they have in abundance.

“They are governed by a sultan, whose title and rank are hereditary; under the sultan are five viziers or ministers of state, as also a head priest, and judge, civil and religious; the hendeggeree, or custom master, is also a very great man; and

* See the Note at foot of page 585. Refer also to the chart of the Maldivhs in three sheets, published by the Hydrographic Office, Admiralty, No. 66 a, b, c. Also to the plan of the islands in the sheet of plans of islands in the Indian Ocean, issued by the publishers of this work.

last of all is the Emir el bahr, or master-attendant of the port; all these reside at Malé, or King's Island.

"To the different Atolls are appointed one or two chieftains, or as they are styled Atoll Warrees; as also a Catib to each Atoll; the catib is priest and judge. Every Atoll pays a certain fixed revenue, a portion of their produce, to the Government at Malé, and none are allowed to trade with foreigners or strangers, except at Malé.

"The men, in appearance, are of a dark copper colour, rather short, and in person not unlike the natives of Ceylon and the Malabar coast; but their language is totally different; their women are not pretty, and are extremely alarmed at the sight of strangers. These islanders have been more than kind in their hospitality to shipwrecked mariners, which was exemplified in their humane and liberal conduct towards the commander, officers, and crew of two vessels, the *Adonis* and *Vicissitude*, which were totally wrecked during the night, one on Colloomando Atoll in 1835, and the other on Heawandoo Atoll in 1836; nor would they accept of any payment, though liberally offered it by the Government of India; they accepted of presents from our Government as a mark of friendship, of which I had the honour of being the bearer. During the two years we were employed surveying among these islands, and in constant intercourse with them, they always treated us with kindness and respect, yet with shyness and suspicion, supposing our motives for making a minute survey of their islands had other ends than to guide shipping in their navigating to India. However, I think we left them with mutual good feeling and understanding, which, I hope, will not be broken. Further information respecting these curious islands will be found in several papers written by myself and officers, and published by the Bombay Geographical Society.

"The **MALDIVÉ** islands and Atolls extend from Lat. $7^{\circ} 6' 20''$ N. to Lat. $0^{\circ} 42' S.$, and between Long. $72^{\circ} 33'$ and Long. $73^{\circ} 44'$ E. In this space there are nineteen Atolls, or groups; in the centre of the group the Atolls lie in double rows—east and west Atolls—with a space between them from 10 to 25 miles; at the north and south extremes, the Atolls lie singly. Between the whole of these Atolls are good channels for ships; in them there are no soundings, not even close to the outside of islands and reefs of the Atolls. The channels and their navigation I shall mention hereafter, as they follow in succession from north to south. A few preliminary remarks for a navigator will be requisite before I describe the channels and Atolls.

"It is only the three or four larger channels that ships ought to pass through at night time, which are as follow:—

"1. The **Cardiva Channel**, called by the natives **CARDOO KANDOO**, whose breadth is 25 miles, and length 67 miles; its direction, N. $63^{\circ} E.$, and S. $63^{\circ} W.$; the centre of its west entrance is in Lat. $4^{\circ} 34' N.$, and Long. $73^{\circ} 41' 48'' E.$; its eastern entrance in Lat. $5^{\circ} 5' N.$, Long. $73^{\circ} 41' 48'' E.$ The navigation of this channel is hereafter described.

"2. The **Vaimandoo Channel**, formed between the Atolls Colomandoo and Adou-Matte. This channel is 15 miles broad, by 27 miles long; its direction E. $37^{\circ} N.$, and W. $37^{\circ} S.$; the centre of its western entrance is in Lat. $2^{\circ} 1' N.$, Long. $73^{\circ} 8' 48'' E.$; the centre of its eastern entrance is in Lat. $2^{\circ} 16\frac{1}{2}' N.$, Long. $73^{\circ} 27' 48'' E.$ Although this channel is safe, a commander would have less anxiety

in passing through the larger channel, a little to the south of it, called the One-and-a-half-Degree Channel.

"3. The **One-and-a-half-Degree Channel**, situated between the Atolls Adou-Matte to the north (whose south side facing the channel is in Lat. $1^{\circ} 47' N.$) and the north extreme of the Suadiva Atoll, in Lat. $0^{\circ} 55' N.$, and Long. $73^{\circ} 14' 48'' E.$ This is a large channel, and a ship soon passes through it.

"4. The **Equatorial Channel**, formed between the south end of the Suadiva Atoll, in Lat. $0^{\circ} 12' N.$, and the small Atoll to the south, called Addoo Atoll, whose north side is in Lat. $0^{\circ} 35' S.$ The detached island of Phoowa Moloku is situated a little to the south and east of the centre of this channel or space, in Lat. $0^{\circ} 17\frac{1}{2}' S.$, and Long. $73^{\circ} 23' 18'' E.$ All the other channels may be passed through without danger during the day-time, even through the Atolls between the coral reefs and the islands, as all dangers are visible at some distance, from the mast-head.

"All the **Atolls** north of the Lat. $3^{\circ} 30' N.$ have no barrier reefs round them, excepting a few detached parts, such as Horsburgh Atoll, in the N.W. part of the Cardiva Channel; Ross Atoll, in the south part of the same; and Garfor Reef, in the S.E. part; as also the S.E. side of Phaidee Pholo Atoll, in the N.E. part of the same channel. The centre of Mahlos Mahdou Atoll, in Lat. $5^{\circ} 35' N.$, and Long. $72^{\circ} 46' 48'' E.$, is much too intricate for a ship to pass through.

"**Malcolm Atoll**, its centre in Lat. $6^{\circ} 20' N.$, and Long. $72^{\circ} 35' 48'' E.$, is one continued barrier reef of 15 miles in extent.

"**Heawandoo Pholo Atoll**, the most northern Atoll, has a large barrier reef surrounding its N.W. side, from Lat. $6^{\circ} 58'$ to $7^{\circ} 6' N.$, Long. $72^{\circ} 46' 48'' E.$ It was on this that the ship *Vicissitude* was lost in the year 1836, on her way from Mauritius to Ceylon, by running on this reef in the night, with westerly winds.

"**HEAWANDOO PHOLO ATOLL.**—This Atoll is the most northern of the Maldivh group; it extends N.W. and S.E., 12 miles long by 7 broad; it contains 24 islands, large and small, which lie on all sides of the boundary; seven of them are inhabited, and contain a considerable population; they afford wood, water, and some supplies. A barrier reef surrounds the north and west sides, on which the ship *Vicissitude* (from Mauritius to India) was wrecked. On the extreme north point of the Atoll is the small island called Turacoon, in Lat. $7^{\circ} 6\frac{1}{2}' N.$, Long. $72^{\circ} 52' 48'' E.$ W.S.W. from Turacoon, $1\frac{1}{2}$ miles, is another small island; still more to the west, 2 miles, is the north extreme of the western barrier, between which and the island, as also between the islands, are good channels leading into the Atolls, with not less than 9 and 10 fathoms water in them. To the S.E. of Turacoon, half a mile, is the large island of Oolegaum, which island is two miles long. On both sides, to the north and south, are good channels leading in. South-east of Oolegaum island, one, two, three, and five miles, are four other islands; the two next to Oolegaum are small; those to the S.E. form the eastern boundary of the Atoll; the south point of the large island of Mooradoo is on the extreme point, in Lat. $7^{\circ} 1' N.$, Long. $72^{\circ} 58' 28'' E.$ S. $\frac{1}{4}$ W., three miles from Mooradoo, is the small island of Gulandoo, which gives name to the channel between Heawandoo Pholo Atoll and Tilladoo Matte Atoll. Between the small island of Gulandoo and the south point of the large island of Mooradoo, are two coral patches, having little water on them; they are in a transit line between the islands, and ought to be avoided by ships. S.W. of Gulandoo island, three miles, is the S.E. point of a large reef, which is on

the extreme south point of the Atoll, in Lat. $6^{\circ} 55\frac{1}{2}'$ N., Long. $72^{\circ} 55' 18''$ E.; between it and Gulandoo is a good channel to enter. The N.W. point of the Atoll is the outer part of the great barrier reef, in Lat. $7^{\circ} 4\frac{1}{2}'$ N., Long. $72^{\circ} 46' 18''$ E. Close to this is a small island, low and bushy. Heawandoo island, in the south part of the Atoll, in Lat. $6^{\circ} 58' 1''$ N., Long. $72^{\circ} 53' 48''$ E., is the principal island of the Atoll, being the residence of the sultan's vizier; it is about one mile in length, and of a triangular form, covered with high cocoa trees and bread fruit. The island is well inhabited, and furnishes good water, and some supplies. I have recommended it as a coal depot. It lies nearly in a direct line between Point de Galle and Socotra island, and about one-third of the distance from Point de Galle; it is easy of access in every direction, and possesses safe anchorages for ships or steamers in all seasons. During the S.W. Monsoon a vessel could anchor on the east side of the island, between it and a small reef, dry at low water, situated about half a mile to the N.E. of the centre of the island. In the N.E. Monsoon the best anchorage is between the island and a large reef to the south, in 16 and 17 fathoms water. There is a fine channel through the barrier, W.S.W. from Heawandoo; it is nearly a mile wide, having 12 fathoms in it. There are three small islands in the centre of Heawandoo Pholo Atoll, which abound with fine green turtle, seldom disturbed by the natives, who do not eat them. The general depths in the Atoll are from 20 to 30 fathoms; several small coral patches are scattered about.

"GULANDOO CHANNEL.—This channel is formed between the south point of Heawandoo Pholo Atoll and Tilladoo Matte Atoll to the south; the N.E. entrance is 12 miles broad, situated between the south end of Mooradoo Island, in Lat. $7^{\circ} 1' 1''$ N., and Long. $72^{\circ} 58' 28''$ E., and the N.E. extreme of Keelah Island, in Tilladoo Matte, in Lat. $6^{\circ} 59' 1''$ N., Long. $73^{\circ} 11' 48''$ E. The west entrance of this channel is between the south point of Heawandoo Pholo, in Lat. $6^{\circ} 55\frac{1}{2}'$ N., Long. $72^{\circ} 55' 48''$ E., and the N.W. part of Tilladoo Matte, distant 3 miles to the south. We could find no bottom in this channel at 220 fathoms; the ebb tide runs to the W.S.W., and the flood to the E.N.E.; high water at 9h. 30m. full and change; rise of tide 5 feet. Should a ship wish to anchor in passing through this channel, she may, without any danger, anchor in the north part of Tilladoo Matte, or south part of Heawandoo Pholo Atoll. The channels between the islands and reefs are all safe, and free from sunken coral patches. The currents about this part of the Maldivh islands set to W.N.W. in December, January, February, March, April; and in May, June, July, and August, to the eastward and N.E.; September, October, and November they set south. The east and N.E. winds commence here about the beginning or middle of December; the south-westerly winds in May, which only continue four months. N.W. and N.E. are the prevailing winds.

"TILLADOO MATTE ATOLL.—This Atoll extends from the N.E. island, Keelah, whose north point is in Lat. $6^{\circ} 59' 1''$ N., Long. $73^{\circ} 11' 48''$ E., to the S.W. extreme of the Atoll S. $36\frac{1}{2}^{\circ}$ W., distance 35 miles, in Lat. $6^{\circ} 30\frac{1}{2}'$ N., Long. $72^{\circ} 50' 48''$ E.; the N.W. point is the south boundary of the Gulandoo Channel, in Lat. $6^{\circ} 52\frac{1}{2}'$ N., Long. $72^{\circ} 55' 48''$ E.; the S.E. point is the island of Mahwahdoo, in Lat. $6^{\circ} 31\frac{1}{2}'$ N., Long. $73^{\circ} 1' 18''$ E. This Atoll is a continuation of the north part of Milladoo Madou Atoll, indeed they are joined, or rather situated on the same bank of soundings—having no channels without soundings separating them, like the other

Atolls; why the natives should have given them two names I cannot tell. There are about thirty-eight islands in this Atoll, generally of a larger size, particularly those on the eastern boundary, where the islands are principally situated; all the islands on the north and east sides are inhabited, affording good water and some supplies; safe channels are between all the islands. The soundings commence between the islands and the reefs forming the boundary; the general depth is from 25 to 28 fathoms. The western boundary of the Atoll has not so many islands but more reefs, between which are safe channels; a very large one leads into the Atoll on the N.W. part. The tides are felt in this Atoll—their strength from one to two miles per hour—accelerated or retarded by the currents.

"MALCOLM ATOLL.—This Atoll, or large lagoon reef, until the late survey was not known to Europeans; I therefore named it Malcolm Atoll, in honour of Sir Charles Malcolm, R.N. By the natives' account many ships have been totally wrecked on the barrier reef which surrounds it, and all lives lost—leaving scarcely a vestige of the wreck a few hours after from the violence of the surf and the perpendicular sides of the reef. On the extreme N.E. point is the moderate sized island of Mah-koondoo, whose centre is in Lat. $6^{\circ} 24\frac{1}{2}'$ N., Long. $72^{\circ} 41' 18''$ E.; it contains 100 inhabitants and has good water. Three and a half miles to the westward of it, on the barrier, is a small island; and to the S.S.W. of it, 6 miles, another, which is on the east side of the entrance of the barrier; the south point of the Atoll is in Lat. $6^{\circ} 13' N.$, Long. $72^{\circ} 34' 48'' E.$; the general breadth of the Atoll is about 3 miles; it is full of coral patches; and has two boat passages into it, on the east side near the centre. The distance between the island of Mah-koondoo and the N.W. part of Milladoo Madou Atoll is 10 miles; there is no bottom between them.

"MILLADOO MADOU ATOLL.—The northern boundary of this Atoll is the termination of Tilladoo Matte Atoll, the N.W. point in Lat. $6^{\circ} 30\frac{1}{2}' N.$, Long. $72^{\circ} 50' 48'' E.$; the N.E. point the centre of the island Mah-wah-doo, in Lat. $6^{\circ} 31\frac{1}{2}' N.$, Long. $73^{\circ} 1' 48'' E.$; from this, S. $9^{\circ} E.$ $5\frac{1}{2}$ miles, are two small islands, the south one Noomerah. From Noomerah, which lies in a bay on the east side of the Atoll, the islands on the east boundary lie considerably more to the east; the first island from Noomerah bears S. $60^{\circ} E.$, distant $9\frac{1}{2}$ miles, and is named Fea-war, its centre in Lat. $6^{\circ} 21' N.$, Long. $73^{\circ} 10' 48'' E.$; between this island and Noomerah is free from danger, on a bank of soundings from 20 to 25 fathoms; the Atoll is only 10 miles broad at this place, in a S.W. direction, and a ship may pass through it with ease. Fea-war island is the northernmost of twenty-four islands, large and small, which lie in succession along the eastern boundary of the Atoll, having safe channels for any ship, from one to two and three miles broad between them. They are as follow :—From Fea-war S. $28^{\circ} E.$, 10 miles to the north point of Far-oo-ko-loo, in Lat. $6^{\circ} 12' N.$, Long. $73^{\circ} 15' 48'' E.$, there are three islands; on the same reef with Far-oo-ko-loo, distant $1\frac{1}{2}$ mile, and south from Far-oo-ko-loo, 12 miles, to Lat. $6^{\circ} N.$ are five smaller islands, having channels between them; these islands lie in a bay. The islands to the south of $6^{\circ} N.$ and $73^{\circ} 15' 48'' E.$ lie more to the eastward; the principal one is the large island of Kain-de-co-loo, $2\frac{1}{2}$ miles in extent N.W. and S.E.; this island has two villages on it, and its interior consists of salt water lagoons; the south point of this island is in Lat. $5^{\circ} 56\frac{1}{2}' N.$, Long. $73^{\circ} 23' 48'' E.$ There is a good channel leading into the Atoll, round the south point of Kain-de-co-loo, as

also between the three smaller islands, to the S.S.E. of it. There is a good anchorage to the west of Kain-de-co-loo, near its south point, where good water may be obtained from the village. Mah-far-roo island is the most eastern island of the Atoll, it lies to the S.S.E. of Kain-de-co-loo, distant seven miles; it is $2\frac{1}{2}$ miles in length, and off its north end, $1\frac{1}{2}$ mile, extends a coral reef; the centre and east side of Mah-far-roo is in Lat. $5^{\circ} 50' N.$, Long. $73^{\circ} 26' 48'' E.$ S.W. from Mah-far-roo island, $5\frac{1}{2}$ miles, is the large island of Man-ah-doo, between which is a good channel. There is good anchorage in 25 fathoms at Man-ah-doo island, either on the north or south sides, according to the season; the south point of this island is in Lat. $5^{\circ} 46' N.$, Long. $73^{\circ} 22' 48'' E.$ It is a beautiful island, filled with groves of bread-fruit trees, and other luxuriant foliage; it is well inhabited, and the village is on the north side of the island; there is a good landing-place on the north and south sides of the island, and a fine pathway through the island; good water, and some supplies may be obtained: the natives keep their boats inside the reef, on the N.E. part of the island. South of Man-ah-doo, $1\frac{1}{2}$ miles, is a long narrow island, between which is a good channel leading into the Atoll. On the south point of the Atoll is the small island of Kah-re-mah, in Lat. $5^{\circ} 39\frac{1}{2}' N.$, Long. $73^{\circ} 17' 48'' E.$, as also two miles to the west of it the small island of Kharn-dhoo-doo, in Lat. $5^{\circ} 39' N.$, Long. $73^{\circ} 15' 48'' E.$; these islands bound the channel on the north side, between Milladoo Madou and Phaidee Pholo Atoll; the distance from one Atoll to the other, across the channel, is $9\frac{1}{2}$ miles. There are not so many islands on the west side of this Atoll, but more lagoon reefs, not in one connected barrier, but in detached portions; on some are small islands, and between the whole are safe channels: the Atoll altogether contains 101 islands, twenty-nine of which are inhabited, containing a population of 1,700 or 1,800. The islands are more numerous in the S.E. part of the Atoll; the general depths are from 20 to 25 fathoms, sandy bottom, with clay at times; there are no dangerous reefs within the Atoll; the tides are felt in the Atoll, and on the springs, about $1\frac{1}{2}$ to 2 miles per hour; the flood to the E.N.E., the ebb to the W.S.W.; currents influence the tides much.

