From the town of Elizabeth the coast turns to the north-eastward 5½ miles to the mouth of the Zwartkop River, and is low all the way; this river is barred, and will only admit boats. Hence to Coega River, another barred stream of similar character, the distance is 5 miles. At half a mile southward from this latter river there is a small islet, 47 feet high, named Jahleel, which is separated from the shore by soundings of 5 to 7 fathoms, and has immediately outside it a depth of 8 and 9 fathoms.

St. Croix Island.—St. Croix is a small islet, ½ of a mile in extent, situate in the north-east part of Algoa Bay, at about 2 miles from the shore. Its west peak is 195 feet high, and its surface is of nearly bare rock. On the north-east side the island is steep, with a depth of 10 fathoms almost close to it; its south-west side is less steep, and here some stunted vegetation grows. Numerous penguins and gulls make it their resort, and it is occasionally used as a stopping-place by sealers when in search of seals, which frequent the adjacent rocks, especially Jahleel Island.

At rather more than a mile south-westward from St. Croix Island there is a rock 50 feet high, named Brenton. The depth close to it all round is 4½ and 5½ fathoms, and immediately outside this depth 13 and 14 fathoms; the latter rapidly increases seaward to 18 and 20 fathoms.

There is good anchorage under St. Croix Island in all winds, but extra care is required with those from the south-eastward, which send in a very heavy sea. The best position is in 10 fathoms, sand, at about ¼ of a mile from the island, with its west peak bearing S. by E., because there the island affords some shelter against heavy seas in blowing weather; the extent of sheltered anchorage is, however, very confined.*

Woody Cape.—From Coega River the coast trends eastward about 10 miles to the outlet of Sunday River, and thence 21 miles south-easterly to Woody Cape, off which are the Bird Islands. Throughout it is formed by an unbroken chain of sand hills, which extend inland from 1 to 1½ mile, and rise in some places near Woody Cape to the height of 350 and 450 feet above the sea level. At Woody Cape the sand-hills are covered with dark bushes; they present to seaward a series of decayed sandstone cliffs, fronted by a beach of rugged rock, which extends along shore for 2 miles, when the sand-hills are again met with, though not so high nor so bare as those to the westward. These reach as far as Point Padrone, 9 miles eastward of Woody Cape, which is also formed by cliffs similar to those at that point, with a beach of rugged rock and shingle.†

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* It has been remarked that it would have been better for the colony if the town of Elizabeth had been erected on the shore opposite St. Croix Island, because the anchorage in that part is better than in the west extreme of Algoa Bay, where the town stands, and the open country with the Zwartkop River would have afforded no mean advantages; but in opposition to this it must be observed that Port Elizabeth is preferable for communication with the mainland, since it is often found that the surf abreast the island and at the mouth of Zwartkop River is high and dangerous after the prevalence of south-westerly winds, and continues so for a longer period than on the beach of Port Elizabeth.

† Lieutenant H. G. Simpson, R.N., says, "Woody Cape, as its name imports, is covered with wood, except a small patch of sand at its summit, and is the only seaboard land in the vicinity of Algoa Bay that is so, which gives it, in contrast with that for miles on either side, a dark appearance; the land on its west side, from near St. Croix Island, rises into numerous small sandy hillocks, quite bare of vegetation, and that eastward of it as far as Point Padrone is similarly bare. The cape is scarcely distinguished as a cape, except when very near it; not so Point Padrone, which juts out into a low point of sand, forming a determinable cape, without vegetation, from which breakers run out some distance, and the water breaks still further out at times, owing to the meeting of currents there, and after strong winds."

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The coast between Sunday River and Point Padrone bears a very monotonous appearance. Behind the sand-hills the country rises into lofty elevations, the summit of Addo Heights being estimated at 1164 feet above the sea; other hills are 1000 to 1200 feet high, and all are covered with grass and dense forest intermixed, but there are no remarkable peaks nor other objects by which any particular part of the coast may be recognised. Woody Cape can only be distinguished from a position close in shore; the cliffs are then seen, but from the southward it is not prominent, the sole conspicuous objects being the wooded sand-hills immediately over it.

At Woody Cape and Padrone Point fresh water may be observed welling out from the base of the sand-hills, just above high-water mark. It is said that fresh water may be also obtained from almost any part of this coast by digging in the sand above high-water mark.

DIRECTIONS.—*Approaching Algoa Bay by day.*—If from the southward, the first land seen will be the high land in the interior. The most remarkable peaks of this mountain range are sufficiently elevated to be visible from a distance of 50 to 60 miles. From Cape St. Francis, 42 miles westward from Cape Recife, the peak named Cockscomb, 5400 feet high, bears N.E. ½ N. 30 miles, and from Cape Recife N.N.W. ½ W. 42 miles; while that named Rugged Top bears from the former cape N.E. by E. ¾ E. 35 miles, and from the latter N. by W. ½ W. 30 miles. These bearings will be a sufficient guide when steering for the land, if the capes themselves cannot be seen in consequence of haze covering the low land between the mountains and the sea.

When making Cape Recife from the westward, the hummock called Recife Hillock, ¾ of a mile north-westward from the lighthouse, is often seen before that building comes into sight, as it is of greater altitude. This is of some consequence to vessels running along the land.

If making Cape Recife from the southward, care is required not to mistake Cape St. Francis for Cape Recife, which error has frequently occurred, notwithstanding the capes are distant from each other 42 miles; the above bearings of Cockscomb and Rugged Top Mountains should prevent this; besides which, the hummock at Cape Recife can be seen from a great distance. As Algoa Bay is approached, the high land immediately behind the coast between Capes Recife and St. Francis comes into view, soon afterwards the hummock appears as the termination of the coast line in that direction, and there will be noticed immediately westward of it a remarkable strip of bare white sand of considerable extent, which looks much like a beach; then Recife itself will appear a little eastward of the hummock, showing low, but distinctly as a cape,—the lighthouse will not be seen till a further approach of about 4 miles.

The coast westward of Cape Recife for a distance of 6 or 7 miles must be cautiously avoided, and the cape itself should not be approached nearer than 2 miles, and then only in a commanding breeze or in a steamer, as the Thunderbolt Reef is situate a mile from the lighthouse, and is steep on the seaward side. Nor is it prudent to get nearer the lighthouse on its south-east side than this distance of 2 miles, because the sea often fails to break upon a 7 feet patch at a mile from it, and yet, without previous warning, breaks in 7 fathoms, and even in 10 fathoms. As a rule, the depth of not less than 13 fathoms should be maintained while out-

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side the cape, especially as a strong current generally sets towards the Thunderbolt Reef.*

Vessels occasionally pass *inside* Dispatch Rock, but it is better to keep outside, the channel being very confined; fine weather and a commanding breeze are essential for safety, and it is seldom that any advantage is gained by adopting it. If compelled by necessity to use this channel, bring the lighthouse on Cape Recife to bear N.W., and steer for it on that bearing until the soundings are decreased to 14 fathoms, when it will be distant 1½ mile; change the course now to N. for about 2½ miles, when you should look out to open the red beacon eastward of the lighthouse, and keep it so. This will lead westward of the rock in a depth of not less than 6 fathoms.† Having brought the two beacons near Beacon Point in one, and again opened them some distance on the other side, steer for the anchorage off the town, taking care not to approach Beacon Point (which is low and sandy, and terminates in rugged rocks) nearer than ¼ of a mile.

To pass *outside* Dispatch Rock.—Bring the lighthouse on Cape Recife to bear N.W. 1½ mile as before, and steer N.N.E. or any course more northward that will admit of the red beacon being kept open westward of the lighthouse, and continue thus until the beacons at Beacon Point are in one, or the staff and point of the Diamond on Fort Frederick are in one with the centre of the remarkable hill behind it, or, if these should not be seen, until Beacon Point bears W.N.W., when the anchorage off the town may be steered for.

Making Algoa Bay from the *eastward*.—In the winter season, vessels from India should endeavour to make the land in the neighbourhood of St. John's River, in Lat. 31° 34′ S., and Long. 29° 29′ E. The land on this part of the coast is mountainous, and the hills appear covered with bush and grass, which distinguishes it from the land further westward, where it assumes a more barren appearance, with sand-hills near the sea. From St. John's to the Cowie River, the current runs with the line of coast nearly W. from 50 to 80 miles in 24 hours. After passing the Cowie, or Point Padrone, the current sets off S.W.; and in strong westerly winds due S. right off the land. When beating along this part of the coast, a ship may safely stand 6 hours in and 4 hours off, and should keep within 30 miles of the land.

When off Point Padrone, the Bird Islands will come into view and be recognised at once by their lighthouse. These islands are very low and proportionably dangerous; and though the main will generally be seen before them, and the distance from them may be estimated by it, yet this is not entirely to be relied on; so, in shaping a course to go outside of them, allowance should be made for the fact that the eddy or return current sets in towards them, and then to the eastward. In clear weather the rugged-topped mountain and the Cockscomb may be seen from these islands, or rather from abreast of them, for the latter would be shut in when on them; but in passing outside the Doddington and East Rocks, the Cockscomb should be kept open west of the rugged-topped mountain, bearing about N.W., and

* A strong indraught will often be felt after passing Cape Recife and Thunderbolt Reef, and allowance must be made for it when shaping the course either inside or outside Dispatch Rock, particularly for the former, as foul ground stretches out a long way off shore between the red beacon on the cape and Beacon Point, and it has often occurred that sailing vessels, by not allowing for indraught, have got on shore.

† Other instructions say in 7 or 8 fathoms, with the exception of one or two casts of 6 fathoms before coming up to the two beacons at Beacon Point.

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the ship should steer N.W. by W. ½ W. Having passed the Doddington, the high land at the back of Port Elizabeth will soon appear right ahead.

Approaching Algoa Bay at night.—If running for Algoa Bay from the westward, the coast must not be approached nearer than with the light on Cape Recife bearing E. ½ N. or E., and if unfortunately the vessel gets nearer the land than that line of bearing, she must without fail immediately haul out till the bearing of E. ½ N. comes on,* when an E.S.E. course may be steered till the light bears N. by W., when the course must be altered to E.N E. till it bears N.W., after which she may steer N.N.E.

Until the light on Cape Recife bears N.W. a depth of not less than 12 fathoms should be maintained, and the vessel should go sufficiently slow to obtain soundings with certainty.

The current sets strongly towards the reefs; therefore, if the vessel find herself, from the altered bearings, dropping upon them, she must immediately haul southward. Whilst steering N.N.E., going eastward of Dispatch Rock, the light on the cape must not on any account be brought southward of S.W., nor must the sounding be decreased to less than 10 fathoms until a run of at least 3 miles after the light bears N.W., but when this distance of 3 miles has been accomplished, a N.W. course may be steered for the anchorage.

But, if the soundings be decreased to less than 10 fathoms, the vessel must be hauled eastward immediately. The town and vessels will appear from under the shadow of the land as the anchorage is approached, even though no light should be seen. During moonlight nights it will sometimes occur that the Beacon Point cannot be distinguished, the only thing distinctly visible being a long line of white sand, the northern extremity of which may be steered for on any course westward of N.W. ½ W.

The channel westward of Dispatch Rock should never be run for at night; even shipmasters belonging to Port Elizabeth would hesitate to attempt the channel.

Tides.—The tides are often irregular, being acted upon by the wind. The surface stream is uncertain in direction and inappreciable.

Mr. G. Chabaud, in a letter to the *Mercantile Marine Magazine* in April, 1859, writes, "Port Elizabeth, I am well aware, has, for many years, been condemned as one of the most dangerous roadsteads on the whole line of this stormy coast (if not in the world)—one in which no vessel, during south-east gales, has any chance of escape. Does it deserve this character?—is a question for its inhabitants to answer. I say, unreservedly and without fear of contradiction—No. On the contrary, Algoa Bay, with ordinary precaution, is one of the best, if not the best, bay on the Cape Coast, and this I am prepared to prove. I do not deny that wrecks were, in former years, of frequent occurrence, and that there has been, at times, great loss of property; but in almost every case this has resulted from the unseaworthy state of the vessel wrecked. In 1836 there were several wrecks—again in 1842, 1848, and 1850, and occasionally one or two between that year and the latter end of 1854; between 1854 and the present time, there have only been two wrecks, one of which was again got off.

"It is very remarkable, that since the period of the establishment, in 1854, of a

* The coast westward of Cape Recife has not been examined, which supplies an additional reason why vessels should keep outside this line of bearing, E. ½ N.

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local Marine Assurance Company, wrecks have become quite out of date, and are now looked upon as a novelty: this is the more remarkable when we consider that we have now more than four times the number of vessels that we used to have previous to 1854. Compare the wrecks at Algoa Bay with those of Table Bay and other parts: you will then find that I am correct in asserting that Algoa Bay is as safe a port as any of the others. A vessel well found in ground-tackle has nothing to fear, as the holding ground in this port is very excellent.

"Having said thus much about the safety of the port, I would now call your attention to its capabilities, and the advantages it possesses as a *Harbour of Refuge*. Masters of vessels too often, it is to be regretted, after receiving damage, persevere in their onward course along this coast, during violent north-westerly gales in the winter months, until their crews are quite exhausted, and their vessels unmanageable —thus placing the lives of all on board in great jeopardy. This obstinacy, which probably arises from want of information, has often resulted in serious loss of life and property. Vessels have been known to have sighted Simons Bay, and after all been obliged to bear away for this port.

"In 1850 we experienced a very severe gale from the west-north-west, which lasted for three days, during which period the destruction of property as well as life was something awful—two vessels, one a Frenchman of 600 tons, called *L'Aigle*, and the other an English ship of 1000 tons, called the *Queen of the West*, after beating about for several days in a disabled state, trying to round Cape Agulhas, were wrecked near St. Francis Bay, at a moment when they considered themselves 35 miles off shore. All hands were lost in the latter. These vessels were lost in the night, owing to their having fallen into an error as to their position. The current on this part of the coast sets in upon the land. In the same gale, the ship *Grindlays*, laden with a cargo of tea from Singapore, was abandoned about 12 miles westward of this port, when the captain might, on the day previous, have reached it with ease, where he would have found 12 or 13 vessels loading cargoes in perfect safety. Three other vessels, the *Asiatic*, *Anna Robertson*, and *India*, put into this port at the same time in a disabled state. Two of these were subsequently repaired, and proceeded on their voyage. The *Ville D'Oleron*, a French barque, was run on shore westward of Recife, in October, 1854, the captain not knowing anything about Port Elizabeth.

"The year 1856 was even more calamitous than 1850. Not less than seven large vessels entered this bay in a leaky and otherwise disabled state, viz.:—the *Collingwood*, *Star of Empire* (American), *Themis*, *Nepaul*, *Sara Lydia*, *Dalesford*, and *Hispanio Filipanna*. The two latter were supplied with new rudders and necessaries, and dispatched in seventeen days. The *Star of Empire*, of 800 tons, arrived totally dismasted, was sold for the benefit of those whom it concerned, and was purchased by parties here, who fitted her out entirely at this port, and renamed her the *Lady Grey*. Many vessels are known to have foundered, or been abandoned at sea, not 100 miles from this port; the barques *Augusta*, *Sunny South*, *Sheridan Knowles*, and the brig *Usk* being among the latter. The Captain of the *Usk* reported having seen a large vessel founder off Fish River. In 1857, the French ships *Donges* and *Mathilde*, and a large American ship called *Bonita*, of 1200 tons, the English ships *Sutlej* and *Exhibition*, and several others put in disabled; the *Donges* and *Sutlej* were both hove down and repaired; the *Mathilde* was also re-

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paired, but the *Bonita* and the *Exhibition* were condemned. This year we have had an unusual number of disabled ships, most of which, I regret to say, have been condemned as unseaworthy.

"Port Elizabeth was established in 1820, at which time it could only boast of a small fort (called Fort Frederick), barracks, mess-house, and commandant's quarters, with a population of about 35 souls. The trade was at that time very limited—confined, in fact, to an occasional visit from a small coasting vessel bringing a few articles of merchandise in exchange for a little butter and hides. A wonderful change has, however, taken place since that period—indeed, since September, 1856. Port Elizabeth, at present, numbers about 1000 houses and stores, with a population of between 8000 and 9000 inhabitants. The value of imports in the year 1857 amounted to £1,256,942; and the exports, consisting of wool, hides, horns, ivory, bees'-wax, sheep and goat skins, ostrich feathers, tallow, &c., amounted to £1,084,687, being a very considerable increase over 1856; this is exclusive of the wool, hides, and skins sent coastwise to Table Bay, and of the horses shipped to India on account of the Indian Government, which amount to a considerable sum.

"Those who have not seen Port Elizabeth since 1854 would scarcely recognise the main street, or, in fact, the town. The magnificent stores and public buildings which appear in every direction have quite changed the appearance of the place. Port Elizabeth may also congratulate herself on the rapid growth of trade and the immense increase of her shipping. Three or four years since it was a novel sight to see 14 or 15 vessels at anchor in the bay at one time—now there are seldom less than 20 vessels, frequently 30, and sometimes as many as 38 at anchor at the same time.

"The Eastern Province of the Cape of Good Hope, of which Port Elizabeth is the seaport, contains a very much larger extent of country than the Western Province, of which Table Bay is the seaport. Nearly all the Eastern Province is well adapted for sheep farming, and this will account for the exports being greater than those of Table Bay. The increase in wool and sheep is very great, and may be taken annually at 30 per cent.: the exports in wool alone amounted to upwards of a million sterling last year. This year, I suppose, it will not export less than 70,000 bales. It may therefore be well imagined that the port is in a position to afford considerable employment to shipping."

"Algoa Bay," says CAPTAIN OWEN, in 1825, "is the name applied to all the country between Capes Recife and Padrone, or Padron. The former is a low point of land, composed of rocks and a few sand-hills: it appears to have been so named from the sea breaking constantly on a few scattered rocks about ½ a mile southward of it. Port Elizabeth is the best sheltered spot on the coast for 600 miles from Cape Town. The bay is open to all winds from South to East, and many vessels have been wrecked; a circumstance which may be attributed principally to having no seamen established there in charge of the port duties.

"The S.E. gales generally give a few hours' notice, in which time ships may either put to sea, or prepare to ride out the gale; but for this latter purpose, hempen cables and long scopes must be used, either with or without the chain cables."*

Again, CAPT. F. MORESBY, C.B., observes, "I consider Port Elizabeth at all times

* See p. 70, and also "Notes on the Physical Geography and Meteorology of the South Atlantic." By W. H. ROSSER. p. 167.

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equal to Table Bay, and for 6 months very far its superior. H.M.S. *Menai* lay off Port Elizabeth from April 29th until June 25th, 1820; during that period there were only two days we could not communicate with the shore; with a S.E. wind a swell rolled in, but never any high breaking sea. Ships have from time to time rode out the heaviest S.E. gales that have been known.

"Had I my choice of trusting my ship, for the year round, to Tor Bay, Palermo Bay, Table Bay, or Algoa Bay, I should without hesitation prefer the anchorage off Port Elizabeth."

Commander Fishbourne, R.N., has observed that "there are many statements current about breakers having been seen from time to time in Algoa Bay during S.E. gales, yet I believe others than those inserted in the charts have no existence, and that which has been mistaken for them is no doubt the effect of mirage. I had seen the appearance alluded to extend nearly the length of the bay, but examination and patient attention showed it all to be unreal, as it vanished by degrees as we passed along. It may be occasioned by the sudden change of temperature in the air, which, altering its capacity for moisture, causes an evaporation from the sea to take place to the lower strata, and less to the upper, which are therefore of unequal densities, and refract light in different degrees, producing the alternate appearance of white or broken water, and sea-green, and regularly as the particles are set in motion, intermingling by the passage of the sea, and whose surface at the same time being smooth but in motion, reflects the rays from different points to the eye, as it rolls along, giving the rolling-over appearance of a wave crest or roller. There may be a little sea at times, the effect of rain or overfalls, where there are, as here, currents and irregular soundings, but nothing detrimental to navigation; while, on the contrary, the palpable change from a very considerable cross sea in N.W. gales to smooth water, which immediately follows on passing into this bay, is quite remarkable, and renders it a good refuge in such gales, almost in any part from Recife to Bird Islands."

Mr. H. G. Dunsterville, R.N., says, in 1843, "Algoa Bay possesses a capital anchoring ground; as a proof of which, it may be observed that all vessels which have been wrecked on its beach have parted their cables, their anchors having always been picked up from the identical situation where they were first let go. A vessel, in my opinion, with a rope or coir cable, would ride out in this bay a S.E. gale longer than in any other bay on the coast; although there is a heavy swell setting into it with the S.E. wind, still there is not that short break of a sea as in other colonial bays."

Vessels calling merely through stress of weather, or for supplies, should anchor with the town bearing West, in about 7 fathoms. During a period of about 16 years, namely, since 1840, it is said that no vessel was ever known to drag her anchor, with common caution.* Here a vessel may ride out the most violent gales from the westward in perfect safety; the only wind that endangers the shipping is the E.S.E.,

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* "The number of cases," says Com. Fishbourne, "of vessels parting their cables induced me to institute inquiries with a view to ascertain the causes. The result left no doubt upon my mind but that they generally arose from the attempt to ride out gales with very insufficient quantities of cable, since there was no room to suppose that their sizes were insufficient, as is evident from a comparison of the size of those that parted with those of ships of war."

Com. Fishbourne recommends riding with a long scope of cable, say 60 fathoms of chain and 30 fathoms of coir (additional next the hawse) in 4 fathoms water, and proportionably more in greater depths.

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which rarely blows during the winter months, from May to August. The barometer always gives sufficient warning of a S.E. wind, which never comes on suddenly, but gradually increases—giving ample time for a vessel to get under way and put to sea.

The worst time in Port Elizabeth is in October and March, at the changing of the monsoon, or season when accidents occasionally happen through vessels being unprepared. Ships loading with wool are too light to go to sea, and are obliged to ride it out,—and if not well found, frequently part their chains.

It was stated in 1859 that the new breakwater at Port Elizabeth was well advanced, and that in the beginning of the year shipmasters would be able to land in their own boats.

PORT REGULATIONS.—1. In the case of vessels about to discharge or receive on board any considerable quantity of cargo, a convenient berth will be pointed out by the harbour-master, as close to the landing-place as the safety of the vessel and other circumstances will admit. The vessel must then be moored with *two bower anchors*, with an open hawse to the south-east, and especial care taken not to overlay the anchors of other vessels, or in any way to give them a foul berth. But all vessels not provided with anchors and cables according to Lloyd's scale of tonnage are to be anchored to the northward of the other vessels until so provided.

2. In the case of vessels touching for water and refreshments, they may ride at *single anchor*, but they must then anchor well to the northward, so as to prevent danger (in case of drifting) to the vessels moored; and it is particularly recommended, when riding at single anchor, to veer out 70 or 80 fathoms of chain; the other bower cables should be ranged, and the anchor kept in perfect readiness to let go.

3. Strict attention must be paid to keep a clear hawse (when moored), the more so when it is probable the wind may blow from the south-east; and whether at single anchor or moored, the sheet anchor should be ready for immediate use. The situation of the vessel must be taken by landmarks and the depth of water; and should any accident occur by which she may drift from such situation, or lose her anchors, the same must be notified in writing to the harbour-master.

4. It is recommended that vessels be kept as snug as possible, especially such as may have to remain some time in the anchorage, for the periodical winds blow occasionally with much violence. Top-gallant masts and yards should be sent on deck, but topsails, courses, &c., should be kept bent and reefed, until the vessel shall have become so much lightened as to leave her no chance of working out in case of parting, when they should be unbent and repaired, if necessary, and bent again as soon as there is sufficient cargo on board to render the vessel manageable under sail.

N.B.—Masters of vessels are especially warned of the danger of housing top-gallant masts, instead of sending them on deck; a practice which recent disastrous wrecks have shown to be very likely to endanger vessels, by precluding the possibility of the topsails being hoisted to enable them to beat out.

5. If it should come to blow at night, it is recommended that vessels should hoist a light at their main-top-gallant mast-head, although the signal may not have been made from the Port Office; so that, in the event of their parting, or drifting from their moorings, their position may be the more accurately pointed out to the harbour-master.

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6. When it becomes necessary for vessels to veer cable in a strong breeze, they must always heave in again to their original scope, *immediately on the return of moderate weather.*

7. All signals made from the Port Office must be answered from the shipping, and strictly obeyed; and any vessel disregarding them will be reported to Lloyd's, as also to their owners.

8. In case of a vessel parting from her anchors, and being unable to work out, it is recommended to run her for the sandy beach to the northward of the town, keeping the headsails set even after striking, for the purpose of assisting in grounding the vessel firmly. No person should attempt to quit the vessel after she has taken the beach, until the life-boat arrives alongside, or a communication is established with the shore by means of Manby's apparatus, or otherwise.

9. On all occasions where it may be considered unsafe to land on the beach, a ball will be hoisted at the yard-arm of the Port Office flagstaff, and it is recommended that *ships' boats* should never attempt to land there, as it is seldom they can do so with safety.

SIGNALS.—Vessels having MARRYAT'S Code of Signals can make their wishes known to their agents, in blowing weather, through the Port Office. Vessels not having the code, can make the following signals with their ensigns:—

1*st.*	*Ensign in the fore-topmast rigging.*	I am in want of a cable.
2*nd.*	*Ensign in the main-topmast rigging.*	I am in want of an anchor.
3*rd.*	*Ensign in the fore rigging.*	I have parted a bower cable.
4*th.*	*Ensign in the main rigging.*	I am in want of an anchor and cable.
5*th.*	*Whift where best seen.*	Send off a boat.

The following signals will be made to vessels that may be stranded, from the most convenient point:—

At night.—By means of transparent figures.

By day.—By means of white figures on a black board.

1. You are earnestly requested to remain on board until assistance is sent; there is no danger to life.

2. Send a line on shore by casks, and look out for a line by rocket or mortar.

3. Secure the line, bend a warp or hawser to it, for us to haul on shore, taking care to secure the warp well on board.

4. Prepare to haul on board the end of the warp, which we will send you by means of the line, and secure it well.

5. Life-boat will communicate at low water, or as soon as practicable; have good long lines ready for her, and prepare to leave the vessel; no baggage will be allowed in the life-boat.

6. Secure the warp to the lower mast-head, bowsprit end, or some other convenient place, and send a hauling line to us, that we may get you on shore by means of a traveller.

7.

8.

9.

10.

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ANSWERS TO THE ABOVE.

By day.—A man will stand on the most conspicuous part of the vessel, and wave his hat three times over his head.

By night.—A light will be shown over the side of the vessel, where best seen.

GENERAL SIGNALS TO BE MADE FROM THE PORT OFFICE.

11.	*Union Jack over No.* 1, MARRYAT, *white, pierced blue.*	Prepare for bad weather.
12.	*Union Jack over No.* 2, *blue, white, blue (horizontal).*	Veer cable.
Do. with a light over.	*Union Jack over the same, with a ball above.*	Veer to a whole cable.
13.	*Union Jack over No.* 3, *white and red (vertical).*	Send top-gallant-masts on deck, point yards to the wind, and see all clear for working ship.
14.	*Union Jack over No.* 4, *blue triangular, with white cross.*	Strike lower yards and top-masts.
15.	*Union Jack over No.* 5, *red burgee.*	Hoist a light during the night.
16.	*Union Jack over No.* 6, *triangular blue, yellow, red (horizontal).*	Heave in cables to the same scope as when first moored.
17.		
18.		
19.		

The above signals may also be made at night, by showing the numbers prefixed to them, in transparent figures. The *answer* will be a light at the peak.

By the Customs Ordinance, No. 6, 1853, section 21, it is enacted, "That the Master of any ship arriving at any Port or Place in this colony, whether laden or in ballast, shall, within twenty-four hours after such arrival, and before bulk be broken, come to the Custom-house for the Port or Place where he arrives, and there make due report in writing, of such ship, and shall make and subscribe a declaration to the truth of the same, before the Collector or other proper Officers of Customs at such port; and such report shall contain the particulars of the arrival and voyage of such ship, stating her name, country, and tonnage, and, if British, the port of registry, the name and country of the Master, the country of the Owners, the number of the crew, and how many are of the country of such ship, and whether she be laden or in ballast, and if laden, the marks, numbers, and contents of every package and parcel of goods on board, and where the same was laden, and where and to whom consigned, and where any and what goods (if any) had been unladen during the voyage, as far as any particulars can be known to him; and the Master shall further answer all such questions concerning the ship and cargo, and the crew, passengers, and voyage, as shall be demanded of him by such Officers of Customs; and if any goods be unladen from any ship before such report be made, or if the Master fail to make such report, or make an untrue report, or do not truly answer the questions demanded of him, he shall forfeit the sum of 100*l.*; and if any goods be not reported, such goods shall be forfeited."

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The master should therefore take care to bring with him to the Custom-house the certificate of registry, together with the shipping bills, clearances, or manifests for the cargo, and also such other ship's papers as he may have concerning the ship, cargo, and voyage; and if a passenger vessel, the official list of the passengers, &c.

SUPPLIES, &C.—At Port Elizabeth every facility is offered to vessels wanting supplies or repairs. A shore boat waits upon the ships three times a-day, at the rate of two shillings per diem. Water is led to the beach in pipes, which is supplied to the vessels at 8s. a tun, including boat-hire; beef and mutton, 4d. per lb.; vegetables abundant and cheap; ship chandlery, carpenters, caulkers, and blacksmiths always to be obtained. Several vessels have been hove down here and caulked—cargoes are landed and shipped in efficient surf-boats—and should a stranger require a pilot, one will be sent off on the customary signal being made.

There are no port charges of any description.

A new water-company has recently been started, and a new boat, schooner-rigged, built at an expense of about 1500*l.*, has been launched; she is capable of carrying about 30 tons of water, so that it is hoped to be able to supply vessels with any quantity of water. It may also be mentioned, that some spirited individuals have purchased a hulk, and intend to use her for the purpose of heaving down vessels that require repairs; they have been to some expense, with the intention of making her thoroughly efficient for the object they have in view.

These and many other improvements which might be alluded to, will give a pretty good idea of the progress made at this port in the last few years, and will, perhaps, eventually be the means of securing for Port Elizabeth the position she is entitled to, as the only port of refuge from N.W. gales on the whole line of the Cape Coast.

In case of accident, there are life-boats, lines, rockets, and blue-lights stationed here, all under suitable regulations, so as to preserve life and property as much as possible.

BIRD ISLANDS:—These are a cluster of low rocky islands, the largest of which is only two-fifths of a mile long from north to south, and 33 feet high. This, which bears the name of Bird Island, is covered to the depth of several feet with an inferior kind of guano. No water is found on it save what little is left in the hollows of the rocks after rain. Eggs are abundant at seasons, and a very palatable vegetable, not unlike spinach to the taste, grows on it. Fish may be had in plenty. The only building upon it is a lighthouse 45 feet high, which stands on the south side of the island; it is of wood, pyramidal in form, and painted white, with a broad black band in the middle. It exhibits *two fixed* lights at 51 and 61 feet above high-water mark, visible in clear weather from a distance of 10 miles. These lights are 18 feet apart in horizontal distance, and when in one bear N.E. $\frac{3}{4}$ E. and S.W. $\frac{3}{4}$ W.; consequently, they lead over Doddington Rock, which bears from the lighthouse S.W. $\frac{3}{4}$ W. $1\frac{1}{6}$ mile. The position of the lighthouse is Lat. 33° 50′ 27″ S. and Long. 26° 17′ 13″ E.*

* In the Admiralty Sailing Directions for the south-east coast of Africa it is mentioned that "The upper lantern of the lighthouse on Bird Island has a shade on the north or in-shore side, which renders the light invisible between N. by E. $\frac{1}{4}$ E. and E. by N. $\frac{1}{4}$ N. from the lighthouse. This should not be, since it is of importance that the light be seen from the anchorage as well as by vessels in-shore; added to which, the intensity of the light to seaward would not be diminished by substituting a sheet of glass for the iron plate now there, and the light thus shown would be sufficient for what is required of it by vessels in-shore."

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At about ¼ of a mile northward of Bird Island there are two islets named *Stag* and *Seal*, of which the latter is the westernmost. These at low water form one island, but at high tide boats can pass through the narrow channel separating them. From the west end of Seal Island, but separated from it by a very narrow boat channel, a ledge of rocks extends nearly half a mile, and is then succeeded for about a quarter of a mile by five black rocky islets, called the Black Rocks. From the lighthouse on Bird Island the outermost of these Black Rocks bears N.W. ½ W. 1¼ mile, and vessels may generally avoid them without difficulty, their position being well shown by heavy breakers, except in the finest weather.

The edge of the reef connecting the Black Rocks with Bird Island is usually shown by breakers, and also that between the rocks and Seal Island.

At nearly half-a-mile north-eastward from Seal and Stag Islands, and nearly parallel to them, are three ridges of rock, the central of which, named *North Patch*, is above water; the others have a depth over them of 2 to 3 fathoms. There are soundings of 6 fathoms at ⅕ of a mile northward of these, which rapidly increase to 8 and 10 fathoms.

West Rock, Doddington Rock, and East Reef.—At a mile south-westward from Bird Island and the reef extending from that island to the Black Rocks, and almost parallel thereto, there are three very dangerous rocks, named West Rock, Doddington Rock, and East Reef; the last, as its name implies, being the easternmost. The bearing of these from the lighthouse on Bird Island is as follows:—West Rock, W. ⅓ N., nearly 1⅓ mile; Doddington Rock, S.W. ⅔ W., nearly 1¼ mile; and East Reef, S.S.W. ½ W., 1¼ mile. From West Rock the Black Rocks bear N.E. ⅓ N. about ¾ mile, and Doddington Rock S.S.E. ¾ E. one mile. From East Reef Doddington Rock bears N.W., northerly, about ½ a mile. As these reefs are all steep they require the utmost attention to avoid. From Doddington Rock the two lights on Bird Island appear in one.

West and Doddington Rocks are awash with the surface of the water, and East Reef probably has a depth over it of 2½ fathoms; close round them are soundings of 10 to 12 fathoms, which deepen rapidly seaward to 20 and 30 fathoms; hence, when passing them it is recommended to keep at least 3 miles from the lighthouse, by which a depth of 40 to 35 fathoms will be maintained. Their position is generally indicated by breakers. East Reef has an extent of nearly ¼ of a mile.

Northward of West and Doddington Rocks and East Reef, between them and Bird Island with its surrounding reefs, the bottom is very irregular, as the soundings vary from 5½ to 10 fathoms. During heavy weather, a tremendous sea rolls over the whole of this space, producing a surf truly terrific, the sea breaking in 8 and 10 fathoms water all around the group to seaward.

"The position assigned to a rock upon which it was supposed the *Doddington* struck is S.W. ¾ W. nearly 6 miles from the lighthouse. This spot and the ground in its vicinity have been carefully examined and thoroughly sounded over, but no signs of rock or rocky ground could be discovered, the depth of water being 40 to 45 fathoms, upon a bottom of sand, broken shells, and decayed coral. In fact, no danger has been discovered outside a radius of 1½ mile from the lighthouse.

"Caution is necessary to give the Bird Islands group of dangers a wide berth in passing, for should a vessel get among them she might run into certain destruction while trying to avoid a seeming danger, since it is difficult to distinguish between

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the sea that breaks in 10 fathoms and that which rolls over the reefs, and nothing of human build could hold together half an hour on any part of the cluster during a gale. Altogether, this is one of the most dangerous parts of the coast, especially to a stranger.

"The Bird Islands group affords anchorage on the northern side, but the holding ground is not good, and the bottom is uneven. The best anchorage is with the lighthouse in line with the North Patch, in 8 to 10 fathoms water.

"With S.E. winds, the lighthouse in line with the boat passage between Stag and Seal Islands, in 10 or 11 fathoms, is a very good spot for shelter, but should the wind come strongly from the westward, it will be found necessary to shift berth to the east, anchoring with the Black Rocks about in line with Stag Island, or a little open on either side of it, in from 8 to 10 fathoms. From this latter position H.M.S. *Geyser* drove to sea in a heavy W.S.W. gale, which shows the holding-ground to be bad, as she had 75 fathoms of cable out at the time.

"Vessels that load here with guano usually anchor in this last position, as it is more convenient for their boats to come off with cargo. It frequently happens that there is no landing, the rollers setting in during calm weather as well as in a gale. After these have subsided, care is necessary in landing, as the sea sometimes breaks heavily and unexpectedly right across the entrance to the space between the islands. The boat must be kept well to the eastward, clear of the shoal off the east end of Stag Island. The lighthouse in line with the first or western rock that shows on the white guano patch at the east end of Bird Islands, is the best line to pull in upon, as it leads between the breakers on the spit and those off the end of Bird Islands.

"In the vicinity of the Bird Islands no regular tidal stream was found, but a regular rise occurs. At the anchorage northward of the group the current sets in generally eastward, and at one time, during a strong westerly gale, it ran east at the rate of 1½ knots an hour. It was, however, upon two other occasions of westerly gales, found setting to windward. It is very seldom that anything drifts on the islands, which is singular, especially as Woody Cape is covered with drift-wood and the remains of wreck."*

Point Padrone.—From Woody Cape the coast trends S.E. by E. ¼ E. about 8 miles to Point Padrone, and is very similar in appearance to that westward of the cape. Point Padrone is difficult to recognise when viewed from the offing, as there is nothing to distinguish it from the land in its vicinity except when seen from a berth close in with the shore. A bed of rocks, over which, at times, the sea breaks with great fury, projects from it nearly a mile to seaward. At 2 miles E. by S. ½ S. from the point there is a low sandy point, off which, to the distance of a mile, heavy breakers have been observed. These are the only outlying dangers, the other part of the coast being approachable, even to the back of the surf, in 7 or 8 fathoms; the soundings decreasing regularly towards the shore.

From Point Padrone the coast trends 36 miles in an almost due East direction to Great Fish Point, immediately northward of which is Waterloo Bay, and is almost unknown, an examination not having yet been made of it. The general features of

* "Africa; South and South-east Coasts of." Published by the Admiralty, 1861.

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the country are not dissimilar in appearance to those of the shore westward of the Bird Islands; it has, however, been stated that the sand-hills are higher, and are collected in great square patches. At 3 miles eastward from Point Padrone there is a hill 990 feet high; succeeding this, are the rivers Bushman, Kareenga, Kasuga, and Kowie, the latter leading to the town of Bathurst. The mouth of the Kowie River is in about Long. 26° 51′ E., and known among the coasters as Port Francis; we possess no description of it further than the following, upon which, probably, but little dependence should be placed.

PORT FRANCIS.—Port Francis is formed by the outlet of the river Kowie, a barred stream, but possibly deep enough at high tide to admit small craft. The river receives its waters into a sandy basin, from which it forces its way through a narrow channel on its eastern side, not wider at low water than 20 yards.* The surf was observed to break across a bar about a quarter of a mile from the entrance, but not violently. The water appeared deep close to the shore. Some rocks, named Cook, are situate about 2 miles E.S.E. from the entrance to the river, and from the appearance of the water were judged to be extensive. In 1847 there was a large house on the starboard side of the river, having near it a flagstaff.

The following remarks on Kowie River are by Mr. William Smith, surveyor, 1841. We find it impossible to recognise the various objects alluded to in the existing charts of the coast.

"The entrance to Kowie River is in about Lat. 33° 35′, and Long. 26° 45′. It lies about S.S.E. and N.N.W., so that vessels may enter at a proper time of tide with the wind from W. round by S. to nearly E.N.E. Should a vessel approach from the westward, with a westerly wind, she must haul up for the western pier, which, when carried out to the extremity of the rocky point, she may boldly approach to within a ship's length; and if she enters with a flowing tide (which she ought to do), should the wind be too much ahead of her to lie up the channel, she may take in all sail. If she cannot cast a warp on the pier, she may drop her anchor, and she will swing up the river, and the moment she passes the pier-head she is in smooth water, when she may either kedge up the river, with her own anchor trailing on the bottom, or she may be dropped up the river by a warp from the western shore. Should she touch in swinging round, there is nothing to hurt her but sand.

"If she comes in with a fair wind with the flood-tide, she must take care to shorten sail the moment she is between the piers, or she will be up to her berth before they will be able to stop her way. She will then require check-ropes to stop her, and must be dropped into Mary's Cove very carefully, as the tide at the entrance of the cove runs with great rapidity both ebb and flood.