"PHAIDEE PHOLO ATOLL.—This Atoll, which lies to the south-east of Milladoo Madou 10 miles, is not of great extent, its southern part bounds the northern side of the Cardiva channel; on its extreme north part are two small islands, having a channel a quarter of a mile wide, leading into the Atoll between them; the eastern island of these two is named Koo-red-doo; its centre is in Lat. $5^{\circ} 33' N.$, Long. $73^{\circ} 17' 3'' E.$; between the north and east sides of this Atoll are six islands, in a distance of 12 miles; between them are five small but deep channels, leading into the Atoll; facing the inside of these channels are a few coral rocks, for which a good look-out must be kept. The east and S.E. side of this Atoll is bounded by an extensive barrier reef of 18 miles in extent, on which the sea breaks in the N.E. monsoon with considerable violence; at low water large masses of coral rock, and some sandbanks are observed on the barrier. There are eleven islands on this barrier; a large one, called Deeve-poore, on its eastern part, is in Lat. $5^{\circ} 24' N.$, Long. $73^{\circ} 37' 18'' E.$; another large one, on the S.E. part, whose centre (a large high tree) is in Lat. $5^{\circ} 17' N.$, Long. $73^{\circ} 34' 18'' E.$; the southern island of the Atoll on the extreme point of the barrier is named Alligow, in Lat. $5^{\circ} 15' N.$, Long. $73^{\circ} 28' 48'' E.$ From Alligow, the Atoll and islands on the boundary take a direction N.W. and west, to the extreme west point, in Lat. $5^{\circ} 22' N.$, Long. $73^{\circ} 18' 18'' E.$ Between

these south and west points are several islands, with good channels between them, leading into the Atoll. There are several islands on the N.W. side; the two most numerous inhabited are Madever and Nar-foree; the latter is the residence of the Atoll-warree, or chief of the Atoll. Nar-foree is a small island, in Lat. $5^{\circ} 26\frac{1}{2}'$, Long. $73^{\circ} 20' 3''$ E. Good water and some supplies may be obtained at these islands, which lie close together. There are many small but deep channels on this N.W. side of the Atoll. Several coral patches, dry at low water, as also several sunken reefs, with one and two fathoms water on them, are within the Atoll; the general depths on a sandy bottom, are from 25 to 30 fathoms. There are only four islands inhabited in this Atoll, containing a population altogether of about 550 people. Several of the other islands have been inhabited, but the natives informed us, many of them had died off, the remainder had deserted. The tides and currents run strong through the channels leading into the Atoll.

"MAHLOS MAHDOW ATOLL.—This is one of the western Atolls; it extends from Lat. $5^{\circ} 1' N.$ to $5^{\circ} 59' N.$; it is divided into two parts, the northern and southern, having a channel between them, which has been named Moresby channel. The breadth of the channel is about 2 miles, having 135 and 125 fathoms in it; the direction of the channel is N. $61^{\circ} E.$, and S. $61^{\circ} N.$, and in length 13 miles. Should a ship wish to pass through it, instead of passing through the northern or southern part of the Atoll, if from the west, the entrance is in Lat. $5^{\circ} 19' N.$, and Long. $72^{\circ} 48' 48'' E.$, and from the east, the entrance is in Lat. $5^{\circ} 25' N.$, Long. $73^{\circ} 0' 48'' E.$ There is also another deep gut or channel with 100 and 120 fathoms in it, leading through the northern part of the South Mahlos Mahdoo, it is only 1 mile wide, its direction nearly east, from the west entrance of Moresby Channel; the extent of South Mahlos Mahdoo, is from the east and west entrances of Moresby Channel, which is close to the northern part; the S.W. part is a large lagoon reef, in Lat. $5^{\circ} 8' N.$, Long. $72^{\circ} 46' 18'' E.$ On the south part are four small islands; the westernmost is Hoo-ree-gery, in Lat. $5^{\circ} 1\frac{1}{2}' N.$, Long. $72^{\circ} 52' 18'' E.$ To the west of this island, 3 miles, is a small island on a large reef; between them a good channel leading into the Atoll. N.W. $1\frac{1}{4}$ miles from this small island, on the same large reef bounding the S.W. point of the Atoll, is a larger island, inhabited, in Lat. $5^{\circ} 2\frac{1}{2}' N.$, Long. $72^{\circ} 48' 48'' E.$ Of the four islands in the south part of the Atoll, the second from the west, called Hee-tah-doo, is the principal one; it contains about 250 inhabitants, and is in Lat. $5^{\circ} 1\frac{1}{2}' N.$, Long. $72^{\circ} 52' 48'' E.$; between these four islands are channels leading into the Atoll, the broadest channel is about 3 miles to the N.E. of Hee-tah-doo. The S.E. boundary of the Atoll, consisting of islands and reefs, extends from Hee-tah-doo, N. $54^{\circ} E.$, 21 miles, having safe channels between all the islands and reefs on the boundary. The east point of the Atoll is a large lagoon reef, on which are several low bushy islands, called Mah-ba-roo, the centre part of them in Lat. $5^{\circ} 16' N.$, Long. $73^{\circ} 9' 48'' E.$ On the N.E. part are several islands, and good channels leading into the Atoll; the general depth within is from 27 to 32 fathoms. The chief of this part of the Atoll resides at an island called Dhur-an-doo, in Lat. $5^{\circ} 10' N.$, Long. $73^{\circ} 5' 48'' E.$, which island is on the S.E. side of the Atoll, and contains about 100 inhabitants, and has good water. North Mahlos Mahdoo is different in form from the southern part; it is not more than 15 miles in breadth, east and west. From the east entrance of Moresby channel, its eastern side is a continuation of moderate sized islands, consisting of twenty in number; their direction from the

east entrance of Moresby channel is N. $\frac{1}{2}$ W., 30 miles. Between all these islands are good channels leading into the Atoll; none of them have good water, except the island where the chief resides, called Fainoo, which is the second island from the south, and in Lat. $5^{\circ} 28' N.$ The north part of the Atoll is quite open, with a bottomless channel between its northern part and Powell's islands, which lie off its north part. These islands are inhabited, of a moderate size, and on one reef; the northern island is called by the natives Etin-gee-lee; the southern one, close to it, Ally-fooree, whose southern side is in Lat. $5^{\circ} 58' N.$, Long. $72^{\circ} 54' 48'' E.$; between these islands and the north part of the Atoll is 4 miles, clear of dangers; the west side of the Atoll is principally lagoon reefs, between which are channels leading into the Atoll; its direction is from Ally-fooree island, S.S.W. $27\frac{1}{2}$ miles, which is the extreme west point, a large lagoon reef, in Lat. $5^{\circ} 32\frac{1}{2}' N.$, and Long. $72^{\circ} 45' 48'' E.$ From this to the south part of the Atoll, or west entrance of Moresby channel, are large lagoon reefs, between which are channels. It would be impossible for ships to navigate with safety through the centre part of North Mahlos Mahdoo, it is so full of small coral patches and rocks, called by the natives the Jungle; it lies between the latitudes of $5^{\circ} 30'$ and $5^{\circ} 34' 48'' N.$ on the west side of the Atoll. The north and south parts of the Atoll a vessel might navigate through with ease; the general depths are from 20 to 27 fathoms.

"MALE ATOLL.—Little can be said in favour of this Atoll; it requires a sharp look-out even in the day time to navigate through it, coral reefs and patches are so numerous; the eye, and not the chart, must guide a vessel through. The general depths in the Atoll are from 25 to 35 fathoms; sandy bottom. From the northern part of Malé Atoll, in Lat. $4^{\circ} 41' N.$ to the southward, as far as Malé or King's island, is 31 miles, or in Lat. $4^{\circ} 10' N.$ The small island of Kaghay is on the northern extreme, and Malé on the southern end, being nearly on the same meridian line of $73^{\circ} 28' 48'' E.$; the centre of the Atoll is 22 miles broad, east and west. There are numerous channels leading into this Atoll, all of which might be used by ships; but as some of them, on the eastern side, are rather narrow, I shall describe those most useful for ships making this Atoll from the N.E. Should a vessel make the northern part of this Atoll, she will find a good channel exactly on its northern end: this is called the Kaghay Channel; it is about half a mile broad, having 23 and 24 fathoms in it. On the north and western entrance there is a large pile of coral stones; the small island of Kaghay, with a clump of trees on it, bears from the pile, S. $\frac{1}{2}$ W. $1\frac{1}{2}$ mile; and the centre of Gafor island, about north, distant a little more than two miles. The next best channel is about 5 miles to the S.E. of this; it leads in, on both sides of a long, low island, called Hellen-gelly, in Lat. $5^{\circ} 38' N.$ This island may be known by a peculiar single cocoa tree, the only one on the island. Kaghay and this island are the only two islands on the N.E. part of the Atoll. Between the island of Hellen-gelly and the centre islands in the Atoll to the S.E., is 14 miles. Several large lagoon reefs, with passages between them, are in this space; there are no marks to guide a ship; she may pass through by keeping a good look-out.

"As a vessel approaches the centre islands of this Atoll, which are conspicuous from seaward from the distance of 16 or 17 miles, two low islands will be observed in Lat. $4^{\circ} 26' N.$; they sometimes look like one island. At the same time, a high clump of trees will be seen to the westward of the low islands: this is the small island called Asdoo, whose cocoa trees are very high—the island being in Lat.

4° 27' 30" N. Asdoo island lies a little inside the Atoll, but is a good guide to mark the channels hereabouts. N. 70° E. 2½ miles from Asdoo, is a good channel; as also N.E. 2½ miles. These channels are to the N.N.W. of the two islands from 2½ to 3½ miles. The two islands on the eastern boundary are named, the north one, Mefaing-soorce; the south one, Devam-pooree; the latter being well inhabited, and could supply men as pilots for Malé—but it is doubtful if they will come out. The centre of Devam-pooree is in Lat. 4° 26½' N., Long. 73° 40' 48" E. Both the islands are on the N.E. point of a long lagoon reef, extending about 6 miles to the S.S.W. and S.W.; on the southern part of which are three small cocoa islands, which is the north boundary of the next channel, but not recommended. W.S.W. of this, 3 miles, is another channel; 3 miles more to the S.W. is another; but both these channels, though safe, are small. The best and largest channel is in Lat. 4° 16' N., about 7 miles to the N.N.E. of Malé or King's island; it is from 1½ to 1½ miles broad; a large reef bounds the north side of this channel, and a remarkable clump of cocoa trees on a small island is on its extreme point; but care must be taken not to mistake this clump for another which lies to the northward about 3 miles. On the southern side of this channel there are two small cocoa islands and a sand-bank with some bushes on it to the westward. A vessel may pass between all these; but the best route is round the north side of them. After rounding the sand bank, a vessel may steer to the S.S.W. and S. by W., to Malé or King's island, distance 5½ miles. The soundings are from 28 to 25 fathoms, sand; and in this depth a vessel may anchor at Malé anywhere off the island, as most convenient. As good a berth as any is with the flagstaff bearing S.E., distant half a mile. There are two good channels leading into the Atoll on each side of Malé, both of which are safe; but the tides run strong through these channels, as is the case with all the channels.

“**Malé, or King Island**, is an oval-shaped island; its length one mile, by half a mile broad. The flagstaff, in the centre of the north side, on one of the principal batteries, is in Lat. 4° 10' 20" N., Long. 73° 28' 48" E. The variation we made by one theodolite 1° E., by another 0° 20' W.; south dip of the magnetic needle 13° 27½'. It is high water here at 12h. 30m.; rise and fall 3 feet, sometimes 4 feet. The island has once been walled round, with bastions at different points. Only the north and west sides are now in any state of repair. They have several good cannon in the bastion close to the flagstaff and landing-place. The reef which surrounds the north and west sides is, on the outer part, built up as a wall, sheltering the small craft, which lie snugly within the lagoon. A gateway in this wall, close to the flagstaff, leads into the lagoon and landing place; at night time this gateway is closed, by a boom being drawn across. The sultan and head men are much pleased if a ship on her arrival salutes with a few guns, which compliment they return; and then the Emir el Bhar, or master attendant, comes on board to inquire after the health of the ship's company, that they may bring no contagion to the place, particularly the small-pox. Good water may be obtained, but no supplies. None of the islanders in any of the other Atolls are allowed to trade with foreign vessels, except at Malé; all trade must be carried on at Malé; and I was authorized by the government of India to attempt by treaty to open the trade with all the other Atolls and islands, but the sultan and his ministers would not agree to it. They carry on a considerable trade between Malé and Calcutta, Chittagong, Point de Galle, and the Malabar coast. Their boats or vessels are from 100 to 200 tons burthen. On their return from India they bring principally rice, and some of their largest boats will carry 7000 bags. They export from the islands, cocoa nuts, tortoise shell, dried fish, coir rope, money

cowries, and mats. A few small brigs belonging to the natives at Ceylon and Chittagong annually trade to this place. Some of them are commanded by Anglo-Indians, who are part owners. Strangers who would wish to participate in this trade would not be well received, and difficulties would be thrown in the way of their dealings. To shipwrecked mariners their conduct has been most kind; not an article that is saved from the wreck is ever stolen by them; the crew are housed, and if necessary, fed by the natives, who will, by the first opportunity, convey them in their boats to King's island, from whence the sultan always sends them to India to the first English port, providing them with everything necessary, and conveying them in one of their large trading boats; for all which acts of kindness nothing is ever charged. Malé contains a population of between 1500 and 2000. Exclusive of Malé, there are 11 other inhabited islands in the Atoll, containing together 700 inhabitants. The insalubrity of the climate is particularly injurious to strangers, either European or native; the latter feels its effects sooner than Europeans. No one ought to sleep on shore; and if every one sleeps afloat, a few days' or weeks' residence will not be attended with ill effects. During the S.W. Monsoon, from June to December, vessels anchor on the east side of a lagoon reef, distant $1\frac{1}{2}$ mile to the N.N.W. of Malé. On the edge of this reef are several anchors, dry at low water, which vessels make fast to in this season: an anchor will require to be let go to the eastward, as well as being fast to the reef. The western side of this Atoll is a continuation of lagoon reefs, between which, at every 2 and 3 miles, are good channels leading into the Atoll; a good one in the centre of the Atoll, in Lat. $4^{\circ} 22\frac{1}{2}'$ N., Long. $73^{\circ} 18' 48''$ E.; another, in Lat. $4^{\circ} 28'$ N. On the N.W. part are two other channels: one near a thick bushy island, in Lat. $4^{\circ} 37\frac{1}{2}'$ N., Long. $73^{\circ} 21' 48''$ E. On both sides of this island the channel is deep and safe. There is another channel about a mile to the N.E. of this last one. On the north part of the Atoll, near the west side, is a broad channel, with a sand-bank on its west side; this channel bears from Kaghay island about W.N.W. distant 3 miles.

"A navigator must keep in mind that all the channels leading into the Atolls are not distinctly seen at the distance of 3 or 4 miles, presenting in appearance one continued line of reef alarming for strangers to approach; but there is no danger to be apprehended when the winds are steady, and, by nearing them to the distance of 1 or 2 miles, the channels are distinctly seen, unless the sun glares in the face.

"**CARDIVA CHANNEL**, called by the natives, **CARDOO KANDOO**.—This channel is extremely useful for ships to and from India; no ship ought to attempt to work through this channel against the strength of the Monsoon, either the S.W. or N.E.; having wind and current against them, it would be next to impossible; it may be advantageously adopted coming from the westward with westerly winds; or from the eastward with easterly winds; or when the Monsoons are changing, and the winds are light and variable; calms are then very frequent, yet little or no danger is to be apprehended, the channel being sufficiently spacious. The channel takes its name from the island of Cardoo, or Cardiva, situated near the centre of the eastern entrance, in Lat. $4^{\circ} 58\frac{1}{2}'$ N., Long. $73^{\circ} 25' 48''$ E. This island is nearly two miles long, E.N.E. and W.S.W., and little more than half a mile broad. It is covered with a dense mass of high cocoa-nut trees; its eastern side convex, having no soundings at 240 fathoms close to the beach; on its western side, a circular reef extends to the westward about $1\frac{1}{2}$ miles, having a lagoon inside, where the natives snugly anchor their boats off the village on the north side of the island. The entrance

through the reef into the lagoon is on the N.E. side near the N.E. point of the island, marked by a few sticks placed as a beacon. A ship's boat can only land on the island by passing through the boat channel. There is generally a heavy surf round this island and reef, except at the channel for boats: it contains about 200 inhabitants. It affords good water, and some few supplies. A ship intending to pass through the Cardiva channel from the east ought to steer into Lat. $5^{\circ} 5' N.$, Long. $73^{\circ} 41' 48'' E.$; from this position a straight course S.W. by W. $\frac{1}{2}$ W. will lead clear through the channel, distance 67 miles, passing to the south of Cardiva island 1 mile. A ship from the westward, intending to pass through the Cardiva channel, ought to steer into Lat. $4^{\circ} 34' N.$, Long. $72^{\circ} 41' 48'' E.$: from this a straight course N.E. by N. $\frac{1}{2}$ E., distance 67 miles, will carry a vessel through with a fair wind; should the wind be variable when entering this channel, the boundaries of it are as follow:—

“**Hoo-wallee-sooree Island**, a large island on the barrier reef of the S.E. extreme of Phaidee Pholo Atoll, on which is a high clump of trees, in Lat. $5^{\circ} 17' N.$, Long. $73^{\circ} 34' 18'' E.$ Alligow island, a small island with high trees on the extreme south point of the same Atoll, in Lat. $5^{\circ} 15' N.$, Long. $73^{\circ} 28' 48'' E.$ On the south side of the east entrance is the large lagoon reef of **Gafor**—its N.W. point in Lat. $4^{\circ} 47' N.$, Long. $73^{\circ} 22' 48'' E.$: the centre and north side of this lagoon reef of Gafor is situated S. by W., distant 12 miles from Cardiva island: it has no soundings near it, and ought not to be approached in light winds; it lies close off the north end of Malé Atoll, having a channel between them $1\frac{1}{2}$ miles broad, with no bottom at 100 fathoms in it. On the east end of the reef is the small island of Gafor, in Lat. $4^{\circ} 44' N.$, Long. $73^{\circ} 28' 18'' E.$; the lagoon reef extends to the west of Gafor $7\frac{1}{2}$ miles into Long. $73^{\circ} 20' 48'' E.$, and Lat. $4^{\circ} 44' N.$; from this, across the channel the distance is 24 miles on a W.N.W. bearing to Goidoo island, the east extreme point of **Horsburgh Atoll**, in Lat. $4^{\circ} 54' N.$, Long. $72^{\circ} 57' 48'' E.$ This Atoll is small, and is situated on the north and west boundary of the Cardiva channel; from east to west it is 10 miles long; its west end, the barrier reef, in Lat. $4^{\circ} 52\frac{1}{2}' N.$, Long. $72^{\circ} 48' 48'' E.$; its south point facing the Cardiva channel in Lat. $4^{\circ} 50' N.$, Long. $72^{\circ} 51' 48'' E.$ At this part a good passage through the reef (for ships) leads into the Atoll; in the passage is 8 and 9 fathoms; it is known by several stony islands bounding the passage on the reef on each side. The west side of the passage is the deepest, the eastern side having 5, 4, and 3 fathoms. There is fine anchorage within, in 17 to 20 fathoms, sandy bottom, mixed with mud and clay, and free from rocks, except near the edges of the barrier reef. There are three larger islands on the north and east part of the Atoll, on the boundary—all of them inhabited—and afford wood, water, and some supplies. Goidoo is the largest and easternmost island—its situation formerly mentioned. Next to it, $1\frac{1}{2}$ miles, is Fhen-doo; then still more to the west is Foo-roo-doo: they contain a population of 200 inhabitants. Between these islands and the south end of the south Mahlos Mahdoo Atoll is 6 miles; the south end of this Atoll lies directly north from Horsburgh Atoll, having a safe channel between them, which may be used by ships, either departing from or entering the Cardiva channel. The south part of Mahlos Mahdoo Atoll is available for ships to anchor, who wish to obtain a few supplies, and some wood and water, which may be obtained at Heetahdoo island, the centre of four islands in the extreme south part of Mahlos Mahdoo, in Lat. $5^{\circ} 1\frac{1}{2}' N.$, Long. $72^{\circ} 52' 48'' E.$ This island contains 250 inhabitants. To the E.N.E. of it 3 miles, as also to the west of it $2\frac{1}{2}$ miles, are good channels leading into the Atoll. From this island, the S.E. boundary of the Atoll, which faces the Cardiva channel, lies N.E. $\frac{3}{4}$ N. 21 miles, to Lat. $5^{\circ} 14' N.$,

Long. $73^{\circ} 9' 48''$ E., which is the east point of Mahlos Mahdoo; between these points are several small islands and reefs, between which a ship may enter the Atoll. From the east point of Mahlos Mahdoo (just mentioned) the small island of Alligow, on the south point of Phaidee Pholo Atoll, bears east a little north 20 miles, and the west points of Phaidee Pholo, Kannee-fooree island, N.E. 12 miles. This is the breadth of the channel between Mahlos Mahdoo and Phaidee Pholo Atolls, and may be used by ships proceeding to the north-east or eastward. Having entered the Cardiva channel from the westward, after passing between the east point of Mahlos Mahdoo, and the west point of Phaidee Pholo, a vessel may steer north until she sights the southern islands in Milladoo Madou Atoll, in Lat. $5^{\circ} 39' \text{ N.}$, Long. $73^{\circ} 15' 48'' \text{ E.}$, she must then steer north-east, which will carry her clear between Milladoo Madou and Phaidee Pholo, or if she have daylight she may steer boldly up north through Milladoo Madou Atoll. The south and west boundary of the Cardiva channel is the north part of Ari Atoll, in Lat. $4^{\circ} 17\frac{1}{2}' \text{ N.}$, Long. $72^{\circ} 45' 48'' \text{ E.}$ East boundary of Ross Atoll, in Lat. $4^{\circ} 17' \text{ N.}$, Long. $72^{\circ} 54' 48'' \text{ E.}$; the centre of Todoo island, in Lat. $4^{\circ} 25\frac{3}{4}' \text{ N.}$, Long. $72^{\circ} 56' 18'' \text{ E.}$ A more particular description of this island and the north part of Ari Atoll will be found in the description of Ari Atoll. The flood tide in the Cardiva channel runs to the E.N.E., the ebb to the W.S.W.; high water full, and change at 12 hours.

N.B.—Having described all the Atolls and channels north of Malé, or King's island, I shall commence from the southern Atolls and channels towards Malé to the north.

"ADDUO ATOLL.—Addoo Atoll, erroneously called by former navigators Phoolah Moloque Atoll; this Atoll, being rich, well inhabited, and available for ships much in want of supplies, I shall be particular in describing it. This Atoll terminates the south extreme of the Maldivh chain of islands, is the smallest of all the Atolls, being only 10 miles from east to west, and 7 miles from north to south; it is of a half-moon shape, the concave side facing the north, and the convex side the south. The N.W. point is in Lat. $0^{\circ} 35' \text{ S.}$, Long. $73^{\circ} 1' 18'' \text{ E.}$; the N.E. point in Lat. $0^{\circ} 35' \text{ S.}$, and Long. $73^{\circ} 10' 18'' \text{ E.}$; the south and centre in Lat. $0^{\circ} 41\frac{1}{2}' \text{ S.}$, Long. $73^{\circ} 5' 18'' \text{ E.}$; there are nine larger, and several smaller islands: the two principal islands lie, one on the N.W. point, the other on the N.E. point; that on the N.W. point of the Atoll is named Hii-ta-doo, and extends to the S.S.E. 5 miles, its breadth is from a quarter to half a mile; next to the S. of it, is Marra-doo, about 1 mile in extent; then Faideo, which is smaller; next to the south, is Gung, which is $1\frac{1}{2}$ mile in extent, and is the most southern and centre island of the group; all these islands, four in number, lie on the western side of the Atoll, and are connected by a barrier reef of coral, dry at low water, with no soundings outside of them.

"There are four channels leading into this Atoll: two in the centre, on the north side; and two in the centre, on the south side. The southern channels are the largest, and may be used at night time; the northern ones are not so broad, yet are safe, and available for vessels coming from the northward with northerly winds, or leaving the Atoll with southerly winds. A vessel could not work through the northern channels, but with a fair tide it could be done through the southern ones; the best way is to adopt that channel through which a vessel will have a fair wind. The northern channels are not easily seen by a vessel coming from the northward, as the northern barrier at some

distance appears like one unbroken reef; on a nearer approach, and almost in the centre of this barrier, between the eastern and western islands, lie the channels, which will be known by a small bushy island and a high bank of coral stones, both on the same reef; on either side of them is a channel leading into the Atoll. The eastern channel is the largest, being 400 or 500 yards broad, having not less than six and seven fathoms; its direction N.W. and S.E.; the western channel is narrower, yet longer, and its direction north and south; the depths are from ten to twelve fathoms. In both these channels the tides and currents are strong, as also in the southern ones; the flood tide sets into the northern channels, and the ebb sets into the southern ones; rise and fall of the tide about four feet; high water at one hour full and change of the moon. The southern channels lie on the east side of Gung island, the southern island of the Atoll; this I shall call Gung channel, and is formed between Gung island and two small islands to the E.N.E. of Gung, called Willing-gilly islands. Gung channel is half a mile broad, having no dangers in it, and the depths are from thirteen to seventeen fathoms; it is convenient for any ship entering the Atoll. The other channel I shall call the Willing-gilly channel, is on the east side of the Willing-gilly islands, formed between them and the south point of the dry coral reef bounding the east side of the Atoll; this channel is one mile broad, and has from seventeen to twenty fathoms water in it, deepening as a ship enters the Atoll; the direction of this channel is about N.W. and S.E.; about one mile inside the entrance, on the N.E. side, there is a small coral reef, and as a vessel proceeds on to the centre of the Atoll three coral patches will be observed, on which the sea breaks at times; but these are easily avoided by a common look-out. The depths in the centre of the Atoll are from twenty-five to thirty-five fathoms, sand and clay. The most convenient anchorage for communication with the natives is near the islands, the west side of which are inhabited; from the Willing-gilly channel, round the N.E. side of the Atoll, to the centre on the north side, is one continued barrier reef, on which are several islands; the only large one, of two miles in extent, is on the N.E. point of the Atoll; this is well inhabited, and an interesting island; it is called Me-doo and Hoo-loo-doo, from two villages situated in its centre.

"This Atoll is clear of reefs, except in the centre, where are the three small patches formerly mentioned, and which are easily avoided; 30 and 35 fathoms is the depth of water in the centre; near the islands on the east and west sides, are 20 and 25 fathoms; a vessel may anchor as most convenient, according to the seasons—during the N.E. Monsoon, on the north or weather side, and in the other Monsoon, on the west side. The islands afford a few supplies of fruit, limes, poultry, eggs; water and firewood in abundance. The natives are very civil and obliging, and will exchange their articles either for money or rice, biscuit, sugar, salt, onions, and garlic; they are extremely lazy and indolent, and very timorous, fearful of strangers, and will not be induced to assist a ship in wooding and watering unless paid for it, and obliged to work; they are under the government of the Sultan at Malé, or King's island; and the Atoll-warree, or chief of the Atoll, is the person strangers ought to apply to for assistance in getting supplies. Some of the natives speak the Hindoostance language; their principal occupation is making cotton cloths of white, red, and black colours mixed, all of which they dye themselves, and sell at a good price in the other Atolls. They are not allowed by their government to trade with foreigners, not even with the English, their allies; all their produce must be sold at the king's island, Malé. They seldom visit ships passing, from fear of

molestation; and it would be wrong of any ships stopping at these islands to allow their crew to intrude into the privacy of their houses, among their females, or wantonly and without permission take their fruit, cocoa-nuts, fowls, &c. They are poor and inoffensive, and have reason to regret the visits of some merchant ships. In religion they are all Mahomedans. The Atoll contains about 500 inhabitants, and in appearance they are like the natives of India on the Malabar coast.

"There are no soundings outside of this Atoll close to the barrier reef, and being southward of the line or equator, it is almost without the influence of the Monsoon—the winds and weather being very variable, subject to squalls and rain. The N.E. Monsoon is felt in January, February, and March; and westerly winds more in July, August, and September. The currents about this Atoll are very strong; for six months they set to the westward, and then back again to the eastward, according to the Monsoons, but are subject to checks from variable winds. They commence to set to the west about January, and to the eastward about June; their velocity from 40 to 50 miles per day, decreasing considerably in strength 40 or 50 miles from the islands. There was, in 1836, no variation of the compass.

"I have been thus particular about this Atoll, as so many ships pass this place on their way to and from India. I have also recommended it as a coal dépôt for steamers.

"**EQUATORIAL CHANNEL**, with an account of **PHOOWA MOLOKU ISLAND**.—This channel is free from dangers. The island Phoowa Moloku, erroneously called by former navigators Addon island, is situated a little to the south and east of the centre of the channel, which is 46 miles broad between Suadiva Atoll and Addoo Atoll. Phoowa Moloku island is 2 miles long N.W. and S.E., by a-half to three-quarters broad; its centre is in Lat. $0^{\circ} 17\frac{1}{2}'$ S., and Long. $73^{\circ} 22' 18''$ E.; from its centre the S.E. extreme of Suadiva, in Lat. $0^{\circ} 23' N.$, Long. $73^{\circ} 29' 48''$ E., bears N. 10° E., distant 41 miles; its south extreme, which is the nearest part to the island, in Lat. $0^{\circ} 12' N.$, and Long. $73^{\circ} 7' 48''$ E., bears N. 27° W., distant 33 miles; and the S.W. point of Suadiva, in Lat. $0^{\circ} 18' N.$, Long. $72^{\circ} 57' 48''$ E. A line drawn through these three situations of Suadiva will shew the boundary of the south part of the Atoll, and which is the northern boundary of the Equatorial channel. The southern boundary bears from the centre of Phoowa Moloku, the point of Addoo Atoll, S. 37° W., distant $21\frac{1}{2}$ miles N.E.; the N.W. extreme of the same Atoll, S. 51° W., distant 28 miles. A ship passing through this channel, and coming either from the east or west, ought with light winds to borrow over towards Addoo Atoll, that in case of calms and variable winds, she may not be drifted too close to Suadiva Atoll; if this should be the case, a vessel might in the day time easily enter one of the numerous channels leading into the Atoll. One good channel (with plenty of water) lies to the W.N.W., 3 miles off the south point of the Atoll, whose latitude and longitude has been mentioned. To the N.W. and N.N.W. of this channel, distant 20 miles, is one continued barrier reef, with a succession of small islands, which appear at a distance nearly as one island. Between the S. and S.E. points of this Atoll, there are eight channels leading into the Atoll, all safe for ships, and in case of being drifted near them, may be used to enter the Atoll, where there is anchorage for the night; the depths are from 35 to 45 fathoms in the Atoll, and in the channels not less than 8 and 10 to 15 fathoms. Should the vessel not be able to return from the Atoll by the same channel she came in by, she may in the

day time steer boldly to the northward through the Atoll, in deep water from 35 to 45 fathoms, passing occasionally some small coral reefs and islands, hauling to the eastward or westward, as her destination may be, that she may pass through some of the channels either on the east or west side of the Atoll; some of the natives will gladly conduct them through for a few pounds of rice or bread. Between Phoowa Moloku island and Addoo Atoll the channel is free from dangers, and Phoowa Moloku may be approached quite close off the north, east, and west sides, having no soundings near it; but off the south side a shelving bank extends to the distance of $1\frac{1}{2}$ mile; the surf breaks very high on this, to the distance of $\frac{3}{4}$ of a mile from the island; yet on its extreme point a vessel may anchor in 6 and 7 fathoms water for a few hours, in moderate weather; the bank is hard sand, with small coral rock, and the anchor does not hold well; its sides, like the island, are precipitous. This island contains between 300 and 400 inhabitants, who are principally employed in fishing, and weaving cotton cloth. Here resides one of the royal family from Malé, or King's island; he is styled Deedee. From the islanders may be obtained turtle, fowls, eggs, fruit, lime, firewood, and fresh water. The natives often visit ships in passing, on shewing their colours; some of them speak the Hindoostanee language. The trees on the island are from 70 to 90 feet high; it is high water at one hour full and change of the moon; rise and fall between 4 and 5 feet; the ebb-tide in the channel sets to the westward, the flood to the eastward; they are little felt except in retarding and accelerating the currents; the prevailing winds are from west to south and S.S.E. from May to December, with much rain and squalls; January, February, and March, the weather is less cloudy and rainy, the winds generally from the north and north-east.

“**SUADIVA ATOLL**, or by the Natives **HOOANDOO ATOLL**.—This Atoll is one of the largest of the Maldivh group, the depth of water inside from 35 to 45 and 50 fathoms, much greater than the other Atolls, also less obstructed by coral reefs. There are thirty islands in its centre, two of which in the N.W. part are inhabited. The islands on the boundary are very numerous, fifteen of them being inhabited, containing together a population of about 2000 persons. The principal employment of the men is in fishing, the women in weaving rush mats for couches, beds, &c., which are woven with different coloured rushes and in pretty patterns; the rushes grow on the islands, and are dyed by the natives; a good mat sells for 1*l.* to 3*l.*; the principal island for their manufacture is at Guddoo, on the S.E. side of the Atoll, in Lat. $0^{\circ} 18' N.$, and Long. $73^{\circ} 23' 18'' E.$ Close to the westward of this island, between it and a long bushy island called Ghang, is a good channel leading into the Atoll. Ghang island lies to the W.S.W. of Guddoo, distant one mile, and is a larger island, being a mile and a half in extent. Close to the westward of Ghang island there is a broad channel a mile and half wide, with 30 fathoms water throughout; also an island about three miles inside the channel, N. by E. from its entrance, having a projecting reef of considerable extent pointing south to the entrance of the channel; this island, after entering the channel, may be passed on either the east or west sides. The inhabitants of this Atoll are much subject to dropsical swellings of the lower extremities of the legs, called elephantiasis, common to Ceylon and the Malabar coast. On the N.W. part of this Atoll, in the year 1802, a Surat merchant ship was wrecked; she was a prize to some French privateer; one of her crew, a Frenchman, remained with the natives of the Atoll, adopted their manners and

religion (Mahomedan), married one of their women, and had a family; the man himself had died some few years before we came there, but his wife and children were living, whom we saw, and spoke to; they were much alarmed, supposing we intended taking them away. Poor creatures, they had little of the appearance of being the offspring of an European; the wife and children were dreadfully afflicted with elephantiasis.