"Should she come in with a north-easterly wind, she must enter with a flood-tide, and if she can only fetch into the channel, even with the western pier-head, should down all sail, and drop her anchor with a very short range of cable, so that if

* "The Kowie, the so-much desired port of Albany, forms a little estuary, where the tidal waters, entering by a narrow channel, spread over a flat of some acres in extent; above this the river is continued in many beautiful reaches, with, however, very little current, and the tide, which here rises about 5½ feet, ascends to a distance of 8 or 10 miles. The position of the Kowie for a port is an admirable one, and for a certain class of small vessels safe accommodation might perhaps be afforded at a very small outlay."—*Nautical Magazine*, October, 1854.

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she trail round with her stern to the westward, she may not trail on the bank.

"Should any vessel come in with a fair wind and ebb tide, they need not be in a hurry to take in sail, as they will require it all to stem the ebb tide, which is very strong all the way from the entrance to Mary's Cove.

"These are general instructions for entering under sail, but should moorings be laid down off the mouth of the river, as it is intended, and a warp be stretched from thence to the pier, or to an anchor in the channel, then, if the wind be scant or right ahead, a vessel may boldly work up to the moorings, and either lie there for a fair wind, or warp into the river at the top of high water. As far as it is known, I believe, the roadstead is clear of hidden danger, both east and west of the river's mouth, at least to some distance, for a vessel to beat up to the moorings should the wind be off shore. Vessels coming from the east or west, running for the port in the night, or laying to, so as to be as near as prudent off the port in the morning, will be in some danger of the Fountain Rocks, and the only security at present for this is, I should suppose, attention to the lead and a good look-out, keeping in a certain depth of water beyond them.

"It is my opinion that steam-vessels, drawing six and eight feet of water, may enter this place when completed, at almost any time of tide, and run up right alongside the wharf or quay, which is intended to be erected in Mary's Cove, at once, without having to use their anchors at all; and, indeed, it will be seldom that any vessels will have to use their anchors in this port, if they are cleverly managed. One great advantage of this place is, that the passage from Mary's Cove to sea is one straight course, so that if a vessel have a fair wind to start with, it is fair the whole way out.

"I have no doubt that vessels drawing eight feet may enter at high water, spring tides, without any danger; and I expect that vessels of from ten to perhaps twelve feet water will be able to enter, but this will be a work of time; and as the importance of the port progresses, means will be made use of to increase the depth, and enlarge the capacity of the port. But at present the large quantities of sand, which are carried during the ebb tide, must necessarily leave a considerable deposit, causing the entrance to be much more shallow than it will be when the sand is all or nearly all out.

"I have said nothing about going out. All that is required is a good leading wind to enable the vessel to surmount the surf, and there will be nothing to hinder any vessel going out at a proper time of tide. The *Africaine* came in under every disadvantage. Her captain had never seen the place before; a dead calm, neap tide, and not high water either; but she went out in the most gallant style with the wind W. by S., under a good press of canvas, and in ten minutes from the time she cast off her moorings, she was out to sea clear of all danger, passing the rollers of the surf without one breaking over her."

From the Kowie River eastward to Great Fish River the coast has a more verdant aspect than it has between the former and Sunday River in Algoa Bay, the sand-hills being covered with luxuriant bushes; but there is not an inlet or curve of any sort that offers shelter for ships, and the surf breaks heavily on the shore. At about midway between Port Francis and Great Fish Point, some rocks close to the shore, named *Black Rocks*, form an excellent land-mark, which is distinctly visible from a

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distance of three or four miles; they are three in number, the centre one is shaped like a wedge, the others are round at the top.

Immediately northward of the Black Rocks is the outfall of the river Monden, which is probably dry, except in the rainy season. This river is said to enter the sea by three channels, which are accessible only at high spring tides.

WATERLOO BAY.—Great Fish Point is estimated to be in Lat. 33° 30′, Long. 27° 7′ E., and northward of it, about three miles, is the entrance to Great Fish River; the coast then trends round to the north-eastward, and forms, with Great Fish Point, what is known by the coasters as Waterloo Bay. The landing at the river is only tolerable, and it is considered a most unfit place at which to discharge a cargo, there being almost constantly a heavy sea breaking on the beach. The bay is said to afford no shelter, and to be unsafe with any winds but those which come off the land.*

The position of Great Fish River may be easily known in fine weather by some distant undulating hills, which, on a N.N.W. bearing, appear between the ravines through which the river flows. The stream passes through an open country in the immediate vicinity of the coast, which is intersected with picturesque ravines, generally clothed with bushes. From the south-west side of the entrance a sand-bank projects within twenty yards of the north-east side, which contracts the channel; part of the ebb is thereby thrown back on the flat beach, runs to the westward, and finds an outlet close to the rocks on the western side. At this spot the water appeared deep, and the sea did not break successively for the space of ten yards, there being at times an interval of five minutes, when a boat could easily have landed; when, however, the sea did break in this space, it was with treble the violence of the constant rolling surf along the sand before the mouth of the river. The river at particular seasons swells to a considerable height, and then, from the violence of the stream, no vessel can possibly enter; but when the causes that filled its bed have ceased, it becomes a mere brook.

In 1847, H.M.S. *Apollo* anchored in nine fathoms off the mouth of the river, in what was considered by those residing at the port to be the best position for riding. The marks were, Great Fish Point W. ½ S.; Black Rocks under the flag-staff N.W. by W. ½ W.; landing-place N. by W.; and the eastern extreme of land East. While running for this anchorage from Kowie River, a strong current setting westward and W.S.W. was encountered; the rate was probably three knots an hour. In the same year Rear-Admiral Davies, Commander-in-Chief at the Cape of Good Hope, caused two anchors of 30 cwt. each, with suitable cables, to be laid down as single anchor moorings, with the view to decrease the damage and difficulty attending the communication with the shore, owing to the heavy surf which usually prevails upon the beach, and the rocky nature of the bottom snapping the cables of vessels waiting to discharge their cargoes.

From Waterloo Bay the coast trends eastward about 50 miles to East London, and includes within it several rivers, of which that named Keiskamma is the chief. All the rivers are fronted by bars upon which a heavy surf constantly breaks, and they are so much alike in appearance that it is difficult for a stranger to distinguish one

* Commander Radcliffe, R.N., describes the bay as being *no* bay, but nearly a straight line of coast. He also says that the bottom is rocky, and the anchorage unsafe.

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from the other. The coast from Great Fish Point to Cove Rock, in Lat. 33° 6′ and Long. 27° 52′, is even and sandy, and offers nothing remarkable by which a ship's position may be ascertained.

River Becca.—The first river eastward of the Great Fish River is that named Becca. This stream is not more than 35 or 40 feet wide at the entrance, and the current outwards is at times very rapid, and the water apparently deep. When visited by Captain Moresby the breakers were not more than would be expected at a depth of 8 or 10 feet, and resembled those seen at the mouths of rivers known to be navigable; it may perhaps, therefore, be capable of admitting coasting vessels.

Keiskamma River.—The entrance to this river is about 24 miles eastward from the Great Fish River, and is about 1 mile wide from point to point, but widens within, and forms a basin or lake, which receives the inland waters; this basin is full only during the rainy season. Captain Moresby says, "It was nearly high water when I visited the Keiskamma, and the mouth was then about 70 or 80 yards across, and the stream was running South into the sea, strong and deep. Part of the stream was forced back along the shore, similar to that at Great Fish River, but the greater part ran close along the low rocky shore which forms the north-east point, and there, the breakers not being constant, afforded a hope that there might be a channel at high tides for small vessels; but the wildness of the coast, with a flat running out 1½ to 2 miles to seaward, precluded every reasonable expectation that this river could ever be opened to the most enterprising trader. It probably can never be the resort of large ships, the tides being too feeble, and of too little elevation, the highest tide observed by marks on the shore being only 7 or 8 feet, and at low water the river did not exceed 40 yards in breadth.

"The ravine through which it winds extends in a N.W. and S.E. direction, and the entrance may be known at sea, in clear weather, by a range of mountains in the interior, one being an insulated cone flattened at the top, with a high mountain a short distance eastward from it having three distinct elevations; when these mountains bear N.N.W. they are in one with Keiskamma River. The north-east point of land, close to which the river flows into the sea, is low and rocky, projecting from a remarkably green hillock, detached from the one where the bank begins to rise; the south-west point is a sandy hillock. Along the coast the sandy soil is covered with bushes, through which, at various places, the sand is visible."

From Keiskamma River to *Cove Rock* the distance is 19 miles. This rock is joined to the shore by a narrow sandy isthmus, over which the sea breaks heavily after southerly gales; hence it is easily recognised by vessels running closely along the coast from Waterloo Bay, as it then appears like an island, but when viewed from a distance in the offing it is not so easily distinguished; it is quite black and bare of vegetation, and forms a good mark for Buffalo River, 8 miles eastward from it. Hence to East London the country bears a different aspect to that westward of Cove Rock, as it is green, and grass grows to the water's edge. When abreast of the rock the houses of East London and two flagstaffs can be seen over Hood Point, a low projection of the coast 2 miles westward of Buffalo River.

Hood Point must always have a good berth given to it—a mile is perhaps as near as it should be approached. A reef extends from it, and outside this is a dangerous

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patch upon which the sea generally breaks. The point and its surrounding dangers have not been examined.

BUFFALO RIVER.—The entrance to this river is in Lat. 33° 0′ 40″ and Long. 27° 58′ 30″, that being the estimated position of the flagstaff on its south bank. It is not very wide, the distance from shore to shore probably not exceeding $\frac{1}{6}$ of a mile, and the stream at low water has a breadth of less than a cable's length, and a depth of only 3 to 8 feet.

Light.—A lighthouse has been erected on the reef at the south side of the entrance to the river, at 391 yards E. by S. $\frac{1}{4}$ S. from the flagstaff previously mentioned. Its base is square, 12 feet in height, and constructed of rubble masonry; the superstructure is of timber, built in the form of a truncated pyramid, weather-boarded, and painted in alternate red and white bands. The light, *fixed*, is 45 feet above the level of high water, and visible in clear weather from a distance of 11 miles.

Vessels anchor outside the river in 7 to 10 fathoms of water at about $\frac{3}{4}$ of a mile E.S.E. from the flagstaff; the marks are:—Cove Rock, just shut in by Hood Point, and the River open. It is recommended when landing troops to lie with a good scope of cable out. The port office is in possession of MARRYAT'S signals, by which any communication can be made. Should the weather be fine and the bar passable, the surf-boats will probably be at the outer buoy, from which to the ship it will be necessary to run a hawser, as the current at times sets so strongly that it is quite impossible to tow vessels against it. It would also be advisable to send a boat's crew to assist in warping the surf-boats from the outer buoy to the ship.

When the bar is passable, a red flag, with a white square in its centre, is hoisted at the lower flagstaff; when it is dangerous, it is hoisted to half mast; and when it is impassable, it is not hoisted. The bar should never be attempted by ships' boats, however smooth it may appear.

When approaching Buffalo River from the westward it is recommended to leave Algoa Bay at such a time that the latter half of the passage can be performed by daylight; but should the weather be fine, and Cove Rock not visible before dark, it would be better for a steamer to anchor off the coast in about 12 fathoms, with her steam up, or nearly so, in preference to lying-to for the night, as on one occasion H.M.S. *Penelope* was set 80 miles to windward against a strong S.W. gale in twenty-four hours. MR. LUKE, of H.M.S. *Boscawen*, recommends sailing vessels to secure a latitude half way between Cape Morgan, in Lat. 32° 43′, and Buffalo River, because of the constant south-westerly current.

When H.M.S. *Penelope* was at Buffalo River she anchored on one occasion with Hood Point bearing W. by S.; the upper flagstaff W. by N. $\frac{1}{2}$ N.; peak east of the river N.W.; and a sand-hill, a high peak bare at the top, N.E. $\frac{1}{2}$ N. In this position the vessel rode out two heavy gales from the S.W. at single anchor, with 100 fathoms of cable, and steam up, which is believed to be preferable to letting go a second anchor.

The *Penelope* always experienced a strong current setting along the coast in a westerly direction at the rate of from 2 to 4 knots per hour. This current probably strikes against Great Fish Point, which sets it off from the coast in a southerly direction. On the last visit of that vessel to Buffalo River, a very variable current prevailed at the anchorage; so much so that the ship swung round her anchor half a

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dozen times in an hour. This, however, is an exceptional case, and may be attributed to the strength of the stream running out of the river after heavy rains and meeting the coast current at right angles.

It is the opinion of coasting captains that the westerly current runs at the rate of 5 to 6 knots an hour in strong westerly gales, and from 2 to 3 knots in moderate weather. An easterly current is seldom known, but on occasions it does exist, and only in very fine weather.

From Buffalo River, the coast runs easterly 27 miles to *Cape Morgan*, and includes several rivers, of which those named Kahoon, Geneka, Gonubie, Kwelegha, Bulugha, Kintza, Kwenugha, and Ikuko are the principal. At nearly 2½ miles from East London there is a remarkable sand-hill, sufficiently high to be seen at a considerable distance; it is easily recognised by the bushes on its summit, which have the shape of a horse-shoe. Another conspicuous sand-hill is in Lat. 32° 52′. Cape Morgan is a low point, but the land behind it rises into a somewhat remarkable hill, covered with grass and bushes intermixed; it presents a similar appearance whether viewed from the N.E. or S.W.

RIVER KEI.—At about 2 miles N.E. by E. from Cape Morgan is the River Kei, a stream which brings down a great quantity of water during the rainy season. It has a very narrow entrance, and a depth at low tide of less than 10 feet; hence it is of but little commercial importance. Immediately within the sand-spit on the south side of the channel the river becomes wider and shallower. In consequence of the want of depth, only vessels of the smallest size can enter, all others being obliged to anchor outside.

In 1857, the entrance to the River Kei was examined by MR. SKEAD, master, R.N., and described in the following terms:

"On the south bank of the river, and very near to the sea, there is an isolated hill covered with dark bush. From the foot of this hill a long, broad spit of sand stretches in a northerly direction to within about 100 yards of another dark bluff hill, situate at the north bank of the river. This narrow space is the river-mouth, at its narrowest and deepest part. From the dark bluff at the north point of entrance to the river, the shore extends in a south-east direction three-eighths of a mile, terminating in a low ledge of sunken rocks. Between this rocky shore and the breakers on the bar (which are 30 or 40 yards only to the southward) the channel into the river is formed.

"From the north extreme of the sand-pit, which partly forms the river's mouth, the breakers extend seaward in a S.E. direction nearly a mile. These breakers are caused by a bank, formed by a deposit of sand from the river which the tide does not carry away.

"While sounding the channel, the least depth found was 7 feet at low water, at the distance of about 30 yards from the rocky point which projects southward, midway between the outer point and the mouth of the river; but between that spot and the point 14 feet was found.

"From the anchorage a remarkable sand-patch is seen on the face of the dark hill on the north shore of the entrance to the river. This serves as a guide to the entrance, as the low ledge of sunken rocks above-mentioned is nearly in line with it, and it is from this point the river must be entered. If it is attempted to enter the river by the channel, a fair opportunity must be waited for, keeping a good look-out

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on the rocky ledge, over which the sea breaks furiously; and, when a favourable chance offers, pull in, keeping the rocky shore so close as to leave just sufficient room for the oars. The breakers on the bar extend to the rocks only during heavy rollers, when, of course, the channel is impracticable.

"If landing is decided upon, and the bar prove impassable, it may be effected more conveniently than on any other part of the adjacent coast at a sandy spit, which is sheltered in some degree by a patch of sunken rocks southward of it. These rocks lie about a cable's length off shore at nearly a mile southward of the outer entrance of the River Kei, and the sea breaks violently over them.

"During flood tide the stream sets northward close in shore, and southward during the ebb. Care must be taken, in landing on the spit, that, while waiting for a smooth, the boat be not swept too far north, for it was found on one occasion, when a whale-boat of H.M.S. *Geyser* was swamped in endeavouring to pass through the surf, that the boat was not thrown on the spit by the rollers, but carried northward by the flood tide into the breakers on the bar, thence into the river, through the channel, and was not recovered until twelve hours afterwards. On the other hand, during the ebb tide, equal care is necessary that the boat be not drifted southward, where the surf is so much heavier and the beach rocky.

"S. by W. ½ W. about half a mile from the river-mouth, and N.E. by E. ½ E. rather more than a mile from Cape Morgan, there are three low, rocky islets, the southern-most and largest of which, called the Snag, is rendered conspicuous by a singular water-worn rock, which rises 20 to 25 feet above its level surface, and has the appearance of the inverted roots of a monster tree. All round these islets the sea breaks heavily; but this does not shelter the main beach, which is of little consequence, as it is all rocky.

"The *Geyser's* anchorage was in 9½ fathoms, with Cape Morgan W.S.W.; Snag Rock, West; and the sandy patch at the river's entrance, N. by W.

"Without a regular surf-boat establishment to ensure the good order and security of the surf-warps and boats, there seems very little probability of this river ever being available as a landing-place, either for troops or merchandise.

"At nearly a mile from the shore, in the neighbourhood of the Kei, the current was found invariably to set to the S.W., at the mean rate of 1½ knot an hour. At the first quarter ebb the stream from the river reached as far to the S.E. as the anchorage, where it joined the coast current, and both ran to the S.W. together. During flood tide the influence of the stream was not sufficient to alter the general direction of the ship's head."

From the River Kei, the coast continues 12 miles in a north-easterly direction to a low point, named in the charts *Sandy Point*, and is throughout of an inhospitable appearance, and extremely difficult to land upon in consequence of the heavy surf that almost constantly prevails. Sandy Point is low, and remarkable from having upon it three or four hummocks, and about a mile inland two large trees: also from arches formed by the sand near the cliffs, with dark bushes near the centre. *Bashee Point*, in or near lat. 32° 16′, has a ledge of rocks extending from it about ¼ of a mile, upon which the sea breaks heavily; a landing may be effected at this point with some difficulty, and there is also moderately good anchorage at a short distance from it.

Hence to the rocks called *Hole in the Wall*, in lat. 32° 3′, the coast maintains its north-easterly direction. At *Rame Head*, 18 miles beyond Hole in the Wall, and

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situate in about lat. 31° 48′, there is, at about ¾ of a mile from the shore, a little westward of the head, a shoal of 8 to 10 fathoms; the headland itself is a bold rocky point, sloping gradually, and with a small rock at its extremity. Immediately under Rame Head is the small River Tata. At 5 miles northward of Rame Head is *Brazen Head*, a bold rocky projection of the coast, which, viewed from the offing, has the appearance of two densely-wooded points; thence to the river St. John, or Umzimvubu, the distance is 13 miles, and at nearly midway is a small stream named Gaziana.

RIVER ST. JOHN, or UMZIMVUBU.—This is a large and rapid river which falls into the sea in Lat. 31° 36′ 50″ and Long. 29° 33′ 20″, that being the geographical position of a house on the western side of the entrance. The breadth of the stream between the points of outlet is not more than a cable's length, and the bar is said to shift considerably after strong freshes from the river, and to vary greatly in depth, hence the assistance of local knowledge is necessary to carry vessels in; the usual depth on this bar is from 8 to 12 feet.

The entrance to the river St. John was surveyed in 1857 by Mr. F. Skead, master, R.N., assisted by Mr. M. P. Auret, R.N. The following remarks are based upon this survey:—

"The appearance of the land at the mouth of the river St. John from seaward is so remarkable, that any one having once seen it, or even a sketch of it, cannot fail to recognise it again. A lofty table-topped mountain, 1200 feet in height, appears to have been cleft to its base, leaving a wedge-shaped gap in the centre, through which the river flows to the sea. The upper part of this table-land, called St. John's Gates, is bare, stratified, sandstone rock, like Table Mountain, but at 200 feet below a dense forest covers the cliffs to the water on the river banks.

"The Gates are 1¾ mile from the entrance to the river, which is in the bight of a westerly indentation in the coast line, lately named Gordon Bay. Cape Hermes, the southern horn of this bay, is distinguished by a round, grass-covered hill, 420 feet above the sea; and the northern horn has a similar hill over it, but neither so large nor so high as the other. The depth of the bay, westward of a line joining these hills, is scarcely half a mile.

"At the left or eastern point of entrance to the river, there is a low grassy hill, named White's Hill, presenting to the south-west a face of dark cliff, fringed with a rocky reef. This is called Porpoise Rock. At 180 yards to the W.N.W. of the northern extremity of the cliff lies the outer point of a sand-spit, which at present forms the western point of the entrance to the river. This is at its narrowest and deepest part.

"From Cape Hermes the coast to the distance of 800 yards N. by W. is all rocky; it here joins a sandy beach, which runs north for 1300 yards, to the spit of the river entrance. At the junction of this rocky and sandy coast there is a small nook, called Paul's Cove, where the boats of H.M.S. *Hermes* effected a landing when the bar of the river seemed impracticable from the heavy surf upon it.

"The direction inland of the river from its mouth is N. ½ W., one mile of which was sounded. The average depth of water found was 15 feet at low tide, and the width of the river averaged 300 yards, above a cliff on the western bank, called the Needles. This cliff rises N.W. by N. 3 cables' lengths from Porpoise Rock. Below

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the Needles Rock to the river entrance, the water increased in depth to as much as 35 feet.

"The channel into the river over the bar at the time of the visit of the *Hermes*, in May, 1857, was found to be S. ½ E., 430 yards from Porpoise Rock; its probable width being 2 cables for a distance of 100 yards, over which a depth not less than 8 feet was found at low water. On both sides of this channel there are heavy breakers, and at the time of the arrival of the *Hermes* the sea broke across the entrance for four or five successive days. It must be noticed, however, that a strong gale from W.S.W. had been blowing some days previous to her arrival, which had raised the rollers far above their usual height.

"The bar of this river, like all such deposits, being subject to a change of position, small vessels which enter the river with merchandise are guided over it by a shifting mark upon the shore, at the back of a hut, which is built near the end of the spit, at the west point of the river-entrance. This hut at the time of the survey stood 150 yards from the spit-point, but the owner, Mr. White, who built it in the month of November, stated that, during heavy rains in the December following, the flood from the river cleared away the sand-spit to within 4 or 5 yards of the hut, leaving a depth of 12 feet water close to the edge of the sand. The channel into the river at that time changed its position to the rocky shore, which extends seaward from Porpoise Rock. The same authority also stated that, as the dry season advances, the channel moves to the westward until June or July, when it gradually begins to resume its former position near the Porpoise Rock, which it reaches in the month of December. In June, whilst the bed of the channel is to the westward, there is less water over the bar than at other times of the year.

"There is a trading station about 9 miles from the mouth of the river, to which place the vessel employed as a trader carries her inward cargo. A surf-boat and surf-warps are employed in communicating with this vessel when outside the bar.

"From the shortness of the stay of the *Hermes* it was not possible to report positively upon the capability of this river for navigation by small vessels, but a favourable impression in this regard has been left upon the minds of those officers who had an opportunity of seeing it. The accounts given by practical men who have crossed the bar at favourable times render it necessary that before any positive statement be made respecting it a regular series of observations should be carried out upon the effect produced by the outset during the rainy season, which prevails from October to April, when it is so great as to produce the changes in the direction of the channel already mentioned. A corresponding set of observations during the opposite season would enable a clear idea to be formed as to the facilities afforded by this river as a place of traffic for coasters. The mild disposition of the natives, and the presence of European traders, with whom they are upon friendly terms, are very favourable for carrying out the observations alluded to.

"Should the place ever become a trading port, two moveable beacons for leading vessels over the bar could easily be erected, and no difficulty experienced in recognising them, as their distance from the shoal part of the bar will scarcely ever exceed 800 or 900 yards.

"During the unfavourable part of the year for vessels entering the river, it appears, even from the accounts of those who have frequently crossed the bar, that except during very boisterous weather the river is always practicable for surf-boats, pro-

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vided with the necessary warps and buoys. It has been also reported that a depth of not less than 12 feet is to be found as far as the trading station, 9 miles within the river.

"From the straight course of the river, which allows the ebb tides and freshets to exert their full scouring power in passing to seaward over the bar, it is more than probable that an artificial reef run out from Needles Point, as far as the outer bar, would tend to remove it by carrying the sand of which it is composed into deep water, where it would be borne away by the ocean current; the channel would then undergo no change in the different seasons. The eastern shore of the river being rocky, no artificial work is necessary to confine the water on that side. An inexhaustible supply of durable rock for such a purpose lies close at hand. Needles Rock itself, and the immediate vicinity, contains all that is required for such a work, and very little labour would be necessary for transporting the stone.

"There is plenty of good timber and abundance of limestone on the St. John.

"The anchorage of the *Hermes* in 13 fathoms with Cape Hermes N.W. by W. ½ W. ⅘ of a mile, and Porpoise Rock N. by W. ½ W. 1¼ mile, was found to be good, but a closer berth would probably be better. With Cape Hermes W.S.W. ½ a mile, and Porpoise Rock N. by W. ½ W. 6 cables' length in 8 fathoms, more shelter from the westward would be obtained; but in both positions the bay is exposed from E. by N., round southerly, to W. by N.

"Neither tide nor current was experienced at the anchorage, but close in-shore, during the flood-tide of the river, which runs regularly, a strong current was found setting to the S.S.W. along the sandy shore inside the breakers, and to seaward along the rocky shore in the direction of Cape Hermes. This has, doubtless, scooped out the sand at its junction with the rock, and formed Paul's Cove. The current should not be forgotten in attempting to land with a flood-tide, for upon one occasion it was found so strong that a cutter could barely stem it, and should a boat be swamped in the surf it would be almost impossible for the crew to reach the shore, and sharks are numerous and ravenous, both outside the surf and inside the river-mouth."

ALIWAL SHOAL.—From the River St. John the coast continues to trend north-easterly to Port Natal, and includes many rivers, of which those named Penchat, Beesan, Fongo, Slanyan, and Bloody, are the principal; all have bars at their mouths, and are represented to be inaccessible to vessels. This coast is almost unknown, and should consequently have a wide berth given to it, especially with a wind blowing strongly from the eastward. In Lat. 30° 15′ and Long. 30° 50½′ there is a dangerous reef, known by the traders to Port Natal as the Aliwal Shoal. It is a mile in extent, has upon it a depth of only 2 fathoms at low tide, and is steep, there being as much as 15 to 11 fathoms close to it on all sides; at 4 miles eastward from it there is no bottom at 40 fathoms. It is 2⅓ miles from the nearest point of land (a green grassy point), and the depth between averages 15 to 12 fathoms, the latter being immediately off the shore. From it Cape Natal bluff bears N.E. by E. 25 miles; the mouth of the Umcomass River North 4 miles; and the mouth of Bloody River W. by N. 4 miles.*

* The *Impulse* is said to have struck in 1860 on a reef 22 miles from the land, in Lat. 30° 19′ and Long. 31° 12′. The report is considered very doubtful.

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PORT NATAL consists of a bay about 3 miles in extent, which is almost wholly dry at low tide. It is formed on its south side by a high wooded tongue of land, the summit of which is 250 feet above the sea at high water; as this bluff is the boldest land on this part of the coast, and the shore north of it is low for several

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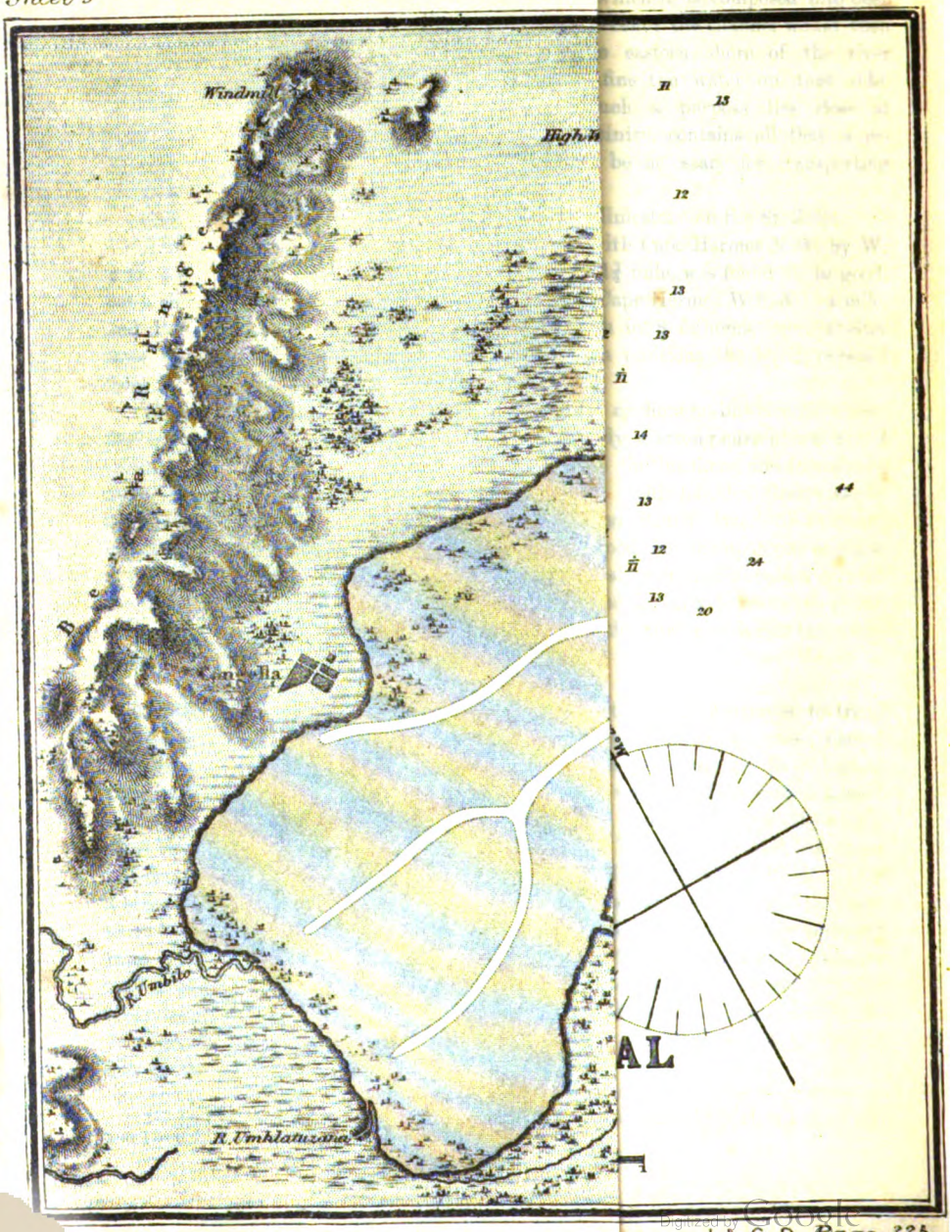
vided with the necessary warps and buoys. It has been also reported that a depth of not less than 12 feet is to be found as far as the trading station, 9 miles within the river.

"From the straight course of the river, which allows the ebb tides and freshets to

Sheet 3



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PORT NATAL consists of a bay about 3 miles in extent, which is almost wholly dry at low tide. It is formed on its south side by a high wooded tongue of land, the summit of which is 250 feet above the sea at high water; as this bluff is the boldest land on this part of the coast, and the shore north of it is low for several miles, it is a very conspicuous landmark, and readily recognised from a distance. The north point of the bay is low and covered with bush; it is visible from seaward only when approaching it from eastward and north-eastward, as the high bluff of Cape Natal hides it from vessels making the bay from southward. The position of the Custom-house jetty on the north point of the bay is estimated to be Lat. 29° 52′ 48″ and Long. 31° 2′ 49″.

A sandy spit juts out from Cape Natal in a northerly direction ½ of a mile, and nearly meets a sandy flat extending out from the shore of the north point of the harbour about half a mile. In the channel between this spit and flat there is usually a depth of 9 to 14 feet at low tide; but this depth cannot be depended upon, as strong easterly gales interrupt the flow of water from the bay and cause a deposit of sand on the bar. Efforts are being made to improve this channel, and it is hoped that large vessels will be able ultimately to enter.*

On the heights of Cape Natal there is a signal staff, and westward of this, close to the shore, are two beacons used as marks for the bar. There are also two beacons on Sandy Point, the north point of the bay.

The town of D'Urban is in the north part of the bay, and is a thriving place, as it is the only seaport town in the province of Natal. Supplies of all kinds required by vessels can readily be obtained from it, and fresh water is furnished to ships in the roadstead by means of large boats. The chief exports are wool and ivory.

Directions.—When approaching Port Natal from the southward, the coast in its vicinity will be observed to be of moderate elevation near the sea, and broken in several places by the mouths of rivers and streams; the hills inland rise to a considerable height, and the landscape strikes the visitor who is familiar with the white sands and stunted brushwood of South Africa, as one of great richness and fertility. Northward of the cape the coast is low, but the character of the country is very similar, although somewhat more thickly wooded.

The following remarks on Port Natal, by CAPTAIN HADDON, are extracted from the *South African Commercial Advertiser* of March 26th, 1836:—

"When leaving Algoa Bay steer out from the anchorage S.E. ½ S. 40 miles, and then E.S.E. 160 miles; you will then be out of the stream, which sets at the rate of

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* The works in progress are under the direction of MR. MILNE, the colonial civil engineer. They were commenced in March, 1850, and their cost is estimated at 100,000*l.*, of which 10,000*l.* had been expended up to August, 1854, by annual grants. Their object is to confine within certain limits the body of water which is forced out by the ebb tide, and to bring its whole power to bear upon one channel, by artificially blocking up the two other tributary ones now in existence; to effect this, a solid stone pier is being run out from the sandy point on the north side of the entrance, towards the bar. The dimensions of the pier are 6 feet wide at top along its whole length, and 50 feet at the base close in shore, widening to 250 feet at the outer end; it will be 4 feet above the sea level at high water, and its total length will be about 2300 feet. On the opposite side of the entrance, and across the rocks projecting from the base of the bluff of Cape Natal, a wall is to be built, with a harbour light on its end. The width of entrance on the bar, between the ends of the piers, is intended to be 500 feet, and the quantity of water to pass through at each ebb tide is calculated to be sufficient to maintain a depth of water of 28 feet at high water spring-tides, assuming a tidal velocity of only 2 knots per hour. In August, 1854, about 1000 feet of the solid pier were completed. The material of which it is built is a red sandstone, procured from a quarry on the bluff nearly opposite the works. It is also, we believe, proposed to erect a lighthouse on Cape Natal.

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3 to 4 knots per hour W.S.W., and have a little help from a current which sets N.E. (for in that part I was laid to with the *Dove* 36 hours, and only drifted 17 miles). Then shape your course to bring you into Lat. 29° 30′, and Long. 31° 30′ or 32°, when you will be north-east of Natal, and with a N.E. wind will soon be carried to it. The port is easily known from the northward, as you can see the entrance better than from the southward.

"If the wind is very strong from the S.W. you should only run to lat. 30°, and the same meridian as before; but do not keep too close in-shore, as the wind dies away very suddenly, and the strong current which inclines towards the shore may endanger the ship and lives.

"The Bluff Point is easily known by the back-land running in a sloping direction, and several flat tops notched here and there. It is also very thickly wooded, while the other shore is low, and consists of a sandy shore covered with bushes at a few yards from the beach.

"If the wind is from N.E. keep your ship under canvas, but with her head off shore, and anchor in 9 fathoms, with the bluff bearing S.W. ½ S. The bar consists of ridges. A S.W. wind causes the deepest water to be close to the reefs, and a N.E. wind makes its deepest in mid-channel. The surf is always worst at high water, and it is seldom that you can pass it in a small boat without risk. If there is not sufficient water at spring tides to permit your vessel to cross the bar, moor with open hawse to the N.E.

"The winds blow strongly at times, but seldom last longer than 24 hours, and then there is not such a heavy sea as at Algoa Bay, and the ground is equally good. The cutter *Circe* rode out the heaviest gale ever recollected there for four days.

"If compelled to discharge cargo outside the harbour, land it on the beach immediately north of the bar, because in fine weather and with off-shore winds it is very smooth for about half a mile northward of the bar.

"When crossing the bar with a vessel drawing from 8 to 10 feet, if with a good commanding breeze, let hands stand by the braces, as the tide is strong, and in shallow water a ship will not answer her helm quickly enough without the help of bracing about the yards as required. In coming in, the depth shoalens from 8 fathoms. It gradually shoalens to 2 fathoms on the bar, and with good way you have not time to get a second cast on it. You then gradually deepen to 7 fathoms, and when abreast of a large sand-coloured stone, haul sharp up and steer for the sandy shore, and hug it as closely as you can,—the tide will keep you from getting on it.

"A ship will not take any hurt by lying aground inside the harbour, it being as smooth as the London Docks even during the strongest winds. She should not, however, be a sharp-built vessel."

Port Natal was visited in 1843 by Lieut. Nourse, R.N., and described as follows:—

"The harbour, though apparently of several miles extent, is in reality confined to a narrow channel of from 14 to 20 feet depth at low water, the remaining part being sand-banks left uncovered when the tide is out. The islands in it are principally mangrove swamps. The almost invariable winds are from W. to S.S.W. and N.E. The strength of tide varies, at springs from 2½ knots up the harbour to 4½ where it is confined at the entrance.

"A reef runs off from the point of the thickly-wooded promontory which forms the southern shore; this reef forms one side of the bar, while the opposite side is a bank

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of sand. The bar varies both in position and depth; from October to February, during which period the most rain falls, it is forced farther out and deepens, while in the dry months, when the N.E. winds prevail, the sand accumulates. We found a depth on the bar of 17 feet at high-water spring tides.

"When the bay is approached from the northward, the south point of Port Natal is most conspicuous, and by its projection a bay is formed, where a vessel may anchor with a S.W. wind in 9 fathoms, sandy bottom, the point bearing S.W. by S. 2 miles; the northern extreme N. 52° E.; and the extreme of the bay S. 70° W. Variation 28° 45′ W."

Port Natal was surveyed in 1854 by LIEUT. DAYMAN, R.N., and a chart of it, the result of the survey, was published by the Hydrographic Office of the Admiralty in 1856. The following remarks are based upon this examination of the bay by LIEUT. DAYMAN:—

"A vessel intending to enter the port and in want of a pilot, should anchor in the road in from 9 to 9½ fathoms, sandy bottom, when the flag-staff on the cape or bluff bears S.W. 1 mile. A signal being made, a pilot will be sent off from the port office, or, if the surf on the bar is too heavy, it will be communicated by signal from the flag-staff on the cape.

"The anchorage in the road is safe so long as the wind does not blow directly on the shore, which is seldom the case; but H.M.S. *Southampton* drove, and was nearly wrecked here during a gale from E.S.E., and it is recommended that, when the wind is inclined to freshen from that quarter, with a long swell and high barometer, a ship should go to sea as soon as possible. If, through any cause, the mariner should be forced to attempt the bar without a pilot, the following may be of service:—Keep the two staves on Sandy Point in one till the marks on the cape or bluff are in line, then haul up for the latter until the bar is crossed; after which, being in smooth water, the vessel may be anchored near the bluff-marks and wait for a pilot.

"A vessel drawing more than 10 or 11 feet should not attempt to enter the port without a pilot, nor at any other time than about high water.

"The bar of sand which crosses the mouth of the port is subject to change, being raised by the swell of the ocean, and scoured out by the force of the ebb, which has been found sufficient to deepen the water 12 inches in one tide.

"In the port, the velocity of the ebb at springs is about 3½ knots per hour, and between Sandy Point and the bar about 2 knots.

"In the roadstead outside the bar the stream of flood sets to the S.W., and of ebb to the N.E."

For a general description of the Winds, see page 70.

A Lighthouse is being erected on the bluff on the S. side of entrance to Port Natal; it will exhibit a *revolving* light, visible 30 miles.

Coast.—From Natal to Cape St. Lucia the coast trends E.N.E. *easterly* about 110 miles. There are many small rivers between the two points, but very little is known respecting them.

Morley Bank extends nearly the whole distance between Natal and Cape St. Lucia, and in some places fully 18 miles off shore; the soundings vary from 20 to 60 fathoms, bottom muddy, and of a lead colour. In Lat. 29° 31′ S., at 1¼ miles from the coast, the soundings are 27 fathoms. On the seaward edge of the bank, and about 13 to 18 miles from the shore, fish are abundant and good.

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Coast.—From Cape St. Lucia to Cape Vidal the distance is 25 miles, bearing N.E. ½ E.; the coast between curves inwards, and is low near the sea. From Cape Vidal to Inyack island the land trends N.E. by N. for 130 miles, and the coast is a continuous line of sandhills varying from 60 to 500 feet high.

Off Cape Vidal, at the distance of 5 miles, there are soundings in 27 fathoms; north and south of the cape, and at the same distance off shore, the soundings are deeper.