"The Atoll is 42 miles in length, north and south, by 34 miles in breadth, east and west; on its west, south, and east sides are numerous islands; the north and N.W. part of the Atoll is bounded by a continuation of coral reefs, between which are numerous safe passages for ships, as also between the islands to the southward and eastward. The north point of the Atoll is in Lat. $0^{\circ} 55' N.$, Long. $73^{\circ} 16' 18'' E.$; here are two channels of 34 fathoms' depth of water leading into the Atoll; 2 miles distant to the south and S.E. inside the Atoll, are two small islands; these are the most northern islands of the Atoll. To the W.S.W. of the north point of the Atoll, distant $10\frac{1}{2}$ miles, is the moderate-sized island of Mah-fooree; this island lies on the north-west part of the boundary, in Lat. $0^{\circ} 50' N.$, Long. $73^{\circ} 7' 3'' E.$; between these last two mentioned points numerous coral reefs, with safe passages between them, form the north boundary of the Atoll, having seven small islands inside the north part. Mah-fooree island is well inhabited, has good fresh water, and plenty of poultry, &c. In surveying this Atoll, we were detained under the lee of this island for fifteen days in the month of December, 1836, blowing in hard squalls, and fresh gales, from W. to W.N.W., with heavy showers of rain. A ship wishing to stop at this island, if from the northward, ought to enter the Atoll at its north extreme, and then steer to the S.W. and W., passing between some small islands, keeping in mind Mah-fooree is the most western island, and is the largest among those in the N.W. part of the Atoll. With Mah-fooree island bearing W., distant 1 mile, in 10 fathoms, is a good anchorage. From Mah-fooree N. by E., distant $1\frac{1}{2}$ miles, is the small island of Willee-gelly, on both sides of which there is a channel; that on its west side, between it and Mah-fooree, is rather shoal, having only 4 fathoms in it; the other to the eastward of the island, is deep. Two small islands are situated in the inner part of this channel. Another broad and safe channel is situated $4\frac{1}{2}$ to 5 miles from Mah-fooree, with it bearing S. $40^{\circ} W.$; two small islands are also inside this channel, and bear from its entrance S. $34^{\circ} E.$, distant $1\frac{1}{2}$ miles. A ship may pass them either on their east or west sides. From Mah-fooree island a long barrier reef extends to the S.E. $4\frac{1}{2}$ miles, on which are three small islands; close to the southward of the south one, there is a good channel leading into the Atoll, with some coral patches about $1\frac{1}{2}$ miles inside the centre; 3 miles, S.S.E. of this last channel is another; here the boundary of the Atoll forms a deep bay, having this channel at the bottom of it, and bears from the centre of Mah-fooree island S. $32^{\circ} E.$, distant 7 miles. Tin-a-doo island is the next principal island on the west side of the Atoll; its centre is in lat. $0^{\circ} 31\frac{1}{2}' N.$, and Long. $72^{\circ} 55' 48'' E.$ The island is about 1 mile in extent, and contains about 200 inhabitants; has good water, and a few supplies. From this island, the boundary of the Atoll to the north forms a deep bay towards Mah-fooree island, and which would be dangerous for a ship to be drifted into in calms and light winds; its direction from Tin-a-doo is N. $50^{\circ} E.$, distant $19\frac{1}{2}$ miles, which is the depth of the bay, and the entrance of the second channel south of Mah-fooree island, S. $32^{\circ} E.$, distance 7 miles, as formerly mentioned. Between this channel and Tin-a-doo island, along the boundary, are seven channels: one of the

best is situated 4 miles to the N.E. of Tin-a-doo, and is off the east end of the reef which joins the island; there are several heaps, or dry banks at low water, of coral stones and sand along this boundary; on two of them are some bushes. A ship coming from the westward or south-west would suppose Tin-a-doo the most northern island of the Atoll. Should a ship wish to enter the Atoll, or if there is much chance of her being drifted into the deep bight to the northward, she ought if possible to enter the Atoll, either by the small, but safe channel, between the south end of Tin-a-doo and an island with low bushes, and one single cocoa-nut tree on it. This channel is not more than 150 yards wide, and has 6 fathoms water in it. There is a much larger channel, called by the natives the Kan-da-doo channel, being 1 mile in breadth, having not less than 6 and 7 fathoms water in it. This channel lies south from Tin-a-doo $3\frac{1}{2}$ miles; it is most convenient for ships; its Lat. is $0^{\circ} 18\frac{1}{4}'$ N., Long. $72^{\circ} 55' 48''$ E. Kan-da-doo is the name of the large island bounding the north side of this channel; it is not inhabited. This island and Tin-a-doo are the most western islands of the Atoll. Two other islands lie to the south of the channel, that forming the south side of the channel is not inhabited, but the second or southern one, which is the largest, is the residence of the Chief of the Atoll, called the Atoll Warree. The island is named Hoon-da-doo, and contains about 200 inhabitants. Good water, poultry, &c., may be procured here; good anchorage east of the island, from 27 to 35 fathoms water. From the Kan-da-doo channel to the southward, the S.W. boundary of the Atoll is one continued barrier of reef for 79 miles, thickly studded with small islands, which at a distance in some places look like one island. The S.W. point is in Lat. $0^{\circ} 18' N.$, Long. $72^{\circ} 58' 18'' E.$; another point is in Lat. $0^{\circ} 13' N.$, and Long. $73^{\circ} 4' 48'' E.$ Here is a good broad channel leading into the Atoll between two larger islands, the western one named Fe-oor-warree, which is inhabited. Matura island is the most southern island in the Atoll, and is to the W.S.W. of the last-mentioned channel, 3 miles, in Lat. $0^{\circ} 12' S.$, Long. $73^{\circ} 7' 48'' E.$ This island is also inhabited. A coral reef extends to the eastward of it $1\frac{1}{2}$ miles, dry at low water: close to the east point of this reef is a good channel leading into the Atoll N.N.W., having not less than 9 fathoms water in its shallowest part; the breadth of the channel is about half a mile; the eastern boundary of the channel is formed by the reef extending $2\frac{1}{2}$ miles from the large island of Wah-doo to the N.E.

“Wah-doo island (the east end in Lat. $0^{\circ} 14\frac{1}{2}' N.$, Long. $73^{\circ} 12' 48'' E.$) is in length $1\frac{1}{2}$ miles, east and west, by $\frac{1}{2}$ to $\frac{3}{4}$ mile in breadth; by the natives' account it formerly contained 1,200 inhabitants, was very fertile and productive; for many years past it has been nearly deserted, having not more than 100 inhabitants, very poor: no cause is assigned why it has been deserted. The island is worth visiting, the ancient mosques, burial places, and other parts, are very interesting. On the N.E. side there is a broad channel, having 25 to 40 fathoms in it, leading W. and W.N.W. into the Atoll, and is more than 1 mile broad; there are two coral banks in the centre of this channel, having 5 and 6 fathoms on them, but in most parts 7 and 8; these banks are very narrow, and are convenient for ships anchoring who wish to obtain wood and water; the tides are strong in this channel. To the E.N.E. of Wah-doo, from 2 to $3\frac{1}{2}$ miles, are several small islands; between the two westernmost a safe channel with 34 fathoms, the least water in its deepest part, leads north into the Atoll. To the eastward of these islands, from 1 to $2\frac{1}{2}$ miles, are two other channels leading in N.W.; still further to the eastward is the large channel of

Ghang, off the west side of the large island of that name, which has been described in the first part of the description of this Atoll; the centre of Ghang island is in Lat. $0^{\circ} 17' N.$, Long. $73^{\circ} 21' 48'' E.$, on both sides of this island there is a good channel.

"From Ghang island the direction of the Atoll is N. $55^{\circ} E.$ distant 10 miles to the S.E. point of the Atoll, which is in Lat. $0^{\circ} 23' N.$, and Long. $73^{\circ} 29' 48'' E.$; in this space are several islands, looking at a distance like one island; they are all on one reef, and have no channels between them, except near the S.W. point of the Atoll, in Lat. $0^{\circ} 21' N.$, Long. $73^{\circ} 27' 18'' E.$; this channel is wide and has 7 and 8 fathoms water in it, and leads into the Atoll, north; it is bounded on its east side by the island Kan-doo-hoo-loo-doo, which is inhabited, and contains good water and some supplies. To the N.E. of Kan-doo-hoo-loo-doo, distant $1\frac{1}{2}$ to $2\frac{1}{2}$ miles, lie two other islands; the northern one, Koo-boo-rah, is a little to the westward of the S.W. point of the Atoll, and in Lat. $0^{\circ} 23' N.$, Long. $73^{\circ} 29' 18'' E.$ North of this, at 2, $2\frac{1}{2}$, 3 and 4 miles, are four smaller islands, all on the same reef, without any channels between them; these are the most eastern islands of the Atoll, in Long. $73^{\circ} 29' 33'' E.$ The barrier on which they lie, extends to the eastward (or seaward) from $\frac{1}{4}$ to $\frac{1}{2}$ a mile. Mah-ra-rah island is the most northern island of these four last-mentioned islands, and close to the north of it, in Lat. $0^{\circ} 27\frac{1}{2}' N.$, is a good channel leading west into the Atoll, having 7 fathoms in it: opposite this channel, distant $1\frac{1}{2}$ miles, inside the Atoll, is a small island; N. by E. of this channel, from 1 to 2 miles on the boundary of the Atoll, are two more islands, both on one reef. Then another channel, between Koon-day island, to the north, and Dee-ah-doo to the south; the channel is in Lat. $0^{\circ} 29\frac{1}{2}' N.$, and lies east and west, having 17 fathoms water in it. The islands on both sides of this channel are inhabited; the northern one, called Koon-day, in Lat. $0^{\circ} 30' N.$, and Long. $73^{\circ} 28' 48'' E.$, is a little more than 1 mile in length; it is situated on the south extreme of a part of the barrier reef, extending to the N.N.W. $3\frac{1}{2}$ miles, on which are four small islands: on the north side of which is another safe channel for ships, in Lat. $0^{\circ} 33' N.$, leading into the Atoll W.S.W.; to the north and N.N.W. of this, from 1 to 2, 3 and 4 miles, four small islands are situated, on separate reefs (on the boundary), with channels between them; the channels are small, except between the two centre islands. This channel is in Lat. $0^{\circ} 34\frac{1}{2}' N.$, Long. $73^{\circ} 26' 48'' E.$, from this channel the Atoll and islands lie in a N.W. direction, $5\frac{1}{2}$ miles, to the centre of Nillan-doo island, between which and the channel just mentioned are four islands and two good channels.

"Nillan-doo island (its centre in Lat. $0^{\circ} 38\frac{1}{2}' N.$, Long. $73^{\circ} 22' 18'' E.$) is a little more than 1 mile in extent. On both sides of this island, north and south, are good channels leading into the Atoll, having 12 and 13 fathoms in them; the northern channel leads in west, the southern one W.S.W. Nillan-doo is inhabited, as also the island to the south of it, called Dan-doo; the former has good water, and some supplies, with good anchorage: on its inner side from 17 to 25 fathoms, from the centre of Nillan-doo island, as described, the islands and outer boundary of the Atoll lie N. $\frac{1}{2}$ W. and N. by W., 15 miles; the first six islands north of Nillan-doo, 5 miles, are on one reef, with no channel between them; a little more to the north, in Lat. $0^{\circ} 44' N.$, Long. $73^{\circ} 21' 48'' E.$, is the island of Koo-ber-doo, having a safe channel on its north and south side; that on its south side is formed between the island Mah-men-doo, distant 1 mile, that on its north side by the island Willee-gillee, distant 1 mile; these three islands are inhabited. Willee-gillee island, which is on the north side of

the channel, is situated on the extreme south point of the barrier reef, extending from the extreme north point of the Atoll, 11 miles; close to the north of Willee-gillee are four smaller islands; and in Lat. $0^{\circ} 50\frac{1}{2}'$ N., Long. $73^{\circ} 20' 18''$ E., on the barrier, are two other small islands, having no other nearer to them than 5 miles; these are generally first seen by ships coming from the north-east.

"ONE-AND-A-HALF DEGREE CHANNEL, situated between Adou-matte Atoll to the north, and the Suadiva Atoll to the south, is 51 miles in breadth between the Atolls. This channel is free from dangers, and a ship soon passes the north point of Suadiva Atoll in Lat. $0^{\circ} 55'$ N., and Long. $73^{\circ} 13' 48''$ E., and $73^{\circ} 16' 18''$ E., and the south part of Adou-matte Atoll in Lat. $1^{\circ} 47'$ N., Long. $73^{\circ} 21' 48''$ E. Should a ship be drifted near to the south point of Adou-matte Atoll, she may enter the Atoll by a large channel 2 miles wide, situated from 3 to 4 miles to the E.N.E. of the south point of the Atoll, on which are two large islands looking like one island; round the east point of them is the channel, having from 12 to 20 fathoms in it. Should a ship drift near to Suadiva Atoll, the channels to enter this Atoll have been described.

"ADOU-MATTE ATOLL is a small Atoll, in shape like a leg of mutton; it lies N.E. and S.W., the smaller part of it to the N.E.; it is principally surrounded by a barrier reef; its length is 26 miles, its breadth in the S.W. part from 15 to 17 miles; its boundary as follows—N.E. extreme point, on which is the large island of Esdoo, 2 miles in extent, whose N.E. extreme point is in Lat. $2^{\circ} 7'$ N., Long. $73^{\circ} 34' 18''$ E.; from this to the south, 6 miles, and a little to the westward, lie eleven small islands, all on the same reef; a little more to the south, in Lat. $2^{\circ} 1\frac{1}{2}'$ N., is the island of Mah-ba-doo (inhabited). North and south of this island are channels leading into the Atoll; the northern channel has from 3 to 4 fathoms in it; the south one has 8 fathoms, and is formed between Mah-ba-doo and Mundoo island to the south; from this last-mentioned island, Mundoo, in Lat. $2^{\circ} 1'$ N., the boundary of the Atoll then extends south a little east $6\frac{1}{2}$ miles; then S. 30° W., $5\frac{1}{2}$ miles; then W. by S., 4 miles; all this distance is one continued barrier reef, thickly covered with islands. A little to the eastward of the south point of the Atoll there is a large and safe channel, 2 miles wide, leading into the Atoll, by which a ship may enter; three small islands are situated inside the channel, a ship may pass between them, or on either side, as the winds may be. Heena-doo Adoo island bounds the west side of the channel, its east extreme point is in Lat. $1^{\circ} 48'$ N., Long. $73^{\circ} 23' 48''$ E.; a reef extends off the island to the eastward from $\frac{1}{2}$ to $\frac{3}{4}$ of a mile, on which the surf breaks high. Gahdoo island bounds the east side of the channel and its centre, in Lat. $1^{\circ} 49'$ N., Long. $73^{\circ} 26' 18''$ E. Should a ship enter this channel, being in want of supplies of wood, water, and poultry, she may, when through the channel, proceed to the island of Mhow-ah, on the western boundary of the Atoll, distant about 11 miles to the W.N.W. of this channel, where wood, water, and poultry are to be procured; care must be taken to avoid the coral patches inside the Atoll, all of which are discernible on a clear day, more especially after entering the channel, and having passed between the island bounding the west side of the channel, and to the south of the three small islands inside the Atoll and channel, as several coral patches lie west from these islands, distant from 1 to $1\frac{1}{2}$ miles. From the south extreme of the Atoll, in Lat. $1^{\circ} 47'$ N., Long. $73^{\circ} 21' 48''$ E., the Atoll then turns to the north and

west, one continued barrier reef with several islands on it. On the extreme west point of the Atoll, on the boundary, is the island of Mhow-ah, in Lat. $1^{\circ} 53\frac{1}{2}'$ N., Long. $73^{\circ} 14' 18''$ E.; this island contains between 300 and 400 inhabitants, who trade to Calcutta every year, in three or four vessels of their own construction, of from 80 to 100 tons burthen; the island is from $\frac{1}{2}$ to $\frac{3}{4}$ of a mile in length and breadth, with good anchorage on its inner side, from 17 to 20 fathoms. North of Mhow-ah, $1\frac{1}{2}$ miles, is a narrow but safe channel leading into the Atoll; the direction of the channel is about S.E. and E.; two small islands on the north side point it out, and lie to the N.N.E. of Mhow-ah, $1\frac{1}{4}$ miles, and are used as places of interment to those natives who die on board their boats. On the N.W. part of the Atoll is a small island called Hang-hooree, situated N.N.E., 4 miles from Mhow-ah, in Lat. $1^{\circ} 57\frac{1}{2}'$ N., Long. $73^{\circ} 15' 48''$ E. From this island the northern boundary of the Atoll extends in a straight line N. 60° E., distant 20 miles, having only three small islands in this space, and two indifferent channels; the first channel is $4\frac{1}{2}$ miles from Hang-hooree, close to the east of two small islands, called Mooneah-fooree; this channel has not more than 4 fathoms in it, and generally 3 to $3\frac{1}{2}$; the next channel is close to the east of a small island, called Wad-i-noo, in Lat. $2^{\circ} 1' N.$, Long. $73^{\circ} 21' 18''$ E.; this channel, though narrow, has deep water in it. From this to the N.E. point of the Atoll, Esdoo island is one continued barrier reef; there are no islands within the Atoll, except the three mentioned as being in the south part: the general depth within the Atoll is from 25, 35, to 42 fathoms.

“COLLOMANDOO ATOLL.—This Atoll is of considerable extent, and like Adou-Matte Atoll is principally surrounded by barrier reefs; it is of a circular form, except its S.E. side, which is nearly a straight line; there are only 6 islands within the Atoll, and those are near the western boundary. Numerous coral patches, dry at low water, lie within the Atoll, and the general depths are from 32 to 42 fathoms; the limits of the Atoll are as follow:—South point an island called Kim-bee-doo (inhabited) its centre in Lat. $2^{\circ} 10\frac{1}{2}' N.$, Long. $73^{\circ} 3' 18''$ E.; from this to the east point is one straight line, N.E. by E. 22 miles. The east point is the south point of a large island, called Phalah, in Lat. $2^{\circ} 23' N.$, Long. $73^{\circ} 21' 18''$ E.; this island is $3\frac{1}{2}$ miles in length, north and south, and bounds the east end of the Atoll. The N.E. point of the Atoll is the centre of a moderate sized island called Willi-fooree (inhabited) in Lat. $2^{\circ} 31' N.$, Long. $73^{\circ} 17' 48''$ E. The north point of the Atoll is the centre of a small island, called Bdoronee, in Lat. $2^{\circ} 34' N.$, Long. $73^{\circ} 5' 48''$ E. The N.W. point of the Atoll, a small island called Kando-fooree, in Lat. $2^{\circ} 32' N.$, Long. $72^{\circ} 58' 48''$ E. The N.W. point of the barrier, on which are no islands, is in Lat. $2^{\circ} 28' N.$, Long. $72^{\circ} 52' 48''$ E.; from this to the S.W. point, the centre of a small island on the barrier, called Fooree, in Lat. $2^{\circ} 12' N.$, Long. $72^{\circ} 57' 18''$ E.; between these two last points is the west boundary of the Atoll, preserving nearly a straight line, having two conspicuous islands, the north one in Lat. $2^{\circ} 19\frac{1}{2}' N.$, Long. $72^{\circ} 54' 48''$ E., called Karn-doo-doo; the southern island called He-lan-doo, in Lat. $2^{\circ} 16\frac{1}{2}' N.$, Long. $72^{\circ} 55' 48''$ E.: both these islands are inhabited, and afford good water, wood, and poultry. Between them is a wide channel leading into the Atoll, having two islands within the Atoll, facing the entrance of the channel, and about 1 to 2 miles inside, and four other smaller islands at the back of them. A reef extends to the south of the larger island, which bounds the north part of the channel, to the distance of half a mile; in the middle and entrance of this large channel there is some shoal water, with coral rocks, having 6 and 7 fathoms water on them, yet in

one small spot there is only 4 fathoms; this may be easily avoided, as on either side of it there is a deep gut, one close to the reef off the northern island, the other close to the southern island; either side may be used according as a ship may wish to anchor eastward of the north island (Karn-doo-doo), or the south one (He-lan-doo). There are no other channels on the west side of the Atoll, and from this round the S.W. and south part is one barrier reef. Passing the south point of the Atoll (the island Kim-be-doo as formerly described,) 2 miles to the E.N.E. is the island Vaiman-doo, its centre in Lat. $2^{\circ} 11\frac{1}{4}'$ N., Long. $73^{\circ} 5' 3''$ E.; close to the east of which, and between it and the next island, Kanhemeedoo, is a broad and deep channel, with a large coral reef within the Atoll, facing the channel, distant about $1\frac{1}{2}$ miles. One mile to the east of Kanhemeedoo, is a small island, and between them a good channel. Further east, one mile, another larger island, called Te-mar-rah, and between the two latter a deep and safe channel, having 35 and 38 fathoms in it; these are the only channels leading into the Atoll on its south part. Te-mar-rah island is situated on the extreme of the barrier reef, which bounds the south-east part of the Atoll, and is in Lat. $2^{\circ} 12\frac{1}{2}'$ N., Long. $73^{\circ} 7' 48''$ E. From this island, N.E. by E., 13 miles, there are no more channels; all is one barrier reef, thickly covered with islands. Three miles to the S.W. of the east point of the Atoll, is a good channel, half a mile wide, having 8 fathoms in it; the channel is between two islands, and in Lat. $2^{\circ} 20\frac{1}{2}'$ N., Long. $73^{\circ} 18' 48''$ E.; from this, round the E. and N.E. parts of the Atoll, are no channels. Between the N.E. and N. points of the Atoll, as described, there are six straggling small islands on the barrier reef; close to the east point of each of the islands are channels leading into the Atoll, which though small are safe. The channel close to the east of Bdoronce island, the north part of the Atoll, in Lat. $2^{\circ} 34'$ N., Long. $73^{\circ} 5' 48''$ E., is the best channel, being wider and deeper. On the N.W. part of the Atoll there are two other channels, a deep but narrow one close to the east of Kandoo-foree island, in Lat. $2^{\circ} 32'$ N., Long. $72^{\circ} 58' 48''$ E.; and to the W.S.W. of this island, $1\frac{1}{2}$ miles, is another channel, much broader, having 12 to 14 fathoms in it; a large bank of coral shingle is on the east side of this channel. There are no more channels on the N.W. or W. sides, except the large one as formerly described on the centre of the west side of the Atoll.