DELAGOA BAY, formerly called Lorenzo Marques, is a frequent resort of South Sea whalers. Its entrance extends from Cape Inyack to Cutfield hummock, a distance of 25 miles; but along this extent it is more or less obstructed by a bar, varying in depth from 7 to 2 fathoms at low water. The general breadth of the bay is 15 miles, with depths varying from 6 to 12 fathoms; the upper part is merely a shallow lagoon, intersected by two or three deep channels. Three large rivers empty their waters into this bay—Mapoota, English River, and King George. ENGLISH RIVER forms at its mouth a good land-locked harbour, and the bar has 14 feet at low-water springs, 25 feet at high-water springs; when inside, there is anchorage in 9 fathoms. These places require a special chart.*

Coast.—From Delagoa Bay to Zavora Point the coast trends eastward for the distance of 160 miles.

The Lagoa shoals are a continuation of the bar of Delagoa Bay, and extend 4 or 5 miles off shore; but there are also other shoals fringing the coast here and there. Off Zavora Point there is a bank of soundings southward and westward, varying in depth from 22 to 80 fathoms; but it is supposed that, in some places, the depths may be less.

From Point Zavora to Cape Corrientes (Lat. 24° 7½′ S. Long. 35° 30½′ E.) the distance is 26 miles N.N.E.-ly; the cape is bold, and has a conspicuous black islet off it, and the coast so far as known is safe to approach at the distance of a mile.

From Cape Corrientes to Cape Bazaruto the trend of the coast is still N.N.E.-ly, and the distance is about 156 miles. Between these points, Cape Wilberforce and Cape Lady Grey project slightly to the eastward; the coast line is irregular, and alternately bluff and low, with here and there dangerous outlying shoals of coral or sand, one of which (the Zambia) is nearly 4 miles off shore.

INHAMBANE BAY, a few miles north of Cape Wilberforce, is fronted by reefs and shoals, on which the water breaks, and the bar is 4 miles off shore. Inside, the bay appears to be clear of danger, with good holding ground; and the river Inhambane is an excellent harbour for small ships.† *Supplies* of cattle, poultry, fruit, vegetables, coffee, sugar, &c., may be procured here.

Coast.—From Cape Bazaruto to Sofola the coast trends Northerly, and then E. by N. from Sofola to Angoxa river, forming a considerable bend to the westward; in the intervening space are the mouths of the Zambesi and the river Quillimane. The coast line from the Quillimane to the Angoxa is fringed with islets and dangerous reefs and shoals, some of the latter being found 30 miles and upwards off shore, but gradually approaching it off Macalonga point, and thence northward.

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* See Admiralty Plan of Delagoa Bay, and of English River.
† See Admiralty Plan of Inhambane River.

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Coral knolls are also found at intervals between Angoxa river and Mozambique, extending from 3 to 8 miles off shore.

MOZAMBIQUE harbour is a deep inlet of the sea 5½ miles wide by 6 long; it is a safe anchorage, being protected by the island of Mozambique, and several islets, reefs, and shoals; it cannot, however, be entered without a special chart.* It must be borne in mind that the current on this part of the coast runs to the S.E.-ward from 2 to 4 knots. *Provisions*, and *water*, and *coals*, may be obtained here, but they are dear.

The coast in the vicinity of Mozambique is low, but to the northward of it, inland, Pao mountain, and the flat-topped Table mountain, in Lat. 14° 41′ S. Long. 40° 40′ E., are conspicuous objects to make.

Coast.—From Mozambique to Cape Delgado the coast is in some places low, and in others moderately high, with here and there an inlet or river entrance. North of Pemba Bay the outlying dangers are numerous, consisting of coral shoals and patches, with a few islets; some of these are from 10 to 20 miles off shore, and as the coast is generally low, it cannot be seen from outside the reefs.

CAPE DELGADO (Lat. 10° 41′ 12″ S. Long. 40° 39′ 51″ E.) is low, and not easily distinguished; it has a coral reef before it, a large portion of which dries at half tide.

Coast.—From Cape Delgado to Pouna point the coast trends N. to Keelwa harbour, and then N.N.E. Reefs and shoals along the coast are very numerous from Keelwa to Pouna point. There are also several river entrances, and off one (the Lufijy) stands Monfia Island, 28 miles long from N.E. to S.W., based on coral, but lofty, fertile, and visible 15 miles.

Latham Island and Bank is 23 miles from Pouna point; the island is 10 or 12 feet above high water, but totally destitute of vegetation; the bank extends from 1 to 2 miles off, surrounds the island, and is generally steep on its outer edge.

ZANZIBAR island is 46 miles long, and 18 miles wide across its broadest part; but its average breadth is from 9 to 12 miles. Its general height is 100 feet, though some hills at its southern part may be from 300 to 400 feet high. It is very fertile, and rich in spices and fruit.

The following observations on Zanzibar and Pemba are from the "African Pilot."† The reefs and shoals around and in the vicinity of both islands are too numerous to give in detail, but they are laid down on the Admiralty charts, with which it is necessary to be furnished when bound to either place.‡

Zanzibar Channel, although nowhere less than 16 and generally exceeding 25 miles wide, is rarely navigated by anything larger than the native dhows, except in the case of vessels proceeding to Port Zanzibar, and these keep between Zanzibar and most of the outlying reefs.

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* See Admiralty Plan of Mozambique Harbour.

† "The African Pilot for the S. and E. Coasts of Africa," by CAPTAIN ALGERNON F. R. DE HORSEY, R.N., an excellently arranged work—partly the result of the Captain's own observations and partly compiled from records in the Hydrographic Office. Every trader on the coast should have it.

‡ See Admiralty Charts:—E. coast of Africa, sheet x.; Zanzibar, S.W. coast and harbour; Cockburn, George, and Chakchak Ports.

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The main channel is obstructed by reefs extending 10 miles westward of Zanzibar, and by others near the coast. There appears to be soundings everywhere, but sometimes exceeding 30 or 40 fathoms; and as this channel has not been minutely surveyed, it is probable that reefs exist of which we have no knowledge. If overtaken by night in the Zanzibar channel, every endeavour should be made to obtain an anchorage. The soundings appear to be more regular off the coast of the mainland than near Zanzibar, and anchorage may doubtless be obtained anywhere off the former.

Kizimkas Head, the southernmost point of Zanzibar, is a rocky bluff cliff, well wooded, and visible at 18 miles; it may be recognised when bearing N.N.W. 12 or 15 miles by a high tope of trees appearing above the others. The shore is lined with a reef which extends from half to one mile. There appears by the chart to be soundings with the deep sea lead at 2 or 3 miles from shore, and an 8-fathom patch (Kizimkas patch) on this bank, at 2 miles from shore. The use of the deep sea lead may therefore give warning of too near an approach, but it is recommended to give this point a good berth at night, on account of the strong northerly current, which varies from one to as much as four knots. Kizimkas head is in Lat. 6° 27¾′ S. Long. 39° 32′ 57″ E.

East Coast.—From Kizimkas Head the coast trends N.E. by E. 5 miles, then N. by E. 2 miles, and here the south-east cliff ends; its north extreme being in Lat. 6° 22′ S., Long. 39° 36′ 42″ E. From the south-east cliff the coast takes a N. ½ W. direction to Chuaka Head, a distance of nearly 20 miles, with a sandy beach all the way, covered by a reef which extends about a mile from shore, and which dries in places at half-tide.

Chuaka Head is the northern extremity of a small peninsula, about 1½ miles wide at Chuaka head; but at its gorge, about 3 miles south of the head, it is hardly half a mile wide. Chuaka head is of moderate elevation, and faced with cliffs. Lat. 6° 3′ 18″ S. Long. 39° 30′ 48″ E.

Chuaka Bay, bounded on the east by Chuaka head, is 4 miles deep and nearly 3 miles wide, open to the north, and very shallow—on which account even small vessels should not enter it without much care.

Coast.—From Chuaka bay to Ngoowy point the shore is unbroken, except by an intermission of cliff and sand beach, the whole covered by the coast reef, which (except Muemba reef) never dries.

Muemba Island is low, white, and sandy, with high trees on it, apparently casuarina trees. An extensive reef surrounds Muemba, except on its west side; this reef extends full 1⅓ miles to the north-east of the island, inside and to the westward of which there is apparently good anchorage. The eastern part of Muemba reef is full 2½ miles from the coast of Zanzibar.

There is said to be a clear ship channel between Muemba and the shore of Zanzibar, but too narrow to be taken by choice.

Ngoowy, or Hog Point, in Lat. 5° 42′ 48″ S. Long. 39° 20′ 39″ E., is the northern extreme of Zanzibar; it is a low wooded point, covered by a reef which extends about a mile from shore. This reef shows, and the point may be rounded at 1½ miles distance.

H.M.S. *Gorgon* anchored in 12 fathoms under the lee of the reef off Ngoowy point for the night, during the southerly Monsoon. H.M.S. *Helicon,* in rounding

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Ngoowy point from the eastward at 1½ miles' distance, got a few casts of 7 and 8 fathoms; the soundings then deepened to 25 fathoms.

Leven Bank.—H.M.S. *Leven* anchored in 8 fathoms about 4½ miles off Ngoowy Point, with the east extreme of Zanzibar S. ½ E., and the north extreme of Moina S.W. ¼ W.; the angle subtended between them being 53°. H.M.S. *Menai* anchored on the bank in 6½ fathoms. It does not appear to be extensive, and has very deep water all round it.

Moina is a small wooded island to the northward of Tumbat. Its north point is in Lat. 5° 45′ S. Long. 39° 15′ 18″ E.

A reef extends to the northward of Moina nearly three-quarters of a mile. It may generally be rounded by the eye, but otherwise give the north point and west side of Moina a berth of a mile. You will be to the westward of Moina reef when the west coast of Tumbat is all open.

Tumbat Island is 5 miles north and south. Its eastern side is 2 or 3 miles from Zanzibar, but its south point is not more than a mile from the cliffy point between Kokotoni and Oswawemba.

The western shore of Tumbat is a rocky cliff, which is quite clean, there being deep water close to it, and good anchorage may be obtained at from half to one mile west of the island in 20 to 24 fathoms, mud; taking care to give the south-west end a good berth, to be clear of Kokotoni sand.

Tumbat bank, with 5½ to 7 fathoms on it in places, commences 1½ miles W. of the N. point of Tumbat, and probably extends to Alek patch, a knoll with 7 fathoms.

The Chart already mentioned (p. 339) shows all the known dangers in Zanzibar Channel, and they must never be approached too closely.

PORT ZANZIBAR.—Pilots do not usually come off to ships approaching Zanzibar, but will probably do so if you obtain an anchorage outside one of the passes and make the signal for one. As a rule, not much confidence is to be placed in Arab pilots, but they are, perhaps, better at Zanzibar than at other places.

Directions.—*From the Southward*, vessels bound to Zanzibar must be careful not to be set past the island by the northerly current, which near Latham bank sets from 1 to 2 knots, or even 3 knots, during the Southerly Monsoon. If you have not sufficient daylight to reach an anchorage in the Zanzibar channel, it is best to endeavour to obtain an anchorage on Latham bank, which may safely be run for, even at night, on most bearings, and by starting from whence in the morning, you will have all the day before you to reach Port Zanzibar.* But, if not intending to anchor on Latham bank, keep well inside it to make the land about Pouna point, the land about there and at Kinbijy head being visible at a considerable distance.

Having made Kizimkas head, steer to pass a mile to the westward of Kwaly and Kiseewa islands, and after passing the latter, Choomby will be seen.

Directions.—South Pass: To enter by this pass, steer for Choomby, bearing about N., opening it on the starboard bow so as to pass at a distance of a quarter of a mile or more. When past Choomby, bring it to bear S. by W., and keep it so until the Ukomby islands just touch S. 25° E., and Maja (a low rocky cliff) bears about East, then alter course to N.N.E. ½ E., and when Chukwany (the northernmost cliff) bears about E.S.E., shape a course to round Shangany point, at a

* *See* Admiralty Plan of Zanzibar, South-west Coast, and Port Zanzibar.

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quarter of a mile or as convenient, hauling into the anchorage to the northward of the fort.

Or:—When past Ariadne shoal, bring the western extreme of the town on with the centre of Chapany island, N. by E. ¾ E. With these marks on, you will pass to the westward of Choomby and of Maja shoal, and to the eastward of South Larkbree shoal, but rather close to the two latter. Observe, however, that, owing to the distance and occasional mirage, it is not easy to distinguish Chapany when approaching from the southward.

The French survey of 1858 gives the following mark for South pass:—Keep a small white house with porticos near the beach on with a minaret (the only one) in the town, N. 24° E. This mark, however, appears to pass very close to Maja shoal.

In going through South pass it is advisable to look out aloft for South Larkbree shoal, as it dries at low water, and is generally visible at other times. Maja shoal does not show well except under favourable circumstances.

Directions.—*From the Northward:* When bound to Zanzibar from the northward, run for Ngoowy point, which may be rounded at 1½ miles; then round Moina at a mile, and steer to pass Oswawemba point at half a mile; from whence the coast may be followed southward at half a mile distance or more, but do not increase your distance from the coast to more than 3 miles, on account of some dangerous 2-fathom spots in the vicinity of Baudin rock.

Directions.—English Pass: This is the best known and safest of the northern approaches to Port Zanzibar. To enter this pass from the northward, and being half a mile or more from shore, steer for Mtony (a small village with a large white house in the centre of it), until the white round tower of the fort, or its flagstaff, comes on with the centre of a white house, bearing S.W. ¼ S., when steer on this course; and as soon as the three islands are in one, or begin to come open of one another, haul more to the westward, about W. by N. ½ N., to avoid a shoal which extends 3 or 4 cables from the Zanzibar shore when Chapany bears about N.N.W.

Two *white nun* buoys have been placed about a cable apart off the eastern extreme of Chapany Spit in 7 fathoms, in lieu of the one which used to be there; but the maintenance of the buoys in their proper position must not be depended upon; on two occasions of visiting Zanzibar in the *Brisk*, we found no buoys.

For a stranger the best guide is the eye, from the fore-yard, passing the islands when in one at one-fourth of the channel's width from the Zanzibar shore, and when the islands begin to open increasing your distance from shore to half a mile.

The bank on the Zanzibar side of English Pass extends farthest from shore when Chapany bears N.N.W.; but here, at its farthest point, the 5-fathom line does not extend more than 4 cables from shore. The 2-fathom line is about 1½ cables from the beach, when the three islands are in one bearing N.W. by W.; and about 3 cables from shore, when the west extreme of Chango bears N. 50° W., and the east extreme of Chapany N. by W.

Directions.—French Pass: The passage between Chango and Kebandiko, called French pass, is only 2 cables wide. No marks can be given for this, except to keep nearer to Chango than to Kebandiko. At low water the channel is well defined, the reefs being then almost awash, and in many parts dry.

Directions.—Grand Pass: The only known dangers between Chango and

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Bawy besides the respective reefs of those islands are Morgan patch, Chango knoll, and the 3-fathom knoll off Bawy.

To enter by Grand pass bring the centre of Bawy to bear S. 39° W., if intending to pass on the east side of Morgan patch, or S. 16° W., if intending to pass on its west side; and when Chapany opens to the southward of Chango steer to pass one mile to the eastward of Bawy, bringing the north extreme of Bawy to bear N.W. by W. ½ W., which will lead clear to the southward of Chango knoll: you may then steer for the anchorage.

The **Anchorage** off the town of Zanzibar is well protected by the surrounding islands and reefs. You may anchor anywhere; the *Brisk* laid about 3 cables from shore in 10 fathoms, with Shangany point S. ½ E.; west extreme of Bawy W. by N. ¼ N., and the middle of Chango N. by W. ¼ W.; this is a convenient berth for men-of-war. Merchant ships and the Zanzibar men-of-war, generally lie farther to the eastward. Vessels should moor here on account of the tides and varying winds.

The Town of Zanzibar is situated on a low peninsula of sand, which is almost insulated by the shallow dhow harbour on the east and south sides of the town; this harbour dries to a considerable extent at low water.

The fort is not very conspicuous amongst the houses, and cannot be distinguished at all when approaching from the southward. The streets of Zanzibar are narrow and dirty, and thickly populated.

Trade of Zanzibar.—The consular reports received at the Foreign-office in 1865 include one from Lieutenant-Colonel Playfair on the trade of Zanzibar in 1863. The Custom-house returns exhibit only the exterior trade of the island of Zanzibar, and do not include the lucrative trade carried on at Lamoo and other northern ports of the Sultan's dominions. The British trade at Zanzibar is carried on almost entirely through India; it amounted in 1863 to about 200,000*l.* in imports, being nearly two-thirds of the aggregate amount of the imports into Zanzibar from all foreign nations; the exports were about 300,000*l.* in value, half of them to India. Piece goods, of the value of $839,716, were imported in the year 1862-3. At one time the market was largely supplied with piece goods of American manufacture, but since the war, English cloth has taken its place, and American merchants have even imported Manchester goods from America into Zanzibar. Beads manufactured at Venice are imported, and taken into the interior of Africa, where they form one of the principal articles of barter for slaves and ivory. Cowries are collected on the mainland, brought to Zanzibar in native boats, and exported to the west coast of Africa by Hamburg merchants, and to India by Indian traders; but this trade is falling off, owing to the more extended use of the precious metals as currency. Oil and oil-seeds of the value of $158,116 were exported in the year 1862-3. There is an increasing trade in sesamum seed, which has within these few years been grown on the east coast of Africa, and is exported to France and Hamburg. About 7,000,000 lb. of cloves, valued at 85,000*l.*, are generally produced at Zanzibar, and they form a considerable article of export; but the crop was a failure in 1863, and it is hoped it will soon be superseded by sugar, for which the soil of Zanzibar is eminently adapted; labour is cheap, ground rent very low, and every condition seems to exist for securing an ample return for capital sunk in a sugar factory. The revenue of the Sultan is derived mainly from the import duty of 5 per cent., which is farmed out to an Indian firm at $190,000 a year; but there is a subsidy payable

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to Muscat State, and as the income really leaves no margin at all for works of internal improvement, and the Sultan is debarred by treaty from imposing any export duties or harbour dues, or increasing the import duties, he has, at COLONEL PLAYFAIR'S suggestion, had recourse now to a modified system of land-tax—a charge of two pice, or ¾d. a year, on every mature cocoa-nut tree (the estimated annual produce of which is a dollar), and also 5 per cent. of all the cloves grown in his dominions. These taxes are estimated to produce about $40,000; the people have hitherto been entirely exempt from taxation, and this amount will hardly be felt. This report says nothing of the slave-trade except in its commercial aspect. It is gratifying to find that the imports of slaves show a marked decrease year by year.

SUPPLIES.—No spars or material for ship-building can be obtained here. Bullocks, sheep, fowls, sugar, coffee, and rice, are to be obtained, and fruit is very abundant. A small quantity of salt provisions and biscuit can generally be purchased.

COAL may sometimes be obtained at Zanzibar. The red mangrove wood is very plentiful on the adjacent islands, and answers tolerably well for steaming purposes. The wood boats brought us 40 tons in a week, but might have supplied it more rapidly had they been pushed to do so.

WATER.—There are two watering places for ships, one at the old palace of Mtony, 2 miles N.E. of the town; and the other (the best one) about 2 miles to the northward of Mtony, and one mile beyond Cliff-end point.

Water taken from Mtony always produces sickness: it is worthy of remark that formerly the crews of all vessels, after watering at Zanzibar, have been subject to dysentery and fevers; but good water may now be obtained at Bubooboo, great care having been taken to bring it down pure. It passes through several troughs and clearing pools, and falls into the sea from two large wooden spouts, at a convenient height for getting either casks or a boat underneath, according to the tide.

Directions, *leaving* **Zanzibar.**—In the southerly Monsoon it is best for sailing ships to go in by the South channel, and out by the North channel, and the reverse in the northerly Monsoon; but if it be desirable to go out by the South channel during the southerly Monsoon, leave in the afternoon, when the wind is well to the eastward, and in two tacks you will be outside South pass, and had better anchor for the night.

When proceeding out northward, during the southerly Monsoon, start early and anchor off Tumbat, starting again with the land wind the following morning, by which means you will get a good offing before the sea breeze sets in. It is useless to start with the sea breeze on account of the strong northerly current, which will probably oblige you to bear up through the Pemba channel, as H.M. ships *Eurydice*, *Narcissus*, and several others have had to do; even under steam you must make a liberal allowance for the current, which sets about N.N.W. into the Pemba channel. During the southerly Monsoon the simplest way to go out is through the Pemba channel, taking day time for this navigation: even if bound to the southward you will not lose more by this course than by trying to beat out to windward of Pemba.

For SEASONS, WINDS, and CLIMATE, see Part I. p. 71.

PEMBA ISLAND, known by the Arabs as Ul Huthera, or Green Island, is about 35 miles long, N.N.E. and S.S.W., by 9 or 10 miles wide, including the

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islands on the west side, which form the harbours. It is of moderate elevation, not being more than 200 feet above the sea in any part; of coral foundation, but covered by a most productive soil, yielding luxuriantly every kind of produce, especially rice of the finest quality; this island, in fact, being the granary of the neighbouring coast. There is excellent ship timber on the island.

Said Point (the southern point of Pemba), in Lat. 5° 29′ 18″ S. Long. 39° 42′ 9″ E., is about 25 miles from the north end of Zanzibar. The south end of Pemba is surrounded by a dangerous coast reef, with no anchorage off it. The current to the southward of Pemba sets into the Pemba channel at the rate of 2 or 3 knots.

The East Coast of Pemba is rather low, and should be approached with care at night, but there do not appear to be any dangers beyond the coast line of reef, which nowhere extends more than a mile from shore, and is steep-to. We approached the shore within two miles without any appearance of soundings.

The current in December off the east coast of Pemba was three-quarters of a knot northerly, but it much exceeds that during the southerly Monsoon.

The West Coast is lined with a succession of islands, which enclose fine sheltered ports between them and the main island; these islands and reefs appear to be quite bold on their west sides.

CHAKCHAK BAY.—Good anchorage may be obtained to the southward of Mesal island without entering any of the ports, but if intending to bring up here, or to enter Chakchak, take care not to be set past your port by the northerly current. In H.M.S. *Brisk*, when approaching from the southward, we rounded Soteman and Brisk islands and the reef on which they stand by the eye, the reefs showing well, and anchored in 7 fathoms with Mesal island N. 7° E.; the south point of Chakchak creek N. 51° E.; Cocoa-nut point S. 19° W.; and Brisk island S. 56° W. This is a good smooth anchorage, but there appeared to be several shoal sand patches inshore of our anchorage, and the inner part of this bay has not been examined; care is therefore requisite if proceeding to the eastward of the above position.

Port Chakchak,* the southern one of the several ports, is a safe harbour, but the soundings are inconveniently deep for anchoring in some parts. H.M.S. *Espiègle* anchored in 9 fathoms, with Mesal island N.W. by N. A spit, with not more than 2¼ fathoms on it, runs out from the Pemba shore more than 1½ miles when Mesal bears N.W. ½ N. The village is situated up a creek about E. by S. from Mesal island. The shores of this creek are lined with reefs, but there is a narrow and deep channel. The watering place is up this creek.

Mesal Island is about three-quarters of a mile in extent east and west, by rather more north and south; its S.W. point is in Lat. 5° 15′ 42″ S. Long. 39° 40′ 27″ E. A reef extends nearly a mile S.W. by S. from the south point of Mesal, but the discoloured water shows the extent of it.

PORT COCKBURN, and also Port George, to the northward of it, are apparently clean, with good depths for anchoring in places, but rather deep water in others. These ports must be approached from the southward through Port Chakchak, unless there be any good pass among the several gaps between the islands, of which we are not aware, as there are no soundings given in the gaps in the plan. Mr. R. A. Newman, Master of H.M.S. *Espiègle* in 1822, states that there is no passage

* *See* Admiralty Plan of Cockburn, George, and Chakchak Ports.

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out between the islands, but his report is previous to the sketch survey of LIEUTENANT NASH.

Off **Kegomachy Point**, the north-west extreme of Pemba, there is anchorage on the western side abreast of a small sandy bay: the north side of the point must be given a wide berth to clear a reef which extends more than 2 miles, on which there is a long spit of sand, which dries at low water. Kegomachy point is in Lat. 4° 52′ S. Long. 39° 43′ 51″ E.

Cape Hay, the north-east extreme of Pemba, appears to be fronted by a continuation of the coast reef from the east coast, and according to the chart this reef ends a mile or less to the northward of Cape Hay, forming an anchorage to the westward of the reef. This anchorage, called Port Wanyeeka, appears by the chart to have good depths in it, and to be well sheltered during the southerly Monsoon, but we have no information about it. Cape Hay is in Lat. 4° 54′ 12″ S. Long. 39° 52′ 57″ E.

Pemba Knolls. — The north side of Pemba forms a shallow bay about 9 miles wide between Cape Hay and Kegomachy point. This bay has numerous anchorages for dhows during the southerly Monsoon, but it apppears to be full of dangerous reefs, the northernmost of which, called the Pemba Knolls, extend 5 or 6 miles from shore. OWEN describes these as a complete labyrinth of coral rocks.

A bank of soundings extends 10 or 12 miles to the northward of Pemba, where anchorage may be obtained in some places to the northward of Pemba Knolls, but this bank must be approached with caution, as it scarcely appears to have been examined at all.

Pemba Channel.—The navigable part of this channel is contracted by the Waseen reefs and North Head reefs to 25 miles at the south end, and 15 miles at the north end, but between Pemba island and these dangers it is said to be all clear with no soundings.

It is not recommended to run through this channel at night, even with a commanding breeze, as the strength of the current is very uncertain, and the wind frequently drops after midnight. But if obliged to bear up through this channel when unable to pass out to the southward of Pemba, (which frequently happens to ships leaving Zanzibar with the sea breeze,) take a good departure from the south end of Pemba, and keep nearer to the island shore than to the main, the former being the boldest. CAPTAIN MORESBY, in 1822, when passing through Pemba channel, reports having got soundings in 7 fathoms when the north end (Kegomachy point?) of Pemba bore S. 20° E., and immediately before and afterwards no bottom at 80 fathoms, but it is not stated at what distance from shore.

The CURRENT sets about N.N.W. into the Pemba channel, and afterwards appears to set right through, rather inclining to the main. In August we found it running between 2 and 3 knots, but it not unfrequently exceeds this in strength, causing a great ripple near the island shore, which gives a false appearance of breakers.

The Waseen Reefs consist of a line of sand and coral reefs parallel to the shore, and at a distance of 4 or 5 miles from it; these have good depths inside them, but are nearly unfathomable on their seaward side. Of the North Head reefs we have no information, but the chart places them 7 or 8 miles from shore at the north end of Pemba channel.

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The Coast of the main inside Pemba is low, but well wooded, and apparently fertile. The shore is sandy, with, in places, a small intervening cliff of coral; but it is unsafe of approach, on account of the Waseen reefs before described. Although the coast is low, there is a range of hills in the background, and occasionally in the distance may be seen curiously isolated mountains, which present a remarkable contrast to the general flatness of the country. One of them, called Waseen peak, is about 2500 feet high, and can be seen distinctly from Pemba island.

Except in one part, where the coast is a kind of putrid marsh, the shores are lined with villages which are always conspicuous by a lofty grove of cocoa-nut trees, in the midst of which they are built.

Along the remaining part of the coast there are a few towns where trade is principally carried on by native dhows, and rarely visited by European vessels, except cruisers. South of the Equator there are Mombaza, Melinda, Lamoo, Patta, and the Dundas or Juba islands; at some of these, bullocks and provisions may be procured, but water is generally scarce and brackish. This part of the coast is more or less fringed with islets, reefs, and shoals, but not extending a great way from the main. North of the Equator to lat. 2° N., the coast is free from outlying dangers, and appears to consist of sand-downs, covered here and there with a stunted vegetation. Warsheek bank in Lat. 2° 20′ N. extends 1¾ miles from the shore, and Ternate shoal in 3° 15′ N. projects 2 or 3 miles from a low point of land destitute of distinguishing marks.

The Coast between Ternate shoal and Assoad point is generally low, with soundings close to the shore.

ASSOAD POINT, or Rás Assoad, or Black point, in Lat. 4° 34′ 12″ N., Long. 48° 0′ 39″ E., is a point of low black cliffs projecting from the sand hills over the beach.

RAS AWATH, in Lat. 5° 32′ 48″ N., Long. 48° 39′ 57″ E., and 71 miles from Assoad point, is fronted by a reef. The coast between these headlands forms a slight concavity, and has soundings of from 20 to 40 fathoms at from 6 to 9 miles from shore.

The Coast from Awath point to Cape Khyle, about 146 miles, is generally low, and has soundings of 18 to 10 fathoms at several miles from shore, and 25 to 40 fathoms at 9 miles or more.

From Cape Khyle to Cape Mabber, 125 miles, the coast is a rocky shore, from 200 to 400 feet high. Soundings may be obtained all along this part of the coast at some distance from shore, until you come to a point about 24 miles southward of Cape Mabber, where there is an indentation which is very little known.

RAS MABBER (or Cape Stand-off) in Lat. 9° 29′ N., Long. 50° 50′ E., is fronted by a reef, and the land in its vicinity is generally low.

The name of the cape indicates the customary practice of the Arab coasters bound to the northward during the southerly Monsoon, who always stand well off from this point in order to round Cape Hafoon.

Coast.—From Rás Mabber to the south-east point of Rás Hafoon, the distance is

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63 miles. Soundings of from 20 to 30 fathoms appear to extend a considerable distance from shore in the bight between these capes.

RAS HAFOON (or Cape Orfui) is a peninsula of table land about 8 miles north and south by 10 east and west, from 400 to 600 feet high, rising from the sea in steep cliffs, and joined to the main land by a narrow low sandy ridge covered with bushes; it is bold of approach on all sides. On its eastern face there are soundings of 20 fathoms close to the shore, deepening to 50 fathoms at 5 miles distance. The eastern extreme of the Cape is in Lat. 10° 27′ 48″ N., Long. 51° 21′ 51″ E.

From the north-east cape of Hafoon to Cape Jerdaffoon (Guardafui or Rás Asir) the distance 82 miles, is free from outlying dangers, and safe to approach by the lead, the soundings shoaling generally from 100 fathoms at 15 miles to 10 fathoms at one mile from shore; but it is deeper than this off the headlands, and shallower in the bays.

CAPE SHENAREEF is a bluff headland rising from the sea in four steps to a height of 2500 feet, and is about 11 miles S. by W. ¼ W. from Cape Jerdaffoon. Cape Shenareef is generally called by the natives Ras Jerdaffoon, which name is probably indiscriminately applied to the whole promontory.

CAPE JERDAFFOON, or Rás Jerdaffoon, (also called Rás Asir, and Cape Guardafui,) the easternmost point of Africa, is in Lat. 11° 50′ 40″ N., Long. 51° 19′ 39″ E. It is a precipitous rocky cape 900 feet high.

Soundings deepen from 20 fathoms near the cape to 70 and 120 fathoms at 18 miles to the eastward, where the bank appears to terminate; but to the northward of Jerdaffoon the bank of soundings does not extend more than 2 or 3 miles.

There is good anchorage with southerly winds in 6 to 14 fathoms, sandy bottom, at a mile from shore, and about 3 miles to the westward of Jerdaffoon. The natives will bring bullocks, sheep, and firewood here from the fertile valley of Wahdy Tohum, which is about 7 miles to the southward of Jerdaffoon. Excellent water may also be obtained from there, but the carriage is expensive.

The trading places north of the Equator are, Brava, Marka, Magadoxa; and Hafoon (North and South) Bays; but along some part of the coast the natives are not to be trusted. Water is scarce and brackish until you approach Hafoon and Ras Jerdaffoon.

ISLANDS AND SHOALS IN THE MOZAMBIQUE CHANNEL.

EUROPA ISLAND,* about 5 miles E.N.E. and W.S.W., by about 3 miles wide, is from 50 to 80 feet high, and its centre in Lat. 22° 22′ 30″ S., Long. 40° 24′ 9″ E. (OWEN.) It is sandy, and for the most part covered with dwarf trees, bushes, and rushy grass, with here and there a few small *casuarina* trees. The

* Europa Island is the Bassas da India of HORSBURGH and the late E.I. Co. Commanders, and the Baxos da Judia of the Portuguese discoverers. The name Bassas da India is now applied to the Europa *rocks* or *shoals* of HORSBURGH. The change was made at the suggestion of CAPT. OWEN, R.N., who surveyed the coast of Africa, &c.

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anchorage is unsafe; vessels may let go their anchor on the edge of the coral reef to leeward of the island, but without room to swing in case of a shift of wind. The island is uninhabited, but there are some large goats and plenty of fine turtle to be procured.

The east side presents low perpendicular cliffs, and is apparently steep to—with no reef off it and no anchorage; off the N.E. point, however, the reef extends half a cable, and there are 12 to 18 fathoms a cable beyond it (Mr. R. Beecroft, R.N., 1825).

On the north side the coral flat, which dries at low water springs, extends about a quarter to half a mile from shore; the reef terminates towards the N.W. point of the island, where there is a small extent of steep beach, with good landing in moderate weather. The coral flat is steep to, but it shows well towards low water; at other times it must be approached with care, for there is no bottom at 30 fathoms within a cable's length. Inside the coral flat the shore forms a deep bight, with a large lagoon at the N.E. end of the island, extending nearly across to the south shore; it is not more than 4 or 5 feet deep at low water, and abounds with fish (Hon. H. Rous, R.N., 1818).

The west side is rocky, with a considerable surf on the beach; it is apparently steep, but landing may be effected in places between the rocks.

The N.W. point is sandy, with low bushes; it runs off shoal and rocky from 1 to 2 cables; a ship might anchor a little to the southward of this point in 7 to 11 fathoms, but close to there is a depth of only 2½ fathoms.

The south side of the island is low, and being the weather side is unsafe; and the reef on the S.W. side has no soundings close to it, and must not be approached (Mr. R. Beecroft).

BASSAS da INDIA (or Europa rocks), discovered by the E.I.Co.'s ship *Europa* in 1774, is a dangerous reef of rocks 7 or 8 miles in diameter; the east end being in Lat. 21° 29′ S., Long. 39° 40′ 39″ E.; the N.W. end in Lat. 21° 26′ 30″ S., Long. 39° 32′ 39″ E.; and the south end in Lat. 21° 32′ S. (Owen.) The greatest extent is from E.S.E. to W.N.W. Rocks of various sizes, looking like hay-ricks, extend to the N.E., while its S.W. extreme consists of a long sandbank, dry at low water; the sea breaks heavily all around it, and is very dangerous to approach.

PILOT SHOAL was discovered by Captain White,* of the American whaling barque *Pilot*, who places it in Lat. 21° 10′ S., Long. 38° 57′ 30″ E.; he states it had not more than 3 fathoms on it, that he could see the bottom very distinctly, and at the same time observed several patches to windward which looked much shoaler: the whole extent of the shoal appeared to be from 1½ to 2 miles, and it bears N.W. by W. ¾ W (? true) from Bassas da India, distant 35 miles. The existence of this shoal has since been confirmed by several captains, but uncertainty respecting its precise position makes it the more dangerous when passing N.W. of the Bassas da India.

JUAN de NOVA ISLAND, 2½ miles long, is low, flat, and sandy, with a covering of shrubs and bushes; it should be carefully avoided at night, as the first

* Nautical Magazine, 1850, p. 339.

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intimation of its proximity might be the noise of breakers; its centre is in Lat. 17° 3′ 30″ S., Long. 42° 47′ 27″ E.* (Owen). Off the east end a shoal extends 4½ miles, on which the sea breaks heavily; and off the west end a reef with breakers is variously estimated to extend half a mile to 1¾ miles. The island appears to be the rendezvous of aquatic birds, which are also very numerous in its vicinity.

According to Mr. Beecroft, R.N., a bank with depths of from 8 to 12 fathoms extends 3 or 4 miles on the north side of Juan de Nova, and affords very good anchorage during the S.W. Monsoon under the lee of the eastern end in 7 to 10 fathoms, clean sandy bottom, at 1½ or 2 miles from shore: this bank shows well by the discoloration of the water; it terminates abruptly from 12 fathoms in most places, and its boundary is everywhere coral.

Juan de Nova bank is apparently quite distinct from the Great Pracel bank, with a space of about 20 miles between their margins.

Chesterfield Island, near the northern part of the Pracel bank, is (its centre) in Lat. 16° 17′ 30″ S., Long. 43° 55′ 33″ E.—(Owen.) According to Capt. D. Cowan,† it is about a mile in extent (north and south), and 15 or 20 feet above the sea. The N.W. end of the island consists of a black mass of rock, with a reef extending about a mile from it; on the west side a reef extends about 3½ or 4 miles, on which a heavy sea breaks, consequently this side may be considered very dangerous to passing ships. The south end and east side appear clean and bold; approaching from the southward the soundings are very regular, shoaling from 13 fathoms at 6 miles to 10 fathoms at about 1 mile off; bottom, sand and mud.

Chesterfield island may be avoided at night by keeping off the Pracel bank; soundings of 15 to 22 fathoms have been found to extend several miles in all directions, and to the westward of the island as far as 40 to 45 miles.

Grenouille Bank.—The *Grenouille* navigating the Mozambique channel from Nossibe to Menabe, January 26th, 1851, being in Lat. 15° 42′ S., Long. 44° 31′ E., sounded in 4½ fathoms, bottom of broken coral and plainly visible; the ship's course was W.S.W. by compass, and the bank extended 12 miles, east and west, on which were soundings of 4½, 6, 8, 14, and 29 fathoms.‡ This may possibly be a part of Chesterfield bank, and caution is requisite in approaching the vicinity.

Caution respecting the **West Coast of Madagascar.**—It is dangerous at all times to make too free with the West coast of Madagascar, especially between Lat. 22° S. and Cape Ambre, the north point of the island; from Cape St. Vincent (or, say Lat. 22°) the coast is fringed with reefs and shoals, which, as far as 20° S., extend in places 15 to 20 miles seaward; then come the Barren Islands, where the bank of soundings extend fully 20 to 25 miles off shore; more to the northward still, on the parallel of Juan de Nova and Cape St. Andrew—shoal casts of 12 and 18 fathoms are found 45 and 75 miles respectively from the main—this is the Pracel bank.

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* Mr. Beecroft, R.N., in 1825 made its Long. 42° 49′ E.
† Mercantile Marine Magazine, vol. x. p. 163.
‡ Annales Hydrog., vii. p. 6–7.

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LAZARUS BANK.*—In 1737 the *Dorset* is said to have obtained soundings of 12 to 18 fathoms in Lat. 11° 56′ S., Long. 41° 45′ E. (or 1° 10′ E. from the main), reporting that to the southward it appeared much shoaler; in 1757 the *Edgecote* had soundings in 10 to 12 fathoms in Lat. 12° 4′ S., Long. 41° 55′ E. (or 1° 12′ E. from Quirimbo); and in 1784 the *Raymond* sounded in Lat. 12° 13′ S., Long. 41° 10′ E. (or 33′ E. of Cape Delgado). These are among the early records of a bank in this part of the Mozambique channel.

In 1833 the *Reliance* grounded on a shoal which the master placed in Lat. 12° 23′ S., Long. 41° 20′ E.; and he describes it as being from 15 to 18 miles across, in a north and south direction.

In 1857 the French barque *Charles et George* grounded on a bank of gravel and coral in Lat. 12° 12′ S., Long. 41° 50′ E., and by laying out an anchor in 17 feet water she was hove off.

In 1859 the barque *Empress*, when in Lat. 12° 3′ S., Long. 41° 35′ E. at noon, observed no appearance of soundings; ship's course true South, at about 2 knots per hour. At 1 P.M. water discoloured, sounded in 7 fathoms; bottom of coral, plainly visible in white and dark patches, with an appearance of shoal water all round; carried this depth about 1½ miles; at 1h. 45m. P.M. in 15 fathoms; at 3h. P.M. in 15¾ fathoms. At 5h. P.M. in 17 fathoms, strong ripplings, Lat. 12° 13′ S., Long. 41° 35′ E.; at 6h. P.M. 35 fathoms, white and red coral, with broken shells. At 7h. P.M. no bottom at 45 fathoms in Lat. 12° 17′ S., Long. 41° 35′ E.

In 1864 the French ship *Duc de Malakoff*, being in Lat. 12° 9′ S., Long. 41° 20′ E., a bank was observed and soundings taken in 19 fathoms, the ship steering true South about 2 knots an hour; in a short time soundings were again taken, which gave 13 fathoms, and decreasing; for two miles the soundings then continued at 10½ fathoms, bottom of broken shells, and white and brown coral, the shoal extending some distance east and west; at noon, being in Lat. 12° 16′ S., Long. 41° 21′ E., the depths had increased to 16 and 19 fathoms, and shortly afterwards to 27 and 30 fathoms; this bank appeared to be steep-to on its north and south sides.

CAPTAIN OWEN, R.N., searched for these shoals and could not find them.

In 1851 H.M.S. *Penguin*, in Lat. 12° 16′ 30″ S., Long. 41° 32′ E., struck soundings in 17½ fathoms, coarse sand and broken coral; from thence she proceeded S.S.E. 6 or 7 miles, with 17 to 19 fathoms; then no bottom at 100 fathoms.

In 1855 H.M.S. *Frolic*, when a little to the westward of a position marked "doubtful" on the chart, was suddenly surrounded by a shoal of sharks, and immediately afterwards coral bottom was distinctly visible; a cast of the lead gave 10 fathoms. Rounding-to, anchored in 9 fathoms, when the ship tended to a S.W. current of 2 knots. Ahead (N.E.) and on each bow, the boats found 10 fathoms for about a quarter of a mile distance; astern and on each quarter the depth decreased pretty regularly to 7 fathoms at about 1 mile from the ship; one boat in a more southerly direction had casts of 6 fathoms, and two of 5½ fathoms. Lat. 12° 9′ 12″ S., Long. 41° 23′ 39″ E. (or 0° 35′ east of St. George island, Mozambique). From this spot weighed and stood S.W., and shoaled very gradually from 9 to 7 fathoms in running 1 mile; thence the soundings increased regularly to 20 fathoms, very

* DALRYMPLE; HORSBURGH; Naut. Mag., 1840, p. 513; Annales Hydrographiques, 1858, 1860, and 1864; Mercantile Marine Mag., 1859, p. 188; COMMANDER M. S. NOLLOTH, R.N.; CAPTAIN W. I. S. PULLEN, R.N.; Naut. Mag., 1857, p. 143.

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shortly after which there was no bottom in 100 fathoms, when the patent log showed 1·8 mile from the place of anchorage.

In 1861 H.M.S. *Cyclops*, when steering S. by W. ½ W., struck soundings in 17 fathoms, then 9 fathoms, and immediately anchored in 10 fathoms, hard sand, Lat. 12° 3′ 28″ S., Long. 41° 25′ 31″ E. The water was very clear, and the bank appeared to extend far in all directions when seen from aloft; thence the *Cyclops* weighed, and proceeded S.W. ½ W., obtaining soundings as follow—9, 8, 10, 13, 14, and 25 fathoms; having run 6·2 miles from her anchorage, no bottom was got at 100 fathoms.

These observations tend to prove that the dangerous part of the Lazarus bank, as far as at present known, lies between Lat. 12° 2′ and 12° 20′ S., and between Long. 41° 20′ and 41° 40′ E.; over this area the depth varies from 7 to 20 fathoms; but there is one dangerous patch of 3 fathoms or under, probably in Lat. 12° 10′ S., Long. 41° 23′ E.—(a mile or two more or less in both lat. and long.) The lead will most probably give ample warning of this dangerous patch during the day, if a good look-out is kept; but, during the night, large ships would do well in avoiding the locality. Should, however, their reckoning mislead, then as soon as they strike soundings, it would be advisable to round-to and anchor until daylight.

On most charts Lazarus bank is delineated as extending from Lat. 11° 48′ S. to Lat. 12° 16′ S., and between Long. 41° 29′ E. and 42° 22′ E.—thus omitting the most dangerous part, which is more to the westward by 7 or 8 miles; as regards the more easterly portion, H.M. ships *Lyra*, *Wasp*, and *Gorgon* have crossed and re-crossed it, sounding frequently with no bottom at 40 and 50 fathoms; in 1862 H.M.S. *Gorgon*, in particular, ran from Lat. 11° 54′ S., Long. 41° 42′ E., to Lat. 12° 16′ S., Long. 42° 7′ E., trying for soundings without obtaining any at 60 or 80 fathoms.

KAUNITZ BREAKERS.—The ship *Kaunitz*, in 1791, is said to have seen breakers at a distance of 9 miles, the land to the westward being visible at the same time; these breakers were *said to be* in Lat. 11° 3′ S., Long. 42° 25′ E. If for Lat. 11° 3′ S. we read 12° 3′ S., we have the position (approximately) of Lazarus bank; but nothing is known of Kaunitz shoal in the position assigned above, although H.M. cruisers on the east coast of Africa have frequently traversed its vicinity.

VAILHEU SHOAL, to the westward of the S.W. point of Comoro, is in Lat. about 11° 49′ S., Long. about 43° 16′ E., with the (*visible*) extremes of Comoro N. 31° E. and S. 76° E.; a town on the mountain side N. 64° E.; and Mantzeza hill (sometimes called Round hill, or the ploughed mountain) East, distant about 10 miles.

Of the existence of this shoal there can be no doubt; the *Charles et George*, a regular trader in the Mozambique Channel, has frequently reported it; it has been seen by H.M.S. *Brilliant*, and passed over by the *Sparrowhawk;* it was also reported by H.M.S. *Nerbudda*, which ship observed heavy breakers in about the above assigned spot, but night coming on, with a heavy sea, they had no opportunity of further examination. Mr. Sunley, H.M. consul for the Comoro islands, also reports that he has passed over this shoal.

The shoalest spot is reported to be from 4 to 6 fathoms, but there may be less water. Of its extent, nothing is known with any accuracy; accounts vary in stating

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it to be from 2 to 12 miles long. Captain Polkinghorne, who passed over it in H.M.S. *Sparrowhawk* in 1826, says the western extreme bore N.W. by W. or W.N.W. from the S.W. end of Comoro. The *Sparrowhawk* appears to have been steering S.E., and obtained from 6 to 4½ fathoms; the water was of a light green colour, and showed at 4 or 5 miles' distance from the foreyard.

Thus there can be no doubt Vailheu shoal is dangerous in places for very large ships; and report says vessels have been nearly lost here when returning from Bombay to England. Comoro native accounts, however, describe it as not dangerous for vessels of ordinary size.

Large ships passing through this part of the Mozambique channel at night should, on approaching the parallel of the south end of Comoro, keep to the westward of the 43rd meridian, in order to avoid the vicinity of Vailheu shoal.

Manoel Pimental records a shoal, but no breakers, 9 miles from the S.W. point of Comoro; this shoal is 15 to 18 miles N.W. and S.E.; the south part at half-flood has 6 fathoms on it, and at the N.W. point 4 fathoms. Nine miles off Comoro island would place this shoal half way towards Vailheu shoal—they are probably one and the same.

COMORO ISLANDS.*

The COMORO ISLANDS, four in number, lie at the north end of the Mozambique channel, nearly midway between the north extreme of Madagascar and the African coast; they are all high, and of volcanic origin; and with the exception of Mayotta, are generally safe of approach—with clear passages between them.

The reefs and shoals between these islands and the coast—on each side—are dangerous, and require caution when in their vicinity, but they are sufficiently apart from one another to render the navigation of this part of the Mozambique channel perfectly safe, with ordinary precaution and a good look-out.

COMORO (also called Angazecha), is the northernmost and least known, although the largest and highest island of the group; it is about 35 miles north and south by about 12 miles east and west; but, possessing no harbour, nor a single good anchorage, it is rarely visited.

Comoro Mountain is situated at the south part of the island, its highest part being about 8 miles from the southern extreme. The mean of our observations gave its height to be 8526 feet. The summit of this mountain is smooth and dome-shaped, rising so evenly from the sea on its south side as to give a deceptive idea of its height when close to; its stupendous height will show better at the distance of 25 or 50 miles, and in clear weather it may be seen at over 100 miles distance. This mountain is the more remarkable from the absence of any land of equal height on the eastern coast of Africa, and also on account of its being the highest mountain in the world *as compared with the size of the island*, although we believe to this day unnoticed by geographers in their comparative tables of mountains.

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* The remarks on the Comoro Islands and their vicinity are derived from the observations of Capt. Owen, R.N.; Capt. F. Moresby, R.N.; Commander M. S. Nolloth, R.N.; Mr. J. Richards, R.N.; the French Surveys; Vicomte F. de Langle, of the French Imperial Navy, "Campagne de la *Cordelière*;" and especially Capt. G. F. R. de Horsey, R.N.; Horsburgh; the Mercantile Marine Mag.; the Nautical Mag.; the Jour. of the Roy. Geog. Soc.; and the Annales Hydrographiques.

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Comoro mountain, like the whole island, is volcanic, and eruptions are very frequent. In 1858 the lava flowed out of the side of the mountain into the sea on the west coast, between the towns of Maroni and Itzanda, which, being only 3 miles apart, thus narrowly escaped destruction.

The natives of Comoro are Mahometans, of Arab descent, with an intermixture of Madagascar blood; altogether a fine, tall race, and hospitable.

The South Coast of Comoro is rocky and steep-to. The S.E. point, in Lat. 11° 53′ 23″ S., Long. 43° 35′ 21″ E., has a rugged hill at its extreme,—the termination of an irregular ridge descending from the smooth-topped mountain.

The S.W. point is low, but rises gradually and without a break to the top of Comoro mountain. Round hill, two or three miles to the northward of the point, appears as an island from the distance, showing over the low extreme of the S.W. point. There is a village close to the sea a little to the eastward of the S.W. point.

The East Coast is said to be bold-to, with neither soundings nor anchorage off it. A small island with a reef outside it, but apparently close to the main island, is stated to be about 5 miles southward of the N.E. point.

The North Coast is rocky, high, and apparently safe; but the N.W. point must be avoided, for it is surrounded by reefs apparently extending 3 or 4 miles (or more) from shore; here is the town of Mouchamouli, 1½ miles westward of which, in 30 or 35 fathoms water, at two cables from the breakers, is an anchorage visited by the French man-of-war *Prudente*, in 1843; but it cannot be recommended. It is opposite a small sandy beach.

On **the West Coast**, which is said to be bold of approach, there are two anchorages, Maroni and Itzanda, and several villages. Approaching Maroni from the S.E.-ward, Round hill (or Mantzeza) will be seen over the low extreme of the S.W. point of Comoro; it is about 3 miles N.N.W. of that point, is about 700 feet high, and juts out into the sea, presenting a bluff face to seaward; a reef extends about a mile from it. Seen from the westward, the appearance of this hill is completely altered, being under the new aspect an oblong mountain, with small ravines from top to base. The town of Mantzeza is on the S.E. side of the hill.

Iconi hill, about 3 or 4 miles northward of Mantzeza, also juts seaward; seen from the southward it is saddle-shaped and steep, but on nearing it a low point of small extent will be observed running out from its base, and just to the southward of and under the hill will be seen the town of Iconi. From the westward this hill shows as two peaks with a deep hollow between them; there are the ruins of a white stone building on the apex of the northern peak.

About a mile to the northward of Iconi hill a low point projects; above this point some way up the side of the mountain there is a large walled town. About 2 miles to the northward of Iconi hill, another low point will be observed with two or three large trees on it; round this point is the bay of Maroni. Between Maroni and Itzanda, a distance of about 3 miles, the coast is rocky and steep-to: about a mile to the northward of Maroni a low black point projects, now forming the northern extreme of Maroni bay; this point was produced by an eruption of lava in 1858.

Maroni Bay is a slight indentation of the shore, with a small cove and a rocky islet in it, in Lat. 11° 40′ 44″ S. (Langle). This cove is shallow, but affords good landing at its head. The town, at the head of the cove, is large, and the Sultan of Maroni is the chief of most influence in Comoro.

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The anchorage for ships is in 25 fathoms, at about 1½ cables from the rocks; and the bank of soundings is so limited that it is necessary to anchor with precision in the right depth, for which purpose a boat should be sent in previously to find out the berth. H.M.S. *Brisk* laid in 25 fathoms, with the low rocky islet in the north part of the cove on with a notch in the high land, with a tree in it bearing S.E. by E. ½ E., and the extreme point to the southward S.W. ½ S.; in this position, with 60 fathoms of cable, there was only good room to swing clear of the rocks.

Iconi hill, projecting into the sea, affords shelter from southerly winds; but if the wind comes from the westward, and especially during the N.W. Monsoon, this is a very dangerous anchorage.

SUPPLIES are cheap and plentiful, particularly cattle. Water, however, is very scarce, and said to be so all over Comoro. The natives say there is a fishing-bank 3 or 4 miles westward from Maroni; but nothing more is known about it.

Itzanda, 3 miles northward of Maroni, resembles it both as regards the bay, and the walled town. The anchorage is very indifferent, being deep and close to shoal water, but ships may anchor in 20 or 25 fathoms water, about midway between the extreme points of the bay. At the head of Itzanda cove, near a tree of very large girth, there is good landing.

MOHILLA, 25 miles S. by E. from Comoro, and 22 miles W. of Johanna, is the smallest and least elevated of the Comoro islands, being about 15 miles N.W. and S.E. by 7 or 8 miles wide at its broadest part. It is well wooded, and on the east side the land is low near the sea, rising gently to the mountainous ridge running along the middle of the island, which has no peaks, and appears capable of cultivation to its summit, 1900 feet.

White Rock, a remarkable islet, N. 76° E., nearly 4 miles from the S.E. end of Mohilla, is upwards of 100 feet high, flat topped, with steep sides, but has a low flat projection on its west side. From a distance it has the appearance of being bold-to, and there is a good channel inside it. There are several other islets off the S.E. end of Mohilla, the outermost of which is about 1¾ miles from shore, but these are neither so high nor so remarkable as White rock, which is conspicuous even at night.

The N.E. Coast has soundings of 8 to 14 fathoms at 1 to 1½ miles off shore, and 14 to 17 fathoms at 1½ to 2 miles; but it should not be approached within a mile.

Douany is a walled town close to the beach, a little to the southward of the N.E. extreme of Mohilla, and shows a battery of guns along its sea face. The Queen's house is near the north-west corner of the town, facing the beach, and has rather the appearance of a casemated barrack; it is in Lat. 12° 17′ 43″ S., Long. 43° 46′ 42″ E. The inhabitants are friendly; the population is not large. The island is very fertile; cattle are good and cheap, and water is abundant.

During the Southerly Monsoon the anchorage off Douany is good, but at times there is more swell than might be expected under the lee of the island: during the N. E. Monsoon the anchorage is not safe. Large ships may bring up in 9 or 10 fathoms, sand and shells, at about a mile from the landing-place, with the centre of the town S. 35° W., and the extreme of Mohilla S.E.; inside this berth the soundings shoal quickly to 7 and 6 fathoms; and though there may be good anchorage in those depths, it cannot be recommended for large ships.

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From the anchorage off Douany, the following bearings were taken:—

White rock	S. 47° E.
Bluff head at S.E. point	S. 42° E.
Extremes (visible) of Comoro	N. 4° W. to N. 21° W.
North extreme (visible) of Johanna . .	N. 82° E.

Douany Cove, frequented only by small dhows, is formed by the coral reefs; its entrance is narrow and obstructed by a central coral shoal, close to which there are 5 or 6 fathoms water. The landing-place is in this cove, but it is inconvenient at low water, owing to the sandy beach running out so very flat; at low water boats cannot approach within 250 yards of the dry beach. The entrance to the cove is plainly seen when there is much surf on the reef; but, if only breaking, occasionally some care is necessary not to miss it; a drop in the high land forms a good leading mark.

The Watering Place is about a mile to the south-eastward of the anchorage, and is not convenient.

The North and West Coasts are scarcely known; between Douany and the north point of Mohilla reefs project, here and there, some distance from the shore. Off the N.W. point, distant about 2 miles, there is a black rock always above water; when passing this rock at 2 miles' distance there is no bottom at 40 fathoms; a reef of dry rocks also projects a quarter of a mile from the N.W. point, but at $1\frac{1}{2}$ miles from these there is no bottom at 30 fathoms.

Captain Wilson, of the *Suffolk*, when off the northern end of Mohilla in 1756, brought up in 24 fathoms, small stones, shells, and coral, three-quarters of a mile from shore, the N.W. point bearing W.S.W., the eastern extreme of land E. by S. $\frac{1}{2}$ S., and a town S.S.W. In a small bay near this town, a supply of good water was obtained 200 yards from the beach in a ravine about 12 feet deep; the casks, when filled, were rolled with ease over a soft sandy beach. A reef of rocks across this bay prevents watering-boats working between last quarter ebb and first quarter flood. On the north shore of Mohilla the flood sets to the westward, but changes before the water has done rising, as does the stream to the eastward before low water.

Off **the South Coast** of Mohilla, towards its western part, a chain of volcanic-looking islands extends upwards of 3 miles from shore, having good anchorages inside, with from 26 to 35 fathoms, sand and shells; these islands are for the most part surrounded with reefs, but may be approached on their northern sides within one or two cables.

Approaching from the westward the fourth or fifth island, called Choa-Sauzi, has an islet at its southern extreme perforated with round holes, which at a distance appears like the Needles rock; this may be closely rounded; you will then perceive a small but rather high island (Choambouhou), with a rock which covers at high water at its south point; give this a berth of 2 cables, and you may then haul in and anchor.

Numa-Choa Harbour, N. by W. $\frac{1}{4}$ W. from Choa-Moa island, is formed by sand and coral reefs on each side, which are mostly dry at low water. The anchorage is in from 8 to 10 fathoms, sand and mud, with Numa-Choa point N.W. by W. $\frac{1}{2}$ W., and the extremes of Choa-Moa S. $\frac{1}{4}$ E. and S.S.E. $\frac{1}{2}$ E.—(*French Survey.*) This port appears to be a good place of shelter during the bad weather season.

Approaching from the eastward, if bound to Numa-Choa, pass the S.E. end of

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Mohilla at 2 or 3 miles, and follow the south coast until you bring the Sail rocks (off the south-west extreme of Mohilla) open to the southward of Choa-Moa island N.W. by W. ½ W. Choa-Moa is a small but high conical island with a flat top, and is the easternmost of the group, except a small islet near the shore. This mark clears the reefs which extend from the S.E. end of Mohilla westward to a point which is about 2 miles East of Choa-Moa: when this point bears N. by E. you may haul in to pass to the northward of Choa-Moa; and if bound into Numa-Choa harbour, the point of that name (on which the town stands), N.W. by W. will lead in. The town is in Lat. 12° 26′ S.—(*French Survey.*)

WATER.—There are several convenient watering-places on the south side of Mohilla; one of them is situated at the head of Numa-Choa harbour.

The S.W. Point of Mohilla is surrounded by a coral reef extending nearly ¾ of a mile from shore; on this reef, at rather less than a quarter of a mile from shore, are two rocks with perpendicular sides, called from their appearance the Sail rocks; they are visible 9 or 10 miles.

Miremani Bay, half a mile to the eastward of the Sail rocks, is a well-sheltered anchorage in 10 to 20 fathoms, sand and mud, being protected on each side by coral reefs; about ¾ of a mile to the S.E. of the entrance to this bay there is a patch of rocks (Flat rocks) above water.

JOHANNA is next to Comoro in size and in height, but far surpasses it in beauty and fertility: in form it is triangular, the east side running about north and south, and the north side forming a deep bay, in which is situated the town of Johanna. As seen from the westward, it appears as a succession of peaks, one rising behind the other, and all, including Johanna peak, being wooded to the top. Like the other Comoro island, Johanna is volcanic, but not actively so now.

Johanna is governed by an independent Sultan, who resides at the town on the north side. The natives are hospitable and well disposed to Englishmen; they are of Arab origin, but the lower orders are much intermixed with the African race.

The climate of Johanna is on the whole healthy, the shores being nearly everywhere free from mangrove swamps; and the cruisers on this station generally consider this island a sanitarium as compared with the other parts of East Africa.

Johanna Peak, near the centre of the island, is 5177 feet above the sea, and in about Lat. 12° 14′ 17″ S., Long. 44° 27′ 34″ E. This peak, of conical form, and probably a thousand feet higher than any of the others, is frequently obscured by clouds, so that it is rarely seen except in the early morning. From the peak a spur of mountainous land projects towards each of the three ends of the island.

North Coast.—The N.E. point of Johanna is in about Lat. 12° 4′ 54″ S., Long. 44° 29′ 57″ E. According to CAPTAIN LE VICOMTE DE LANGLE, the reef off it extends 2 or 3 cables to the W.N.W. of the point, outside which the soundings are regular; but MR. OLIVE, master of H.M.S. *Brilliant*, reports it to be shoal for 1½ miles from the point. It is possible that the appearance of reef, which by some authorities has been described as even 3 miles from shore, is caused by tide-rips; but nevertheless give the N.E. point a good berth, for it is generally the weather side.

The N.E. point when on with Saddle island (near the N.W. point) bears S. 82° W., the two being about 15 miles apart, and the coast between forming a large deep bay,

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in which is situated the town. The north shore is bounded in most places by a reef extending from 1 to 2½ cables. For 4 miles eastward of Saddle island the reef may extend nearly half a mile off shore, but it then becomes bolder, and the whole way along this shore at half a mile distance there are no soundings with the hand line; the green line of reef shows at high water, and at about half tide the reef breaks everywhere, except in very smooth weather.

Saddle Island, 400 feet high, near the N.W. point of Johanna, is small, bluff, and saddle-shaped; its N.W. extreme is in about Lat. 12° 9′ 30″ S., Long. 44° 15′ 17″ E. There are two or more islets inside and to the southward of Saddle island, connected by reefs, with boat channels between them. Saddle island is apparently bold on its N.E., N., and N.W. sides, but from the N.W. point a reef extends about S.W., which, increasing its distance from shore to full one mile, then trends to the S.E., and forms the reef which lines the S.W. shore of Johanna.

Off Saddle island, as well as off the other extremities of Johanna, tide-rips give an appearance of shoal water beyond the reef to an extent of a mile or two, arising probably from the rocky and uneven bottom; but these appearances of broken water have been passed over without obtaining soundings, and possibly no dangers exist beyond the reef, which is plainly visible except at high water.

The old town of Whani is situated about 3½ miles to the north-eastward of Johanna town. About 6 miles westward of Johanna town there is a small deep bay to the westward of a bold bluff called Assombe; this bight is open to the eastward, and has at its mouth a remarkable group of black rocks, with anchorage for small craft inside them.

About three quarters of a mile to the westward of Johanna town the soundings deepen regularly from shore to 20 fathoms, increasing afterwards to 42 fathoms at half a mile; beyond this the depth increases to 350 fathoms, soft black mud, at one mile from the beacon.

Johanna Town (or Moussamoudou) is on the north side of the island in the depth of the bay, about 10 miles from Saddle island and about 6½ miles from the N.E. point. The south-west angle of the town is in Lat. 12° 9′ 50″ S., Long. 44° 25′ 51″ E. The town, which is on low ground close to the sea, is substantially built of stone, with very narrow winding streets, and is surrounded by a wall; it is overlooked by a dilapidated fort or citadel, on a height immediately at the back. The English consulate is a detached building close to the beach, about 300 yards to the westward of the town.

Directions.—During the *southerly* Monsoon, sailing ships should approach Johanna town from the westward, where a fresh breeze will often be found, whilst it is calm to the eastward; give Saddle island a berth of at least 1½ miles, as you sometimes get a considerable swell and no wind under its lee; from thence you will very often fetch the anchorage without a tack; be prepared for squalls, which occasionally come off the land in furious gusts. During the *north-east* Monsoon, on the contrary, it is best to approach from the eastward, on account of light winds and westerly currents, which may sweep you away towards Mohilla. A French vessel of war, which had been close to Saddle island, was swept away by a strong westerly set in light winds, and after being carried completely round Mohilla, did not make the anchorage of Johanna for six days.

The **Anchorage** off Johanna town and also off the watering-place is very limited in extent, and close to the shore; vessels should therefore be prepared to

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anchor immediately on obtaining soundings with the hand line. The best anchorage is abreast of a cocoa-nut plantation, about ¾ of a mile westward of the town, with a small white stone beacon bearing S.E.; this beacon is in Lat. 12° 10′ 25″ S., Long. 44° 25′ 24″ E.; it was erected to mark the anchoring ground, and is about 100 yards to the eastward of the watering place, and about 200 yards westward of a round grassy hill; off here the soundings deepen regularly from the shore to 20 fathoms at a quarter of a mile distance, the bottom being dark sand with small pieces of coral and shell near the shore. H.M.S. *Brisk*, anchored in 15 fathoms, 1½ cables from the 5-fathom line off the coral reef, with the white beacon near the watering place S. 25° E., and Black rock N. 87° E.; from this anchorage Saddle island bears N. 76° W.; the N.E. extreme N. 38° E.; Johanna peak S. 32° E., and the citadel N. 75° E.; this is a very good and convenient berth during fine weather. There is anchorage abreast, or immediately to the westward of the town, but it is not recommended, the bank here being steep: during the southerly Monsoon it is an unsafe position, as it is immediately to windward of the coral flat. Between the two mentioned anchoring grounds this coral flat, which dries at low water springs, extends about 1½ cables from shore. This flat fronts the round grassy hill before mentioned: it commences at the beach a little to the eastward of the watering place, and terminates near Black rock, just to the westward of the English consulate. Off the edge of this flat the bottom is rocky and uneven. During the S.W. Monsoon the anchorage off Johanna town is smooth and safe; but vessels should lie with a good scope of cable, and be prepared for gusts off the land.

The Watering Place is abreast of the western anchorage as above described, and is a small stream about 100 yards westward of the beacon; it flows through the cocoa-nut plantation, and generally discharges itself into the sea in two branches. The water, which is easily obtained, is excellent, except during the rainy season, when the quantity of vegetable matter brought down from the hills renders it bad, after being kept a short time on board. In watering here a considerable length of hose is required to enable the boat to lie afloat; the beach, being composed of large round stones, is not suited for rolling casks. H.M.S. *Boscawen* obtained 100 tons in 8 hours.

There is a good stream of water close to the westward of the town, but the natives use it for bathing and washing. Another stream of water, off which there is anchorage, runs into the sea 1⅓ or 1¾ miles westward of the town.

Supplies are plentiful at Johanna: the cattle are small but of excellent quality, at from $10 to $15 a head. Goats, kids, and poultry are comparatively dear. Sweet potatoes, yams, cocoa-nuts, limes, oranges, and other fruits and refreshments, are abundant.

The Trade is limited, but whalers (50 or 60 a year) often touch here for refreshments; they are charged $15 a year for recruiting and watering as often as they please. Other merchant vessels touching here pay $10 port dues.

The S.W. Coast is about 20 miles in extent; and from about 3 miles southward of Saddle island to the south point the coast is slightly concave; the extremes of land are in one S. 41° E., and although several spurs of high land approach the sea, giving the appearance of a point at a distance, no point projects beyond the line joining the extremes of the island.

The reef on the S.W. coast extends farthest seaward in the vicinity of Saddle island, elsewhere not more than a mile, and in most places not more than 3 or 4

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cables. The coast is boldest to the southward of Pomony, where in places the reef terminates.

"**Pomony Harbour** is formed by coral reefs, and situated on the south-west coast of Johanna, about 8 miles from its south extreme, and about 12 miles from the north-west point of Saddle island. The landing place abreast of the middle of the harbour is in Lat. 12° 16′ 20″ S., Long. 44° 24′ 54″ E. Pomony may be known seaward by being under a saddle in the high land, and by two peaks like dog's ears, which are immediately over the harbour; also by the bright verdure of Mr. Sunley's sugar estate, and by the factory with its white square chimney, the harbour's mouth being about three-quarters of a mile north-westward of the factory.

"Pomony harbour is very small, but has good depths of from 15 to 5 fathoms, black sand, throughout. The anchoring space is 190 fathoms wide from the 5-fathom line on each side abreast of the beacon at the entrance, and 158 fathoms wide towards its head. We did not measure its exact length, but it is between 2½ and 3 cables. The reef side is steep, and the shore side shelving. By choosing your spot, vessels may in case of necessity lie on shore here, as in the case of the I. N. steamer *Semiramis*, which was beached for repairs. This harbour will safely contain 5 or 6 small vessels if properly moored, but vessels of over 200 feet long should not enter the harbour, there not being space enough for them to moor with sufficient scope.

"**The South-east Reef** dries entirely at low water springs; at its northern extremity we placed a beacon consisting of an iron pole and basket, whitewashed; this beacon may be passed within a boat's length on its western side, but should have a little wider berth on the harbour side. There is a boat channel from the head of the harbour out to sea, or to the river off the factory, but this is practicable only when the sea is smooth.

"**The North-west Reef** only partly dries at low water springs. There is a boat channel to sea inside this reef, which is practicable in all weather, the sea in rough weather being always broken by the outer and shallower part of the reef.

"**The Coral Shoal** in the middle of the entrance to the harbour is abreast of the outer point of the north-west reef: it is about a cable in extent north-east and south-west, with depths of 5, 3, and 2 fathoms on it, except on its south-east edge, where there is only 6 feet at low water springs. A black nun buoy was placed on this spot, to be left on your port hand when entering the harbour, and this side of the shoal being quite steep, the buoy might be approached on its eastern side within a long boat's length, but we believe it has since been washed away, and not replaced. This centre shoal does not generally show well, and is very treacherous for boats, a solitary surf sometimes breaking at long intervals. Boats are frequently capsized here; on one occasion when it appeared tolerably smooth a surf rose and turned a whale boat end over end.

"**Directions.**—Two beacons were erected in 1861 to the westward of the north-west village. They each consist of five cocoa-nut trees placed together on end in the ground and whitewashed; the lower one is near the beach, and the upper one about 350 yards behind it. These lead in between the south-east reef and the centre shoal, on about a N. by E. ½ E. course, and render the channel perfectly safe for vessels which answer their helm properly. The beacons are visible 8 or 10 miles at sea. To enter:—When within a mile or so of the shore bring and keep the beacons

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in one about N. by E. ½ E., which will take you in the fairway, passing the centre shoal on your port hand, and the beacon on the reef end on your starboard hand. When abreast of the *reef* beacon, haul sharp round to the south-east into the harbour. The channel between the south-east reef and the centre shoal is about 100 yards wide. There is also a deep channel between the shoal and the north-west reef, but it is very narrow, and should not be used except on emergency. Observe that when there is much swell the surf rolling over the reef into the harbour causes a considerable outset in the channel.

"The harbour being very small, care is required not to enter with too much way, so as to be able to turn short round at the reef beacon. It is desirable to moor about mid-channel between the shore and the reef: for this purpose observe a diamond-shaped beacon on the beach near the factory; this beacon brought on with a remarkable and outermost cocoa-nut tree (also on with a small rock on the beach at the head of the harbour) denotes the middle line of the harbour.

"Vessels should moor with open hawse to the S.E. or N.W. according as it is the southerly or northerly Monsoon. We generally moored with 50 or 60 fathoms each way, and put on the mooring swivel, particularly during the north-east Monsoon. When moored in the harbour the south extreme of land bears S. 32° E.; the sugar factory S. 41° E.; the south (visible) extreme of Mohilla West; and Comoro mountain, just open of the north-west extreme of land about N. 49° W.

"During the N.E. Monsoon the harbour is quite smooth, and at low water it is as smooth as a dock at all times of year; strong gusts of wind come down occasionally off the land; but light land and sea breezes generally prevail, and occasionally shift from one to the other several times during the day; care is therefore required in entering Pomony under canvas, although in case of necessity you may anchor in from 12 to 17 fathoms inside the coral shoal: outside it there is no anchorage, unless it be on the outer part of that shoal in 4 or 5 fathoms coral. At this time of year there is no difficulty in going out under sail if you choose your time, but do not attempt it unless the land wind is steady.

"During the S.W. Monsoon the harbour is generally smooth enough for all purposes, but when strong southerly or south-westerly winds occur at spring tides, although all heavy sea is broken by the reefs, sufficient swell rolls in at high water to cause a confused boiling sea, and to make dry landing impracticable; if it were to blow really hard from that quarter at high water springs we should call the harbour unsafe, unless special precautions were taken, such as placing an anchor close over to the weather side of the harbour, so as to lie with a whole cable scope; but the S.W. Monsoon rarely blows home with force, and we have no reports of its ever having amounted to a gale. Whilst, therefore, the harbour may be considered tolerably safe and available at all times of year, vessels lying here in the strength of the S.W. Monsoon during spring tides will do well to be prepared.

"Sailing vessels at this season will frequently have to wait some days for an opportunity of going out.

"WATER.—There is a very good watering place at a stream which runs into the sea near the factory; here the water is excellent and may be made to run of its own accord into the boat by placing a starting hose a little way up the rocks past the bridge. In smooth weather boats can proceed across the reef from the harbour and enter the river towards high water, but when there is any swell they have to lie outside the surf with a great length of hose and must return to the harbour by

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the ship channel: of course when there is much surf, landing at the river is impracticable, but this is of rare occurrence.

"There is also a stream running into the sea at the northern part of the harbour, with a deep pool inside: this is very convenient for washing clothes or a ship's company's blankets and bed-ticks, but it comes from marshy ground and is probably not wholesome for drinking.

"SUPPLIES.—A supply of provisions and coal is kept at Pomony for the use of H.M. ships on this station. Cattle and fresh supplies are plentiful, the latter being brought round from Johanna town when required in any quantity.

"**Pomony Outer Anchorage.**—There is good anchorage about ¾ of a mile to the south-eastward of Pomony harbour, with Mr. Sunley's factory chimney bearing N.E. by E., on which bearing you will be at right angles to the sea face of the building and be able to see through its two doors. Anchoring here in 14 fathoms you will be about a ¼ of a mile from shore, and have room to lie with a whole cable if desired: there is also said to be anchorage in 30 fathoms at half a mile from shore.

"Strangers approaching this anchorage should run for the factory on about the given bearing, as on the north-west side the reef extends 2 or 3 cables from shore, and on the south-east side there are some detached rocks, the largest of which only covers at high water.

"This anchorage being immediately abreast of the river is very convenient for ships calling for water during the N.E. Monsoon; at the other time of year vessels will generally find this anchorage practicable, but they should be prepared to slip on appearance of strong winds or heavy swell.

"About a mile to the south-eastward of Mr. Sunley's factory there is a bay (unexamined) apparently free from reefs, at the northern extreme of which is a stream of good water. There is another bay about a mile to the north-westward of Pomony harbour, and here again there is a stream of good water. About 5 or 6 miles to the north-westward of Pomony there is another harbour formed by the reefs, somewhat similar to Pomony, but only fit for dhows."

The South Point of Johanna is bluff and of considerable height; it is in about Lat. 12° 21′ 16″ S., Long. about 44° 31′ E. This end of the island does not form an acute point, but is 4 or 5 miles across; in rounding it, several points will successively appear. The southern extreme of Johanna is surrounded by a reef which extends from three-quarters to one mile; there are two islets close to the shore about a mile to the eastward of the southernmost part. During the southerly Monsoon there is occasionally a very heavy sea off this point.

East Coast.—From the southern extreme of Johanna the land trends N. 15° E., about 7 miles to a bluff point, and thence N. 4° W., about 10 miles to the N.E. point. The east coast is high and rocky, near the sea, with scarcely any indentations; although apparently steep-to, it is not desirable to approach too close, since it is usually the weather side of the island. Coral reefs line the coast in places, with channels between them for boats and small vessels. The small harbour of Demony is scarcely known. Between Demony and the N.E. point where the reefs cease, the coast is very steep. The soundings on this side of the island have not been examined.

Seen from the eastward, distant 50 miles, the island makes with two peaks—the higher to the northward, with the land gradually sloping towards the south.

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MAYOTTA, to the S.E.-ward of Johanna, and next to it in size, is the easternmost of the Comoro islands. It is 21 miles long from north to south, with an average breadth of 6 or 7 miles; but if the dangerous reefs which surround the island be included, the whole occupies a space of 30 miles north and south, and 24 miles east and west, between Latitudes 12° 34′ and 13° 4′ S., and between Longitudes 44° 59′ 15″ and 45° 23′ E. The horizontal form of the island is very irregular, and owing also to very uneven surface, it presents a remarkable aspect from all points. Mavégani, the highest mountain, is situated 7 miles from the southern extreme of the island; it has two peaks close together, of which the westernmost is the highest, being 2164 feet above the sea. Uchongui, a sugar-loaf peak, at less than 3 miles from the southern extreme of the island, rising to a height of 2105 feet from land of inconsiderable elevation.

Mayotta, when seen bearing west, at about 40 miles distance, makes like two islands, the highest part appearing to the southward; when seen from the southward, Uchongui mountain will rise before any other part. The channel between Johanna and the outlying reefs of Mayotta, is 29 miles wide.

Mayotta is now a French colony, a small military and naval establishment having been formed at Zaudzi. The island is fertile, but not very healthy, for the shores of the main island are lined in places with mangrove swamps, which uncover at low water. The inhabitants are similar to those of the other Comoro islands.

Pilots.—Two Government pilots reside on Pamanzi island, and one will generally come off to ships about to enter by the Bandéli passage, if the signal is made. For the other passages no pilot can be procured, as they are out of signal distance of Pamanzi.

Outlying Reefs.—Mayotta is surrounded by a line of reefs, extending from the main island on the north, N.E., S.E., and south sides 4½ to 5 miles, and in some parts of the west side 8 miles. To the N.W. there is a detached reef 8 miles from Zamburu, and 11½ miles from the main island; this reef is about a mile in diameter, with least water 2¾ fathoms, and the centre bears N.W. ½ W. from the high part of Zamburu.

The reefs round Mayotta afford many passages, most of which are good for even large ships; the passages generally used are the Zamburu on the N.W., and the Bandéli on the east side. When inside these reefs the anchorages are spacious and sheltered in all directions, but the outer edge of the reefs is most dangerous to ships approaching the island without due caution, for besides their great distance from shore, the currents which prevail in the vicinity are uncertain, the island being to the southward of the general westerly set.

The reefs are generally visible by the discolouration of the water, which when the sea is calm is in many places the only sign of danger, their outer edges being very steep, with no bottom, at 50 fathoms close alongside. But it is said that on the western side of the island, a bank of deep soundings extends nearly two miles beyond the reefs, where, in case of necessity, vessels being drifted towards the reef might bring up. Inside the reefs the soundings on the eastern side of the island are from 15 to 25 fathoms, and from 25 to 40 on the western side.

Between Mayotta and Johanna, the current is generally to the S.W., but at times sets to the S.E. with considerable strength: during calm and variable weather H.M.S. *President* was set from the north-west to the south-east part of the island (round the east side), in two days. About the south end of Mayotta an easterly current is very common.

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Zamburu, or Saddle Island, about 3 miles off the north-west end of Mayotta, is about a mile in diameter, and over 1000 feet high; its higher peak, towards the north-western part, is in Lat. 12° 38′ 20″ S., Long. 45° 6′ 45″ E. The saddle appearance of the top of the island is most visible from N.E. and S.W.; this island is somewhat similar to Saddle Island, off Johanna, but very much larger and higher. The soundings close to the reef surrounding Zamburu are from 10 to 15 fathoms. Between Zamburu and the main island is a reef, having on the extremities the two Choazil islands, one at each end; they are small, but visible 12 miles.

Zamburu Passage.*—Approaching Mayotta from the N.W., Zamburu cannot be mistaken; if approaching to the northward of the outlying shoal, keep Zamburu peak to the southward of S.E. ½ S., which will give the shoal a berth of over a mile. Bring and keep Cape Duamuni on with the second summit (the south-western peak) of Pamanzi S.E. ½ S., until Zamburu peak bears West, when run East from the latter until the next marks come on—viz., Point Congo on with the second summit of Pamanzi S.E. ¾ S. Observe, however, that Point Congo is not the extreme of land, as shown in sketch C on the chart; there is a point beyond it—ill defined on the chart—which a stranger is apt to mistake for Point Congo. The point which *is* the extreme land (Point Makaoen) must be made to overlap the second summit of Pamanzi as much as the second summit appears above it. This will take you in the fairway between the narrows, and continuing that course you will leave Prévoyante Shoal on your right hand (going in). When Morne hill comes on with Zamburu peak N.W. by W., steer from these last marks. You may then pass close to Aombé islet, which is steep-to on its west and south sides, and thence pursue a midchannel course into Pamanzi bay, or round to the anchorage south-west of Zaudzi. In rounding Zaudzi spit, do not haul to the southward until the four Nossi Effatsi islands open westward of Mognaméri.

Entering Zamburu passage with the leading mark on, when between Zamburu and North reef, there is a bank of 7 fathoms' soundings, apparently good anchoring ground. The French frigates *Cordelière* and *Somme* sounded on this bank; it is a mile in extent N. by E. and S. by W., lying right in the fairway with least water 4½ fathoms; at its north and south extremes there are 6½ fathoms; it may be dangerous in parts for vessels of heavy draught.