"VAI-MAN-DOO CHANNEL, situated between Adou-Matte Atoll to the south, and Collomandoo Atoll to the north; the direction of this channel is N. 53° E. and S. 53° W., 27 miles long, and the breadth of the channel, or distance between the two Atolls, is from 16 to 17 miles, free from danger; the centre of the east entrance is in Lat. $2^{\circ} 16\frac{1}{2}'$ N., Long. $73^{\circ} 27' 48''$ E.; the western entrance is in Lat. $2^{\circ} 1' N.$, Long. $73^{\circ} 6' 48''$ E.; should a ship in calms and light airs be drifted near either of the Atolls, the channels to enter them and their boundaries have been described. The boundary of Vai-man-doo Channel is as follows:—East entrance—on the north side is Phalah island, its south point in Lat. $2^{\circ} 23' N.$, Long. $73^{\circ} 20' 48''$ E., and is on the east extreme of Collomandoo Atoll: the south boundary on the east entrance is the centre of the large island of Esdoo, on the N.E. extreme of Adou-Matte Atoll, in Lat. $2^{\circ} 7' N.$, Long. $73^{\circ} 33' 18''$ E.: the western entrance, north boundary, is the island Kim-bee-doo, on the south point of Collomandoo Atoll, in Lat. $2^{\circ} 10' N.$, Long. $73^{\circ} 3' 18''$ E.: south boundary is the island of Mhow-ah, on the west side of Adou-Matte Atoll, in Lat. $1^{\circ} 53\frac{1}{2}' N.$, Long. $73^{\circ} 14' 18''$ E., but the narrowest part of the channel at the west entrance is between the south point of Collomandoo Atoll, and

N.W. island of Adou-Matte Atoll, in Lat. $1^{\circ} 57\frac{1}{2}'$ N., Long. $73^{\circ} 15' 48''$ E., situated by itself on the N.W. part of the barrier reef. It is high water in this channel, full and change of the moon at 3 hours; rise and fall, about 4 feet: the flood tide runs to the east, ebb to the west, velocity about 2 miles per hour in the springs.

"**KOODAH-HOOAH-DOO CHANNEL** is formed between the Atolls Nillandoo, and Moloque, to the north, and Collomandoo to the south; its western entrance is its narrowest part, being only ten miles wide, between the south part of Nillandoo Atoll, on which is a moderate sized island, called Koodah-hooah-doo, in Lat. $2^{\circ} 40\frac{1}{2}'$ N., Long. $72^{\circ} 53' 48''$ E.; from this to the nearest part of Collomandoo Atoll across the channel is 10 miles, to an island on its N.W. boundary, called Kandoo-fooree, in Lat. $2^{\circ} 32'$ N., Long. $72^{\circ} 58' 48''$ E.; the eastern entrance of this channel is bounded on the north side by the islands in the south extreme of Moloque Atoll, in Lat. $2^{\circ} 46'$ N., Long. $73^{\circ} 23' 18''$ E., and the island Willi-fooree on the south side, which is on the N.E. extreme of Collomandoo Atoll, in Lat. $2^{\circ} 30\frac{1}{2}'$ N., Long. $73^{\circ} 17' 48''$ E.; near the centre on the south boundary of the channel is the small island of Bdoronee, in Lat. $2^{\circ} 34'$ N., Long. $73^{\circ} 5' 18''$ E., which is the north boundary of Collomandoo Atoll; N.N.W. of this island, 10 miles, is an open space between Moloque and Nillandoo Atolls, which are 19 miles apart. The tides in this channel have the same direction as in the other — flood to the east, and the ebb to the west.

"To the north of Collomandoo Atoll, from Lat. $2^{\circ} 35'$ N. to 6° N., the Atolls lie in double groups, east and west, with an open space of 10 to 20 miles between them, free from all dangers.

"**NILLANDOO ATOLL** is one of the western Atolls next to the north of Collomandoo Atoll; is 40 miles in length north and south, and is divided into two parts — the northern and southern — having a channel three and a half miles wide, without soundings, separating the two parts. South Nillandoo Atoll extends from Lat. $2^{\circ} 40'$ to $3^{\circ} 1\frac{1}{2}'$ N., Long. from $72^{\circ} 49' 18''$ to $73^{\circ} 1' 48''$ E.; North Nillandoo Atoll, from Lat. $3^{\circ} 4'$ N. to $3^{\circ} 20\frac{1}{2}'$ N., and Long. $72^{\circ} 47' 48''$ E. and $73^{\circ} 1' 48''$ E. On the south point of **South Nillandoo** is the moderate sized island of Koodah-hooah-doo, inhabited, and which gives name to the channel south of Nillandoo; this island affords some supplies of wood, water, and poultry; its centre is in Lat. $2^{\circ} 40\frac{1}{2}'$ N., and Long. $72^{\circ} 53' 48''$ E.; on its east side is an excellent channel one mile wide, leading into the Atoll; between it and the next two small islands to the E.N.E., distant one mile and a half, there is 9 and 10 fathoms in the channel. From the N.W. of Koodah-hooah-doo a barrier reef extends 12 miles to the N.N.W. to Lat. $2^{\circ} 51'$ N., with three islands on the S.W. part of the barrier, from 2 to 3 miles to the N.N.W. of Koodah-hooah-doo. On the S.E. side of the Atoll there is another good channel to enter, N. 70° E., distant $4\frac{1}{2}$ miles from Kooah-hooah-doo; and the third island from it to the E.N.E. is the moderate sized island Mah-im-boo-doo (inhabited); on its east side is the channel having 14 fathoms in it, and nearly one mile wide; to the N.E. of this last channel near the S.E. point of the Atoll is another channel, which though narrow is deep. The S.E. point of the Atoll, in Lat. $2^{\circ} 45'$ N., Long. $73^{\circ} 1' 18''$ E., is the south extreme of a large group of 20 islands, situated close together on one reef, extending from the S.E. part to the northward 5 miles, where there is a channel to enter. The east side of the Atoll lies north from the S.E. point, nearly in a

straight line. On the northern part are several detached small islands on the boundary, all on separate reefs, with a safe channel on the south side of every island; they are situated as follows:—in Lat. $2^{\circ} 51\frac{1}{4}'$, $2^{\circ} 53\frac{1}{4}'$, $2^{\circ} 56'$, and $2^{\circ} 59'$ N. The most N.E. island in the Atoll is the small island of Fooree, in Lat. $3^{\circ} 1'$ N., Long. $73^{\circ} 0' 18''$ E.; south of it, one mile, there is another small island, and between them a good channel to enter the Atoll. On the north side of the Atoll there are no islands, two large reefs bound it; between them in the centre, in Lat. $3^{\circ} 1'$ N., Long. $72^{\circ} 55' 48''$ E. is a wide channel with 17 fathoms in it, and to the W.S.W. of this channel 4 miles, is another broad channel between the boundary reefs; also to the S.W. $2\frac{1}{2}$ miles on the N.W. part of the Atoll, is another broad channel. Two moderate sized islands are situated on the boundary on the west side of the Atoll, the northern one, Mar-dally, in Lat. $2^{\circ} 53\frac{1}{4}'$ N., Long. $72^{\circ} 49' 48''$ E.; the other island, Hoo-loo-dally, is 2 miles to the S.S.E. of Mar-dally, and is the larger island of the two; between them is a broad channel $1\frac{1}{4}$ miles wide, with 19 fathoms in it; there is also a good channel close to the S.W. side of Hoo-loo-dally and the north point of the large barrier reef, which extends from this to the S.W. and south of the Atoll. There are 11 small islands in the N.W. part of the Atoll, distant 2, 3, and 4 miles to the N.E. of Mar-dally; on the N.E. one, called Doo-rai, reside a number of working jewellers, who voyage among the Atolls for employment. The general depths in the Atoll are from 27 to 35 fathoms. Within are several large and small coral reefs, dry at low water; and some in the south part that have 1 and 2 fathoms on them; they are all steep, and easily discovered.

“**North Nillandoo Atoll** has not many islands on its boundary, or within the Atoll; on its S. point is the moderate sized island of Nillandoo, in Lat. $3^{\circ} 4\frac{1}{4}'$ N., Long. $72^{\circ} 53' 18''$ E.; this island is inhabited, and affords some supplies; on its east side a good channel (1 mile wide, with 20 fathoms in it) leads into the Atoll. The next island to the E.N.E. of Nillandoo is Dare-un-boo-doo, to the east of which is another good channel, nearly 1 mile wide. On the west side of the Atoll, N.W. from Nillandoo 4 miles, is one long reef on the boundary; a little north of this there is a good channel leading into the Atoll; then there is a circular lagoon reef, to the north of which in Lat. $3^{\circ} 9\frac{1}{4}'$ N. is another channel; these are the only channels on the west side of the Atoll, excepting two on the N.W. part, one close to the south of Himmittee island. Himmittee island is a small island with high trees on it, situated on the boundary of the N.W. part of the Atoll, in Lat. $3^{\circ} 16'$ N., Long. $72^{\circ} 48' 18''$ E. The island, though small, contains between 200 and 300 inhabitants; they are great traders and navigators, sending annually to Bengal five or six vessels or boats, from 80 to 100 tons measurement each: here also is a large school for instructing the native youths in navigation; the natives also make nautical instruments here, and I was somewhat surprised at a very neat wooden sextant made by them. Although this island is thickly inhabited, the fresh water on it is bad. Ten or fifteen years past this island was twice the size it is now; the sea has been gradually washing it away. Close to the south of Himmittee is a good channel leading into the Atoll; a small island within the Atoll, two miles, faces this channel, the least water in it is six fathoms; a ship after entering may pass either to the N.W. or S.W. of the small island, and anchor: a reef extends from Himmittee north $1\frac{1}{4}$ miles, between which and the next boundary reef, to the N.N.E. 1 mile, is a good channel, having 15 fathoms water in it. On the north part of the Atoll is a small island with a clump of cocoa-nut trees on it, in Lat. $3^{\circ} 20'$ N., Long. $72^{\circ} 52' 48''$ E. Close to the east side

of this island are two channels, and to the west of it, $1\frac{1}{2}$ miles, another channel, whose depths are from 15 to 20 fathoms. On the N.E. and east part of the Atoll are channels every 1, 2, and 3 miles, some of them are narrow, but safe. The general depths in this Atoll are 25 and 35 fathoms; several large coral reefs dry at low water are within.

"MOLOQUE ATOLL.—This Atoll, situated to the N.N.E. of Collomandoo Atoll 15 miles, is in length, north and south, 25 miles by 15 miles in breadth, east and west: the N.W. point is in Lat. $3^{\circ} 10' N.$, and Long. $73^{\circ} 21' 48'' E.$, the N.E. point is in Lat. $3^{\circ} 7' N.$, Long. $73^{\circ} 36' 48'' E.$, south or S.W. point Lat. $2^{\circ} 45\frac{1}{2}' N.$, Long. $73^{\circ} 23' 18'' E.$, the centre and eastern side of the Atoll is in Lat. $2^{\circ} 56\frac{1}{2}' N.$, Long. $73^{\circ} 33' 18'' E.$; here are several islands, the largest one called Moloque, which faces a large channel leading into the Atoll. Moloque island may be known by a large banyan tree near its north and centre part; it is in Lat. $2^{\circ} 57' N.$, Long. $73^{\circ} 32' 48'' E.$; it affords good water, plenty of wood, and a few supplies; there is a good channel on each side of its island leading into the Atoll, in which are soundings from 8 to 15 fathoms, sand and rocky bottom, deepening to 25 and 28 fathoms, as you enter the Atoll; in which depth a vessel may anchor on a sandy bottom. The village on Moloque island, containing about 200 inhabitants, is on the N.E. side of the island, whence the natives bring the water. The passage to the south of Moloque is the best, being nearly 1 mile in breadth, with the island of Molee forming the southern boundary of the passage. Molee contains 200 inhabitants, but does not produce good water: the Atoll Warre, or chief of the Atoll, resides here. N.E. of Moloque island, 1 mile, and bounding the north of the other passage leading into the Atoll, is the island Va and, 1 mile in extent: it has 200 inhabitants; the fresh water on it is bad. The passage between Moloque and Vaivand is rather contracted, as shoal water projects from the south end of the Vaivand and the N.E. end of Moloque; however, with a fair wind the centre of the passage is safe, having 8 fathoms sandy bottom. From Moloque or Vaivand island, N.N.E. 10 miles to the N.E. extreme of the Atoll, is nothing but a long barrier reef with no passages through it. There are three small islands in this space; and on the N.E. point of the Atoll are two moderate sized islands (both inhabited), called Rymun-doo, in Lat. $3^{\circ} 5' N.$, Long. $73^{\circ} 36' 18'' E.$; they cannot be approached, except from the interior of the Atoll. From these two northern islands the barrier reef then takes a direction to the W.N.W., between which and the N.W. point of the Atoll are two small, inhabited islands, with high cocoa-nut trees on them. Near and between these islands are two narrow passages leading into the Atoll. The channels are safe, though narrow, being about 50 yards in breadth, and having not less than 7 fathoms in them. From these islands to the N.W. point of the Atoll, which is the elbow of a large barrier reef, there are only two passages, almost too narrow for ships to enter: they might be adopted in case of great emergency. From the N.W. point of the Atoll, in Lat. $3^{\circ} 10' N.$, Long. $73^{\circ} 20' 48'' E.$, as formerly mentioned, the outer and western boundary of the Atoll takes a direction south, a little west, distant 23 miles, to Lat. $2^{\circ} 47' N.$, Long. $73^{\circ} 20' 18'' E.$ In this space there are fifteen passages, or channels, all safe for ships, some of them rather small; indeed, almost at every mile you find a passage on this side of the Atoll; none of them have less water than 10 and 15 fathoms: there is only one small island in the centre of this space, to the south of which is a good channel; the island has neither inhabitants nor water,

and is called Too-ah, in Lat. $2^{\circ} 54' N.$ On the south point of the Atoll, from Latitudes $2^{\circ} 45\frac{1}{2}'$ to $2^{\circ} 48\frac{1}{2}' N.$, Long. $73^{\circ} 23' 18'' E.$, are situated on the barrier reef six islands close together, two of which are inhabited, and possess good water; they can only be landed upon from the inner part of the Atoll: from this to Moloque island is N.E. 15 miles, and is one continued barrier reef, without a passage through it; several heaps of coral stones are here and there seen above the surf, and on some are bushes: the surf from the long S.E. swell breaks very high here, even in N.E. Monsoon. As you approach Moloque several smaller islands are on the barrier to the S.S.W. of it, from four to five miles. The Atoll altogether contains 21 islands, nine of which are inhabited, having a population of about 900 inhabitants. There are a number of coral patches within the Atoll, and the depth of water is from 28 to 38 fathoms on a sandy bottom; the greatest depth is in the centre of the Atoll: it is high water at three hours, full and change of moon, rise and fall about four feet.

"CHANNEL BETWEEN MOLOQUE AND PHA-LEE-DOO ATOLLS.

—Between these two Atolls is $8\frac{1}{2}$ miles from the north part of Moloque to the south part of Pha-lee-doo, on which is a small island called Ra-heck-doo, in Lat. $3^{\circ} 19' N.$, Long. $73^{\circ} 25' 48'' E.$; but this channel ought not to be used by ships, as it is nearly filled up by a large lagoon reef, dry at low water, called Wah-ter-oo reef, leaving a small channel on each side from 2 to 3 miles broad, having no soundings in them. The channel near Moloque Atoll is the larger; in both these channels the tides and currents run very strong, in which it is high water at three hours; flood to the east; ebb to the west. Wah-ter-oo reef, situated between the two Atolls, is almost circular, and nearly 4 miles in diameter; there are two low bushy islands on its south part: between these islands is the only opening for a boat, leading into the lagoon within the reef, in which there are soundings from 12 to 20 fathoms on a white sandy bottom; there are some young cocoa-nut trees on these islands, as also some wells, in which the fresh water rises and falls with the tide, being drinkable only at low tide. There are no inhabitants on them. Should a ship be obliged to pass through this channel from the eastward, she may clear the western Atolls by passing between the channel separating north and south Nillandoo, distant about 30 miles to the S.W.; and, should a ship coming from the westward enter the channel between the north and south Nillandoo, she may clear the eastern Atolls by passing through the channel between Moloque and Wah-ter-oo reef, or Pha-lee-doo Atoll and the reef; and, if the winds will not allow her doing so, she can steer to the S.E. round the south of Moloque, or to the north round Pha-lee-doo Atoll, into the Pha-lee-doo channel.