Buoys.—The edge of the shoals off Cape Duamuni, and the south point of the North-east reef opposite to it, are buoyed; beyond these buoys you will come to others on shoal patches, between which you should pass; there is also a buoy on the Prévoyante reef.

These buoys are pyramidal, but do not show well; the shoals, however, are plainly visible towards low water.

Dua Muni, or the North-east passage, appears clear for vessels of any size. To enter this pass, bring Duamuni point on with Muruamu mountain S.S.W. ⅞ W.; this will lead in between the north and north-east reefs, and when Congo point comes nearly on with the second summit of Pamanzi, proceed as directed for entering the Zamburu passage.

Choazil Passage lies with the northern Choazil island on with Morne hill, S. 86° E.; it appears to have only 5½ fathoms mid-channel, although about half a mile wide between the reefs.

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* For Mayotta Island and the passages between the reefs, it is necessary to be furnished with Admiralty Chart No. 2741.

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Great Western Passage is wide and safe. To enter, bring Red mount (a hill with a red patch near the sea) on with Combani mountain E. by S. Combani mountain may be known by the sugar-loaf appearance of its summit, and by its being on the nearer range of mountains.

Boeni Bay.—If bound to Boëni bay, proceed as above until East point (on the Boëni peninsula) comes on with Uchongui peak S.S.E., you may then steer on the latter course, and when a mile or more distant from East point, haul into the bay with Caroni island S.E., which course will clear the reefs off East point. Acua point (remarkable for a small green hillock) on with the peak of Zamburu, clears you to the westward of a reef which lies W. by S. $\frac{1}{2}$ S. about 2 miles from Red mount.

Boeni Passage is half a mile wide, but its distance from shore renders it difficult to distinguish Boëni point from the other land; to enter, bring Boëni point on with the southernmost peak of Mavégani mountain bearing east.

Boat Passage is very narrow, but has water for all classes of vessels; the leading mark is Cani point (between Cani hill and Uchongui mountain) bearing about E. $\frac{1}{4}$ S.; but it should not be attempted without a pilot on account of its narrowness, and because a considerable space inside the reef does not appear to have been examined.

Saxiley Passages, three in number, are divided from each other by coral flats,—the southern of the two flats being crowned by a sand-bank, which uncovers at one-third ebb. Though not much frequented, these passages have sufficient water for vessels of the largest size.

South Saxiley Passage is wide and good. To enter, bring a distant tuft of trees W. by N. $\frac{3}{4}$ N. over Dapani point. Boëni island bearing W. $\frac{1}{4}$ N. will also lead in. Boëni is at the south extreme of Mayotta, and when seen from outside the passage it has the appearance of a low hill joined to the main island.

Middle Saxiley Passage lies with the sugar-loaf part of Uchongui mountain just open to the southward of Morne Carré, about W.N.W. This passage has 7 and 8 fathoms water.

North Saxiley Passage is very narrow; to enter, bring Morne Carré just open southward of Uchongui mountain about W. by N., but caution is necessary, for this takes you rather close to the coral reef on your port hand.

Bandeli Passage, about 5 miles to the southward of Pamanzi, is the usual one for vessels from the eastward. There is a *whitewashed obelisk* on Mavegani mountain, which serves as a distant mark, and leads to the entrance of the pass when bearing N. 72° W. To enter, bring White Rock (a mark close to the water's edge) on with a white beacon on the top of a hill called Morne X, bearing N. 72° W., taking care not to open Morne X *beacon* to the northward on first entering the passage, nor to open it to the southward at the inner end of the passage. When the sugar-loaf peak Uchongui comes on with the north end of Bandéli W.S.W. you are within the reefs, and may haul up North for the west end of the westernmost Ajangua island; pass this at half a cable or more, and then on the east side of Bouzi, giving the islet off the latter also a berth of half a cable. If preferred you may pass to the westward of Bouzi, but in this case give its S.W. end a berth of a quarter of a mile to avoid an outlying reef, and pass within a third of a mile or less of its north side to avoid the patches of coral which extend southward from Choa point.

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The marks on Morne X and White rock are not very distinct to a stranger, and one being a considerable height above the other, a slight error in their being in one may be unobserved. If, therefore, entering this pass for the first time without a pilot, much care is required. In the morning when the sun is behind you, the reefs will show well, but be careful not to mistake False passage for the Bandéli, the former being about two miles to the south-westward of Bandéli pass.

Buoys.—There are four *white* buoys on the north side of the channel, and three, chequered *black* and *white*, on the south side; but it is doubtful if one can be distinguished from the other, all being rusted to the same colour. Besides these, there is also a *white* buoy to mark the western extreme of the reefs which lie to the southward of the Ajangua islands; a *black* buoy on the eastern edge of the reef off the islet at the south extreme of Ajangua bay; and a *black* buoy on the eastern extreme of the reefs off Ironi point.

Longorori Passage is a narrow cut in the reef, about 3¼ miles southward of Pamanzi; it is clear and has plenty of water, but it is winding; and when inside, the navigation is obstructed by coral patches. This passage is not recommended except for boats.

Pamanzi Island, about 1¼ miles from the eastern side of Mayotta, and within the encircling reef, is about 3 miles north and south, and 2½ east and west; the eastern hill, on which there is a signal station, is 782 feet high; when seen at a distance, Pamanzi makes like a saddle. The reef on the eastern side of Pamanzi does not appear to extend more than half a mile, not so much in places. At the north-east extreme of Pamanzi there is a lake, apparently the centre of an extinct volcano.

Zaudzi Island, in Lat. 12° 46′ 48″ S., Long. 45° 20′ 14″ E., lies to the westward of, and is connected with Pamanzi by a neck of sand, on which a causeway has been constructed. The French establishment is on this island, and consists of a governor and colonial officers, some artificers and seamen, and about 100 soldiers, some of which are natives. There are a few substantial government buildings and storehouses, and numerous huts.

Water.—There are two wells on Zaudzi, but the water is not good. The establishment is supplied from the main island, the water being brought over in casks.

Supplies are scarce; poultry and vegetables may be obtained in small quantities only, and cattle from the main island; the latter are imported to Mayotta from Comoro and Mohilla. A government supply of provisions is kept here for the troops and for the French cruizers on this station.

Coal is kept here for the service of the French men-of-war.

Zaudzi Spit extends nearly 4 cables westward of the north end of Zaudzi; its extreme is usually marked by a *white* buoy, but is sometimes absent. To clear the west extreme of this spit open the four Nossi Effatsi islands westward of Mognaméri island.

Orestes Rock, situated just in the usual anchorage, was discovered by H.M.S. *Orestes* in 1862; lies about 3 cables from shore, with the jetty lantern on with the lightning conductor of one of the government buildings.

From the *Orestes*, when lying close alongside this rock, the west extreme of Mognaméri island bore N. 5° E., and the west extreme of Bouzi island S. 55° W. It is a cone of coral not more than 12 yards in diameter at its base, rising to pinnacles, so

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small that the lead can hardly be placed on them; these pinnacles have only 10 feet water on them at the lowest spring tides, with four or five fathoms all round at 25 yards distance. A buoy has been placed on this shoal, which must not be mistaken for the buoy on Zaudzi spit.

Zaudzi Anchorage is good everywhere to the southward of Zaudzi spit, by avoiding the position of Orestes rock. A good berth will be in 11 fathoms, mud, with the west extreme of Zaudzi N. by E. ½ E., and the south extreme of Pamanzi S.E. by S.

The best anchorage during the southerly Monsoon is in Pamanzi bay, which at that season is very smooth. It is all clear except a small coral shoal in the middle, on which a *black* nun buoy is moored. There is anchorage in 7 fathoms, with North point N.E. by E., and the second summit of Pamanzi S.E. ½ S.

GEYSER REEF AND ZELEE BANK.—Early voyages abound in reports of rocks and shoals to the eastward and north-eastward of Mayotta, but they are very indefinite. The *Firebras*, in 1682, is said to have discovered shoals E.S.E. from the north point of Mayotta, and distant 40 or 45 miles from the nearest part of the island; the *Devonshire*, in 1766, is also reported to have passed this danger. In 1830, the French corvette *Zélée* saw breakers in Lat. 12° 21′ S., Long. 46° 36′ E. (probably the bank now known by the name of Geyser); and 12 miles to the S.W.-ward of this spot there was an extensive bank, with the least soundings then found on it 5½ fathoms.*

More recently (1831), the whaler *Rover* announced "a large and dangerous shoal in Lat. 12° 22′ S., Long. 46° 20′ E., extending about 10 miles E.S.E. and W.N.W., 4 or 5 miles of which dries at half ebb, and the other parts are covered with high breakers: when the middle of the shoal bore N. by E. ½ E. about 5 or 6 miles, there were soundings of from 12 to 10, 9, and 8 fathoms, sandy and rocky ground." In 1832, the whaler *Borneo* struck and was lost on "an unknown coral shoal, in Lat. 12° 14′ S., Long. 46° 7′ E."†

In 1842, the *Shannon*, bound to Aden, was wrecked on a dangerous reef in Lat. 12° 24′ S., Long. 46° 32′ E.; it extended E.N.E. and W.S.W., with many rocks visible at half ebb, and most of them dry at low water. At three-quarters ebb they counted 17 rocks above water, besides some dry sand-banks; there are several swatchways between the reefs, with apparently deep water: remnants of other wrecks appeared imbedded in the sand.

In 1848 Mr. J. Richards, R.N., of H.M.S. *Geyser*, partially examined a dangerous group of rocks and sand-banks, of a crescent form, convex to the westward. The S.E. extreme is in Lat. 12° 26′ 30″ S., Long. 46° 32′ 35″ E. (or 2° 6′ 44″ E. of Johanna town); the N.E. extreme of the rock which uncovers is in Lat. 12° 20′ 45″ S., Long. 46° 30′ 39″ E., and their West extreme in Long. 46° 27′ 50″ E., but to the N.E.-ward of the North extreme a bank or shoal projects to Lat. about 12° 17′ S., curving to the eastward to Long. 46° 35′ E., thus forming a horse-shoe open to the S.E. The soundings on this bank are not given, but it is described as a barrier shoal dangerous to cross: inside the horse-shoe, approaching from the eastward, the depths are from 17 to 20 fathoms.

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* Annales Hydrographiques, t. iii. pp. 343-346.
† Nautical Magazine, 1833.

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Zelee Bank is placed on the charts 14 miles S.W. of Geyser Reef, with depths varying from 30 to 5½ fathoms, the shoalest part to the southward.

It would appear certain that the *Shannon* was lost on the Geyser Reef. The *Zélée* also saw the breakers of the northern part of Geyser Reef, but whether the bank to the S.W. was more than the south-western edge of the Geyser does not appear clear from the French notice, for she had an error in her longitude. The description of the *Rover's* shoals coincides with that of the *Shannon;* but at present it is not decided whether they are all the same reef or not. Therefore, approaching this part of the Mozambique Channel either from the northward or the southward, the area included between Lat. 12° 12′ and 12° 32′ S., and between Long. 46° 11′ and 46° 37′ E., must be considered dangerous, for in fine weather, at high water, the reefs do not always break, and it is doubtful if the lead will give any warning.

A N.E.-ly current often prevails in this neighbourhood, although at no great distance off is the southern edge of the great westerly set of the equatorial current.

Bisson Shoal.—In Lat. 11° 59′ S., Long. 46° 29′ E., a shoal has been reported under the name of Bisson,—nothing more is known of it.

Richards Bank.—About 25 miles to the eastward of Geyser Bank, and in Lat. 12° 17′ S., Long. about 27° 4′ E., soundings were obtained by the *Geyser* in 16, 21, and 23 fathoms—nothing further was ascertained.

LEVEN AND CASTOR BANKS.—A bank, discovered by CAPT. OWEN, R.N. and named the LEVEN, is placed by him between Lat. 12° 21′ and 12° 44′ S., and between Long. 47° 46′ and 47° 57′ E.; on it are soundings of 40 to 20 fathoms, and 16 fathoms near the southern part.

In 1837, H.M.S. *Pylades*, in Lat. 12° 38′ S., Long. 47° 43′ E, obtained soundings in 13 fathoms.

In 1860, the French corvette *Cordelière*, in Lat. 12° 5′ S., Long. 47° 37′ E., during a calm, got no soundings with 165 fathoms of line. At another time, being in Lat. 12° 3′ S., Long. 47° 55′ E., soundings were had in 33 fathoms, and this the commander (VICOMTE LANGLE) thought might be an extension of the Leven Bank; he also found 30 to 35 fathoms, and fixed the eastern limit of the bank in Long. 48° 5′ E., where the depth was 68 fathoms.

In 1852, H.M.S. *Castor* discovered a bank between Lat. 12° 49′ and 12° 57′ S., and between Long. 47° 36′ and 47° 46′ E., with soundings from 25 to 7 fathoms, sand and coral; the latter depth (the shoalest the *Castor* passed over) is in Lat. 12° 52′ S., Long. 47° 41′ E.; from the masthead, the sea appeared discoloured as far as the eye could see, hence it was inferred that shoaler water might exist in this vicinity; on the chart this is called CASTOR BANK.

Whether these observations indicated one bank, between Lat. 13° and 12° S., stretching in a N.N.E. direction, or a series of banks with deep water between them, is uncertain; as yet, the shoalest soundings appear to be on the Castor Bank, and large ships should avoid its vicinity during the night, and be watchful as they approach it by day.

Intermediate Bank.—To the Eastward of Leven Bank, between it and Cape St. Sebastian (Madagascar), a bank of soundings was found by OWEN, in Lat. 12° 24′ S., Long. 48° 25′ E. Nothing more is known of this vicinity.

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GLORIOSO ISLANDS, two in number, together with a small islet, and many scattered rocks and banks, appear to be situated on the same coral reef, which extends east and west about 15 miles, with a breadth of about 3 miles; there is apparently no passage into the lagoon. The sea breaks with violence on the reef, and no soundings were found with 100 fathoms of line at one mile from it. The islands, about 15 feet above the sea, are sandy, but covered with brushwood and small trees. Turtle and birds are plentiful; fresh water may be obtained, but it is scarce.

Glorioso Island, the westernmost of the group, in Lat. 11° 34′ 48″ S., Long. 47° 24′ 9″ E., is about 1¼ miles long by 1 mile broad, with a reef extending from its west end. A small basin, with 7 fathoms water, is formed in its eastern end by a curve in the sand-bank, and here a small vessel might probably find shelter, but the bottom is rocky and uneven.

Isle du Lise (the eastern island), is about a mile in length, and its eastern extreme is in Lat. 11° 35′ S., Long. 47° 32′ E., beyond which the reef extends a considerable distance to the S.E.-ward. This island, when viewed from the northward, distant 10 miles, makes like three small hummocks with cocoa-nut trees between them.

Verte Islet, on the reef between the two main islands, is more to the southward than either of them. Passing about 3 miles to the southward, Verte Islet appears as a rock with a house on it, which is apparently the highest object on the island.

Avoid the vicinity of Glorioso Islands at night; and do not approach them from the eastward by day, unless with a commanding breeze, on account of the strength of the current—which sets strongly to the westward.

ASTOVE ISLAND, the centre of which is in Lat. 10° 6′ 30″ S., Long. 47° 48′ 27″ E. (Owen), is a small low island upon which the French ships, *Bon Royal* and *Jardinière*, are said to have been wrecked. Nothing more is known about it.

COSMOLEDO ISLANDS.—A ring of coral reef, about 10 miles in diameter, with several islands on it, and enclosing a magnificent lagoon, is known as the Cosmoledo group. On the southern side there is a small patch of sand where vessels may anchor during the northerly Monsoon; but within a mile of the reef there are no soundings. There is no entrance to the lagoon. The islands are sometimes resorted to for fish and turtle, and vessels occasionally leave a few negroes here to await their return.

Wizard Island is on the S.E.-side; its north point is in Lat. 9° 43′ 12″ S., Long. 47° 45′ 21″ E.; and its south point in Lat. 9° 46′ S.

Menai Island, on the west side, is in Lat. 9° 42′ 12″ S., Long. 47° 37′ 39″ E.; it is the highest part of the group, and has on it some cocoa-nut and other trees.

North Island is in Lat. 9° 38′ 12″ S., Long. 47° 41′ 21″ E.

ASSUMPTION ISLAND is low, sandy, and covered with shrubs; the hummock near the S.E. end of this island is in Lat. 9° 46′ 18″ S., Long. 46° 33′ 57″ E. According to an old French plan (from M. MORPHEY), the island extends N.E. and S.W., about 7 miles; and has anchorage on its north-west side (but nearer the western extreme), in 20 to 30 fathoms; on the north and east sides the coral reef is steep-to.

ALDABRA ISLANDS.—This group of islands is about 22 miles in extent, east and west: from Hadoul point, the eastern extreme, in Lat. 9° 26′ 30″ S., Long.

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46° 34′ 39″ E., a reef extends about 3 miles to the eastward. The N.W. end of the group, in Lat. 9° 21′ 30″ S., Long. 46° 11′ 57″ E., is fronted by a white beach of about half a mile in extent, and apparently clear of danger. At the SW. end of the group there is also a projecting reef.

Four principal islands almost connected with each other, and called respectively East, South, West, and Middle islands, constitute the group. They are visible at about 15 miles distance; West Island not more than 12 miles. The north and west sides may be approached with safety in clear weather. The four islands enclose a shallow lagoon interspersed with small islets and sandbanks; and on the west side is a small harbour.

South Island runs nearly the whole extent of the group, in shape like the arc of a seaman's quadrant, convex to the southward.

East Island, lying S.E. and N.W., is rather low; a hummock, near its eastern extreme, is fronted by patches of white sand; and on the north side there are several rocks close to the shore, with high breakers. This island has a beautiful appearance, and is well wooded with a forest of large trees.

Middle Island is higher than the others at its eastern end, where it is partially covered with very high trees; the rest of the island is clothed with verdure and interspersed with trees—with white sandy patches here and there. Coasting along, the beach of the island appears to be steep-to, the water not being discoloured.

West Island is low compared with the other islands, and of level appearance; although clothed with verdure, it has very few large trees; on it are several bare white patches. The coast is clear of danger.

Supplies.—From the appearance of these islands water may probably be obtained. Land and sea turtle abound, wood is plentiful, and ships in distress might probably obtain spars from the forest on East island.

The Aldabras have at different times been called Aro, Atques, and Arco Islands.

Euphrates Harbour is the name given to that part of the lagoon, enclosed by the Aldabra islands, where a barque of that name anchored in 1862; according to the captain's account, this harbour has sufficient room for many large ships, sheltered from all winds,—the best anchorage being in its widest part abreast of Mushroom islet (so called from its shape). The entrance to Euphrates harbour is between Middle and West islands, about three-quarters of a cable wide, with no dangers, and least water 13 fathoms if you keep in the dark water; but do not approach the green water, where there are rocks, some of which dry at low tide. Much care, however, is requisite to keep mid-channel on account of the narrowness of the passage and great strength of tide. If the wind is light the ship will drop in or out with her anchor dredging.*

The entrance between West and South islands has 6 or 7 fathoms water, and here also the tide runs with great rapidity. Between East and Middle islands there is a gap about half a mile wide, with apparently no passage,—breakers stretching right across.

Mota Island, said to have been seen by Aleixo de Mota in 1600, and described as small, low, and covered with trees, in Lat. 10° 20′ S., Long. 42° 29′ E., has no existence.†

Dupont Island.—About 1807, this island was reported in Lat. 10° 4′ S., Long. 46° 13′ E. We have no corroboration of the existence of an island here;

* Mer. Mar. Mag. (1863), vol. x. pp. 162, 163. † Dalrymple.

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but from the similarity of latitude with that of Astove, it may be the latter island which MR. DUPONT saw; until this opinion has, however, been confirmed, it is desirable to keep a good look-out when near the assigned position.

Natal Island does not exist. On the assigned position (Lat. 8° 31′ S., Long. 46° 23′ E.) birds were seen, but nothing else to give warrant of any danger.

A Bank was reported in 1860 by the slave brig *Formosa Estrella*, and stated to be about two degrees eastward of Zanzibar; the vessel anchored on it. This is the only notice of a bank in that vicinity, and the report is not credited.

Bassas de Patram.—A shoal was reported by the *Pitt* in 1758, in Lat. about 4° 30′ S., Long. about 44° 40′ E. The journal states that breakers were seen from the mast-head *distant five leagues*. No other report confirms the existence of a shoal or bank anywhere near the position given.

Bassas de Ambre.—In 1760 a bank was reported by H.M. ships *Norfolk* and *Panther*, bound from Johanna towards India; its position is stated to be in Lat. about 0° 9′ S., Long. about 50° 15′ E.; extending about 9 miles, bottom sandy, and visible in several places. The *Huddart*, in 1803, reported an *appearance* of broken water in Lat. 0° 5′ S., Long. 48° 50′ E., and supposed it to be Ambre shoal. Lastly, the *Cambrian*, bound to Aden, reports as follows: Crossing the Equator, July 3rd, 1857, in 49° 45′ E., startled by the appearance of discoloured water; sounded in 15 fathoms; hauled up to eastward, and sounded again—no bottom half an hour afterwards with 76 fathoms, water not so highly coloured.* The last observation would seem to indicate the possible existence of the Ambre shoal, though it has for some time past been erased from the charts of the Indian Ocean.

SOKOTRA ISLAND AND ITS VICINITY.

SOKOTRA ISLAND is 71 miles long, east and west, and 22 miles wide at its broadest part from Rás Bashurí to Rás Kattaní; in shape it is very irregular, narrowing to a sharp point at its eastern extreme; the southern coast is rudely convex, presenting a bulwark against the swell of the ocean, whose waters are perpetually rolled against it; but the northern and western shores are indented and broken into a succession of small open bays. "The whole island may be described as a pile of mountains, of nearly equal height, almost surrounded by a low plain, extending from their base to the margin of the sea. This is of irregular width, varying from two to four miles, excepting near Rás Felink and Rás Shaab, where the mountains rise up perpendicularly from the sea, and it disappears altogether. Throughout the whole extent of this belt, with the exception of those parts which are watered by the mountain streams in their progress towards the sea, and some spaces hereafter specified, the soil is hard, and does not in its present state appear to any considerable degree susceptible of cultivation. The southern side, though considerably less fertile than the northern, is yet, in the vicinity of Rás Mom, reasonably productive; but to the westward of it is as arid and barren as the worst parts of Arabia. There the force of the south-west wind has blown the sand up

* Mercantile Marine Mag., 1859, vol. vi. p. 1.

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from the sea-shore, where it is so fine as to be nearly impalpable, and formed it into a continuous range of sand hills, which extend parallel to the beach for several miles, whence it spreads over the plain, and is even in some places deposited in great quantities at a distance of 3 miles from the sea, at the base of the mountains which there form a barrier, and alone prevent it from overwhelming the natural soil of the whole island. On the northern side, the plain is stony and covered with a dwarfish bush (the metayne) about six feet in height, the foliage of which appears to be retained during the north-east season of the year, and gives to the space where it grows the appearance from a distance of being clothed with verdure. Such is the appearance and nature of the sea-coast, but the high land exhibits a great variety of soil and surface. As a general remark, it may, however, be observed, that nothing in the North-east Monsoon presents a stronger contrast than the eastern and western sides of the island. While the former is destitute of verdure, has scanty pasturage, and, with the exception of some places near the sea, has no other water than what is retained in natural reservoirs, the latter is supplied with frequent streams; its valleys and plains afford luxuriant grass, herds of cattle are numerous, and the scenery in many places is equal to that of our own country.

"Sokótra is not distinguished by any remarkable fertility of soil, yet it is so varied as to be difficult to be able to speak of it in general terms. The summit and sides of the greater part of the mountains composing the eastern part of the island present the smooth surface of the rock entirely denuded of soil, though in some places the rain has worn hollows and other irregularities, in which is lodged a shallow deposit of light earth, and a few shrubs spring forth. On the summits of the hills on the northern side of the island, and against the sides and elevated regions in the vicinity of the granite peaks, a dark rich vegetable mould is found, which nourishes a thick and luxurious vegetation. In the plain about Tamarída, and some portions near Cadhoop, are several beautiful valleys. The soil is a reddish-coloured earth, which nourishes, at certain seasons, an abundant supply of grass, and appears well adapted for the cultivation of grain, fruit, and vegetables. In the valleys through which the streams flow, not only are there extensive groves of date-trees, but the existence of a broad border of beautiful turf, occasional enclosures of dukkuw, and, though but rarely, a plantation of indigo or cotton, indicate no want of fertility in the soil. The natives themselves, indeed, are aware of this, and speak of their own stupidity and indolence as the work of fate.

"Climate.—Though Sokótra is situate only a short distance from the continents of Africa and Arabia, and is, in fact, in the same parallel with their most parched and burning plains, yet, from both Monsoons blowing over a vast expanse of water, it enjoys, at least as compared with them, a remarkably temperate and cool climate. A register of the thermometer, kept in the N.E. Monsoon from the 12th of January to the 13th of March, exhibits during that time the mean daily temperature of 70½°, while several streams, at but a short distance from the level of the sea, indicated the mean annual temperature at 74¼° (Fahr.) On the hills it is still cooler, and the great elevation of the granite mountains would enable settlers to choose their own climate. Until a few days before we quitted the island, the Monsoon blew very fresh, and at times the wind swept through the valleys with a violence which I have rarely seen equalled. The sky was usually overcast; and while in the countries of Asia and Africa, under the same parallel, some time was yet to elapse before the termination of the dry season, Sokótra enjoyed frequent and copious rains, due to

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her granite mountains, the lofty peaks of which obstruct the clouds, causing them to deposit their aqueous particles to feed the mountain streams, or precipitate themselves in plentiful showers over the surrounding country.

"On our second visit, in the S.W. Monsoon, during the time the vessel remained in Tamarída Bay, we found the average temperature much higher than the above; but it should not at the same time be forgotten that we were then under the high land on the lee side of the island, and the wind became heated in its passage across it. On the windward side of the island, the summits of the mountains, and the open part of the coast between Rás Moree and Tamarída Bay, the weather was at this time also delightfully cool.

"In place of the dark cloudy weather with which the season of the S.W. Monsoon commences in India, it was here for the most part clear and cloudless, the stars at night shining forth with uncommon brilliancy. During this period also, when it was blowing nearly a hurricane, and when the gusts swept down from the mountains with a force almost irresistible, throwing up the water in sheets, and keeping our decks and masts to the height of the tops continually wet with the spray, we had, with the exception of a dense white canopy of clouds formed like the table-cloth over the Table Mountain at the Cape, before the setting in of the breeze with its utmost degree of violence, the same clear and cloudless weather. The wind when it blew strongest felt dry; and indeed, such was its siccity, that water dropped on the deck dried up instantaneously. As is usual with winds of this nature, we felt hot or cold, according to the previous state of our own skins. If we were perspiring, we felt cool; but otherwise, we felt hot, feverish, and uncomfortable. And notwithstanding the heat of the wind at Tamarída at this season, the natives do not ascribe to it any ill effects; it would merely appear from their testimony that intermittent fevers are prevalent at the change of either Monsoon, and few of the Arabs from the coast, who reside here any time, escape them."*

PRODUCTIONS.—The chief productions of the island for commercial purposes are aloes; the gum called dragon blood; and several varieties of hard wood, applicable for sheaves of blocks, splicing-fids, &c.

SUPPLIES.—Oxen are numerous near Tamarída and on the mountains in its vicinity; the cows are kept mostly for their milk, from which the ghee, so much esteemed in Arabia and Africa, is made. Vast flocks of sheep and goats are found in every part of the island—the latter are so numerous that the owners keep no account of them.

Sokótra has no ports in which a vessel can ride in safety, protected from all winds; and it is only on opposite sides of the island that good shelter is found from the prevailing Monsoon.

During the N.E. Monsoon the bays and anchorages sheltered from East and E.N.E. winds are Ghubbet Kúrmeh, Ghubbet Göllousír, Ghubbet Sháab, Bander Né, Bander R'dresseh, and Bander Fíkeh; also Tamarída, with the wind from the East, if anchored close in shore; during N.E. winds all these, with the exception of Tamarída, afford tolerable shelter,—the same remark applies (generally) to the south coast, if close in. During N.N.E. winds Ghubbet Sháab alone gives shelter, all the other bays being a dead lee-shore; at Bander Né, on the south side, the anchorage is also good, if close in.

* Memoir on the Island of Sokótra, by LIEUT. J. R. WELLSTED, I.N., in Jour. Royal Geog. Soc., vol. v. p. 129 et seq.

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During the S.W. Monsoon, there is shelter in all the bays between Rás Kadármeh and the west end of the island,—these are Kúrmeh, Kadhúp, Tamarída, Delíshí, Garrieh, and Fíkeh; but they are subject to very strong gusts of wind that come from the mountains and through the valleys. Natives say that, at this season, the only really good anchorage is at Bander Delíshí, where a vessel can ride out the Monsoon in a perfectly smooth sea and free from the effects of wind. Good ground tackle is necessary, for the soundings deepen rapidly on the north side of the island.

Tamarida, or Hadibu, on the north side of the island, and 30 miles from the east end, is in Lat. 12° 39′ N., Long. 53° 59′ 20″ E. It may be known by the high craggy peaks of the mountain range, 3000 to 4000 feet high, which overhang the plain on which the village stands; or, should the peaks be clouded, by a high sand-hill (Jebel Omharí) at the N.E. extreme of the bay, and a low point (Rás Hauláf) partly sandy, partly rocky. The anchorage is indifferent, but there is no danger in the bay; the soundings gradually increase from the shore to 10 fathoms at the distance of a mile, and 20 fathoms at 2¼ miles. The landing place is a quarter of a mile from the village, close to a small stream near a grove of date-palms.

Supplies.—Good water, bullocks, goats, sheep and fish may be procured here at reasonable prices; also firewood. The natives are poor but hospitable, and ready to barter refreshments for rice. Grapes, water-melons, pumpkins, oranges, and plantains may be obtained in March and April, and dates in June.

Ghubbet Kurmeh is a large bay between Rás Kúrmeh on the east and Rás Kadármeh on the west; the soundings are regular, the 10-fathom line being nearly 1¼ miles from the shore, increasing to 38 fathoms at 4½ miles, bottom of sand and coral, with sand and shells in the offing. Rás Kúrmeh is in Lat. 12° 38′ 35″ N., Long. 53° 51′ 10″ E., and Rás Kadármeh in Lat. 12° 42′ 15″ N., Long. 53° 38′ 15″ E. The swell is considerable during the N.E. Monsoon.

Ghubbet Gollonsir, which is partially sheltered during the N.E. Monsoon, lies between Rás Gollonsír to the eastward, and Rás Bedú to the westward. The best anchorage is off the landing-place (800 yards distant), in 4 fathoms, low water, with the north peak of Rás Gallonsír bearing N.E. by E., and the mosque S.E. by E. The soundings under 10 fathoms, which are within a mile of the shore, are irregular; from 20 fathoms the soundings deepen rapidly to no ground at 100 fathoms. The shore of this bay is fronted by a rocky reef extending off a quarter of a mile, and W. ½ N. of the village, 1¾ miles from the shore, is a small patch of 2½ fathoms. There is no shelter during the S.W. Monsoon. The mosque of Gollonsír is in Lat. 12° 41′ 15″ N., Long. 53° 29′ 30″ E.

Between Rás Gollonsír and Rás Samárí to the eastward, a shoal fronts the shore in some places a mile off; near its edge are several shallow patches of 2 fathoms.

Ghubbet Shaab is a bay affording shelter from the N.E. Monsoon, but completely open to the S.W. It lies between Rás Bedú (Lat. 12° 39′ 30″ N., Long. 53° 23′ 30″ E.,) and Rás Shúab (Lat. 12° 33′ 20″ N., Long. 53° 18′ 40″ E.) The 10-fathoms line is ⅔ of a mile off shore at the eastern side of the bay, increasing to 1½ miles at the western side, bottom of sand and rock. At 7 miles from the bottom of the bay the depth is 35 fathoms, rapidly deepening to no bottom at 100 fathoms. The best anchorage is in 10 fathoms, with Rás Bedú bearing N. ¾ E., and Rás Shúab S.W. by W. ¾ W., opposite the mangrove-trees growing close to a saltwater

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lagoon. About 2¾ miles eastward from Rás Sháab are two remarkable hills like ears; they are 1488 feet high, and visible from the S.W. side of the island; with these bearing S.W. by S., and Rás Sháab S.W. by W. ¾ W., there is good anchorage in 10 fathoms, bottom white sand. This is ¾ of a mile off shore, and the water is smooth during the N.E. Monsoon.

Ras Shaab is the western extreme of the island: it is a fine bluff cape, terminating the sloping side of a mountain, off it a reef extends 300 yards. The coast thence trends S.E. for 18 miles, off which, for the greater part of the distance, is a 6½ fathoms bank, 1 mile off shore; inside there are soundings of 8 or 9 fathoms, and outside there are regular soundings of 20 to 25 fathoms about 5 or 6 miles off shore; this bank is not more than half a mile wide.

Ghubbet Ne, or **Bander Ne,** is the name given to the part of the coast between Rás Sháab and Rás Kattání, in Lat. 12° 22′ 20″ N., Long. 53° 32′ 10″ E. The anchorage inside the 6½ fathoms bank affords good shelter during the N.E. Monsoon.

The coast on each side of Rás Kattání for a distance of 6 miles east and west is rocky and precipitous; thence a chain of mountains under different names stretches to the east end of the island: these mountains rise wall-like from a low plain (2 to 4 miles broad), which forms the sea margin of the island on the south side. The whole of the coast from Rás Kattání to Rás Feliuk is bold to approach, the 20 fathoms line being 4 to 8 miles off shore, but in some places there are overfalls of 2 and 3 fathoms. A vessel, during the fine season, may anchor in 9 to 12 fathoms, bottom of sand and coral.

Ras R'Dresseh, in Lat. 12° 34′ 15″ N., Long. 54° 30′ 50″ E., is the eastern extreme of the island, and forms in two small rocky points a mile distant from each other; a reef extends 600 yards off each, and at a distance of 1¾ miles to the eastward and northward there is no bottom with 100 fathoms. The strong rippling produced by the tides leads navigators to suppose the reef off the cape extends farther than it really does.

Bander Ras R'Dresseh is an anchorage to the S.W.-ward of the cape of that name, between the low point and the three dry patches of rock that lie off it. A vessel may bring up here in 9 fathoms, sand and rock, in tolerably smooth water, during the N.E. Monsoon, with the outer small patch of rocks bearing E. by S., the low point N.E. ½ E., and the high bluff of Moín W. ½ N. The channel formed between the outer rocks and the reef projecting from the point has depths of 6 to 9 fathoms, but it is less than half a mile wide, and the overfalls and strong currents make it dangerous. Half a mile to the N.E.-ward there is no bottom at 80 to 90 fathoms.

Ras Mom, in Lat. 12° 34′ 10″ N., Long. 54° 27′ E., is the extreme eastern bluff terminating the range of mountains already referred to; being 1920 feet high, it is a conspicuous object before the low land of Rás R'Dresseh is visible.

Islands and Bank of Soundings between Sokotra and Cape Guardafui (or Ras Asir).

Jezirat Saboynea, in Lat. 12° 39′ 30″ N., Long. 53° 9′ 20″ E., is a small white rocky islet, forming in three peaks; it is 800 yards long by 150 yards broad, and visible 25 or 30 miles; from Gollonsír mosque it bears W. ½ S. 18 miles, and from Rás Sháab N.W. ½ W. westerly 9 miles. In the channel between Sokótra and Saboynea there is no danger; and ¾ of a mile off the islet there are from 25 to 30 fathoms water.

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Jezirat Darzi, the easternmost of two islands frequently called the Brothers, is 3¾ miles in length, by 1⅛ miles in width at its widest part, near the centre; it rises perpendicularly from the sea to an elevation of 970 feet, except on the northern side, where the north point of the island projects about 700 yards from the base of the hill. The east end of the island bears from the western point of Sokótra South (westerly) distant 27 miles. Soundings extend from the S.W. part of Sokótra to Darzí, varying from 15 to 20 fathoms, until near the latter, when they become deeper; on the north side of the island a small bank extends 1¼ miles, at which distance there are 13 fathoms water, decreasing gradually to the shore, and increasing to 127 fathoms at 4⅓ miles distance, from which the edge of the bank of soundings runs to the northward towards Jezírat Saboynea; on the south side depths varying from 20 to 30 fathoms extend to a distance of 10 miles off shore, whence it rapidly deepens off the bank. The southern edge of the bank is nearly due East and West. The eastern bluff off Darzí is in Lat. 12° 6′ 20″ N., Long. 53° 17′ 30″ E.

Jezirat Samheh, the westernmost of the Brothers, bears from Darzí W. by N.; it is nearly 6⅓ miles long, by 3 miles in breadth at its eastern end; at its western end it narrows to a point. The highest point of the island is elevated 2440 feet above the level of the sea; its shores are rocky, and the south side rises in perpendicular cliffs from the sea. A reef extends half a mile off the western point, and another from the N.E. point to the same distance; and there are two small rocky islets off the south-east side. In the channel between Samheh and Darzí, which is 9 miles wide, there is no danger—the soundings varying between 20 and 25 fathoms, with bottom of sand and shells, occasionally patches of coral. E. by N., 1½ miles from the N.W. point, is a small bank of 13 fathoms; on the south side the bank of soundings extends 17 miles; and to the westward, soundings extend to Abd-al-Kúri, increasing midway to 145 fathoms, and decreasing again towards the latter island, near which the water is very deep. The west point of Samheh is in Lat. 12° 9′ 20″ N., Long. 52° 58′ 30″ E.

Abd-al-Kuri is a long narrow island between the west end of Sokótra and Rás 'Asír, but nearer to the latter; it is 20 miles in length, by nearly 4 miles in width at its widest part. Two ranges of hills, separated near the centre, occupy the whole length of the island, and from a distance it appears as two islands. The eastern range is 1670 feet above the sea at its western extreme, while the western range is only 500 feet high at its highest part. The northern coast is chiefly a sandy beach, with a few rocky points; but the southern coast is composed of cliffs rising abruptly from the sea. The bank of soundings extends from 1 to 2¾ miles to the northward, and 4 miles to the southward of the island. The inhabitants are few, and very poor; and they are seldom visited by strangers, for the island is entirely destitute of cultivation, and the water is very indifferent.

Bacchus Bank.—To the north-eastward of the N.E. point (Rás Anjíreh), Bacchus Bank extends over 3 miles, on which the depths vary from 3 to 12 fathoms, rapidly deepening off the bank to the northward, where the edge of the bank is only distant one-third of a mile; a strong ripple is created on this bank when the tide is setting in opposition to the wind.

The depths off the eastern end of the island are 40 fathoms at 2¼ miles, 50 fathoms at 3½ miles, and 55 fathoms at 6½ miles distance, from which it suddenly deepens into 100 fathoms. The width of the channel between the east end of Abd-al-Kúri and the west end of Samheh is 35 miles, in which there are no

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dangers except Bacchus Bank. The N.E. point of Abd-al-Kuri is in Lat. 12° 11′ 15″ N., Long. 52° 22′ 20″ E.

The western extremity (Rás Khaisat-en-Kaum) of the island forms in two sharp rocky points, bearing north and south of each other, half a mile distant; from the northern point a reef of rocks extends west half a mile. The soundings off the west end of the island are very deep, there being 25 fathoms water 1 mile, and 20 fathoms 2 miles distant, sand and coral bottom. The south point of the western extreme is in Lat. 12° 13′ 20″ N., Long. 52° 2′ 45″ E. W.N.W. of this extremity of the island, and distant 9 miles, is a coral bank, 24 to 40 fathoms water, with deep soundings of 60 to 180 fathoms all round it.

On the south coast the water is deep, there being 18 to 20 fathoms close to the cliffs, and increasing to 100 fathoms at 4 miles distance. The cliffs are abrupt, with here and there a rocky islet.

Bander Saleh, or Leven Bay, is on the south side of the island, being a concavity in the coast line, immediately to the westward of the extreme of the high mountain. The anchorage is very good in from 6 to 10 fathoms water, coral bottom, ¼ to ½ a mile from the shore, affording shelter during the N.E. Monsoon; but no supplies of any kind are to be procured. This is the narrowest part of the island, being only one mile across, and formed of elevated sand-hills. The sandy beach of Leven Bay is in Lat. 12° 10′ 20″ N., Long. 52° 12′ 40″ E.

From the south-eastern point of Leven Bay the coast to the eastern extreme of the island is convex, formed of steep cliffs, with from 10 to 12 fathoms water close to them. The edge of the bank of soundings is 4 miles distant from the shore.