"PHA-LEE-DOO ATOLL.—This Atoll is the next to the north of Moloque, and is situated between Lat. $3^{\circ} 19\frac{1}{2}'$ and $3^{\circ} 41' N.$: it is of an extraordinary shape, like a gouty foot and leg; the sole of the foot, or south part of the Atoll, is one immense barrier reef, extending 20 miles E.N.E. and W.S.W. On the eastern point, or toe of the Atoll, is an island (now uninhabited) called Fa-ta-o, which lies in Lat. $3^{\circ} 27\frac{1}{2}' N.$, Long. $73^{\circ} 43' 48'' E.$ on the extreme point of the barrier: there is no passage into the Atoll near this island. It is safe to approach from the eastward; coming from the northward, care should be taken not to be drifted to the westward of it, as there is a deep bay on the east side of the Atoll; the currents and tides run very strong into this bay, particularly during the N.E. Monsoon. A heavy swell sets direct on the islands in the centre and east side of the Atoll into this bay; and,

though there are channels close to all these islands, as well as several better ones to the northward of them, it would be hazardous for a vessel to steer for these channels or passages with light airs and a heavy swell. The north part of the Atoll, or Phoo-lee-doo island, is in Lat. $3^{\circ} 41' N.$, Long. $73^{\circ} 22' 48'' E.$; the centre and west side of the Atoll is in Lat. $3^{\circ} 30' N.$, Long. $73^{\circ} 15' 28'' E.$; at the south point, or heel of the Atoll, is an island called Ra-chee-doo, in Lat. $3^{\circ} 19' N.$, Long. $73^{\circ} 25' 48'' E.$ On either side of this island is a fine safe channel leading into the Atoll; within are numerous reefs and coral rocks, whose sides are precipitous, having soundings along-side of and between them, from 25 to 35 fathoms. There are three channels leading into the Atoll on the N.W. side, nine on the S.W., and two on the south point at Ra-chee-doo island. There are no channels on the south and east sides, but in the deep bay between the N.E. and east points there are 16 channels, all safe, some of them rather narrow. There are two small islands on the N.E. part of the Atoll, Dhig-gherrie and Alley Mattar, the former the northern one, the latter the southern, in Lat. $3^{\circ} 36' N.$ Close to both these latter islands are good channels leading into the Atoll: there are only ten islands in the Atoll, five of them inhabited, containing a population of 300 inhabitants. The Chief, or Atoll Warree, resides at Tin-a-doo island, which is the northern one of those islands in the centre of the bay, between the East and N.E. points of the Atoll, in Lat. $3^{\circ} 29\frac{1}{2}' N.$, Long. $73^{\circ} 30' 3'' E.$ None of these islands afford wholesome drinking water, it is all brackish, the natives catch what they can when it rains; all kinds of pots and pans are then in requisition: the coconut trees are very useful for catching the rain, as round the base of their trunks they tie leaves to conduct the water into jars. Some few turtle are to be procured, and a few fowls; some limes and fruit; firewood is in plenty.

"ARIADDOO CHANNEL AND PHOO-LEE-DOO CHANNEL.—Ariaddoo channel is formed between the north part of Nillandoo Atoll and the south part of Ari Atoll, in Lat. $3^{\circ} 30' N.$, Long. $72^{\circ} 49' 48'' E.$; the north part of Nillandoo Atoll is in Lat. $3^{\circ} 20' N.$, Long. $72^{\circ} 52' 48'' E.$; it is 10 miles in breadth, free from dangers, and has no soundings in it. Should a ship from the westward enter this channel, she may clear the Atolls to the eastward when she is at the entrance of the channel, by steering N.E. by E. 36 miles, which will bring her between the Atolls of South Måle and Pha-lee-doo, called the Phoo-lee-doo channel, or she may steer from Ariaddoo channel to the E.S.E. through the channel, between Moloque and Pha-lee-doo, as formerly described.

"Phoo-lee-doo channel is safe, being bounded on its north side by the south point of South Måle Atoll, in Lat. $3^{\circ} 48\frac{1}{2}' N.$, Long. $73^{\circ} 22' 48'' E.$, and on the south side by the north point of Pha-lee-doo Atoll, on which is the island of Phoo-lee-doo in Lat. $3^{\circ} 41' N.$, Long. $73^{\circ} 22' 48'' E.$: this channel is $8\frac{1}{2}$ miles wide. Should a ship enter this channel from the east, she must clear the western Atolls, by steering to the S.W. through the Ariaddoo channel. The tides and currents in these channels set east and west, and are strong during the springs. Flood tide to the eastward, ebb to the westward; high water about two hours, full and change of the moon.

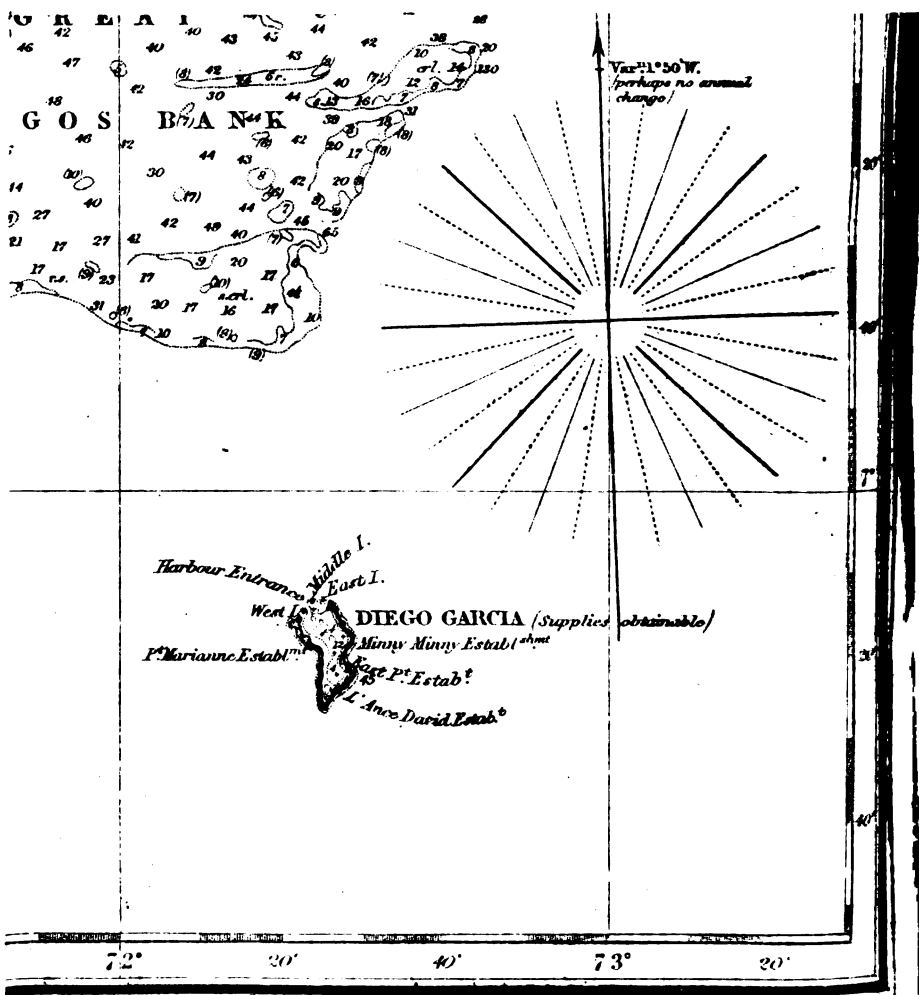
"ARI ATOLL.—This is one of the western Atolls, and situated between Lat. $3^{\circ} 30'$ and $4^{\circ} 17' N.$, Long. $72^{\circ} 56' 48''$ and $72^{\circ} 40' 18'' E.$: it is of oblong shape, 48 miles in length, north and south, by 17 in breadth, east and west. The greatest number of islands are situated on its eastern boundary, and they are generally small. The Atoll

has no barrier reef surrounding it, except a small space on the S.W. part; on all other sides, west, north, and east, are numerous good channels leading into the Atoll, safe for any ship to enter; those on the west side of the Atoll are the broadest, and are 13 in number, formed between the large lagoon reefs and the islands on the boundary: they occur every 3 and 4 miles. The principal islands on the western boundary are as follow:—Man-doo, in Lat. $3^{\circ} 43' N.$, Long. $72^{\circ} 41' 18'' E.$; He-men-doo, in Lat. $3^{\circ} 56' N.$, Long. $72^{\circ} 43' 18'' E.$; Mah-lus, in Lat. $4^{\circ} 0' N.$, Long. $72^{\circ} 41' 18'' E.$; Feri-doo, in Lat. $4^{\circ} 3\frac{1}{2}' N.$, Long. $72^{\circ} 42' 3'' E.$ All the above islands are inhabited, and afford wood, water, and some few supplies. To the south of Man-doo is a good channel; south of He-men-doo another good channel between it and a small island, which lies 2 miles S. by W. from He-men-doo. Mah-lus island has on both sides of it an excellent channel, as also on both sides of Feri-doo island. On the N.W. boundary of the Atoll a small group of four small islands are situated on the south and west side of a lagoon reef: the northern one of the four is the largest, and is named Mattewares, in Lat. $4^{\circ} 12' N.$, Long. $72^{\circ} 43' 18'' E.$ The island is inhabited, and affords good water and some few supplies. N. by E. of the island, 2 miles, is another small island with a narrow channel to the south of it; but close to the south of the group a large channel, $1\frac{1}{2}$ miles wide, with 25 fathoms water in it, leads into the Atoll. There is a large lagoon reef on the north part of the Atoll, 5 miles in extent, which forms the north part of the Atoll, in Lat. $4^{\circ} 17\frac{1}{2}' N.$, Long. $72^{\circ} 45' 48'' E.$: to the east of this reef is a channel 3 miles wide, leading into the Atoll, with not less than 22 and 27 fathoms in it. Soundings, from 100 to 170 fathoms, extend from the N. and N.E. of Ari Atoll, 5 and 6 miles. The island of Occulous, which is inhabited and affords some few supplies, as also wood and water, is situated on the N.E. part of the Atoll, in Lat. $4^{\circ} 13\frac{1}{4}' N.$, Long. $72^{\circ} 50' 48'' E.$ A ship may anchor at this island without trouble or danger, except a few coral patches on the boundary to the S.E.; two small islands lie close to Occulous, distant 1 mile, one to the east, another to the north. The north part of Ari Atoll is very convenient for ships anchoring, as all dangers are visible, and the depths from 25 to 29 fathoms. To the N.E. of Ari Atoll, 5 miles, is a large lagoon reef, which I have named Ross' Atoll, in honour of Captain Daniel Ross, of the Indian Navy, formerly Marine-Surveyor-General. **Ross' Atoll** is nearly circular, its diameter $4\frac{1}{2}$ miles, its north part in Lat. $4^{\circ} 20' N.$, Long. $72^{\circ} 57' 48'' E.$, its west side in Long. $72^{\circ} 54' 48'' E.$; on its centre and south sides are three islands close together; the western one is the largest, and called Couramat-tee, in Lat. $4^{\circ} 16' N.$, Long. $72^{\circ} 57' 18'' E.$ It is inhabited. Between the islands is a channel for small vessels leading into the Atoll, and another channel with 8 fathoms in it on the N.E. side, near which, on the south side, is the small island of Welle-gan-doo, in Lat. $4^{\circ} 18\frac{1}{2}' N.$, Long. $72^{\circ} 59' 18'' E.$ The north and western side of this Atoll is one continued barrier reef; within are soundings from 15 to 20 fathoms, but it is full of coral patches. Between Ross' Atoll and Ari Atoll the channel is safe, having deep soundings from 100 to 140 fathoms. North of Ross' Atoll, 6 miles, is the moderate-sized island of **To-doo**, about $1\frac{1}{2}$ miles in length, by 1 mile in breadth; it stands by itself, detached from any Atoll or reefs; it is steep, and safe to approach, the reef which surrounds it not extending more than 150 yards from the trees; its centre is in Lat. $4^{\circ} 25\frac{1}{4}' N.$, Long. $72^{\circ} 56' 18'' E.$ It contains between 200 and 300 inhabitants, has good water, and some supplies; the natives on it are principally employed in fishing. To-doo island, Ross' Atoll, and the north part of Ari Atoll, bound the south part of the west entrance to the Cardiva

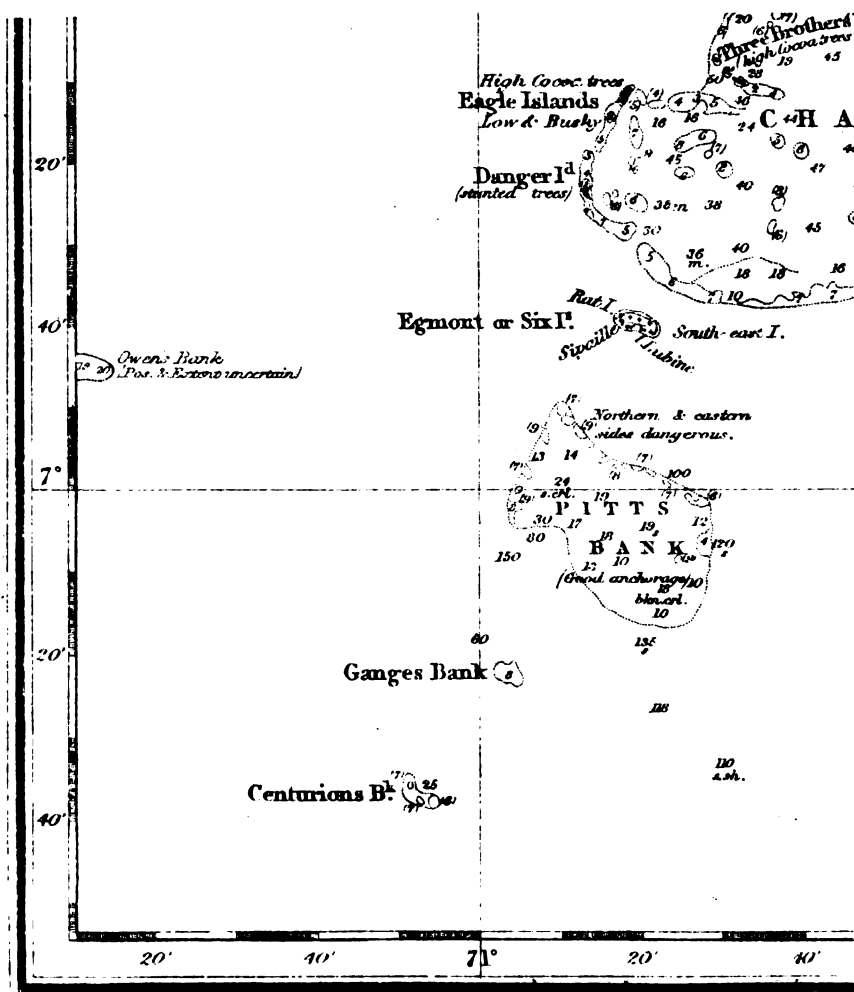
channel. The east side of Ari Atoll abounds with numerous channels leading into the Atoll; some of them are small, but all safe, if a good look-out is kept. On the S.E. part of the Atoll there is a large island called Dhig-hoorah, its north part in Lat. $3^{\circ} 33\frac{1}{2}'$ N., Long. $72^{\circ} 54' 48''$ E. This island is inhabited. To the north of it, 1 mile, is a broad channel leading into the Atoll. Between it and the south point of a reef, extending to the south 2 miles, from the island of Dun-gah-tee, an inhabited island, lying 4 miles N. by E. from Dhig-hoorah; five miles to the S.W. of Dhig-hoorah is one reef, on which are three smaller islands, then two other larger ones, inhabited; the most southern one is Ari-ad-doo, and is on the extreme south point of the Atoll, in Lat. $3^{\circ} 30'$ N., Long. $72^{\circ} 49' 48''$ E.; on either side of it is a safe channel leading into the Atoll; to the westward and north of Ari-ad-doo, 8 miles, is one continued barrier reef, on the S.W. boundary of the Atoll, on which are few islands. There are numerous large coral reefs within the Atoll, which are not all dry at low water, some having 2 and 3 fathoms on them: many of the large coral reefs whose edges are dry at low water, have deep lagoons inside of them; all may be avoided on a clear day with a good look-out. The general depths in the Atoll are from 30 to 40 fathoms; the tides on the springs are felt in this Atoll.

"SOUTH MALE ATOLL.—This is one of the eastern Atolls, and is situated between Pha-lee-doo Atoll and North Måle Atoll, between Lat. $3^{\circ} 49'$ and $4^{\circ} 8'$ N., and between Long. $73^{\circ} 19' 18''$ and $73^{\circ} 30' 48''$ E.; its greatest length N. by E. and S. by W. 20 miles, and 12 miles broad near the northern part. It contains 22 islands, three only of which are inhabited by about 200 people. None of the islands afford good water or supplies; they are all situated on the eastern side, except three on the western. Where islands are situated, there are safe channels to enter the Atoll; sometimes on both sides of the islands—excepting the smaller islands on the S.E. boundary, which are on a long and broad barrier reef, extending round the south side of the Atoll for 8 miles, leaving a channel on the S.W. part of the Atoll, with a heap of dry coral rocks on the west side of the entrance. The channel is half a mile broad, and has soundings in it from 5 to 8 fathoms. The west side of the Atoll is nearly a straight line, in Long. $73^{\circ} 19' 48''$ E. There are several safe channels on this side, particularly one, in Lat. $4^{\circ} 1\frac{1}{2}'$ N. On the N.W. part are several channels, but they are small. On the N. part of the Atoll are two small islands, the easternmost, called War-doo, in Lat. $4^{\circ} 7\frac{1}{4}'$ N., and Long. $73^{\circ} 25' 33''$ E.; the westernmost small island is called Villar-sar-roo; between them is a good channel leading into the Atoll, as also another channel to the east of War-doo; from thence, to the N.E. part of the Atoll, 4 miles, is one large reef, on the east part of which is a small island called Finorah, close to the south of which is a broad channel leading into the Atoll. A small island just within this Atoll faces this channel, and is named Heemboo-doo. The general depth in this Atoll is from 25 to 32 fathoms, sandy bottom; it is full of reefs and little coral patches, but these are easily avoided by a good look-out from the masthead.

"WAR-DOO CHANNEL.—This channel is formed between the south part of North Måle Atoll and the north part of the South Måle; it is only $2\frac{1}{2}$ miles broad; its N.E. side is bounded by the island of Måle, or King's island, in Lat. $4^{\circ} 10'$ N., Long. $73^{\circ} 28' 48''$ E.; the S.E. side by the reef and island of Finorah, in Lat. $4^{\circ} 6'$ N., Long. $73^{\circ} 20' 48''$ E.; its western entrance faces Ari



Words like *Islands* signify unsurveyed, and of very doubtful authority.
The Variation of the Compass is for the year 1863.



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Atoll. On its N.W. boundary is the small island of Ge-rar-ver, on the S.W. part of Mäle Atoll, in Lat. $4^{\circ} 11\frac{1}{2}'$ N., Long. $73^{\circ} 22' 48''$ E. The S.W. boundary is the north part of South Mäle and the small island of Villa-sar-roo, in Lat. $4^{\circ} 7' 11''$ N., Long. $73^{\circ} 24' 48''$ E. This channel may be used by ships which cannot pass through the Cardiva channel. After entering by the westward, the direction of the War-doo channel is east and west 8 miles. The tides are very strong in this channel; the flood-tide to the east, the ebb to the west. During the Monsoons, when the tides are increased in strength by the currents, they run with great velocity, 4 miles an hour, and cause a great rippling in the sea, setting in whirlpools; difficult in light winds to steer a ship through. There is no bottom in this channel at 200 fathoms. From the west entrance of War-doo Channel to Ari Atoll is 25 miles; the space between them is free from danger; from To-doo island, in the Cardiva channel, it bears S. 55° E., 30 miles distant."

CHAGOS ARCHIPELAGO.

The following description of the Chagos archipelago is by COMMANDER MORESBY, of the Indian Navy, who surveyed the islands in 1837-8. The longitudes are dependent upon Bombay Observatory, ascertained to be $72^{\circ} 48' 4'' 5$ E.*

"The liberal means placed at my disposal enabled us to go over a great deal of ground, and to ascertain the limits of a great bank occupying the whole space between the outer islands, which bank I have named the Great Chagos bank, the outer edge of which is dangerous for ships, having in some parts only 4 fathoms, and seldom more than 6 or 7 fathoms; when over the edge the soundings suddenly deepen to 30 and 45 fathoms, with here and there patches of 8 and 6 fathoms. As a caution to navigators, I would advise them not to pass over this bank, except in a case of necessity, and that only in the day-time. Should a ship in the vicinity of these islands be in want of stock, water, and wood, it can easily be procured, without passing over or near this bank, by visiting either Peros Banhos or Diego Garcia, both of which lie without the bank, and afford every facility for vessels touching there. Pigs and poultry may be obtained in abundance. Masters of vessels should not allow their seamen to cut down the cocoa trees for the sake of the nuts, as they can be readily procured by other means.

"**DIEGO GARCIA, or GREAT CHAGOS ISLAND**, extends from Lat. $7^{\circ} 13\frac{1}{2}'$ to $7^{\circ} 26\frac{1}{2}'$ S., and a meridian line through its centre, is in Long. $72^{\circ} 24' 48''$ E. The variation in 1837, by theodolite, $2^{\circ} 20'$ W., and the dip of the magnetic needle 35° : the rise and fall of the tides from 5 to $6\frac{1}{2}$ feet. The tides run into the harbour to the S.S.E., and out N.N.W. It is high water at 1h. 30m. full and change; at spring tides, in the entrance of the channel, from its being contracted, the tides run about 2 miles per hour, and unless a vessel has a fair wind, or a good slant, she would find it impossible to work in to anchorage against the tide. This is frequently the case during the S.E. trade winds, which blow generally directly out of the harbour. I would advise a vessel, wishing to touch at this island during these winds, to make the island from the east; and so time her arrival off the entrance of

* See note at foot of page 585. Refer to the charts of the Chagos Archipelago, published by the Hydrographic Office, Admiralty, Nos. 3 and 4. Also, to the plan of the islands, in the sheet of Plans of Islands in the Indian Ocean, issued by the publishers of this work.

the channel as to have the tide in her favour to enter, when she can easily work in, as the channel is a mile broad; taking care not to approach too near to the reef, which extends to the westward from Middle island, which reef is very deceptive, having some shoal patches of coral off the western extreme, not easily discernible. The western island is steep, and can be safely approached: when inside the channel, the only care required is to have a look-out at the mast-head, to avoid the coral patches, few of which are in the centre of the bay, having 3 and $2\frac{1}{2}$ fathoms on them. Care must be taken not to stand too close over to the islands bounding the eastern side of the channel, as there are several coral knolls about this part: a coral band, dry at low water, surrounds the inner part of the island, extending from 100 to 200 yards off shore—this is easily seen. The best anchorage for a ship, during the S.E. trade, is at Minni Minny establishment, which bears from the centre of Middle island S. 29° E. 7 miles. At this place a ship anchors with the houses bearing S.E. or E.S.E., distant $\frac{1}{2}$ of a mile, and $\frac{1}{4}$ of a mile off the shore reef, in 10 fathoms, sand, the water perfectly smooth, and boats able to land on the beach at low water. The fresh water in wells is close to the beach, and very excellent; fire-wood also is equally available, and only requires cutting. In the N.W. Monsoon, the rainy season, this anchorage is rather a lee shore, and a chopping swell renders landing at times unpleasant. Vessels ought in this season, which is from the middle or beginning of December to the beginning or end of April, to anchor on the west side of the bay, under lee of the land near to point Marianne establishment, which bears from the centre of Middle island S. by E., distant $5\frac{1}{2}$ miles. A shoal bank of sand and coral extends off point Marianne, $\frac{1}{4}$ of a mile into the bay, close to the edge of which a ship may anchor in 8 or 10 fathoms, soft sand. Point Marianne and the establishment is known by some high trees of the fir species.

"The **Great Chagos Bank**, of which Blair's bank, as mentioned by HOBBSBURGH, is only a part, occupies the centre of the Chagos archipelago. The S.W. point of this bank is nearly north from Diego Garcia, 32 miles, and in Lat. $6^{\circ} 42' S.$, Long. $72^{\circ} 23' 48'' E.$; it then takes a direction N. 30° E. 39 miles, to its eastern boundary, which is in Lat. $6^{\circ} 8' S.$, Long. $72^{\circ} 44' 48'' E.$ Between these two points it curves to the west 5 miles; from the eastern boundary the bank continues to the N. by W. 29 miles, in Lat. $5^{\circ} 40' S.$; it then runs west 35 miles, which is the northern and eastern edge of it. On this part lies the island I have called Nelson's island, in Lat. $5^{\circ} 41' S.$, and Long. $72^{\circ} 16' 48'' E.$ The N.W. point of the Great Chagos bank is in Lat. $5^{\circ} 49' S.$, and Long. $71^{\circ} 33' 48'' E.$; it then takes a direction to the S. by W. 18 miles, to the north Brother island; it still continues further to the west, from 16 to 17 miles, and on its western edge lie the Eagle and Danger islands, the former in Lat. $6^{\circ} 11' S.$, Long. $71^{\circ} 17' 48'' E.$, the latter in Lat. $6^{\circ} 23' S.$, Long. $71^{\circ} 12' 48'' E.$ The bank then takes a sudden turn to the E.S.E. about 70 miles, passing to the northward of the Six islands, leaving a channel of 5 miles in breadth. The soundings on the edge of this bank are from 4 to 10 fathoms, sand and coral rock; the shoal water on its edges is not very broad. I consider it very dangerous; for, though the surveying vessels never found less water than 4 and $4\frac{1}{2}$ fathoms, a ship would do wrong to proceed over it without a good look-out, or adopting some of the channels which lead in. On some parts of the verge of this bank not less than 7 and 8 fathoms is to be found: when inside the bank, the soundings deepen to 40 and 45 fathoms, soft clay. Several coral patches, with

7 and 8 fathoms on them, will be found in the interior of the bank—capital spots to anchor on. Fish, such as sharks and some red rock fish, are in abundance.

"Pitt's Bank" is to the S.W. of the Great Chagos bank, about 17 miles; between which there is a clear channel. The Six islands are on the northern side of this channel. This bank is of an oblong shape, N.W. and S.E., near 30 miles long, by 17 broad; its southern extreme is in Lat. $7^{\circ} 17' S.$, and Long. $71^{\circ} 24' 48'' E.$, the northern extreme in Lat. $6^{\circ} 49' S.$, and Long. $71^{\circ} 10' 18'' E.$, and bears from the centre of the Six islands S. $42^{\circ} W.$, distant $13\frac{1}{2}$ miles, between which and the bank is a good channel.

"The trees on the Six islands are just discernible from the poop of a ship when on the northern end of the bank. This bank is dangerous on the north and north-eastern sides, or edges; on some parts of this boundary we found 6 and 4 fathoms—there may be less; on the centre of the bank the soundings are deeper, from 17 to 20, and 24 fathoms, soft bottom; like the Great Chagos bank, it is steep all round. Close off the south end of this bank we had no soundings at 200 fathoms, yet at two miles' distance we obtained deep soundings on another bank, extending to the S.E. about 18 miles, on which we had from 110 to 135 fathoms, sand and shells. Pitt's bank ought to be avoided by navigators, more especially at night; yet in the daytime it may be passed over, if a good look-out is kept, and the shoal patches avoided. There is good anchorage on the bank.

"Ganges Bank" is a small bank 15 miles distant to the S.W. of the Pitt's, its centre is in Lat. $7^{\circ} 22' S.$, and Long. $71^{\circ} 3' 18'' E.$; it is from 3 to 4 miles in extent; least water 8 fathoms, and 12 fathoms in the centre. There are no soundings near the bank at 200 fathoms.

"Centurion's Bank," to the S.W. of the Ganges, 18 miles; between them are no soundings; the least water on this bank is 7 fathoms, on the N.E. edge, where we observed the heavy rollers breaking at times, and where two of our boats were in danger of being swamped. We anchored on the centre of it in 14 fathoms; it is from 3 to 4 miles in extent, and in Lat. $7^{\circ} 37' S.$, and Long. $70^{\circ} 51' 48'' E.$ There are no soundings close to the bank.

"Owen's Bank" is supposed to be in Long. $70^{\circ} 6' 48'' E.$, yet, as I place Diego Garcia 8' more east, Owen's bank will be in Lat. $6^{\circ} 46\frac{1}{2}' S.$, and Long. $70^{\circ} 14' 48'' E.$ We did not explore this bank.

"Six Islands," bearing from Diego Garcia N. $62^{\circ} W.$ (true), distant $69\frac{1}{2}$ miles. One of the largest islands of the group, on which the proprietor has built his magazines and establishment for cocoa-nut oil, is the south-easternmost island; it is in Lat. $6^{\circ} 40' S.$, and Long. $71^{\circ} 21' 18'' E.$ From this, other five islands lie on the circular edge of a coral reef, extending to the N.W. by W. 5 miles; the northern islands have conspicuous trees on them; there are no channels between the islands, nor soundings close to the reef, which is of an oval shape, having a lagoon in its centre, and depth of water in it from 8 to 12 fathoms; it is full of coral knolls. There is a wide channel leading into this lagoon on the north side of the circle; but only small vessels can enter, as 2 fathoms is the greatest depth of water on the edge of the reef. We found no coral bank extending off to the S.W. The reef is steep close to the breakers. The current and tides sometimes wash the loose sand off the reef to leeward, discolouring the blue water for half a mile, which we took to be shoal water fit for anchorage, until we found we were deceived. These islands produce 6000

gallons of oil yearly. Pigs and poultry in abundance; also pigeons, and the fat tail land crab, which are numerous. Fresh water is also easily procured; but should a vessel be in want of these articles, Diego Garcia, or Peros Banhos, as also Eagle island, are more convenient for anchoring and landing.

"**Danger Island**, in Lat. $6^{\circ} 23' S.$, Long. $71^{\circ} 13' 18'' E.$, is to the N.W. of the Six islands, and lies on the western edge of the Great Chagos bank. The island is nearly $1\frac{1}{2}$ miles in extent, low, and covered with trees; we could not land on it from the violence of the surf. It is said to be full of wild poultry, and belongs to the proprietor of Eagle island. S. by W. from the island, distant from 2 to 3 miles, a dangerous reef extends, on which the sea breaks at times. There is good anchorage to the east of the island in 17 fathoms water, which is on the Great Chagos bank.

"**Eagle Island**, to the N.N.E. of Danger island, 12 miles, is $2\frac{1}{2}$ miles in extent, N.E. and S.W., by $\frac{1}{2}$ to $\frac{3}{4}$ mile broad, and lies also on the western edge of the Great Chagos bank. The island is covered with cocoa-trees, and some high jungle trees on its S.W. point, off which a breaking reef extends $\frac{1}{2}$ a mile. To the S.W. of Eagle island, distant 2 miles, lies a woody island, half way between which and Eagle island there is a good channel, and anchorage in 7 or 8 fathoms water, sandy and coral bottom between the two islands, taking care not to stand to the northward of the transit line between the two islands, as the bank suddenly ceases. There are no soundings or anchorage to the N.W. of Eagle island, unless a ship would run the risk of anchoring on the bank of coral reef, extending 300 yards from the island, on which there is 5 and 6 fathoms; but this is a dangerous place in case of a shift of wind. The village lies at the N.W. side of the island, near the centre, and is in Lat. $6^{\circ} 11' S.$ and Long. $71^{\circ} 17' 48'' E.$ The landing-place is opposite the village; it is bad during the N.W. winds from December to May, but good during the S.E. trade; landing should never be attempted on any other part of the island, it being dangerous. A ship requiring supplies of wood, water, and poultry, may easily obtain them at this island, and may anchor as before-mentioned between the two islands. The proprietor of this island obtains yearly about 6000 gallons of cocoa-nut oil, a small quantity of cotton, soap, and tortoise-shell. Salt fish is also exported.

"The **Three Brothers**, small islands, as before-mentioned, situated on the N.W. verge of the Chagos bank, and 12 to 14 miles to the eastward of Eagle island, are small woody islands covered with cocoa-nut trees. They are not inhabited, yet belong to the proprietor of Eagle island; the centre one is in Lat. $6^{\circ} 8\frac{1}{2}' S.$, and Long. $71^{\circ} 30' 48'' E.$; from this, the South Brother, the largest, lies 2 miles to the S.W., and the North Brother, the smallest, 2 miles to the N.W. These islands are difficult to land upon, on account of the high surf; excepting the middle one, round which, on the east side, there is a lagoon reef, and on the north part there is a channel leading to the Middle Brother; this island does not afford water. There is anchorage to the eastward of the Brothers in various depths, from 12 to 40 fathoms—the shoaler part near the North Brother; off the South Brother a reef extends; between the South and Middle Brother there is a channel having in the centre a rocky islet, on each side of which the soundings are from 12 to 20 fathoms. Between the North and Middle Brother is a good channel, from 35 to 25 fathoms. Close to the S.W. side of the Brothers a deep channel, with 40 and 50 fathoms in it, leads on the Great Chagos bank, on the verge of which, both to the N. and S.W. of the Brothers, there are some dangerous shoal spots.

"**Nelson Island**, in Lat. $5^{\circ} 40\frac{1}{2}' S.$ and Long. $72^{\circ} 16' 48'' E.$, on the north

and eastern verge of the Great Chagos bank, was discovered by CAPTAIN DIXON, of the *Sivera*, and by CAPTAIN BIDIN, of the *Victory*, in 1835, and severally called by them *Sivera* and *Nelson* islands; the latter name I have retained. It is a low rocky island, about 12 feet above the sea, composed of rocky cliffs of sand-stone; the east and west ends of this island are covered with long grass and a few bushes; it is nearly divided in two by a dry sand-bank, and seen from a little distance looks like two islands; from one extreme to the other, east and west, is $1\frac{1}{4}$ miles in length, by 400 or 500 yards broad; there are no soundings close off its northern side; on the east and west are several shoal spots of 4 fathoms, on the verge of the Chagos bank; yet there is a good deep channel of 25 fathoms close to the east side of this island, leading on the bank, where a vessel may anchor at any distance from the island in 16 to 17 fathoms, sand and coral. This island bears from the *Victory's* bank S. 31° E. distant 10 miles—between which there are no soundings; and from the S.W. island of the Salomon group S. 20° E. 21 miles.

"Victory Bank, in extent from 3 to 4 miles, having from 3 to 4 fathoms water on it. I consider it is a dangerous coral bank, for though we found not less than 3 fathoms, there may be less on some of the rocks. It was discovered by CAPTAIN BIDIN, in the *Victory*, in 1835, and lies south from the Salomon islands, distant 11 miles, and is in Lat. $5^{\circ} 33'$ S. and Long. $72^{\circ} 11' 18''$ E. There are no soundings close off this bank.