Kal Farun, or **Salts' White Rocks**, 12 miles north of the west end of Abd-al-Kúri, are about three-quarters of a mile long by 200 or 300 yards in width; they consist of two rocks divided by a narrow channel filled up with sunken rocks, and are situated on the northern side of a large bank of soundings 10 miles in length N.E. and S.W., by 6 miles in breadth. The eastern rock, which is the largest, has one peak 282 feet high, and two smaller ones; the western rock has also one large peak of the same elevation, and one smaller one. They form from different points of view in two to five peaks, and are well covered with guano, which gives them a snow-white appearance on all sides; their only occupants are birds, which flock here in great numbers. These rocks are visible, in clear weather and during the day, about 20 miles; but at night they are difficult to distinguish, owing to their colour. On the northern side the soundings only extend a short distance, increasing from 16 fathoms close to the rock, to no bottom at 100 fathoms at the distance of 1½ miles; to the southward there are from 5 to 10 fathoms for a distance of 1½ miles, from which they gradually increase to 25 fathoms at 4½ miles, and thence suddenly drop off the bank into no ground at 120 fathoms; to the east and west of the rocks the edge of the bank is distant about 2 miles.

Oliver Bank was discovered by the E. I. Co.'s steamer *Semiramis*, on her passage to 'Aden, in 1845. On sounding during the night, one cast of 17 fathoms was obtained, and immediately after no bottom. On the return voyage the vessel was steered for the spot, when the same soundings were obtained. An examination of the spot was subsequently made by Lieutenant Grieve, Indian Navy, in the *Palinurus*, without, however, any success in finding it; it is probably, therefore, very small. The position given is Lat. 13° 51′ N., Long. 54° 5′ E.

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THE SOMALI (OR N.E.) COAST OF AFRICA, FROM RAS 'ASIR TO BURNT ISLAND.

From Rás 'Asír to Rás Alúleh the coast trends in a W.N.W. direction, in a nearly straight line, for 30 miles; there are a few projecting points, but no dangers exist. In the bay immediately to the westward of Rás 'Asír is good anchorage, and protection from southerly winds, but more to the westward the ground is rocky from the shore to the 10-fathoms line, a distance of 1 mile. The soundings rapidly increase in depth from 10 fathoms to the edge of the bank, which off Rás 'Asír is distant 2½ miles, increasing to 6½ miles off Rás Búah, and decreasing again to 2 miles off Rás Alúleh.

Ras Aluleh, in Lat. 11° 59¾′ N., Long. 50° 46½′ E., is a very low, sandy, but prominent point, near the extremity of which is the narrow entrance to an extensive lagoon.

The small village and anchorage of Alúleh lie on the west side of the point. The anchorage is on the edge of a narrow ledge of coral, 350 yards from the shore, and is sheltered from N.E. winds. The water at the village is bad, but cattle and abundance of firewood may be procured.

From Rás Alúleh the coast trends to the W.S.W. 15 miles, as far as Rás Fílúk, when it turns to the S. by W. 7 miles to Marayeh. The shore, with the exception of Rás Fílúk, is low and sandy, with an elevated stony plain between it and the mountain range in the interior. The bank of soundings extends but a short distance from the shore, being 5 miles in width to the northward of Rás Fílúk, and only 1½ miles at Bander Fílúk; the depths increase rapidly from the shore, to 100 fathoms at those distances.

The Auckland Bank, in Lat. 13° 13′ N., Long. 50° 9′ E., was discovered in August, 1841, by Lieutenant Hewett, I.N., who reported it as an extensive bank having overfalls on it from 17 to 13 and 22 fathoms.

Ras Filuk (or Rás-al-Fil), in Lat. 11° 57⅓′ N., Long. 50° 38′ E., is a prominent hill 800 feet high, projecting far into the sea, 9 miles W.S.W. of Rás Alúleh, and whether viewed from the eastward or westward has the appearance of an island, the land about it being low; it may be seen at the distance of 40 miles in clear weather. The water is deep off it, there being 18 and 20 fathoms within a ¼ of a mile. In the valley to the eastward is a lagoon of salt water and the bed of a water-course; and to the westward is a small but deep bay, with good anchorage in from 8 to 10 fathoms water, where shelter may be found from easterly or southerly winds.

The low sandy point 6 miles to the S.W.-ward of the above-named point, is also called Rás Fílúk.

The small fort and village of Fílúk is situated close to the beach, 5 miles southward of the low point of Rás Fílúk, off which is a coral bank with 3 to 10 fathoms water on it; and immediately to the north of the village is the entrance of an extensive lagoon.

Marayeh is the principal town on this part of the coast, in Lat. 11° 43′ N., Long. 50° 28′ E.; it is situated close to the beach, 7 miles southward of the village of Fílúk, and is defended by forts. The anchorage off the town is good, in from 5 to 10 fathoms water, the soundings increasing gradually to 20 fathoms at 1¾ miles

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distance from the shore, after which they become irregular with overfalls; the edge of the bank lies 5 miles from the shore.

SUPPLIES.—Good water may be obtained from a well two miles inland; bullocks, sheep, and firewood may be procured in abundance.

From Marayeh to Rás Gorí, a distance of 47 miles, the coast trends in a general W. by S. direction, but slightly concave, with small projecting rocky points. The soundings are deep, and the shore bold to approach, there being no dangers except off the town of Khór, where a bank of 3 fathoms extends off shore to the N.W. and West one mile. The edge of the bank of soundings varies in distance from the shore from 1¾ to 6 miles; bottom of sand.

Ras Gori, in Lat. 11° 30′ N., Long. 49° 43½′ E., is a high rocky cape, 60 miles W.S.W. of Rás Fílúk, being the termination of a high range of lofty table mountains, which stretch away to the E.S.E. The soundings off the cape are very deep, and the 100 fathoms line is only distant from the coast 1 mile.

Ras Antareh, in Lat. 11° 27½′ N., Long. 49° 35¾′ E., is a high rocky cape 9 miles W. by S. from Rás Gorí, and is the termination of another range of lofty mountains; the shore between the two capes is sandy and covered with bushes; the soundings extend off shore 3 miles.

From Rás Antareh the coast trends W.S.W. 16 miles to Rás-al-Hamr, and is divided into two shallow bays by a rocky point called Rás Abúrgabeh, 6½ miles S.W. of Rás Antareh. The shores of both bays are sandy, and behind them is a range of hills from 800 to 1500 feet high. Close to the westward of Rás Abúrgabeh are two small villages. With the exception of a small 2 fathoms bank half a mile north of the westernmost of the villages, the soundings are regular, and there are no dangers; the depths increase gradually to 20 fathoms, from which they rapidly deepen into no bottom at 120 fathoms, at the distance of 2 to 6 miles from the shore. The general nature of the bottom is sand. In the bay westward of Rás Abúrgabeh there is very good anchorage in 9 and 10 fathoms 1¼ to 1½ miles from the shore, but it is open and unprotected.

Ras-al-Hamr, in Lat. 11° 20¾′ N., Long. 49° 20′ E., is a prominent rocky point, about 300 feet high, terminating a narrow ridge of hills. The soundings off the point increase from 6 fathoms close to the point, to 10 fathoms at 1¼ miles distant, and 100 fathoms at 2½ miles.

From Rás-al-Hamr, the coast runs in a general West direction for 40 miles to Rás Hadádeh; it is slightly concave, forming a bay, generally low, with occasional hills, and backed by a high mountain range (Jebel Wursúngeli), averaging 6500 feet in height, without any prominent peaks, being perfectly level along the summit. The range extends as far west as Meyet. The soundings on this portion of the coast appear regular, but deep; the 10 fathoms line is from ½ to 1 mile distant from the shore, and the edge of the bank of soundings is from 1½ to 4 miles, being very steep, —in some parts falling suddenly from 20 to 100 fathoms. The bottom is rocky inshore; sand, and sand and shells farther out.

Ras Hadadeh, in Lat. 11° 20¼′ N., Long. 48° 40½′ E., is a rocky point about 300 feet high, backed by a cluster of hills 600 feet in height.

From Rás Hadadeh to Rás Galwéni the coast trends W.S.W., a distance of about 47 miles. It is low near the sea, with an occasional hill, but bounded in the interior by the lofty range of Jebel Wursúngeli. The soundings on this part of the coast are irregular, and the bank extends off shore from 1½ to 4 miles. Indifferent and

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unprotected anchorage may generally be found in from 5 to 10 fathoms water close in to the shore; bottom of sand and rock.

Ras Galweni, in Lat. 11° 8′ N., Long. 47° 57′ E., is a low sandy point, to which a spur of the mountain range slopes.

From Rás Galwéni the coast trends West 9 miles, to an unnamed point; whence to Rás Súereh, a distance of 15 miles W. ½ N., it is concave, forming a bay 3½ miles in depth. The shore is low and sandy the whole distance, and thinly covered with bushes at a short distance from the beach, behind which undulating hills stretch to the range of mountains in the interior. The edge of the bank of soundings is at an average distance of 2½ miles from the coast, except at one point, E. by N. of Rás Súereh, where it is 6 miles distant. The 10 fathoms line is about ¾ to 1 mile off shore, from which the depths rapidly increase to 100 fathoms. The bottom is generally sand and coral, occasionally shells;—and towards the edge of the bank, mud.

Ras Suereh is a low bluff point, from which the slightly convex coast line trends to Rás Katíb, in a general W. by S. direction, for a distance of 22 miles; the range of undulating hills, mentioned above, still continue to bound the coast, with occasional spurs from them approaching the sea.

Ras Katib is also a low rocky bluff point, off which the soundings are very deep, there being 22 fathoms water close to it, and to the westward of it the soundings do not extend beyond a mile.

Ras Hambais, 8 miles E.N.E. of Rás Katíb, is a low sandy point, and may be known by a single large tree on the beach.

Burnt Island, or **Meyet,** in Lat. 11° 13′ N., Long. 47° 14′ E., is a barren rock, 430 feet above the sea, and perfectly white, being covered with guano. It lies 5½ miles from Rás Hambais, the nearest point on the mainland, which bears from it S. by E. ¼ E.; Rás Katíb bears from it S.S.W. ¾ W. A reef projects about 200 yards from its western extreme, with a sunken rock having only 2 fathoms water over it. The soundings in the channel between the island and the main, in which there are no dangers, are very irregular, varying from 13 to 22 fathoms, and to the south-eastward to 78 fathoms. The depths close to the island are 13 to 19 fathoms. The edge of the bank of soundings is 3 miles distant to the northward of the island, and the same to the westward; to the north-eastward it is 5½ miles distant. The bottom is chiefly coral,—occasionally sand, or sand mixed with shells.

No water is to be found on Burnt Island except in rainy weather, which lodging in pools on the summit of the rock, percolates through, and finds its exit close to the water's edge.

On the south side of the island is a remarkable cove or natural dock, capable of admitting a ship of 300 tons by clenching the ends of a cable through the holes in the rock: the remains of two clenches of cables were found affixed to the rock in 1801. In October, 1844, the remains of a hempen cable were found, which had been apparently rove through a hole in the rock.

From Rás Katíb the coast runs S.W. 8 miles to Jebel Meyet (1200 feet high), which terminates on the coast at a small rocky point. The coast for 4 miles from Rás Katíb is composed of low cliffs, after which it becomes sandy. The soundings are very deep, and the edge of the bank is only 1½ miles distant from the shore, affording no safe anchorage.

From Jebel Meyet the coast trends west for 4 miles, where it forms a low, round,

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sandy point called Rás Jalbú, off which the soundings are still very deep, extending off shore only half a mile. S. ½ W. from Rás Jalbú the high mountain range of Jebel Wursúngeli terminates in a lofty pyramidal peak, 6170 feet above the sea; and 11 miles to the eastward of the peak is the loftiest part of the range, 7150 feet high.

For vessels bound to or from the Red Sea, the only real dangers in the Gulf of 'Aden are—(1), the reefs in the vicinity of Zeyla, on the African coast, which are so placed as to render it almost impossible to give a satisfactory and clear description of them; and (2), the extensive bank of broken ground between Rás Kaú and Rás 'Arah on the Arabian side; but with ordinary precaution—with a good look-out, the regular use of the lead, and with occasional night observations, all these dangers may be avoided.

1. *Dangers on the African side*, in the vicinity of **Zeyla**:—

At the distance of 92 miles from Berbereh and on the parallel of 10° 59′ N., is the small inlet of the sea called KHÓR KARANGARÍT, off which, bearing E.S.E. 5½ miles from the entrance, is SHAB KARANGARÍT, a dangerous rocky patch, just awash at low water, and distant from the coast line 2 miles. It has 10 and 11 fathoms water close to it all round, and 40 fathoms at the distance of 5 miles to the N.E.-ward.

Shab Maduji is a dangerous rocky shoal, 1½ miles in length N.W. and S.E. by ¾ of a mile in breadth, and distant from the nearest land 2¼ miles. On the south-western side is a small sandbank, which covers at high water springs. The centre or dry part of the shoal in Lat. 11° 3½′ N., Long. 43° 38¾′ E., bears from Khór Karangarít N.N.E. 4¼ miles; and from Sháb Karangarít N.W. by N. 7¼ miles. To the N.W., N.E., and S.E. of the shoal, the soundings are regular, there being 10 and 11 fathoms water at a distance of 1¼ miles, increasing gradually to 40 fathoms at a distance of 9½ miles from the shore; but between the shoal and the shore the soundings are irregular, there being a bank with 2 to 3 fathoms water on it, on either side of which there are 7 and 8 fathoms.

N.E. by N. 1½ miles from Khór Madúji (another small inlet of the sea, and 7¼ miles N.W.-ward of Khor Karangarít), is a bank with 1 and 2 fathoms water over it, on which the sea breaks heavily at times, between which and the shore the depth is 4½ fathoms, and 7 fathoms immediately to seaward.

Ras Maskan is a low, round, and slightly projecting point, off which a reef of rocks extends 1 mile. N.E. of the cape, distant 2½ miles, is a dangerous reef of rocks, just awash at low water, rather more than ½ a mile in diameter, with 5 to 9 fathoms water close to it all round: it bears from Zeyla mosque S.E. ½ S. 11¼ miles. The channel between the shoal and the reef projecting from the cape is 1¾ miles wide, with 5 to 7 fathoms water over a mud bottom.

The coast from Rás Maskan to Zeyla, a distance of 12 miles N. by W. ½ W., is low and swampy, with a range of sand-hills, from 30 to 40 feet in height, about 2 miles from the beach. It is fronted by a reef of rocks, and the following dangers known as the Sháb Sheïkh Yakúb:—

A reef of rocks, dry in some parts at low water, and about half a mile in diameter, having 6 fathoms water close to it all round. It is distant from the shore 4 miles, and bears from Zeyla mosque S.E. by E. distant 6 miles.

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A rocky patch, having 2½ fathoms water on it, and 4 fathoms close to it. It is 2¼ miles from the shore, and bears from Zeyla mosque S.E. ½ S., distant 4½ miles. A 5-fathom bank, 5 miles off shore, and bearing from Zeyla mosque S.E. ¼ E., distant 8 miles.

The soundings increase gradually from the shore to seaward, until a depth of 40 fathoms is reached, beyond which no soundings have been taken.

Zeyla (the mosque) is in Lat. 11° 22′ N., Long. 43° 27⅓′ E., and is of some commercial importance.

Of the many reefs and dangers in the immediate vicinity of this place, it is almost impossible to give a clear description :*—

"The harbour is 2 miles wide North and South, by 3 miles East and West, having depths of 3 and 4 fathoms at low water springs, muddy bottom, the deepest water being near Sadaldín island. On the West side are a series of sandbanks extending from Rás Takúsheh, a low sandy point 3¾ miles W. by N. of the mosque, in a N.N.E.-ly direction towards Sadaldín island, having three channels between them, each about 300 yards wide, with 3 fathoms water in them at low water springs. On the North it is bounded by Sadaldín island, which is of coral formation, elevated about 20 feet above the level of the sea, and thickly covered in some places with bushes, otherwise perfectly barren. The island is 2 miles long in a North and South direction, by 1½ miles East and West: a reef extends from it in all directions, to a distance of 1 mile from its S.E. and S.W. extremes: ¼ of a mile from its N.W. end, and ½ a mile from its N.E. end. To the eastward of the island, and separated from the reef by a narrow channel 700 yards wide, with 4 to 6 fathoms water in it, is a reef 1 mile long, lying N.N.E. and S.S.W., dry in some parts at low-water springs: it bears from Zeyla mosque N. by E. ½ E. 5 miles; and South of this reef nearly mid-channel is a small patch of 5 fathoms. There is a small village and tank of water at the south end of the island. On the South, the harbour is bounded by the reef, which extends from the shore ¾ of a mile, and from Rás Hamár 1¼ miles to the North and N.E. A bank of hard sand, having on it 3 and 3½ fathoms at low water, extends from Rás Hamár 4½ miles in a direction E.N.E., and is 3 miles in width.

"**Shab Fílfil** are two sunken reefs lying off the hard sandbank which extends from Rás Hamár, with a channel 1½ miles wide between, having 4 to 6 fathoms water in it, over a mud bottom: they are separated from each other by a channel 1½ miles wide, with 5 fathoms water in it. The north-western reef is 2 miles long, lying W. by N. and E. by S., by 1½ miles wide, the centre of it bearing from Zeyla mosque N. E. by E. 8 miles distant. The south-eastern reef is 2 miles long, lying North and South, by 1¼ miles wide, the centre of it bearing from Zeyla mosque E. by N. ½ N. 8½ miles.

"Between these two reefs, to the south-westward, is another small rocky patch, nearly dry at low water, about 300 yards in diameter, and bears from the mosque N.E. by E. ¾ E., distant 7¼ miles.

"There is also a very dangerous rocky patch, about 300 yards in diameter, having on it 1½ fathoms at low water springs, and 6 to 10 fathoms water all round it. Between it and the reef off Ivát island, is a channel 2¼ miles wide, with depths of

* Commander C. G. Ward, I.N., from Lieutenant W. C. Barker's private M.S.; see also Journal R. Geog. Soc., vol. xviii. p. 130.

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9 and 10 fathoms water in it; and between it and Shâb Filfil the channel is one mile wide, with depths of 8 to 10 fathoms water in it. This patch bears from Zeyla mosque N.E. ¾ N., distant 8 miles.

"The soundings to the eastward of Shâb Filfil gradually increase from 17 to 25 fathoms at a distance of 4 miles, then suddenly drop into no bottom at 40 fathoms: the bottom is all mud, with the exception of the bank off Rás Hamár, and the depths decrease gradually towards the harbour.

"**Ivat** or **Ifat** is a low sandy island, with a few stunted bushes scattered over its surface, lying to the northward of Sadaldín island. It is 2½ miles long in a direction N.E. by N. and S.W. by S.; the western side is steep-to, having 8 or 9 fathoms water close to the beach: a reef, however, extends to the eastward of the island 3½ miles; and to the south-westward 1½ miles in rocky patches and overfalls, having a channel one mile wide between it and Sadaldín island, with 5 to 7 fathoms water in it. The south-west point of the island bears from Zeyla mosque N. ¾ W., distant rather more than 8 miles. There are two rocky patches bearing from the south-west point of Ivát island as follows—viz., N. ¼ W. distant 1½ miles, and W. ¼ S. 3¾ miles. The former has 11 fathoms water close to it on the north and west sides, and 6 fathoms between it and Ivát island. Between the latter and Ivát island the depths are 9 and 10 fathoms, and between it and the sandy spit off Rás Gomehlí, from the nearest point of which it is distant nearly 1½ miles, there are 7 fathoms water. There is also a rocky patch, dry at low water, close to the westward of the sandbanks forming the western boundary of Zeyla harbour. Between Ivát island, Sadaldín island, and Rás Gomehlí the depths are from 5 to 7 fathoms."

2. *On the Arabian side the dangers are as follows:—*

RAS KA'U, in Lat. 12° 39¾′ N., Long. 44° 24¼′ E., is a projecting cape, which, from its dark appearance, is known by the name of the "Black" Cape. Three miles inland to the N.N.W. is a remarkable saddle hill (Jebel Ka'ú), 798 feet above the sea; three other small hills occur to the S.W. of it near the coast.

The coast to the eastward of Rás Ka'ú is flat and sandy for a distance of 18 miles, as far as Rás 'Amrán, forming a bay nearly 5 miles deep, with regular soundings, there being 12 and 13 fathoms 2 or 3 miles off shore, and no dangers; the bottom is principally clay and sand, with an occasional patch of rock.

KHOR 'AMRAN is a remarkable inlet, situated 17 miles W. by S. from Rás Ka'u; it is 4½ miles long from E. to W., by 2½ broad, and is almost land-locked by a narrow spit of sand which projects from its eastern shore, and forms its southern boundary, leaving a very narrow entrance to the westward, with only 6 feet water.

Between Rás Ka'u and Khór 'Amrán, a very dangerous sand-bank extends, at one point reaching 4 miles off shore: no vessel should approach nearer than 15 fathoms by day and 20 fathoms by night, and even then great attention must be paid to the lead; for although the limit of the bank may sometimes be seen from the masthead of a vessel, much caution is *always* necessary in approaching this part of the coast, as the water shoals very suddenly. On some parts of the bank, the water breaks at low water springs. The bank of soundings extends 20 miles from the shore, there being 125 fathoms water at that distance.

RAS 'ARAR, in Lat. 12° 37½′ N., Long. 43° 53½′ E., and 31 miles W. by S. from Rás Ka'u, is the southernmost cape of Arabia; it is a very low, sandy, rounded point, and so difficult to distinguish at night that it is one of the most dangerous capes on

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the coast, for being in the direct route for vessels proceeding to or from the Red Sea, and having a bank of hard sand extending nearly 3½ miles off shore to the *eastward* of it, with two or more dangerous rocky patches with only 9 feet of water on them, several vessels have been wrecked in this vicinity. This bank, which extends as far as Khór 'Amrán, is the more dangerous, as the water suddenly shoals from 15 fathoms; and a ship with good headway would hardly have time to get a second cast of the lead before touching the ground: it is advisable not to approach nearer than 15 fathoms by day and 20 fathoms by night.

The whole of the coast between Rás 'Amrán and Rás A'rah is low and generally sandy, with a few bushy shrubs; but here and there a rocky point occurs.

The natives are treacherous, and not to be trusted.

Anchorage.—There is good anchorage in the small bay to the westward of Rás 'A'rah, affording shelter against the strong winds during the N.E. Monsoon: the coast immediately round the bay is rather steep.

THE RED SEA.

It does not come within the scope of this work to give directions for and a description of the Red Sea; commanders bound thither should be supplied with Capt. Elwon and Moresby's "Red Sea Directions," now published by the Admiralty.

The lights in the Red Sea are at Perim Island, on the Dædalus Shoal, in Jubal Strait, at Zafarana, and at Suez; these are fully described in the "Light List" at the end of this work.

The following general remarks on the passage of the Red Sea are by Capt. F. G. Dent, and may be of service to a commander going there for the first time:*—

"Bound to Aden during the N.E. Monsoon, after rounding the Cape of Good Hope, the middle passage is preferable, passing to the eastward of Rodrigues, say 67° E., and keeping this meridian as nearly as possible until the ship is in Lat. 8° or 9° N., then stretch over to the north-west, in order to weather Sokótra, before keeping away for Aden.

"Leaving Aden for the Red Sea during the S.W. Monsoon (June, July, and August), short tacks of two hours' duration on the Arabian side, up to Bab-el-Mandeb Peak, will be found most advantageous,—keeping clear of the overfalls between Rás Ka'u and Rás A'rah, the ripple on which can be seen by day; at night, the lead should be kept going when standing in, and do not reach inside of 17 fathoms till they are passed. On arrival at the Straits of Bab-el-Mandeb, the wind will be found blowing down the sea from about N.W. The Straits being difficult to beat through, it is advisable to dodge under the lee of Bab-el-Mandeb Peak till daylight, before making the attempt; the large strait is preferable with a loaded ship. On the last passage drawing 17 feet, drifted out on the first trial. The next morning the following plan was successful, occupying thirteen hours:—From close under the lee of Bab-el-Mandeb Peak, stood over towards Perim Island, worked short tacks under the lee of it, until nearly abreast of the bay on the south-west side of the island; from thence stood over to the African side, weathered Ras Seajarn, and the cluster of rocks to the

* Mercantile Marine Mag., 1859, vol. vi. pp. 1-5.

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north-west of it, which are visible above water, made several short tacks on the African shore (where I found the current slack) before standing to the north-east, and weathering Perim Island.

"From the Straits, past Mocha and up to the Harnish islands, the Arabian side should be kept; from thence, passing between the Great and Little Harnish, keeping to the westward of Jibbel Zoogur, Zebayer islands, and Jibbel Teer, the Arabian side is best for beating up. If bound to Cosire, Namahn island should be reached before standing over to the western side for it. Bound to Suez, the Arabian side should be kept until the island of Joubah is sighted to the north-west of Moilah, from thence stand over to the African side, work up under the lee of Shadwan Island, and watch a favourable opportunity for beating through the Straits of Jubal.

"Beating up from Jibbel Teer to Moilah on the Arabian side, two plans may be followed: First, by working short-tacks near the reefs during the day, standing well off at dusk, and tacking so as to be near the reefs again at daylight; this, with a constant look-out from the foreyard, is the safer, though more tedious way, and requires but little calculation as to the position of the ship beyond the latitude at noon. The other is, to be well in mid-channel about dusk (having afternoon observations for chronometers to be sure of the distance from the reefs), and ready for a long stretch on the port tack to the northward, as the wind at this time backs a point, sometimes two or three points, to the westward, and remains so the greater part of the night. This is the most expeditious way of turning up, but requires great attention and a good chronometer.

"On arrival off the Straits of Jubal, vessels were formerly in the habit of remaining under Ras Mahommed, for an opportunity to beat through. Ras Mahommed is low, not easily distinguished in the night, and the set of the tides varying, several ships have been on the reef at night, among them an American ship, in charge of Jerboose Serroul, one of the oldest and best Arab pilots in the Red Sea. Between Shadwan island and the Jaffatine islands, close up under the lee of the former, is now preferred by all the Arab pilots who go up with ships from Jiddah.

"The Straits of Jubal may be worked through by night, with a good moon up. If dark or hazy, it is not safe. In 1842 it was attempted by one of the E. I. Company's schooners, under the command of an officer who was thoroughly acquainted with the place, and in doing so, she got on shore on the reefs above Jubal, on the western side; the breeze was moderate, weather rather hazy, very little sea on, vessel under all plain sail, with a good look-out on both bows. In getting the stream anchor out into a boat, the tackle parted and the anchor was lost; preparations were then made to rig a raft across the two quarter boats, for the purpose of carrying out a bower anchor; before this was completed, the vessel's stern fell with the tide, and she slipped off into deep water.

"On the eastern side of Jubal Island is a *white patch*, visible on a moonlight night; from the anchorage at the south end of Shab Ally; this cannot be seen, so that in standing to the north-east on the port tack, care must be taken to go round before losing sight of it. This is an excellent and favourite mark of the Arab pilots, by one of whom it was pointed out to me. Standing to the westward on the starboard tack, the bearings of Jubal Island, and the high land of Zeitee, will indicate the time to go about. With a dark night coming on, when abreast of Jubal Island, good anchorage is to be found close in under the south side; this is preferable to the

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narrows on the eastern side of the Straits, or to running back under the lee of Shadwan Island. From Toor up to Suez the dangers may be avoided with ordinary attention: the greatest difficulty is in judging the distance from the shore by the eye, when turning up at night. In this the Arab pilots are to be depended upon, from long practice. Too much dependence must not be placed even on the lead at night, as the water shoals suddenly on approaching the high land.

"The variation has decreased in the Red Sea of late years. In the lower part of the Sea, ten miles to the S.W. of Zebayer islands, the mean of three Azimuths taken during a calm, August 23rd, 1857, gave 4° 30′ West; Bar. 29·89, Ther. 91° Fahr.

"The northerly winds blew strongly between Toor and the Khurrar Reefs; and the southerly winds are most violent between the Straits of Bab-el-Mandeb and the Zebayer islands. Off the north end of Jibbel Zoogur, in December and January, they are very severe. With the northerly winds, ships are rarely reduced on a wind below double-reefed topsails, courses, and jib. With southerly winds in the lower part of the sea, it is common to be under the lee of Jibbel Zoogur, with close-reefed topsails, for fourteen days at a time. At Jiddah there is an off-shore wind in the early part of the morning, which enables ships to get clear of the reefs before the northerly wind comes down: in September it commences as soon as the last star in the tail of the Great Bear rises above the horizon in the north-east. This is the Arab's sign for it, who have all ready for tripping by the time it makes its appearance.

"The atmosphere, at times, is remarkably clear in the Red Sea. At sunset, with Riackah Island on the Arabian side, bearing N.E. ½ E. 4 miles, I have seen Moilah High Peak, bearing N. by W., distant about 92 miles. It appeared like a bark under canvas, on the port tack, heading to the westward with her main-yard to the mast.

"The quickest passages up the Red Sea, from 'Aden to Suez, against the N.W. winds, under canvas, have been made by the Hon. E. I. Company's schooners *Mahi* and *Constance*, which were running with the mail at that season, before steamers were established at Suez. The *Mahi*, I believe, has turned up from 'Aden to Suez in twenty-eight days; they, however, at times, could make no progress against the northerly winds in the lower part of the Gulf of Suez. I remember seeing the *Constance* at Toor on her first trip, where she landed her mails, which were forwarded by land to Suez from the above cause. Forty-five days up, and ten days down, is about the average passage for a coal-laden ship between 'Aden and Suez in June, July, and August.

"September is the best time to leave England to get a good run up, and also down the Red Sea; this period should always be selected for an ordinary sailing ship, which will then be enabled to procure, by the time she is discharged at Suez, a cargo of pilgrims from thence to Jiddah, and possibly a cargo of salt from Jiddah to Calcutta.

"A fast sailing ship may leave England in February, provided there is a good run out of the English Channel, and quick despatch at Suez. She may thus clear the Red Sea in September before the strong southerly winds set in, outside, in the Gulf. It has been done. At this period cargo down, or pilgrims, as passengers, are not to be obtained.

"With the exception of country ships from Calcutta to Jiddah with rice, and those from England to Suez with coals, from the Tyne and Liverpool, for the

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which rise abruptly from the low sandy region of Southern Arabia.

Cape 'Aden, the most remarkable feature on the south coast of Arabia, is so

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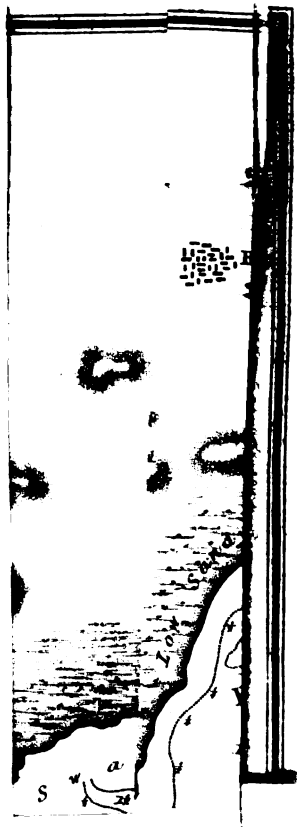

Jiddah with rice, and
those from England to Suez with coals, from the Tyne and Liverpool, for the

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Peninsular and Oriental Company, the Red Sea is but seldom visited by merchant vessels. Occasionally American and French ships will proceed to Mocha or Hodeidah to purchase coffee; the latter will sometimes proceed to Massowah and purchase a cargo of mules for the Mauritius or Bourbon.

"At Suez, sand is supplied for ballast, and placed on deck at 3*s.* per ton. The port charges are trifling.

"Water and fresh provisions can be obtained on the passage up, at Mocha, Hodeidah, Jiddah, Wedge, and Toor—all easy of access without pilots, except Jiddah, which is not safe to attempt without one; but vessels hove-to outside, near the reefs in sight of the town, with a pilot-jack flying, will soon have one alongside. Beating down against southerly winds, vessels in want of dunnage, or fire-wood, can anchor and obtain it for the cutting. Off the north end of Jibbel Zooghur, and on the north-west side of Jezirat Fartmar, on the African side, south-west of Mocha. Pilots for the Red Sea can be obtained at 'Aden, but they are not so good as those at Jiddah, particularly for the northern part of the sea. JERBOUSE SERROUL is the only pilot at Jiddah who speaks English, but many of them understand Hindústanee.

"The agent at Suez being limited as to the amount of cash to be advanced for ship's use, commanders of ships who have not quick despatch may find themselves in an awkward situation for want of money to pay disbursements; and as there are no parties in a position to advance money in return for captain's bill on owner, a journey to Alexandria, and detention of the ship is the consequence.

"Owners who have ships chartered for Suez, can correspond and arrange with some firm at Alexandria, to forward to Suez any stores required. MESSRS. TANCREDI, AGIUS, and Co., from long connexion with the shipping interest at Malta and Alexandria, are in a position to do this satisfactorily.

"Scorbutic ulcers, to which seamen are so liable after a long salt-beef passage, are in the Red Sea difficult to eradicate; an efficacious mode of treatment, in the absence of fresh provisions, is to apply lint dipped in fresh water, and kept moist with the same. Generally the climate may be considered healthy, although excessively hot at times.

"A boom foresail, and an apparatus for distilling salt water, will be found advantageous; the former will greatly assist in turning to windward, and the latter will amply repair its cost, as fresh water is not only difficult to obtain, but the best is brackish, and the average price at any of the ports is £1 per ton.

"Commanders, however, are recommended to get their supplies of fresh provisions out, either at Johanna or Jiddah, for which purpose they had better provide themselves with cash for the same, in dollars, prior to leaving England; they will then only have to lay off 'Aden to receive and post letters."

'ADEN HARBOUR AND ITS VICINITY.

THE **BAY OF 'ADEN** is situated between two lofty, peninsular-form promontories—Cape 'Aden (or Jebel Shamshán) on the east, and Jebel Hasan on the west—which rise abruptly from the low sandy region of Southern Arabia.

Cape 'Aden, the most remarkable feature on the south coast of Arabia, is so

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conspicuous that it cannot be mistaken, being more elevated and much more peaked than the rock of Gibraltar, to which, however, it bears some resemblance; it extends 5 miles east and west, and 3 miles north and south; and the highest part (1776 feet above the sea, and visible 60 miles), is called Jebel Shamsháu—a name expressive of the *turreted peaks* on its summit.

Rás Marshigh is a narrow cape, projected from the promontory to the south-eastward of Cape 'Aden; it shelters (from N.E.-ly winds) the entrance of Bander Darás which lies between Rás Marshigh and Rás Taih, a point half-way toward Rás Sinaïlah.

Flagstaff.—The flagstaff, hitherto on Sírah island at the east side of 'Aden, is now removed to the highest part of Marshigh promontory at the S.E. corner of the peninsula.

Rás Sinaïlah, the southernmost point of the peninsula, is in Lat. 12° 45′ 10″ N., Long. 45° 0′ 40″ E. On old charts this point is called Cape 'Aden.

North-westward of Rás Sinaïlah, distant 3¾ miles, is Rás Tarsheïn, the extreme west point of the peninsula, near to which is a peak 988 feet high. A little more than a mile W. ½ N. from Rás Sinaïlah is Jezírat Denáfah, or Round island.

To the north (a little easterly) of Ras Tarsheïn, distant about ½ a mile, is Rás Marbút (or Steamer point), off which is the *light vessel:* continuing now to the north-eastward, at the distance of rather more than ½ a mile from Rás Marbút, is the small point of Rás ïbn Jarbeïn; 500 yards further eastward lies the Flint rock (or Sheikh Ahmed), and ¼ of a mile beyond is the rocky point of El 'Ainah; then, at ½ a mile more to the eastward, is Point Hejaf, forming the southern and western limit of the inner harbour of 'Aden, immediately off which lies a rock named Jerámah.

The peninsular promontory of 'Aden is almost divided from the main land by a creek on the eastern side of the inner harbour, called Khor Maksa, contiguous to which is a large swamp.

Jebel Hasan is the mountainous peninsular promontory, to the westward of and opposite to Cape 'Aden; it is six miles long from E. to W. by three miles in breadth; and its highest peak (in the form of a sugar-loaf) rises to an altitude of 1237 feet above the sea-level. To each of its numerous projecting points the Arabs give a name:—on the S.W. are Rás Feïkam and Rás Alargah; the most southern point—Rás Mujallab Heïdí—forms the western limit of a small bay called Bander Sheïkh: and Rás Abú Kiyámah divides this bay from Khór Kádir.

Rocks.—On the southern and eastern sides of the promontory of Jebel Hasan are nine rocky islets, nearly connected with the main at low water springs: one is in the small bay of Bander Sheïkh, to the eastward of Rás Mujallab Heïdí; two lie in the middle of the entrance to Khór Kádir, to the N. of which extends a reef of rocks for a quarter of a mile; another islet, Jezírat Sálil, S.E. of which is a rock awash, is situated off the S.E. point, called Rás Sálil; and five of them off the N.E. bluff, about one mile from the shore.

The bays and islands round the promontory are safe to approach, with proper attention to the lead, for the soundings decrease gradually to the shore.

About 1100 yards to the northward of the extreme point of Rás Abú Kiyámah is the white tomb of Sheikh Kadir. Near this spot the natives deposit coffee, cotton, and a few other articles of merchandise, in readiness for the small trading boats

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lying in Bander Sheïkh and Khór Kádir, the only two ports belonging to the 'Akrabi tribe, who dwell on and in the vicinity of the promontory.

The outline of the whole of Jebel Hasan is very picturesque; a deep ravine winds through the hilly tract from Bander Feïkam to the little bay of Bander Sheïkh. The land to the northward is low, and immediately at the back of the mountains a deep inlet, named Khór Biyar Ahmed or Seïlán, extends three miles to the westward, almost insulating the promontory of Jebel Hasan.

Ass's Ears.—At the north-eastern end of this mountainous promontory is a remarkable double peak of granite, 700 feet in height, which, from its peculiar shape, is known by the name of the Ass's Ears, and is a remarkable object from seaward.

Biyar Ahmed, a small fort and village, about 3 miles from the beach, and 6½ miles north of the Ass's Ears, is the residence of the chief (or sultan) of the 'Akrabí tribe. These people are treacherous, and not to be trusted.

The chief produce of the country is jowárí (millet), of which great quantities are exported.

Jebel Hasan and 'Aden promontory are not very unlike, having at a distance the appearance of two islands,—one on each side of the fine harbour they enclose.

'ADEN HARBOUR.—Bander Tuwayyi, or 'Aden West Bay, more generally known as 'Aden Back Bay, is formed by the two peninsulas just described. It is about 8 miles broad from east to west, by 4 miles deep; and is divided into two bays by a flat which runs off half a mile to the southward of the small island 'Alíyah. The entrance between Rás Salíl on the west and Rás Tarsheïn on the east is 3½ miles in width. The depths of water in the western bay are from 3 to 4 fathoms, decreasing gradually towards the shore; across the entrance the depths are 4½ to 5 fathoms, and at a distance of 2 miles outside 10 to 12 fathoms; bottom, sand and mud—both inside and outside the bay. The town of 'Aden is about 4 miles from the landing-place.

The *inner bay*, known as 'Aden harbour, is at high water between 3 and 4 miles long from north to south, and 2 miles broad, but the sand-banks at its northern and eastern shores, which dry at low water springs, contract the harbour to about two-thirds the above dimensions; the entrance, between the sandspit off the island of 'Alíyah on the north and Rás Hejáf on the south, is, at low water, about ⅓ of a mile across; off Rás Hejáf is a *dangerous sunken* rock. The depths across the entrance, and in the centre of the bay, are from 2 to 2½ fathoms, decreasing towards the shore. This harbour can be used only by small vessels. A fine pier has been built here, and a large village has sprung up near it.

Islands.—There are several islands in the inner bay; the eastern and principal one, Jezírat Sawáyíh, is 300 feet high, and almost joined to the main land at low water springs: the others are named Marzúk Kabír, Keïs el Hammán, Kalfeteïn, and Feringí; and on the sand-spit at the north side of the entrance are two small islets named Jám 'Alí, and 'Alíyah: outside, about 2 cables distant from the peninsula, is the island Sheikh Ahmed, or Flint rock, with a channel between it and the main of 2 fathoms.

Light.—Off Rás Marbút, in the inner harbour, a light-vessel (painted red), is moored in 24 feet; it exhibits a *fixed white* light, and carries, at the mast-head, a

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red ball by day, and fires a gun and burns a blue light when a vessel enters during the night; position, Lat. 12° 47′ N. Long. 45° 1′ 15″ E.

Anchorage.—A vessel may anchor in any part of these bays; but the usual anchorage is between Flint rock and Rás ibn Jarbeïn,—off the coal sheds, situated near the latter. The *tides* in the bay are very irregular, being influenced by the currents outside.

Directions.—The coast round Cape 'Aden is bold to approach, and a vessel may always choose her own distance. A vessel coming from the westward may steer direct for the light-vessel, rounding it to the northward, and thence to the anchorage. In like manner a vessel from the eastward, after passing Rás Tarsheïn, may steer directly for the light-vessel, and on to the anchorage. A vessel working into the bay, towards the anchorage, may stand boldly across in any direction, being guided by the lead, until the light-vessel is reached, to the north of which the depth becomes less, and short tacks must be made. It is advisable always to moor, the anchorage being rather confined; and good scope of cable should be given, in consequence of the sand squalls, which come from the northward and eastward after sultry weather, and which give but little warning.

Supplies.—The water supplied to the shipping from the wells is very brackish; but good water, distilled from the sea by a condensing apparatus which has lately been erected in one of the small bays in the harbour, may be purchased at 13s. per ton, not including casks or boat hire. A considerable sum has been expended in clearing out the old Portuguese tanks discovered (in 1850) near the town, from which water may be procured at a less price, but the charge for carriage to the harbour would raise the cost to more than that of the distilled water. There are immense stores of coal at 'Aden, the principal part of which belongs to the Peninsular and Oriental Company. Private merchants have large quantities stacked in the bay inside Sheïkh Ahmed, or Flint rock. There are great facilities for coaling steamers. Provisions of every description may be procured; but fruit and vegetables are scarce and dear.

Trade.—'Aden was declared a free port in 1850, since which it has engrossed nearly the whole of the coffee trade formerly enjoyed by Mokhá. The principal articles of export are coffee and honey; imports chiefly coal, cotton goods, sheep, malt liquors, wines, spirits, and sundries.

'Aden is in the territory of the Abdálí tribe, which is not friendly towards Europeans; consequently, it is not safe to land on the western shore of the West or Back bay.

The religion of the Abdálí tribe is Mohammedan, and they are, apparently, very strict observers of their creed.

'ADEN TOWN.—To the N.W.-ward of Rás Marshigh, distant about 1¼ mile, is situated the town of 'Aden, on a plain rather more than half a mile square, encircled on the land side by singularly-pointed hills, having its eastern face open to the sea, while immediately in front is the rocky fortified island of Sírah. This island, which commands the eastern bay and town of 'Aden, is a triangular rock about 430 feet high towards the southern end, half a mile long by 600 yards wide: the passage which formerly existed between it and the main is now filled by sand, consequently at low water it is joined to the coast.

Between Sírah island and Rás Marshigh the curve of the land forms a small

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sandy bay, named Bander Hokat; there is another to the northward, between the north point of the island and Rás Kútam.

The following remarks on the passage to, and on making, 'Aden are by CAPTAIN BROWN, of the *Ayrshire*:—*

"Crossed the line on the 13th in Long. 48° 54′ E.; our average current from Bourbon to the Equator S. 31° W., 105 miles in nine days; from thence to Rás Hafún the currents were very strong and mutable. The first day after crossing the line we were swept to the westward thirty miles, and afterwards constantly to the eastward, more or less, with a great deal of weed, and strong scent of the same. Average current from Equator to Cape Guardafui was N. 85° 30′ E., 128 miles in five days, or 25·6 miles daily.

"From the strong northerly currents said to be experienced between Guardafui and Sokotra, sweeping vessels far to leeward at times, determined to steer for Rás Hafún, and run along the land from thence to Guardafui, and by shortening sail a little the night previous, managed to make it at daylight on the 18th. Some precaution is here necessary from the uncertainty and strength of the currents, and the hooked form of the cape; a ship might get embayed at night without seeing the headland, which has been the case in some instances. Had a fresh Monsoon while running along the land, which here forms a deep bight up to Ras Banneh. This cape we had on our beam at 2 P.M., distant four leagues; at 7 P.M. abreast of the Cape Guardafui, distant 6 miles, easily distinguishable. Steering along due north, by 10 P.M. had ran beyond the distance of Cape Asir by log, and as the high land of Guardafui was fast receding from view, nothing to be seen in the western direction, concluded we were in a position to steer N.W.; took in first reefs, expecting it to be squally on hauling under the land; in a short time began to shoal our water—by the lead kept constantly going—and on having 15 fathoms hauled out again to eastward of north, and could now see with the night-glass, but very indistinctly, a low deceiving point about N.N.W.

"I cannot account for this, having ran more than the distance between the capes, otherwise than that a counter-current probably exists in-shore, making very great precaution necessary in rounding those capes at night-time, for the deceptious appearance of the land here would deceive and lead any one astray. The *lead, and nothing but the lead*, can positively be trusted to, and must not be neglected be the night ever so clear. At midnight had fairly rounded, and, contrary to expectations, the fresh wind fell away to a calm about 2 A.M., and continued until near noon; the 19th, got a light breeze and hauled in-shore, for Ras Met; from hence had very light and variable airs, with a slight favourable current, by keeping at a moderate distance from land, but found it most tedious up to Burnt Island, and were a little surprised at not having the strong gusts spoken of by Horsburgh, who recommends, and very properly so, to have all best canvas bent in the months of June, July, and August. However, we had yet to learn this by bitter experience, when lulled asleep by the recent calms and light winds; as the wind got to the westward it came off the land at night.

"On the 24th of June stood off from Burnt Island; in standing over, the wind increased and became more favourable; carried a great press of canvas across, and on the morning of the 26th expected to have been abreast of Cape 'Aden, but nothing to be

* Naut. Mag., 1847.

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seen at daylight; and on having sights, to our dismay, found we were fifty miles to the eastward: it now fell calm, found the current running not less than three knots to the eastward; at once concluded it to be useless to attempt beating up on this side. A fast barque which fetched into 'Aden Front bay about the same time was ten days beating round into Back bay, within the sound of the morning and evening gun the whole time; she lost kedge and warp, and on entering the harbour at night-time grounded on the mud flat which lines the northern and eastern part of the harbour, and had to be lightened before she hove off. Another ship making to leeward at the same time stood across again to the African side, and fetched 'Aden on the eighth day.

"We stood over again and fetched in with the coast of Africa, far to the eastward of Burnt Island; now found the winds constant and strong from the S.W. to W.S.W., and to come off about midnight in sudden and very violent hot gusts, to which we could show but very little canvas; working to the westward of Burnt Island. In standing over there came one of those tremendous gusts, blowing the clews out of the reefed sails (being all 'preventered' and 'stoppered'), and raised such a sea, we were glad to get under the land for shelter and bend other canvas; intending to have anchored under Burnt Island, but could not find sufficient shelter, the wind being at west, along the land; stood off and on under the lee till we shifted sails. There is a good passage between the island and the main land; but we observed some shoal water about 1½ mile from the coast, and tacked pretty close to it.

"The seamen now began to complain of excessive thirst, and I was obliged to increase their allowance (although short), from the air being impregnated with sandy particles in the hot winds; indeed, all began to feel it very acutely. While under Burnt Island, searching, without success, for the watering-place, the gusts that came off were literally as though they came out of a furnace. Notwithstanding what is here narrated of our troubles in the passage up the coast, some vessels, a few days ahead, made the passage from Guardafui to 'Aden in eight or ten days without difficulty, and apparent ease, the winds being favourable and moderate, the moon, then in the last quarter, having apparently great influence on the winds and weather in this gulf.

"Working alongshore until off Ras Kurrum, or about 60 miles to windward of Burnt Island, we experienced those heavy gusts which come off about midnight, but took especial care to be under double reefs and reefed courses before that time. Stood over from thence, and fetched to windward with ease, although a heavy sea. The day previous to making Cape 'Aden, came suddenly into green water (from the deep sea blue), and the edges very clearly defined; had a cast of the lead, but found no soundings.

"On the 4th of July made Jebel Shamshan (the high land off Cape 'Aden), bearing N.N.E.; stood on under all sail, breeze decreasing to a calm as we approached the high land, a short sea heaving us in; anchored in 10 fathoms, sand, Round Island, or rock, bearing N.E. 1½ mile; afterwards, in endeavouring to avail ourselves of a light air, got too close in, with the heave of the sea, and obliged to anchor in 6 fathoms for the night; veered to 60 fathoms, much closer to the rocks than agreeable, with the heavy sea tumbling in. (There was no light-vessel at this time.) In the morning ran in with the sea-breeze, and anchored in about 4 fathoms, sand, a quarter of a mile from the Coal Depôts; moored N.W. and S.E. 40 fathoms each way, which is not too much for a heavy ship in the westerly Monsoon, as the squalls at times are heavy, with a little swell,—and the sudden sand squalls also that come

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occasionally from the northward and eastward, after very sultry weather, give but little warning, raising a dense black mass, and in half an hour, or less, burst upon you, covering and filling every crevice with sand. It is requisite to secure every hatch, skylight, and door, to keep it out, and to have all awnings furled, for while the squall lasts, or the pillar of sand is passing, you cannot discern a single object out of the ship. Had three or four during the time we lay there; in some cases, two or three vessels drove and fouled each other, not having sufficient scope on their outer anchors.

In reference to the approach to the harbour from the westward during the *South-west Monsoon*, the land is easily distinguished by the Jebel Hasan, with the Asses' Ears and Sugarloaf on the west, and Jebel Shamshan over Cape 'Aden on the east. I would recommend keeping the western land aboard, and having the harbour open, by steering in upon a N.E. by N. to N.N.E. course, so that should it fall calm, you can safely anchor; and with the lightest air, will drive in with the swell.

The whole of the foregoing remarks are applicable only to the western Monsoon. In the north-east Monsoon, of course, ships take the eastern passage, to fetch Guardafui; from thence there can be no difficulty, only taking care not to make the Arabian coast, as it is a lee shore, until up with Cape 'Aden. Back Bay anchorage is *then* perfectly smooth; but the egress from thence to the eastward is very tedious; and long passages may be anticipated (five and six weeks) at times, to Bombay,—and even more from October to March and April."

Capt. E. G. Dent, of the *Cambridge*, in 1859, made the following observations on the same subject, viz., the passage to 'Aden during the period of the S.W. Monsoon:*—

"After rounding the Cape of Good Hope, the passage through the Mozambique Channel is to be recommended during the N.W. Monsoon; besides having the wind free, and comparatively smooth water, it enables ships to call at Johanna—which is easy of access, and the charges are light—fill up water casks and obtain a supply of fresh meat, vegetables, and live stock, at a low rate; these being scarce and dear at 'Aden at times.

"After crossing the Equator, it is prudent to make the land before getting into the latitude of Ras Hafún, as the current sets strongly toward the island of Sokotra; in passing, found the current setting to the north-east, sixty-three miles in twenty-four hours. After rounding Cape Guardafui and Cape Felix (Ras Filuk), the coast should be worked along well in-shore (where the current will be found favourable), to at least ten miles to windward of Burnt Island, before standing over to 'Aden. Many shipmasters, in their anxiety to make a quick passage, often make a long one by standing over too soon,—for on approaching the north side the wind decreases, the current becomes adverse and strong, and if 'Aden cannot be reached it is useless to attempt beating up on the Arabian side. The African shore must be made again, and navigators who are compelled to do this will find themselves a long way to leeward of their original starting-point. Many have been a month on the passage from Cape Guardafui to 'Aden from the above cause, when by going further to windward, five or six days would have sufficed. In beating up from Cape Filuk to Burnt Island, it is well to be in-shore about sunset, as the wind hauls more to the southward, and remains so till about two o'clock in the middle watch, when it backs to the south-west. Attention to this enables a ship to make a long favourable reach.

* Mer. Mar. Mag., vol. vi. p. 2.

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"The high land of 'Aden is so conspicuous that it cannot be mistaken. The town of 'Aden is on the eastern side, but ships discharge coals in 'Aden Back bay (Bander Tuwayyi'), on the west side, the entrance to which is between the high land of 'Aden and the Asses' Ears on the land to the westward. Ships may run in, keeping nearest the 'Aden side, until they sight the light-vessel, on arriving near which the pilot generally comes alongside and directs to a berth for discharging. If calling for letters or refreshments only, the light-vessel, bearing from E. to E.S.E., half a mile distant, is a good berth, in 5 fathoms. Rock stone is supplied for ballast, and placed alongside at two shillings per ton."

MAKALLEH.

Makalleh, the principal commercial depôt on the south coast of Arabia, is constructed on a narrow rocky point projecting about half a mile into the sea, with a bay on each side of it. The Nakib's (or governor's) house is in Lat. 14° 13′ 40″ N., Long. 49° 3′ 20″ E., is situated almost directly beneath a curious and remarkable oblong hill, the circular top of which rises above the summit of a steep cliff, commanding a complete view of the town, and on which six square towers have been erected for its protection.

A ship in want of supplies will find Makalleh the best port on the coast for the purpose of renewing her stock. Persons should be careful to send their own casks on shore for water, as otherwise the people are likely to bring it off in quite a brackish state; it is conveyed in skins, which women fill and donkeys transport from a well nearly 2 miles West of the town; yet notwithstanding the trouble of obtaining it, they do not render it expensive. Firewood, bullocks, sheep, fowls, eggs, and vegetables are to be procured in abundance.

The Bay of Makalleh may be said to extend from Rás Burúm to Rás Makalleh. Owing to the promontory on which the town is situated projecting from the centre of a large concavity on the coast, two small bays are formed. Of these, the lesser, or western one, is the general anchorage for boats. This is merely a small nook, with 1, 2, and 3 fathoms, having Makalleh to the eastward, and a reef to the westward (nearly dry at low-water springs), extending ½ a mile from the shore. The eastern small bay is seldom or never used, owing to a swell which rolls in with considerable violence during the N.E. Monsoon, causing a surf on the beach. The bank of anchoring soundings round the Bay of Makalleh extends for about half a mile from the shore, until off the low sandy beach running towards Fuwah, when it increases to nearly one mile.

The great Bay of Makalleh (in which are the two smaller ones, known as the eastern and western) is sometimes affected by a swell rolling in, when the wind blows strong outside; but, generally speaking, the breeze falls off towards night, and the swell goes down. A vessel can lie here with perfect security during the N.E. Monsoon.

The weather in this bay is exceedingly warm during the middle of the day, and on shore intolerable. Occasionally, however, land and sea breezes, with slight showers, seem to pour a refreshing influence over the scene in the months of October, November, March, and April, and often in June and July.

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The natives say that in the S.W. Monsoon the wind blows home with very great force; but always as the sun declines the breeze and swell decrease, and that often during the morning it blows strong enough from the N.W. to carry a ship clear out to sea. They also say that a vessel with chain cables might ride out the Monsoon with safety; which is probably true, otherwise (judging by comparison), one half of Makalleh town would very soon be demolished, as the houses are, for the most part, erected in a careless and slatternly style, on a projection which necessarily receives the whole benefit of the S.W. winds, and their inevitable fate must be a general sweep into the waters beneath them, whereas they still quietly retain their separate stations.

Anchorage.—The anchorage off the town is good, in 8 to 10 fathoms water, sandy bottom, with the flagstaff off the governor's house bearing N.N.E., distant a quarter to half a mile from the shore. The only danger in the bay is the reef and sunken rock to the westward of the boat anchorage, and which must be carefully avoided. The flood sets S.W.

Ras Makalleh is a low neck of land projecting about 2 miles in a S.S.E. direction from the base of the hills, which here extend from the interior close down to the shore. Three-quarters of a mile W.N.W. of the cape is Rás Marbát, with a ruined fort; and 1½ miles to the N.W. lies the town of Makalleh. To the southward of the cape, distant one-third of a mile, is a rocky shoal with only 4 fathoms water on it, there being 18 fathoms between it and the cape, and 40 fathoms close outside of it. The bank of soundings extends about 2 miles from the cape.

The sea along the whole of this coast is remarkable for its clearness, the bottom being plainly visible—when calm and the water smooth—in from 12 to 15 fathoms. When the *Palinurus* was lying at Makalleh, anchored in 12 fathoms, a new coil of deep-sea lead-line accidentally fell overboard and sank, but was plainly seen at the bottom. An Arab seaman belonging to the vessel went down with a sounding lead attached to his feet, and recovered it without any difficulty.

KURIYAN MURIYAN BAY AND ISLANDS.

Kuriyan Muriyan Bay is an extensive concavity of the Arabian coast formed between Rás Nús to the S.W., and Rás Sherbedát to the N.E.—being 68 miles wide by 26 in depth, having on the outer edge of the bank of soundings five islands, called the Kuriyán Muriyán. The soundings in the bay are regular, varying from 20 to 40 fathoms, decreasing towards the shore and islands; bottom of sand, coral, and shells, but occasionally rocky near the islands, and off Rás Karwáú, a bluff projecting headland 800 feet high, 2 miles W. of Rás Sherbedát. The coast line within the bay presents a succession of limestone cliffs generally fronted by a sandy beach.

Rás Nús, in Lat. 17° 12½′ N., Long. 55° 14′ E., is a low rocky but prominent point, which may be easily known by a mountain, 1200 feet high, immediately over it, the highest and steepest part being towards the sea.

Rás Sherbedát, in Lat. 17° 53¼′ N. Long. 56° 20′ E., is a steep, projecting headland, flat on the summit, but the face of the bluff is considerably convex.

Within the great bay of Kuriyán Muriyán there are several small bays and anchorages, separated sometimes by low rocky or sandy points, sometimes by bluff

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projecting headlands; but there are no villages, and only a few inhabitants, who are generally ready to assist in procuring wood and water.

The KURIYAN MURIYAN ISLANDS, to which ships have occasionally resorted for guano, are five in number—namely, Hásikí, Sódah, Hullániyah, Kiblíyah, and Kirzáút (or Rodondo). The first four are on the edge of the bank of soundings, and lie nearly parallel with the north shore of Kuriyán Muriyán bay, from which they are distant about 22 miles. The shores are generally bold and rocky, and the hills rise in the interior into irregular conical peaks.

Hasiki, the westernmost island of the group, is nearly 1½ mile long by ¾ of a mile wide; and 500 feet high near its southern point, in Lat. 17° 27¼′ N., Long. 55° 36′ E. The surface is quite white with the guano, and it is without a vestige of tree or shrub.

The island is rocky all round, but there are two small indentations of the coast on its eastern side. The only danger off the island is a rock ½ a mile S.W. by W. ½ W. from the N.W. point; it is 150 yards long, and dries at low water; the channel between this rock and the island has 16 fathoms water.

Round the island the average depths are from 25 to 30 fathoms at a mile distance from shore; but the edge of the bank of soundings passes near the south point, where no bottom is found at 145 fathoms half a mile from it.

Sodah, the second island of the group from the westward and the second largest in size, is 3 miles long by 2 miles wide, and lies 12 to 13 miles from Hásikí. Its shape is oblong, and the surface is an irregular slope from the central peak 1310 feet high, near the summit of which is some grass. The coast has many small projecting points, off which reefs extend from 100 to 300 yards, forming coves for small vessels or boats; and at the east end is entirely lined with rocks.

On the south side of the island there is a small bay, ½ a mile wide at its entrance, and about ¾ of a mile deep, with good anchorage, having 10 fathoms water in the centre, decreasing as the shore is approached. A ledge of rocks extends 500 to 600 yards from the eastern point of the bay, in a S.W.-ly direction, and there is a sunken rock at a short distance from the western point. This bay affords shelter from all winds, except from W.S.W. to S.

Danger.—Half a mile west of the S.W. point of the island is a sunken rock, surrounded by a bank, with 2 and 3 fathoms water on it, between which and the shore is a narrow but safe channel, having 5 and 6 fathoms water in it.

The soundings round Sódah are generally deep, 20 to 30 fathoms being found close in, between the east and north points; from the north to the west point 20 to 30 fathoms a mile off; 40 fathoms a mile off the S.W. side; and the edge of the bank passes ¾ of a mile from the south side, there being 130 fathoms at that distance. The bottom is sand and rocks on the east and west sides of the island; sand, shells, and coral on its north side, and grey sand on its N.W. side. Off the S.E. side, between this island and Hullániyah, the bank extends southwards, but deepens suddenly from 33 fathoms.

The highest peak of Sódah is in Lat. 17° 29½′ N., Long. 55° 51¾′ E. At the S.E. point, near a well, the water of which is brackish, are the remains of a few huts.

The channel between Hásikí and Sódah is safe, with the exception of a sunken rock off the west side of Sódah. On a line drawn from the north side of Hásikí to

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the north side of Sódah, the depths are from 35 to 40 fathoms; to the south of that line the soundings suddenly deepen off the bank.

Hullaniyah, the largest island of the group, is 7¾ miles long by 4½ miles wide, and nearly 20 miles in circumference; it lies 4½ miles to the eastward of Sódah.

The general aspect of the island is rugged, and the centre consists of numerous peaks (the highest 1503 feet above the sea) forming a cluster of irregular pillars: the eastern and western ends of the island terminate in comparatively low points; but the north end is a bold, projecting bluff, 1645 feet in height, being the loftiest part of the island, and presents a rugged and nearly perpendicular face to the sea for upwards of a mile on each side of the cape. The whole island is extremely barren, the largest and only tree being the tamarisk; there is a little grass on the eastern side.

The western point of the island is called by the Arabs Rás Shatt, by the islanders Erékhi Frahunt; the eastern point is Rás Sáïr; and the northern point, called Rás Hullániyah (or Erékh-er-rahíb) is steep-to—there being 12 and 13 fathoms water close to the cliff.

The N.E. bluff of Hullaniyah is in Lat. 17° 32¾′ N., Long. 56° 2½′ E.

The edge of the bank of soundings is about 2 miles south of the island, beyond which distance there is no bottom at 140 fathoms.

Ghubbet Er-rahíb is a bay on the N.E. side of the island, 3¾ miles wide from point to point, and 1½ miles deep, formed by Rás Hullániyah on the N.W. and Rás Sáïr on the S.E.; there is good anchorage here in from 7 to 14 fathoms water, and good shelter from all winds between S.E. to N.W. round by S. and W.

Dangers.—Several shoals and rocks extend to the distance of 2 miles off the west end of the island, and have between them narrow channels of from 5 to 10 fathoms. One of these rocks ¾ of a mile from the point, dries at low-water springs. Off Rás Sáïr, and for 2½ miles to the S.W., the coast is fringed with rocks, extending in some places half and three-quarters of a mile from the shore. One-third of a mile S. by E. of the south point of the island is a small bank, having 3½ fathoms water over it; and in the bay to the westward of the point is a reef of rocks close to the shore.

Although the distance between Hullániyah and Sódah is 4½ miles, yet the safe channel is on the Sódah side, since the rocks lying off the western end of Hullániyah reduce the width of the channel to 2½ miles. There are 12 to 20 fathoms water in the clear channel; and the east side of Sódah, though rocky, may be safely approached to within half a mile.

Tides.—The ebb sets through the channel northwards, but is much influenced by the sunken rocks.

WATER.—There is a well of fresh water about 400 yards from the beach, in the centre of the valley turning westward, abreast of a small nook with a sandy beach, which may be known by a small peak that forms its eastern end; this nook is situated one mile to the westward of the east end of the long sandy beach, in the centre of the bay. Two other wells are situated towards the western end of the island—one northwards, and the other southwards.

The anchorage is 600 to 800 yards off shore, in 10 or 12 fathoms, sandy bottom, abreast of a small sandy nook, 1¼ miles west of two conspicuous sand-hills, which are about 2½ miles east of the western point of the island, and visible at a distance of 10 or 12 miles. It is open to all winds from East through North, to West.

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Vessels anchoring here must therefore be prepared to start at a moment's warning, the beláts, or northerly winds, setting in very suddenly, when the coast becomes a dead lee shore.

Hullániyah is the only inhabited island of the group, and the few people who live on it dwell in huts on the N.W. side of the island, about one-third of a mile from the beach. They chiefly subsist on the fish they catch; but a few native boats occasionally touch here, on passing, and generally exchange small and useful articles for dried fish.

KIBLIYAH, the eastern island, and third largest of the group, is nearly 2 miles long and 1½ miles broad; but it is merely a barren rock, rising into several peaks, one of which is 550 feet high, and in Lat. 17° 29¼′ N., Long. 56° 19½′ E. The island is rocky all round, with the exception of a small sandy bay at the N.W. point. Like Hásikí it is white with the guano deposited by birds.

Danger.—A small and dangerous rock, even with the surface of the sea at low water, bears from Kiblíyah E. by S., 3¾ miles distant. Vessels should be careful in rounding the island at night, as the soundings are a bad guide, and the breakers on the rock are not always visible. Within a few yards of the rock are the following cross bearings: Four Peaked Rock in one with the north end of Kiblíyah, and Well Rock on with the south end of Hullániyah.

Between the rock and the island the least water is 9 fathoms; the edge of the bank of soundings is 1½ miles south of the rock, 2 miles north, and 2½ miles east.

The channel between Hullániyah and Kiblíyah is 12½ miles wide, with from 20 to 46 fathoms water, and perfectly free from all dangers, except close to the islands.

FOUR PEAKED ROCK, so named from its outline, lies two-thirds of a mile W.N.W. from the north point of Kiblíyah, with a rocky channel between them of 2 to 3 fathoms. It is about 100 feet high, and has a rocky ledge extending from it half a mile to the N.W., on which there are four small rocks dry at all tides; several parts of the reef are also dry at low-water springs.

WELL ROCK—so called from is salt-water well—lies 800 yards S.S.W. from the S.W. part of Kiblíyah; there is a channel between them of from 7 to 10 fathoms water.

KIRZAWET, Kirzáút, or Rodondo, 6½ miles N.E. by E. from the north point of Hullániyah, is the smallest island of the group; it is a mere rock, with a double peak, the highest of which rises to 230 feet above the sea, and is visible 25 miles; the point to the eastward is low.

The only dangers off this island are two sunken rocks, one about 300 yards to the West of it, and the other 150 yards to the N.W., with a channel between them of from 8 to 16 fathoms water. Close off the east point of the island are two rocks above water. On all other bearings the island is safe to approach, 20 fathoms water being found within 500 yards of its shore.

Tides.—On the north side of the islands the flood sets to the westward, and on the south side to the eastward.

CURRENT.—Between Rás Farták and Rás Nús the current often runs against the wind, during the N.E. Monsoon; amongst the Kuriyán Muriyán islands the direction is uncertain, but it frequently sets to the north-westward, rendering it unsafe if becalmed near them.

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RAS-AL-HED:—The N.E. point of Arabia is in Lat. 22° 32¾′ N., Long. 59° 48′ E.; it is a very low sandy point, having near it a few date trees—and the little town of Al-Hed, lying 1 mile south-west of it; a spit runs from the point nearly 300 yards.

To the north of this cape no soundings are to be obtained when more than half a mile from the shore; to the east the bank of soundings extends about 3 miles, and the 20-fathoms line is 1 mile off shore. This bank is famous for large fish.

Challenger Bank.—On August 9th, 1830, at 1.30 P.M., discoloured water, with ripplings, was observed from H.M.S. *Challenger*, in 22° 29′ N., and about 40 miles east from Rás-al-Hed. On sounding, two casts of 13 fathoms water were obtained, and soon after no ground at 65 fathoms, the sea having resumed its natural colour. The bank appeared 3 miles long by half a mile broad. Having been observed so shortly after noon, the position given is probably correct. The *Palinurus*, while surveying the coast, made diligent search for it, but without success.

WEST COAST OF INDIA.

KARACHI.

KARACHI, on the sea coast of the Indus valley, is the nearest safe port to the Persian Gulf, and the only land-locked harbour between Bombay and the Red Sea.

Manora Point, at the west side of entrance to the harbour (and on which is the lighthouse), is in Lat. 24° 47′ 21″ N., Long. 66° 58′ E.; being a bluff 100 feet high and surrounded by low land, it is readily recognised from a distance, appearing as an island.

To the N.E.-ward of Manora point, at the distance of rather more than a mile, are the Oyster islands, situated on an extensive shoal flat having from 6 to 10 feet on it at low water. Inside Manora point and the Oyster islands is the low sandy island of Keamari, 2 miles long E. and W., having off its southern side an extensive sandy flat, dry at lowest spring tides. Two miles beyond is the town of Karachi.

Depth of Water on the Bar.—The great difficulty at this port has always been the state of the bar, which is very uncertain. In 1852 the *Duke of Argyle* (800 tons), drawing 16 ft. 9 in., crossed the bar the day preceding the lowest neap tides. In 1857 a notice was issued stating that no vessel drawing more than 18 feet should be sent to Karachi; and in 1860 the Port officer (Mr. E. Giles) published the following as the state of the bar:—

"*S.W. Monsoon season, May to September.*—Spring tides, 22 ft. to 23 ft. 6 in.; neap tides 19 ft. to 18 ft.

"*Fine season, October to April.*—Spring tides 20 ft. to 21 ft. 6 in.; neap tides, 19 ft. to 18 ft. Ships may load.

"*From September 15th to April 15th (the bar being generally smooth).*—Spring tides, 19 ft 6 in.; neap tides, 18 ft.

"*From April 15th to the end of May, from September 15th to the 30th, periods*

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before and after the S.W. Monsoon.—Spring tides, 18 ft. 6 in.; neap tides, 17 ft. 6 in.

"*From June 1st to the middle of September, with the average weather in the S.W. Monsoon.*—Spring tides, 17 ft.; neap tides, 15 ft. There are days during this Monsoon when the sea on the bar is so heavy that ships at the above draught could not with safety cross."

Since that date great efforts have been made to improve the harbour and increase the depth of water, as the following letter (1862) from Lloyd's agent shows:—

"We have the pleasure of informing you that, during the last two years, the depth of water in the eastern and deepest channel into Karachi harbour has been gradually increasing. Vessels drawing 22 ft. to 22 ft. 6 in. can now safely load inside the harbour, leaving on the springs, during the N.E. Monsoon, say from 15th October to 1st April. During the remainder of the year, when there is more or less swell on the bar, the draught of ships entering and leaving harbour should not be more than 18½ feet.

"The Karachi harbour improvement works, especially the Keamari groyne, which has been run out exactly one mile in length, with a bottom breadth of 70 feet, and a top breadth of 15 feet, have already begun to have a favourable effect in deepening the channels; this groyne has still to be carried out 2120 feet further, and will probably be completed by next May or June. There is every reason to believe that the extensive harbour improvements at present being proceeded with, will, if carried out in their entirety, be real and permanent improvements, and that they will render this harbour available for ships of the largest draught at all times of the year. The amount of room in the harbour can be indefinitely increased by dredging, and the formation of floating docks."

The latest information by the Indian Overland Mail, June 1865, respecting the depth of water on the bar is as follows:—

"The ship *China*, from Glasgow, Mr. Smith, commander, crossed the bar on the 27th May, drawing 20 feet 6 inches. The least water she had while crossing the harbour was 26 feet. This is a fact well worthy of note, as it shows that if the harbour improvements now in progress have altered the channel into this harbour and made it more tortuous, they have at the same time increased the depth of water very considerably. The largest line of battle ships can now enter the port at spring tides in perfect safety.

The Coast of Cutch and Sindh, and the Approach to Karachi Harbour.—The following remarks are by COMMANDER GRIEVE, I.N., who surveyed this part of the coast in 1848-50:—

Wind and Weather during each month:—

January.—Steady land and sea breezes between N.N.W. and N.N.E. The North-easters on the coast of Sindh and Cutch frequently blow fresh for three or four days at a time. Southerly winds are rare, but the sea breeze occasionally veers to S.W. Squally weather, with rain, sometimes occurs near Karachi.

February.—Winds become more variable. The North-easters less frequent, and of short duration. Sea breezes between W.S.W. and W.N.W., and towards the end of the month you may get a hard blow from the westward for two and three days, particularly on the northern part of the coast. A heavy sea always accompanies these breezes, and renders the anchorage off Karachi, in the outer roads, very unsafe.

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March.—Land winds become less regular. Sea breezes are generally moderate, between W. and N.W., but blow very hard at times, with thick, misty weather.

April.—Winds much the same as last month. Weather generally hazy, with a very damp atmosphere. Swell from the westward at times.

May.—Winds moderate, W. to W.S.W. Weather hazy, with very heavy dews. Clouds begin to gather, and much swell prevails from the westward.

June, July, and August.—The S.W. Monsoon prevails, blowing moderate, and fresh breezes from W. to S.W. by W., with passing clouds and hazy weather. It becomes very cloudy as the season advances. Rain is uncertain, but may be looked for in the latter half of July; and when it falls it is generally accompanied by variable winds and thunderstorms. A heavy swell prevails during these months.

September.—Winds light from W. to W.S.W. Squalls from the land may be expected. The weather is generally hazy, and the Monsoon swell not quite subsided.

October.—Winds W. to N.W., light, with occasional calms. Land winds begin to get steady about the latter end of the month. Weather generally very clear and pleasant, but occasionally dense fogs come off the land. Sea smooth.

November.—Land and sea breezes become steady, veering from W. to N.E., the land winds towards the end of the month often lasting two days at a time, but not very strong. Weather generally very clear, and objects visible at a great distance. Remarkable terrestrial refraction prevails this month and the next, making distant objects appear much closer.

December.—Winds and weather the same nearly as described for January. North-Easters prevail, and the weather is cool and pleasant, with a remarkably clear atmosphere.

CURRENTS ALONG THE KATTIWAR COAST.—The current during the months of November and December sets always to the N.W., from 1 to 1½ knots per hour, but liable to checks, particularly at night, when there is sometimes a drain in the opposite direction. After the middle of January there is little or no current; but again, from the end of March to the beginning of May, the current frequently sets to the S.E. at the rate of 12 to 20 miles per day; and there is no doubt that the S.E. current prevails along this coast throughout the whole of the S.W. Monsoon, many navigators having experienced it as strong as 30 and 36 miles per day all along the coast from Karachi to Bombay.

Directions for the Coasts of Sindh, and the Approach to Karachi Harbour:—

Vessels from Europe or from the westward, bound to Karachi, should not care to make the coast of Sindh and Cutch, or any of the contiguous land whatever, previous to sighting Karachi lighthouse; but should they do so, and find they have to beat up to Karachi, they will find the entire coast, with one or two exceptions, which are hereafter specified, a perfectly safe one to approach.

From Diu head to Karachi the coast is divided into three parts:—

1. Diu head to Dwarka is the west coast of Kattiwar.

2. From Dwarka to Juckoo is the entrance to the gulf of Cutch; and any vessel bound to Karachi, or even out of Karachi (unless bound into the gulf of Cutch), ought not, on any account whatever, to go inside of a line drawn from Dwarka to Juckoo.

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3. To the southward of the Lukput river the coast is within the territory of Cutch, and all to the northward of that river is the coast of Sindh.

The different ports on this part of the coast are very seldom visited by any vessels except the native craft of the country.

The west coast of Kattiwar runs about N.W. and S.E., with bold soundings off its entire length, except a small patch of 2 to 3 fathoms extending from 1½ to 10 miles west of Diu head.

No vessel should approach this shoal under 12 fathoms, which is about 1 mile from its southern edge.

The general character of the west coast of Kattiwar is low, with a sandy ridge fronting the sea. There are a few hills visible along the coast. The Barda range lies N.E. 12 miles from Porebunder, and may be seen 25 to 30 miles off. Junaghur hill is in 21° 31′ 48″ N., and 70° 32′ E., of a conical form, 3,837 feet high, with three small peaks on it, and may be seen all along the coast from Diu head to Porebunder.

As a general rule, no sailing vessel should come nearer this coast than 20 fathoms by night or in rough weather; or under 12 fathoms by day, in fine weather.*

Off the entrance of the gulf of Cutch is a small patch called the Lushington shoal, having 3 fathoms (or less) on it; and during the S.W. Monsoon the sea breaks on it. There is also another shoal spot of 5½ fathoms 4 or 5 miles S.W.-ward of the Lushington shoal. Great care should be taken in approaching the vicinity of the danger.

From above Juckoo, the coast is pretty safe, and may be approached to within 7 fathoms, until you reach the Muneja bank.

The Muneja bank extends 6 to 7 miles off shore, from Lat. 23° 55′ N. Long. 67° 27′ E. to Lat. 24° 11′ N. Long. 67° 15′ E. It is formed by the alluvial deposits of the river Indus, which, in 1854, was navigated by the Hujamree channel, but the waters have since forced their way to the southward, through the Kokowarry mouth.

The western edge of the bank is very steep, having 5 fathoms at 1 mile, 8 fathoms at 2 miles, and 10 fathoms at 3 miles' distance. The flood tide rushes with great strength, causing a high ripple, which would very probably be mistaken at night for shoal water, particularly as the muddy particles give the water a whitish and sometimes a luminous appearance.

During the inundation the water is frequently fresh at the mouth of the river at half ebb. The flood tides are not strong.

The coast above the Muneja bank up to Karachi is very safe to approach during the fine season, and vessels may go safely into 5 fathoms by day, and 8 fathoms at night; and good anchorage is always available; but during the S.W. Monsoon months it would be prudent to avoid getting in too close, partly because there is a

* Commander C. G. Constable, I.N., under date Bombay, June 22nd, 1863, writes as follows respecting the loss of the *Lord Raglan*, by striking on a rock off Mongarol:—"I write to inform you that the ship was wrecked by running ashore on the Kattiwar coast, about 6 miles S.E. of Mangarol. The coast is low and level, of a brown colour, and it is seldom you can see it at night, but the bank of soundings extends a great distance off it, and the lead is the best guide when standing in towards the coast by night:—20 fathoms is 10 miles off; 10 fathoms is close to the shore, for it is a bold coast. It is perfectly free from shoals or rocks, except a narrow rocky shoal close to the westward of Diu head, distant from the shore 1 to 1½ miles, which should not be approached under 13 fathoms.

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set to the S.E., and partly because the wind is liable to lull occasionally, and thus a vessel might get into difficulty.

The deep-sea or outer soundings along the entire coast from Diu head to Karachi are very accurately laid down, and in cloudy foggy weather, when observations for latitude and longitude are not to be obtained, a little attention to the soundings will enable the navigator to fix the position of his ship with great precision. The most remarkable feature in the soundings is the Swatch, in Lat. 23° to 23° 45′ N., and Long. 67° to 67° 35′ E.; this is a deep and narrow valley (of 100 to 130 fathoms' depth) in the ocean bottom, between depths of 15 to 25 fathoms on the east side, and 40 to 50 fathoms on the west side.

Directions for Approaching Karachi Harbour.

At all seasons, if coming from the southward, the coast of Sindh, from the parallel of 23° 30′ N., should not be approached under 14 fathoms. This line of soundings will carry a ship from 7 to 8 miles off the dangerous banks which extend from the Hujamree, Kediwarry, and Kokowarry mouths of the Indus river to a distance of 7 miles, showing in several places 10 fathoms on their extreme edge. The set of the tides and currents being very uncertain, the coast low throughout, and barely visible from the outer edge of the banks in clear weather, too much attention cannot be paid to the lead in passing these banks.*

Ras Muari (or Cape Monze), distant 18 miles W. ½ N. from the western entrance to Karachi, is high and bold of approach. Ships during the S.W. Monsoon season should make this headland, keeping to windward of the port if the weather is thick, or if the tide does not suit for crossing the bar; allowance must also be made for a strong set to the S.E., always prevalent during the S.W. Monsoon. Do not bring Manora point to the South of East, and do not go under 15 fathoms near Ras Muari, nor along the coast between it and Manora point.

Manora point can be approached to within half a mile on any bearing from North to East, with 5 fathoms water. On this point stand the lighthouse and signal station. As at certain times of tide pilots cannot get off, attention should be given to all directions signalled from the shore.

Masters of ships should not, under any circumstances, attempt to enter the port without a pilot.

Anchorage in the Roads.—From June to the middle of September, ships should not on any account anchor, but stand off and on, keeping the lighthouse bearing from N.b.E. to N.E., one to two miles distant, until boarded by a pilot or directed by signal. September 15th till the end of March, anchorage, lighthouse N.b.E. to N.N.E., distant one mile, in 7 fathoms. April and May, lighthouse N.N.E. to N.E., distant 1½ miles in 8 fathoms.

To the southward of the port, vessels should not come under 8 fathoms, or bring Manora point to the Westward of North, and under no circumstances, except the most urgent necessity, should vessels anchor on the coast to the Southward during the S.W. Monsoon.