"PEROS BANHOS, the largest group of the Chagos islands, and, excepting Diego Garcia, the most valuable in the production of cocoa-nut oil (about 34,000 gallons yearly), is the property of a gentleman at Mauritius, whose overseer and negro apprentices, about 90 in number, manufacture the oil. This group was discovered by the French in 1744; their situation is between Lat. $5^{\circ} 13\frac{1}{2}'$ and $5^{\circ} 27'$ S., and Long. $71^{\circ} 41' 48''$ and $71^{\circ} 55' 48''$ E. It forms nearly a square, of 50 miles in circuit, containing 27 islands of small extent, low, and covered with cocoa trees; nearly all are on the north and west sides; two only being on the east side, four on the south side—two of which are barren rocky islands. Between all the northern islands are good channels leading in, having 8 and 10 fathoms water. The N.W. islands are connected by a barrier reef, which continues to the southward on the west side, as far as the middle of the group, where a good channel, $\frac{3}{4}$ of a mile wide, leads in, having 10 and 15 fathoms water in it. The barrier again commences on the southern side of this channel, and connects the islands on the southern and western sides; it breaks off again into several channels on the centre of the south side, close to two small rocky islands, with bushes on them, **Isle Vache Marine**, and **Coin du Mire**. Here the barrier is lost altogether above water; it can be traced under water, having 3, 5, and 7 fathoms on it. A vessel of 300 or 400 tons may pass over it, but the deeper parts ought to be chosen. A ship making Peros Banhos from the southward, or during the period of the S.E. trade winds, where a heavy swell rolls into the Atoll, would do well to enter by the southern channels, and anchor under the lee of the south westernmost island and reef, where there is an establishment of negro apprentices on **Isle du Coin**; this island is the south westernmost island of the group, about 2 miles long: $\frac{3}{4}$ of a mile from its east end lies a small island, with high forest trees on it. Still more to the east of this small island, distant 1 mile, lies another small island, larger than the former, but covered with low trees, and is called **Isle Foquet**; close to this latter island ends the barrier reef, round which a vessel may steer to enter the group; the channel here

between isle Foquet and isle Vache Marine being 2 miles wide, with 7, 8, and 10 fathoms water in it. From the channel, a west course, $3\frac{1}{2}$ miles, leads to the anchorage off isle du Coin, in 13 to 15 fathoms water, with the houses bearing S.W., distant about 1 mile: wood, water, poultry, and some fruits and vegetables, may be obtained from the negroes. This is a good anchoring-place during the N.W. winds, or rainy season; but as the northern islands are then more directly to windward, and afford better shelter for a vessel getting her supplies, I would recommend **Diamond island** from December to May: it is the north-westernmost island of the group, about 2 miles long, thickly covered with cocoa trees, and contains the principal establishment, which is in Lat. $5^{\circ} 15' S.$, Long. $71^{\circ} 42' 48'' E.$; and due north 11 miles from the southern establishment. A vessel may have the use of flat-bottomed boats to bring her water-casks off. There are abundance of poultry, fruit, vegetables, and pigs. The anchorage is $\frac{1}{2}$ a mile distant from the houses, bearing N.W. in 16 to 17 fathoms. A coral reef extends from the shore, 200 to 300 yards, which is dry at low water, and is steep close to its edge. A ship departing from this anchorage, proceeding to the northward, may either proceed through any of the northern channels between the islands, or if the wind is far to the north, she can proceed through the eastern channel. In the centre of the group, on its eastern side, are two moderate-sized islands, covered with cocoa trees, and called **Petite Coquilage** and **Grande Coquilage**. Close to the northern island, Petite Coquilage, there is a good channel of 14 to 15 fathoms depth of water in it; between the two islands there is also 4 and 5 fathoms; from the north side of the channel, at Petite Coquilage, a reef, dry at low water, extends up to the N.E. island, called **Isle Yayo**, to the west of which there is a broad and safe channel. A ship making Peros Banhos from the N.W. during the N.W. winds, may either enter by the western channel, in the centre of the west side, or by Moresby's channel, which is the first channel on the north side, east of Diamond island. **Moresby's Channel** is $\frac{3}{4}$ of a mile wide, and has 7 and 8 fathoms water in it, taking care not to approach too near the spit of sand and coral reef, extending off the east end of Diamond island $1\frac{1}{4}$ miles; and which bounds the west side of the channel, as do Moresby's islands the east, which are bold and safe to approach. The soundings increase in depth to 20 and 30 fathoms, soft bottom, when a vessel has entered the group. Coral knolls are numerous in the centre, and are very easily seen; the sides of them are precipitous, none of them dry at low water, generally 2, 3, and 4 fathoms on them. Close outside the barrier reef of the group we found no bottom at 200 fathoms.

"**Benares Reef, or Shoal**, discovered by us, is a most dangerous shoal coral patch, having only $1\frac{1}{2}$ to 2 fathoms on it, and lies W. $\frac{1}{2}$ S. from the west side of Diamond isle, distant $4\frac{1}{2}$ miles. The sea seldom breaks on it; it is about $\frac{1}{2}$ a mile long N.W. and S.E., and lies outside the Peros Banhos group, consequently ought to be avoided by ships making the island from the N.W. There are no soundings near it, nor between the islands and it.

"It is high water at Peros Banhos at 1h. 30m., rise and fall from 5 to 6 feet; the ebb tide sets to the westward, flood to the eastward; the ebb runs out of all the northern channels.

"**Salomon Islands**, a circular group, containing five large and six smaller islets, is 11 miles in circumference, and has only one opening into it to the N.W.: this passage is narrow, being nearly blocked up by a shoal patch in the middle of the channel, on which there are only $1\frac{1}{2}$ and 2 fathoms. On the northern side of this

patch the channel is the deepest, having 3 fathoms, and only 2 on the south side; the principal island is the S.W. island, called by CAPTAIN BLAIR **Soddam's island**, and is in Lat. $5^{\circ} 21\frac{1}{2}'$ S., Long. $72^{\circ} 9' 48''$ E., and 14 miles to the east of the eastern side of the Peros Banhos. The N.E. island of the Salomon's is called **Ile de Passe**, in Lat. $5^{\circ} 18'$ S. and Long. $72^{\circ} 12' 18''$ E., and bears from the south end of Blenheim reef (a dangerous breaking reef) S. 81° W.; and distant 12 miles from the south end of Speaker bank, between which there are no soundings.

"**Blenheim Reef** is a large lagoon reef, 6 miles in extent, north and south, by 2 miles broad; on the south end there is an opening to the lagoon, and anchorage off it in 6 or 7 fathoms; all other parts of the reef are steep, and have no soundings near. The rocks are generally covered at high water, excepting some large blocks of coral and sand-stone on its eastern side, perhaps the remains of three low sandy islands, as seen by the *Griffin*, in 1749, and also by other ships. The centre of the reef is in Lat. $5^{\circ} 12\frac{1}{2}'$ S., Long. $72^{\circ} 24' 48''$ E., nearly south from the east verge of the Speaker's bank, distant 11 miles; the vicinity of these dangers has been well surveyed by us, and we may confidently say no other danger exists but what we have observed. Between the Blenheim reef and Speaker bank there are no soundings.

"**Speaker Bank** extends from Lat. $4^{\circ} 44'$ to $5^{\circ} 6'$ S., and between the longitudes of $72^{\circ} 12'$ and $72^{\circ} 25'$ E. It is nearly an oval shape, lying N.N.E. and S.S.W. about 24 miles, having a slight indentation on its S.E. side, like all the other banks of the Chagos; its edges are the shoalest part; the least water is 6 and 7 fathoms on its edges, excepting the south part, where we found only 4 fathoms; no doubt the sea would break here at times, when the long ocean-swell comes up with the S.E. trade. A ship ought to avoid this part; the water deepens on the centre of the bank to 15 and 22 fathoms, soft sand, and some spots of coral rock of 6 and 10 fathoms; the whole bank is sand and small coral. There are no soundings to be obtained close outside the bank.

"The currents about the Chagos are generally with the wind; four months, from the middle of December to the middle of April, to the eastward; during June, July, August, and September, to the westward, varying occasionally a little to the north or south of this direction. April and part of May the winds and currents are variable, all November and December the same: we found the greatest velocity of these currents to be 2 miles per hour on the great Chagos bank; this was when the tide and current ran in the same direction. There are regular tides on the banks and islands; the flood sets to the E.S.E., and the ebb to the W.N.W.; high water, full and change, 1h. 30m. Sometimes the tides and currents run obliquely to each other, or against each other, in which case the currents are retarded or accelerated, causing rippings, and if there is much breeze, the swell becomes short, and confused, and on the shoaler parts of the banks heavy rollers break at times, each wave having a rise and fall (by measurement) from 15 to 18 feet: this alone ought to prevent ships crossing these banks when there is much swell, yet, as I observed before, they are easily avoided, and the islands approached with safety. Supplies are readily procured by ships in want of them."

ANDAMAN ISLANDS.

These islands extend from Lat. $10^{\circ} 27'$ to $14^{\circ} 56'$ N., and between Long. $92^{\circ} 25'$ and $93^{\circ} 45'$ E. They contain many fine harbours and anchorages capable of receiving fleets of the largest vessels, but are seldom visited, as there are no places of trade. The inhabitants bear the reputation of being extremely treacherous; hence it is necessary on landing to take all possible precautions against being attacked and cut off from the boats; but very little is really known of the natives of these islands beyond what is contained in occasional notices of shipwrecks, and these invariably represent them as irreclaimably savage, implacable, hostile, and inhospitable.* The islands are covered with dense forest, and there is abundance of fresh water. At Port Blair, in Lat. $11^{\circ} 43'$, a convict settlement has recently been formed by the Government of India.

The Andamans were partially surveyed by LIEUTENANT BLAIR and CAPTAIN MOORSOM in 1789—1790, and in 1858 by the committee appointed by the Governor-General of India to discover a suitable place for a convict settlement. It is mainly from the reports of these surveys that the following description of the islands is derived.

PREPARIS, the northernmost of the Andamans, is $4\frac{1}{2}$ miles long, in a N.N.E. and S.S.W. (*true*) direction, and very narrow, being not more than a mile wide in its broadest part. It is of moderate height, covered with wood, and slopes gradually to the sea. On its east side, at a few paces from a fine, sandy beach formed between two ledges of rock, where boats can land with safety, there is a pond of fresh water very convenient for watering; from it the highest part of the island bears N.W. This east side of the island is very steep, there being at a very short distance from it a depth of 10 fathoms, rapidly deepening to 17 and 22 fathoms. The north end of the island is in Lat. $14^{\circ} 54' 30''$ N., and Long. $93^{\circ} 43' 30''$ E.†

Both the east and west shores of Preparis island are bordered by a reef, which is prolonged southerly from its south end $3\frac{1}{2}$ miles; upon it are some rocks above water. This reef is extremely dangerous, its edge being very steep, and the soundings near it are such that the lead gives little indication of its vicinity.

At about $1\frac{1}{2}$ miles from the north end of Preparis there are some islets named Cow and Calf, connected with which is a bank of 6 to 8 fathoms extending from them nearly two miles, in a N.W. and S.E. direction. A channel, 11 to 24 fathoms deep, separates these from Preparis.

* CAPTAIN J. H. MILLER, in a communication to the *Nautical Magazine*, 1842, says:—"The Islands on the west side of the Andamans are frequented during the fine season, from December to April, by a mixed and mongrel race of Malays, Chinese and Burmese fishermen for *Rêche de Mer* and edible birds'-nests, who are of very doubtful honesty; and it is necessary to take a few muskets and cutlasses, just to show them that you are prepared for mischief in case of need. These fellows are also 'fishers of men,' and to their evil deeds much of the hostility of the islanders may be attributed; they carry off children, for which they find a ready market as slaves in the neighbouring countries. I have been told that formerly they were friendly and assisted these fishermen, until a large party was invited on board a junk or prow (the Chinese got the blame of it), and after being intoxicated were carried off and sold at Achene; and the practice is still carried on by these fellows, who land and carry them off whenever they can catch them. The Andamanians have retaliated fearfully whenever any foreigner has fallen into their power, and who can blame them?"

† This is according to the Admiralty chart, No. 152; but the observations of the Danish corvette, *Galathea*, place the north end of Preparis in Long. $93^{\circ} 38' 27''$, supposing Fort Cornwallis, Penang, to be $100^{\circ} 20' 10''$ E.

"On the west side of Preparis a reef with some islets upon it has its outer edge $2\frac{1}{2}$ miles from the island; in the narrow channel between this reef and the island are soundings of 9 to 15 fathoms. There is also a reef south of this one, on the same side of the island, having some rocks upon it above water, situated about 3 miles westward of the reef which extends southward from the south end of the island; this reef is seated upon a bank of 6 to 10 fathoms, and its south end is distant from the south end of Preparis about $6\frac{1}{2}$ miles in a S.W. by S. $\frac{1}{2}$ S. direction, and from the extremity of the reef extending from the south end of that island S.W. $\frac{1}{4}$ W. 4 miles.

The anchorage at Preparis is on its eastern side in 12 to 14 fathoms, or nearer the island at $\frac{1}{2}$ a mile from the shore in 8 or 9 fathoms; the bottom consists of sand, coral and shells. It is probable that there is anchorage also on its western side.

Although Preparis is considered to be one of the Andaman islands, it does not appear to be united to them by a bank of soundings, for in mid-channel between it and the Great Coco (the northernmost of the group) there is no bottom at 100 fathoms.

GREAT COCO.—At about 46 miles S. by W. $\frac{1}{2}$ W. from the south end of Preparis is Great Coco island, which is sufficiently elevated to be visible from a distance of about 18 miles. It is or was covered with trees. It is about 7 miles long from north to south and 2 miles broad, and has a reef extending from its south end about 4 miles, upon which is an islet; two islets, named Table and Slipper, also lie off its north end. A reef is said to run off a short distance from its north-east shore. The island is seldom visited except for firewood and water.

Great Coco island has been only imperfectly examined, the above particulars are therefore uncertain. The usual anchorage is on its eastern side in 12 to 20 fathoms at about $1\frac{1}{2}$ miles from the shore; it is probable that vessels may also anchor off its west side in a similar depth.*

LITTLE COCO.—This island lies about 10 miles south-westward from Great Coco, is of moderate height, and visible from a distance of about 18 miles. Its extent from north to south is only $2\frac{1}{2}$ miles, and its breadth does not exceed $\frac{1}{2}$ a mile. It is or was covered with trees. According to LIEUTENANT BLAIR's chart, a reef surrounds it except on its east side (which was apparently left unexamined), and extends from its north and south ends about a mile; this reef is steep, there being at a short

* "The Great Coco has timber of a large size growing upon it, and a ship getting disabled in beating down the Bay in the South-west Monsoon may take shelter under this island, and procure sufficient spars to enable her to proceed on her voyage, or may caulk any open butts or seams. She may then, if bound across the equator, pursue her course to the southward, inside of the Andaman and Nicobar Islands, and round Acheen Head, without loss of time. This, I think, would in many cases be better than putting back, when it often happens that the expense for necessary repairs is but a fraction of the 'tottle.' On the 10th of October, 1839, I landed the following list of animals on the island:—One goat in kid, four pigs, eight ducks, and six fowls, and on a subsequent voyage pigeons and rabbits."—CAPTAIN J. H. MILLER.

"The Cocos are sheltered by the Andamans from the heavy south-west swell of the Bay of Bengal, and afford facilities for careening vessels in safety; of both the islands it may be said that they have a fine sandy beach all round, one or two commodious bays, and good anchorage, and that at the southern extremity of each there is a reef of rocks extending several miles into the sea. Both islands also are uninhabited. The Burmese occupy the Great Coco during the whole of the North-east Monsoon, leaving it at the commencement of the South-west Monsoon, when it is probably less healthy; they say that whatever sickness prevails among them originates at Little Coco, and that they generally improve in health on their return to Great Coco. Little Coco is a very marshy, and of course unhealthy, place; for this reason the Burmese only make short trips to it to obtain cocoa-nuts, which are very abundant."—*Report on the Andamans, 1859.*

distance from it a depth of 10 to 17 fathoms. Fresh water may possibly be obtainable on the east side of the island.

The anchorage at Little Coco island is said to be eastward of it at a moderate distance from the land; and also off its north-west end, with soundings gradually decreasing to the reef bordering the shore. It is also stated that boats may land at a sandy bay on the west side of the island.

The channel south of Little Coco island, between it and Landfall island off the north end of North Andaman, is about 20 miles wide, and from 12 to 40 fathoms deep for a distance (east and west) of about 18 miles, when bottom will be suddenly lost sounding in 100 fathoms. The ground is coral, but occasionally sand and mud. During the North-east Monsoon the current sets frequently through this channel to the North-westward; in the South-west Monsoon it flows mostly to the eastward; in fine settled weather the prevailing currents are flood N.N.E., ebb S.S.W.

When sailing between Little Coco and Landfall islands it is necessary to maintain a good look-out, it being probable that more reefs exist than are inserted in charts. In 1809 the *Daphne* (drawing 10 feet) is said to have struck on a rock at about 5 miles S. by W. from the south-east end of Little Coco; alongside it rocks were visible under water; and from the vessel's deck the surf breaking on the shore of the island could not be seen, hence the estimated distance of 5 miles may not be greatly in error.

GREAT ANDAMAN.—The three principal islands of the group are so closely connected together that for all practical purposes they may be considered as one island, which is hence called Great Andaman. The straits dividing them can only be navigated by boats at high water. The islands are named North, Middle, and South Andaman. They are surrounded by a bank of soundings which extends westward from them about 20 miles, and eastward not more than 5 to 8 miles. The outlying islands, in addition to Preparis and the Coco islets, already noticed, are Narcondam, Barren, Little Andaman, and the Sentinels. In our own description we shall follow the east coast commencing at Cape Price, and afterwards add a few remarks on the west coast.

East Coast of the Andamans.—The northern Andaman island is about 44 miles long in a north and south direction, and 14 miles broad in its widest part. Cape Price, its north point, has an islet named Pocock off its east side, which is surrounded by a reef and separated from the shore by a narrow and possibly a navigable channel. At 16 miles southward from Cape Price is Port Cornwallis, a splendid land-locked harbour, which contains excellent anchorage ground, sheltered from all winds, with good holding, and is sufficiently capacious to accommodate a fleet of the largest vessels. This appears to be the only harbour in the northern island. The surface is so densely covered with wood that it is almost impossible to penetrate into the interior, and it is related by Dr. Mouat, in 1857, that his exploring party could never proceed more than 5 or 6 miles in a day, and then it was almost always necessary to cut a path through the jungle.

At the north end of the North Andaman are some islands and reefs, the largest and most elevated of which is Landfall island; this island, and that next eastward of it, East island, are seated on a reef, and it is probable that there is no passage between them. West island is about 7 miles south-westward from Landfall island, is distant from Cape Thornhill about 3 miles in a northerly direction, and is also surrounded by a reef. South-westward of West island and nearer the shore are Cliff and Reef