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* Since the beginning of 1857, the ship *Admiral Boxer* has been totally lost on the Indus banks. The ships *Thomas Campbell* and *Augusta*, with the steamer *Pioneer*, have grounded on them, but were eventually floated off. Two large troop steamers have also, in the same period, touched on them.

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Vessels making the Lighthouse should always endeavour to come within signal distance before dark; but if not able to do so to keep standing off and on till daylight; they should endeavour to pick up the Pilot-boat without delay if she displays a Pilot Jack, for when she does so it is to intimate that there is no time to be lost to save the tide; but in picking up the Pilot, no vessel should run down to the Eastward further than to bring the lighthouse to bear North.

Light.—The lighthouse at Manora point exhibits a *fixed white* light at an elevation of 120 feet above high water, visible 16 miles, but frequently during the hazy weather of the S.W. Monsoon not more than from 7 to 10 miles.

For coming into the harbour, vessels should have all the fore and aft sails that belong to them bent, and their hawsers on deck, with everything ready for laying out a kedge anchor.

In consequence of the tides being irregular, persons are apt to be out in working them, therefore a red burgee at the yard-arm of the flagstaff will signify that it is flowing, and when at the mast-head that it is high water; a burgee at the yard-arm will signify that the tide is ebbing, and when at the mast-head that it is low water.

Leaving Karachi in the S.W. Monsoon.—Bound out in the S.W. Monsoon, it would be advisable to work to the W.S.W.-ward into about 15 fathoms or 10 miles to windward of Manora before stretching to the South, for, although a vessel might lay along shore direct from the entrance of the harbour, she might get into difficulties by the wind falling light, and the tide and S.E. current setting her in towards the mouths of the Indus; in passing the Hujamree and Muneja banks, which extend from Lat. 23° 55′ to 24° 10′, and Long. 67° 12′, she should not be in less than 20 fathoms, or more than 2 to 4 miles east of the meridian of Manora.

The S.W. Monsoon does not blow strong generally on the coast of Sindh, the wind at times is variable, and generally so when it rains, which is mostly in July.

The navigator is cautioned to be careful about anchoring anywhere on this coast if there is any sea on; it would be much more advisable to keep under way.

If bound to Bombay, it is as well to know that a line from Diu head to Bombay lighthouse is the 20-fathom line; so that a vessel, by her lead and soundings alone, could make Bombay from the northward, by simply keeping in the 20-fathom line.

In 1862, Captain L. Bilton, a correspondent of the *Mercantile Marine Magazine*, gave the following information respecting **Karachi**:—

"I reached Bombay on August the 25th, and lay there a fortnight, but finding freights low, and my owners having a valuable ship loading at a very low rate, I considered it advisable to look out for other than home employment, and chartered to proceed to Karachi to load a cargo of salt for Calcutta. I had, however, now lost the opportunity of making a quick passage thither, as the S.W. Monsoon was over. I experienced nothing but light baffling winds from N.W., with a lee-current, and did not reach that port till the 5th October, making 28 days' passage from Bombay; however, I should have been in no way advanced by arriving earlier, as, owing to the heavy and protracted rains, the salt was so wet as to be unfit for shipment.

"Karachi is a new and highly favoured port, with all sorts of public works and improvements in progress—the harbour being deepened, wharves and docks being built, piers and railways projected, with the determination, apparently, of making it

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a first class place of trade. I was close to Manora point at daybreak, and soon had a pilot on board—their residence is just inside the point, at Manora village, and on a gun being fired, one is always ready to come out. Crossed the bar at high water—on which is 18 to 19 feet at neaps, and 22 feet at springs—and moored abreast of the village with 35 fathoms of cable each way. Mooring-buoys are to be laid down here, and they will be a great advantage to large ships not intending to proceed further up than Manora. Smaller vessels go to Keamari, a village two miles further up, where the Custom-house is at present situated, and whence various descriptions of carriages ply for hire to Karachi, about 2 miles further still, or to the camp three miles off.

"Karachi is built at random and without any apparent plan—every one planting his house on the spot that best suits his convenience; the native town, like all others of its class, has narrow dirty streets, and houses with windows like pigeon-holes. The roads are excellent, there being plenty of good stone in the vicinity. A long bund runs through a low, swampy salt-marsh, from Keamari to Karachi, having rails laid down on it for a projected railway. When the new Custom-house (of stone) is finished, the present temporary one (of bamboo) will be abolished; here, Mr. P. DALZELL is collector, police magistrate, municipal commissioner, and I know not what besides, in his own person.

"The offices of the European merchants are mostly at Karachi, and are magnificent stone edifices, with extensive warehouses (or *godowns*) surrounding them. A large and increasing trade in grain, seeds, cotton, gums, wax, dates, salt, &c., is carried on. A well-built wharf is in a very advanced stage, extending from a column marking the spot where GENERAL SIR CHARLES J. NAPIER embarked when leaving Sindh (which fact it records) to the town; it is nearly half a mile in length, and joins a railway which runs to Hyderabad, and is already in full operation. Here the native craft discharge and load, and representatives of most of the countries in the East may be seen jostling each other. There are also no less than three steam companies engaged in the navigation of the river Indus, who are fitting out an immense number of vessels both at Manora and Keamari to develope the trade. It is a busy place, and no doubt will one day be a port of great consequence, from its position—more particularly if the Euphrates Valley railway is carried out.

"Manora is the Brighton of Karachi—or rather will be—where the inhabitants resort for change of air; it is well adapted for bathing, and is cool and pleasant from its vicinity to the sea; there is, however, a scarcity of houses and general accommodation at present. Point Manora is a high bluff, on which is the lighthouse, with a good fixed light, visible 16 to 18 miles off; but the whole point is rapidly wasting away, and will in time be only a sandy spit. The Oyster rocks, forming the eastern side of the entrance, are also fast crumbling away, owing to the action of the heavy sea in the S.W. Monsoon, and the soft sandy nature of the rock of which they are composed; there are two perforations through them—one of which I have often pulled through in a boat. The northernmost of the rocks is the resort of innumerable flocks of birds, which build their nests and hatch their young in security in holes in the rock. It is intended to run a pier from Keamari to join these rocks, with a view to deepening the channel—which is quite practicable, the foundation being a stiff clay. It is supposed the current will then alter or completely remove the present bar—which is a very bad one, particularly during the S.W. Monsoon, at which period no ship drawing more than 17 feet should attempt to enter the port; but in

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the fine season, during the N.E. Monsoon, a ship may safely cross at springs, drawing 21 to 22 feet. The Collector of Customs, Master Attendant, and other government officials reside at Manora, and transact business there; the houses of the pilots are also down near the shipping, which is very convenient. A medical gentleman resides at Manora, and attends the shipping, but there is not much sickness.

"I loaded inside to 19 feet, and filled up outside the bar. Manora point at N.E. ½ E., 1½ miles off, which anchorage is quite safe during the N.E. Monsoon.

"Supplies of every kind are cheap and good. Abundance of turtle may be procured on the beach to the north of Manora, and my Jacks, though hard at work all day, loading salt, never thought it the least hardship to range four or five hours every night to catch them—in this, I too was very successful; there are also plenty of fine oysters to be got. Game abounds in the neighbourhood, and can be bought very reasonably. There is, however, a great lack of trees, and the country looks barren in consequence.

"I left on the 21st November—having been 12 days on demurrage—deeply laden with salt; and on the 25th was off Bombay, having accomplished in four days the distance it took me twenty-five to get over, going to Karachi."

CAPTAIN BILTON, writing again in May, 1863, says:—

"I arrived off the bar of Karachi on the 4th of May, and though near the top of springs, found there was but 20 feet water now at the very highest tides. The old deep-water eastern channel is now completely filled; and the western (formerly the shoalest) is at present the only available passage—through which no vessel above 17 feet can proceed during the south-west Monsoon, and then at a great risk without steam.

"I found several ships lightening outside the bar, having been detained several days, and paying 2s. per hogshead for beer being landed. I lay there two days, and could not get a boat off; when I had a consultation with the port officer and senior pilot, and finding there was just the ship's draught on the following day, I determined to attempt it, as the obstruction is only about 20 feet broad, and loose sand; and on the 7th, at high water, made a dash at the bar, and went safely over without a bump, the sea being quite smooth, and moored off Manora, in about the same berth I occupied two years ago. However, even then my troubles were not over, as I had not room to swing, and had to heave a-head to my anchor on each tide, till lightened, to avoid tailing on the eastern bank, drawing 19 feet 8 inches. The generally received opinion is, that the bar will eventually be better when the aforesaid harbour works are completed, and the port yet be all they anticipate. It never can, however, contain any number of ships, *and large vessels should not be sent here at all during the south-west Monsoon.* By *large*, I mean ships exceeding 800 tons. The trade of the port is, however, rapidly increasing; and the enterprising firm of FLEMING and Co. have established cotton screws. Mooring buoys are being laid down for the larger class of shipping at Kemari and Manora. There is a great want of a good tug here.

"Large crops of cotton are being grown, and as the climate is one of the finest and healthiest in the world, I have little doubt that the country will soon assume a degree of prosperity almost unprecedented. All that is wanted is a small influx of European energy and capital. The railways and Indus steamers have trebled their receipts in as many years, and a line is projected from Kotree to Moultan.

"I thought it well to give you the earliest information as to the decrease of depth

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Bombay Island ; formerly the three islands were separated by [illegible]

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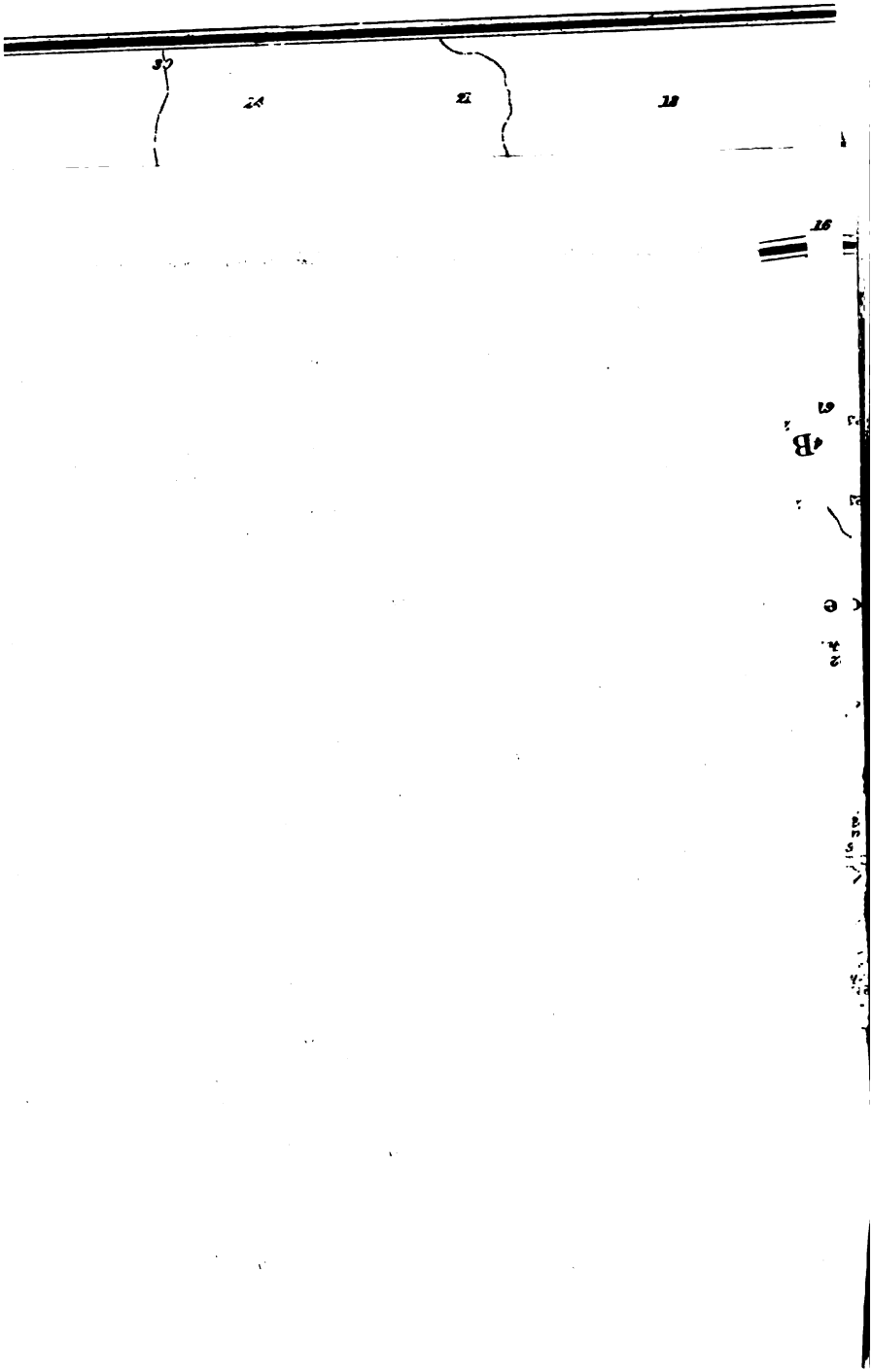

" I thought it well to give you the earliest information as to the decrease of depth

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of water on the bar, as many people will, no doubt, be misled by the statement issued about the time I left London—viz., that they had gained 2 feet water additional; now, when last here, we had 24 feet in the east channel; two additional would make 26; and large ships sent hither on the strength of such a statement would have to endure an amount of danger, disappointment, and loss, very serious to contemplate."

At the entrance to the Gulf of Cutch, on the S.W. bastion of the fort of **Mandavee**, there is a *fixed white* light, visible 10 miles. Position, Lat. 22° 50′ 20″ N., Long. 69° 20′ 49″ E.

Between Diu head and Tarrapur harbour is the entrance to the Gulf of Cambay. Here are the dangerous **Malacca Banks**, which extend from Lat. 20° 20′ to 21° 12′ N.; they run in irregular ridges from north to south, and are connected by shoal water affording no safe channel. Sutherland or the easternmost channel into the Gulf of Cambay lies between Malacca bank and the Snally bank—which extends about 2 miles from the shore of the main; it is 3 miles wide, with depths of 12 to 17 fathoms; at its northern end is **Surat**, where there is anchorage in 7 or 8 fathoms.

Tapti Light, at the entrance to the Tapti river, leading to Surat, is *fixed white*, elevated 61 feet, and visible 10 miles. Position, Lat. 21° 5½′ N., Long. 72° 37½′ E.

The Grant, or western channel, is formed by the west edge of the Malacca banks on the one hand, and Goapnauth shoal and the shore of the main on the other; it is 5 miles wide, and has in it depths of 10 to 20 fathoms.

The northern limits of the Malacca banks should never be approached with an ebbing tide, as the shoals are very steep.

There are also *fixed white* lights at Dandi, Perim island, Gogah, Deojugan or Tankaria, and Koon Bunder, higher up the Gulf of Cambay.

Between Terrapur and Bombay there is no danger, provided a ship does not approach the coast under 10 fathoms in the fine season; but during the S.W. Monsoon the parallel of Khundari island (say 18° 42′), at the southern entrance to Bombay harbour, ought to be made at the distance of 30 to 40 leagues from the land, and then steer East.

BOMBAY.

BOMBAY is the seat of government for the western presidency of British India, and the centre of an extensive commerce carried on with all parts of the world, while its trade with China exceeds that of either Madras or Calcutta.

Bombay Island, about 7 miles long by 2 wide, is generally low—the sea in many parts being kept out by embankment; but there are also two parallel ridges of sandstone hills running north and south—the most conspicuous being the western ridge, which terminates on the S.W. side of the island in Malabar hill. From seaward this hill has an oblong appearance; it is covered with trees, among which are interspersed many houses (or bungalows), and near the extreme (south) point are the signal post and flag-staff. The town and fort of Bombay are at the S.E. part of the island.

Close to Bombay island, and extending to the S.W.-ward nearly 2 miles, are **Old Woman's** and **Kolaba** islands, now united by a causeway, as the former is to Bombay island; formerly the three islands were separated by narrow creeks fordable

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only at low water. The point of Kolaba, on which the lighthouse stands, is guarded on all sides by an extensive reef of rocks, divided into prongs,—the most dangerous being the S.W. prong.

Salsette, to the north of Bombay, and formerly an island, is now, like Kolaba and Old Woman's islands, united to Bombay island by several causeways; between the two, however, there are several creeks navigable by small craft.

In the northern part of the harbour is the island of **Trombay,** 4½ miles long by 3¾ wide, near the centre of which is Salsette hill, 1008 feet high, being the highest point of a ridge which terminates at the south extreme of the island, and from its appearance is generally known as the Neat's Tongue. At the east end of the island there is another conspicuous hill and leading mark 324 feet high, having on it the ruins of a church. Here is the entrance to the Tannah river.

Cross Island, which from a distance resembles a haycock, lies about 1¼ miles to the northward of the anchorage off the town, and ¾ of a mile from the nearest shore. A shoal projects ½ a mile from it to the S.W., but there is a very narrow passage between this shoal and the bank off the main shore.

Butcher (or **Derdewee**) **Island,** nearly due S. of the Neat's Tongue, distant 2⅛ miles, is much larger than Cross island, from which it lies to the E.N.E.-ward nearly 3 miles; on it are several buildings, and a tower in the centre. Near the S.E. end of the island is a large tree, which, in one with Trombay old church, leads inside Thull shoal.

Elephanta (or **Garaporee**) **Island,** 1½ miles due E. from Butcher island, and 2⅛ miles S.E. from the point of the Neat's Tongue, has a conspicuous peak on its western side, which is the *first isolated high land seen to the right of the* NEAT'S TONGUE, when approaching the harbour from the S.W.-ward. This is the island in which is the celebrated temple, with immense excavations and figures cut out of the solid rock.

Khundari and **Oonari** are two islands outside Bombay harbour, near the shore of the main land on the south side of entrance.

KHUNDARI ISLAND, the highest summit of which is 120 feet above the sea, lies 2⅔ miles from the main land opposite the village of Nagaow, and W. by N. ½ N. from the village of Thull, close to Thull knoll; though small, it is covered with houses and trees, and is surrounded by a fortified wall. Large ships should not borrow too near Khundari island in the S.W. Monsoon, as it is situated on an extensive flat which projects from it several miles to seaward, and over which a heavy ground swell rises, causing ships to labour very much.

OONARI ISLAND, inside Khundari, is very low, and rather more than a mile off the shore of the main land.

Thull.—The high land of Thull forms the S.E. boundary of Bombay harbour. Near the N.W. corner of this land is Thull Knob (180 feet high), to the S.E.-ward of which, at the distance of 3⅓ miles, are two peaks called the Paps. The Knob and northern Pap in one clear the Thull shoal to the northward.

Carija Island, 4 miles long in a N.N.W. and S.S.E. direction, and 2 miles wide, forms the east side of the entrance to Bombay harbour; it is generally low and woody, but near its north and south extremity are two conspicuous and remarkable hills. Great Carija hill (990 feet high), near the south end of the island, is of a tabular form, slightly convex, and has a steep declivity at each end—the northern brow having on it the ruins of a church; it forms the third isolated high land to the

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right of the Neat's Tongue. Little Carija hill (690 feet high), near the north end of the island, is irregular in its outline, and, from seaward, resembles the elevated island (Elephanta) beyond; this is the *second* isolated high land to the right of the Neat's Tongue.

Casoah (or **Gull**) **Island** is a large rock midway between Thull Knob and Carija island; it lies on the south side of the entrance to an estuary into which the rivers Amba, Penn (or Bhogeshwuree), and Aptah (or Mehgownee), discharge their waters.

Thull Shoal, 2 miles long N.N.E. and S.S.W., and ¾ of a mile wide, consists of rocky patches with soft ground between; and having on it from 20 to 27 feet of water, with three spots of only 17 feet, and one of only 13 feet, may be considered very dangerous during the S.W. Monsoon, owing to the high sea that rolls in towards Thull. Its centre is about 3⅞ miles E. by N. from Thull Knob, and 2¾ miles from the shore of Thull Land; and the following marks and bearings clear it on every side:—

To the southward, Keyim bungalow in line with One Tree hill S.E.; to the S.W. and west, the foot of Kamballa hill open westward of the lighthouse; to the northward, Gull island open twice its breadth to the right of Carija point.

In the channel between the Thull shoal and the foul ground fringing the shore of Thull there is a depth of from 27 to 30 feet, and the large tree at the E. end of Butcher's island, in line with Toorbah church ruin, N.N.E., gives a safe course through it.

The foul ground of Thull shoal is very dangerous with Thull Knob bearing between E. ¼ N. and E. by S., and it should not then be approached nearer than the lighthouse well open to the eastward of the range of hills at the back of Bombay—say N. ½ E., or Khundari island S. ½ E.

The S. W. Prong is the name given to some rocky ground (partly uncovered at low water) on the north side of the entrance to Bombay Harbour, and stretching 2½ miles from the lighthouse in a S.W. by S. direction, but it really forms part of an extensive mass of foul ground—here rock and there mud—surrounding the west, south-west, and south sides of Bombay island, and thence entering the harbour itself. The following marks and bearings clear this danger:—

The outlying shoals 2¼ miles west of the lighthouse must be approached no nearer than Mahalakshmi Pagoda, open west of the bungalows on Malabar hill, N.N.E. ½ E.; the outer light-vessel in one with Khundari island S. by E. ½ E., clears the S.W. Prong on the S.W. side; Thull Knob in one with the North Pap S.E. by E. ¼ E.; or Funnel hill just open of or touching the north brow of Great Carija hill E. ½ N., clears the prong to the south; and the left end of Butcher's island, seen to the right of the inner light-vessel, clears the east side of the Prong.

Carija Shoal, on the east side of Bombay harbour, extends 3 miles west of the S.W. point of Carija island, and 2 miles N.W. by W. ½ W. from the N.W. point of the same island: off the middle of the west side of the island at the distance of 2½ miles is a 10-foot patch; and at the N.W. projection of the shoal is a 6-foot rocky patch. The large tree at the east end of Butcher island in one with Toorbah church ruin, N.N.E., clears Carija shoal to the westward in 27 to 30 fathoms *until* the lighthouse on Kolaba point bears west. The northern part of the shoal is very irregular—steep and rocky in places, but the southern end is more even and composed of hard sand.

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Sunk Rock Shoal extends 1½ mile to the E.S.E.-ward of the lighthouse, and its outer edge is marked by a *red* buoy, which bears from the lighthouse S. 68° E., 2 cables to the southward of which is the inner light vessel.

The Middle Ground Shoal, opposite the Apollo Bunder, is steep, and has but a few feet of water on it at low water springs when blowing hard; its S. end is marked by a *black* and *white* buoy, and its N.E. end by a *black* buoy: the W. side of Cross island, in line with Sewree fort, leads clear inside or westward of this shoal; and Cross island, open twice its breadth to the left of Sewree fort, clears it to the eastward.

The Flagstaff Shoal, opposite Bombay castle, is marked by a *red* buoy.

Lights.—Four lights mark the entrance to Bombay Harbour:—

(1.) At Kolaba point, the N.W. side of entrance, there is a lighthouse exhibiting a light *revolving every two minutes:* the lighthouse is coloured white, and the light being at an elevation of 132 feet above high water, is visible 17 miles. Its position is Lat. 18° 53′ 42″ N., Long. 72° 47′ 42″ E.

It is said that the tower is not easily discerned in daylight, being lost in the surrounding trees and buildings. The S.W. point of Kolaba, on which the lighthouse stands, dries out at low water to the distance of 1½ mile.

(2.) The Outer light-vessel, moored in 6 fathoms, lies S.S.W. 4½ miles from Kolaba point, W.N.W. 2 miles from the centre of Thull shoal, N. by W. ½ W., 7 miles from Khundari island, and S.W. by S. ¾ of a mile from the Fairway buoy: it exhibits a *fixed* light at 36 feet above the sea, visible 9 miles. The vessel is painted red, carries a red ball at the mast head, and hoists a red flag when a sail is seen in the offing. During the night a blue light is burnt every hour, and a torch every half hour.

(3.) The Inner or Sunk Rock light-vessel lies ¼ of a mile southward of the Sunk rock, and a short distance eastward of the south part of the shoal on which the rock is situated; it exhibits a *fixed white* light; the vessel is painted red, carries a red ball at the masthead, and hoists a red flag when a ship is seen in the offing.

(4.) The Dolphin rock light is *green* to south and east, *white* to northward, and screened to westward; it is 20 feet high, and is visible 2 miles.

A Fairway Spiral Buoy marks the entrance to Bombay Harbour, being southward of the S.W. Prongs, and N.W.-ward of the centre of Thull Shoal—equidistant from both; it is also about N.E. by N. ¾ of a mile from the *Outer* light-vessel.

The Outer and Inner light-vessels have been known to break adrift during the height of heavy S.W. Monsoon weather. Until replaced, the *Fairway buoy* is the only guide to the entrance.

Tides.—The flood sets into the harbour from the S.W., and ebbs out from the N.E. At the entrance, the stream does not set in fair through the channel, but slants over the foul ground off Thull towards the opening leading to Penn river, and during the rains in the S.W. Monsoon, the ebb sets strong out of that river to the westward.

Directions to enter Bombay Harbour.—As soon as the *Outer light vessel* is visible on any bearing (from seaward) between N. by E. and S.E. by S. round by East, steer directly for it; when up with it, steer to the N.E.-ward so as to pass the Inner or Sunk Rock light-vessel, 1 to 2 cables to the eastward; thence steer to pass the same distance to the eastward of the Dolphin Rock light; from which make for the anchorage off the town.

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Or, *if it be night*, after rounding the Inner or Sunk Rock light, steer to the N.E.-ward, and anchor about 1 mile N.E. by N. of it, where the water will be smooth, and there wait for a pilot.

Approaching Bombay.—The following directions for approaching Bombay in thick weather, are from LIEUT. W. B. SELBY, surveyor, I. N.:—

"In coming from the westward, and being at Lat. 18° 30′ N., a vessel will first strike soundings of 55 fathoms coarse sand, decayed coral, and broken shells, in Long. 70° 30′ E. Should, however, the latitude be doubtful, with tolerably correct longitude that point will be at once ascertained, as, on *this* meridian, the depths will decrease to 51 fathoms fine sand, and even 48 fathoms fine sand, as far north as Lat. 19° 16′, while 10 miles to the southward no bottom at 300 fathoms will be found.

"Again, should the latitude be correct, and longitude doubtful, 4 miles west of this meridian no bottom would be had at 300 fathoms, while 20 miles to the eastward 47 or 48 fathoms fine red sand would be obtained.

"In the parallel of 19° N., the bank extends to Long. 70° E., when the first cast would be 75 fathoms greenish sand; and continuing to steer east 60 miles, you would cross over 50 to 51 fathoms grey sand,—at last 48 fathoms fine red sand; and this nature of bottom would continue for 40 miles more, when you would obtain from 40 to 50 fathoms, on a very remarkable bed of gritty mud (*i. e.*, soft mud mixed with small dead pieces of coral), and, probably, in some places, decayed coral rock or sandstone rock.

"The nature of the bottom is now such as cannot be mistaken, and by steering S.E. about 50 miles, you will carry a line of 38 fathoms, same bottom, till you strike your first cast of from 37 to 27 fathoms coarse sand and shells; you are then on the Northern edge of 'Direction Bank' (which I shall subsequently describe), and distant from lighthouse S.W. 30 miles, or by steering E.S.E. 50 miles, you would have 30 or even 24 fathoms coarse shells and sand, in which case you would be distant from the lighthouse about 25 miles, bearing E.N.E.

"In the parallel of 18° N., the bank of soundings extends to Long. 70° 47′ E., and the first cast would be 56 fathoms sand and shells.

"Continuing to steer east, you would pass over a coral belt of 49 fathoms, then a flat of from 49 to 52 fathoms fine red sand (deepening to the eastward), until, having run 60 miles, the bottom would change to mud and sand, though the depth, 52 fathoms, is the same. Forty miles more easting will place you, with a gradual decrease of soundings, in 23 fathoms mud, from whence the water shoals gradually towards the coast.

"About 100 miles W. by S. from the lighthouse, in Lat. 18° 35′ N., Long. 71° 5′ E., is a knoll of 38 fathoms fine sand, having all round it soundings of about 50 fathoms, same nature of bottom.

"Running E. by N. from this, you will have 50, 46, and 42 fathoms, fine red sand; and after 60 miles, 38 fathoms, on the edge of the gritty mud and decayed coral belt.

"Almost due S.W. from the outer light vessel, distant 38 miles, and therefore on the best bearing for making the harbour in the S.W. Monsoon, is a bank of soundings, which, from its being in nearly the same position as that assigned by Horsburgh to the '**Direction Bank**,' I have called by that name. It extends in a N.N.W. and S.S.E. direction from Lat. 18° 7′ to 18° 27′ N., centre in Long. 72° 20′ E., having an average breadth of 7 miles, with a depth of from 22 to 27

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fathoms small, white, dead, bivalve shells, in places mixed with a little sand, and but rarely a few pieces of coral. From Lat. 18° N., and Long. 72° E., where a depth of 50 fathoms, mixed mud and sand, will be found, the soundings in running for it will gradually decrease to 30 and 26 fathoms mud, close to its outer edge: immediately inside, the depths are from 30 to 27 fathoms mud, gradually decreasing towards the land. On obtaining soundings on it, the arming of the lead will be found almost entirely covered with these shells, and as this is the only spot over the whole of the great bank off Bombay where they are found in such profusion, the navigator cannot doubt his position. A course may then be confidently shaped according to circumstances, allowing for a southerly set after the middle of July; and as the soundings decrease quite gradually in towards the land, the navigator will be warned in time, should the weather be so very thick as to prevent the land from being seen when within a reasonable distance.

"From the northern part of Direction Bank, and extending as far north as Lat. 19° 20′ N., Long. 71° 40′ E., is the remarkable belt which I have noted, averaging 15 miles broad, of a peculiar soft slimy mud, mixed with decayed coral, having on it from 34 to 47 fathoms, with gradually decreasing soundings of blue mud inside it towards the land.

"And here I would observe that, from the very soft, unadhesive nature of the bottom of this belt, recourse must be had to other means than that of arming the lead to bring it up; coir rope yarns frapped round the lower part of it I found answer very well.

"Although this belt extends about 50 miles in a N.W. and S.E. direction, yet a glance at the chart will show that there can be no doubt as to whether a vessel is on the northern or southern part; if the latter, a run to the eastward of 26 miles will cause a decrease of 17 fathoms, while, if on the northern, the same distance would not cause a greater decrease than from 6 to 10 fathoms.

"In conclusion, I would observe, that although from a careful study of the chart the seaman would fix upon many other points whereby his position in dark weather might be known, I have in these remarks only endeavoured to draw attention to those which appeared to me of the greatest importance, convinced that in themselves they offer all that is necessary for an object which has so long been desired."

Coast.—South of Bombay the coast is foul as far as Rajapúr; opposite Choul harbour (Lat. 18° 32½′), the 10-fathom line of soundings is 12 miles off shore, and, in the fair season, fishing stakes lie out in 6, 7, and 8 fathoms; on the parallel of 18° N. the 10-fathom line is 7 miles off shore.

Angria Bank.—Viziadrug or Geriah Harbour flagstaff is in Lat. 16° 34′ N., Long. 73° 19′ E.; west of it, at the distance of 64 miles, is Angria bank, extending between Lat. 16° 18′ and 16° 39′; it is of a curved form, the convex side being towards the land, whence the extremes stretch N.W. and S.W. It is about 23 miles long; and, near the centre, 10 miles wide E. and W. The depths on it vary from 15 to 12 fathoms, but they are irregular, and though nothing less has been found there may be shoaler water: the bottom is rocky. Angria bank is steep all round; on the landward side no bottom has been found at from 50 to 100 fathoms, and at a

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short distance off 140 to 170 fathoms has been obtained; 7 miles off is a cast of 115 fathoms, then 49 fathoms at 12 miles distance, thence decreasing gradually to the coast. There is a very perceptible tide on the bank at springs, flood to N.E., ebb to S.W., with a rise and fall of 9 feet.

Off **Melundy Island**, in Lat. 16° 2′ N., a large ship in passing should not come under 13 fathoms, for 11 fathoms is close to the edge of foul ground; about 3 or 4 miles to the *northward* is **Kura** islet, standing 1¼ miles from the shore, and connected with it by a reef; to the southward of Melundy island, as far as **Newti Point**, in Lat. 15° 56½′ N., several rocks extend 3 miles off shore, making it unsafe to approach the coast.

Vingorla Rocks, or **Burnt Islands.**—These are a group of rocky islets, the highest of which is 180 feet above the sea, but the rest are considerably lower; many are only even with the water's edge; the rocky patches connected with the islets make the vicinity of them dangerous for vessels passing in the night, on which account they should not be approached under 18 fathoms, since, on the S. and W. sides, there are 15 fathoms very close to them. They extend from the parallel of Newti point to Lat. 15° 52½′ N., a distance N. and S. of nearly 4 miles, and have a white appearance when the sun shines on them. The channels inside the Vingorla rocks, and between them and the reefs to the northward, should never be attempted by a large vessel, for, though in several places they are sufficiently deep, they are everywhere very narrow.

Coast.—Between Geriah and Goa, the bank of soundings is generally from 14 to 18 leagues off shore; 6 or 7 leagues off there are 30 to 32 fathoms; and 2 leagues off 15 to 16 fathoms.

Aguada Point is the northern extremity of Goa bay; at Aguada fort, on a hill above the landing-place, and about a mile from the outer port, there is a lighthouse 280 feet above the sea, which exhibits a **Light**, *revolving* every *seven* minutes, visible 12 miles; its position is Lat. 15° 29′ 26″ N., Long. 73° 45′ 32″ E. A convenient place for watering is to bring the flagstaff and lighthouse in line (N.N.W. ¼ W.), and anchor in 4¾ fathoms, at the distance of 2 cables or more from the flagstaff.

St. George Islands, in Lat. 15° 21′ N., are about S. ¼ W., distant 8 miles from Aguada point: although there is deep water (4 to 6 fathoms) between these islands and the shore the passage should never be attempted by large vessels, for the bottom is uneven and rocky. Between Aguada Point and the St. George islands, the coast has, in many places, rocks and reefs fringing it at the distance of ½ a mile to 1 mile off shore, so that if not intending to call at Aguada (or Goa), a vessel should not come under 16 fathoms at night; there are 14 fathoms close to the southernmost rocky islets of St. George.

The high, bluff headland of Cape **Ramas** is in Lat. 15° 5′ N.; the soundings between the St. George islands and Cape Ramas are regular,—as also between cape Ramas and Carwar—6 or 7 fathoms, from 1⅓ to 2 miles off shore.

Carwar Head and Sedashigur Bay.—Carwar head, a conspicuous headland, 640 feet high, is in Lat. 14° 48¼′ N., Long. 74° 5′ E. The port of Carwar is to the northward of the head in **Sedashigur Bay.** Great improvements have been

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projected and are in progress here, making a large area available for anchorage in *both* Monsoons,—building piers, wharves, &c.

The **Oyster Rocks** are high (160 feet), rocky, and have deep water close to them; from Carwar head they bear W.N.W. distant 2½ miles, and from Cape Ramas S.S.E. ½ E. 16 miles.

Light.—A temporary *fixed white* light has been established on the Oyster rocks at an elevation of 160 feet above the sea, visible 10 miles. The light tower is round, of white granite, 40 feet high, and stands on the summit of the outer Oyster rock, in Lat. 14° 49′ 15″ N., Long. 74° 2′ 45″ E.

The apparatus is to be replaced by a dioptric one of the first order, when the light will be visible 20 miles.

A *sunken rock* with 14 feet on it at low water, lies between the Oyster rocks and Elephant islet, with the lighthouse bearing N.W. ½ N., distant 1$\frac{6}{10}$ miles; Elephant islet E.S.E., 6½ cables; and the western ends of Deogur and Coormaghur islets nearly in line about N.N.E. A *red* buoy marks its north-west side.

Also, a *shoal* about 50 yards in length north and south, and 20 yards east and west, with 2½ fathoms on it at low water, over rocky bottom and shells, lies with the lighthouse bearing S.E. ½ E., distant 2½ miles; Coormaghur islet E. ½ N.; and Black rock N.N.E. ½ E. There are 10 fathoms all round the shoal. A *red* buoy marks the west side of it; vessels should not approach nearer than a cable.

Directions.—Steam vessels from the northward should make Cape Ramas, and then steer for the Oyster Rocks lighthouse, avoiding the rocky shoal north-west of the lighthouse. When within 3 to 4 miles of the lighthouse, the Collector's bungalow on Konay hill will be seen, and when it bears E.S.E. steer for it and anchor in 4 or 5 fathoms water, mud bottom, near a white buoy which is placed to mark the anchorage, at about half a mile from the shore. As the Oyster light is approached at night, a *red* light should be seen on the shore of the bay, and when it bears E.S.E. steer for it, and anchor in about 5 fathoms water as before.

Vessels from the southward should make the Oyster Rocks lighthouse, and during day can with safety pass between them and Carwar head. The highest part of Deogur islet on with the highest part of Goormaghur islet, leads eastward of the Oyster rocks reef, which will shortly be marked by a beacon. When the Collector's bungalow on Konay hill is in sight, bring it to bear E.S.E., steer for it and anchor as before. Vessels from the southward at night should not pass between the Oyster rocks and Carwar head, unless well acquainted with the harbour; but should keep westward of the Oyster light until the *red* light on the shore of the bay bears E.S.E., then steer for it.

Sailing vessels making the port at night should anchor in about 8 fathoms water, near the Oyster rocks light, and wait till daylight. It is high water at full and change at 9h. 30m. A.M., and the rise is 7 to 8 feet.

Coast.—Fronting the bays to the S.E.-ward of Carwar head are several small islets. Anjediva, in Lat. 14° 45½′ N., about a mile long, is 1 mile from the southern shore of Carwar head; close to it on the seaward side the depths are 9 and 10 fathoms, and 14 fathoms at the distance of 4 miles; a vessel may find shelter under the island, between it and the main, during the S.W. Monsoon, there being 4 to 5 fathoms in the channel; 2½ miles to the S.E.-ward of Anjediva, and 1½ miles from the shore, is the Button rock.

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At Coumta, in Lat. 14° 25′ N., Long. 74° 22½′ E., a *fixed white* light is exhibited on a columnar tower 180 feet above the sea, and visible 12 miles.

Pigeon, or Netrun Island, in Lat. 14° 1′ N., Long. about 74° 18¾′ E., is about 10 miles from the coast, and being 300 feet high is visible 24 miles in clear weather; a small rock lies near its south side, but passing the island to the eastward, there are 20 fathoms a mile off it; but at night do not approach it nearer than 2 or 3 miles in 23 to 24 fathoms.

S.E.-ward of Pigeon island the coast for a distance of 17 or 18 miles is foul and rocky. Hog island, close to the main, is nearly on the parallel of Pigeon island, and between them the channel has 15 to 16 fathoms near the latter, with 9 or 10 fathoms near the former island. The worst ground is nearly opposite False Barsalore Peak (4400 feet high), in Lat. 13° 51¼′ N., where several rocks are found 4 miles from the coast; consequently ships would do well not to come under 20 to 22 fathoms. The edge of the bank of soundings abreast of Pigeon island and Barsalore peak is from 60 to 70 miles from the coast.

The St. Mary Isles extend from Lat. 13° 27′ to 13° 19¾′ N., and though generally low, some of them may be seen 18 miles. They are 2½ miles from the shore, having a boat passage between them and the main. To the southward of St. Mary islets, distant 2¾ miles, and about 1½ or 2 miles from the coast, is an islet with detached rocks awash.

Primeira or Molky Rocks, in Lat. 13° 11¾′ N., are 4 miles from the shore, and have 8 fathoms close to them: they are 50 feet high, and visible 20 miles. At night these rocks and St. Mary Islets should not be approached under 16 to 20 fathoms, for in some places the depths decrease suddenly.

The Asses' Ears, a double-peaked hill, to the N.E.-ward of Mangalore, and 15 miles from the coast, is in Lat. 13° 5¼′ N.

MANGALORE.—The anchorage in the roads is with the flagstaff bearing from E.N.E. to E. by N. ½ N., in 5 or 6 fathoms, muddy bottom.

Light.—A *bright fixed* light is exhibited at an elevation of 250 feet above the sea, visible 14 miles; it shows on all parts of the horizon to the westward: position, Lat. 12° 51′ 30″ N., Long. 74° 49′ 25″ E.

Directions.—Coming from the *northward*, having passed St. Mary islands and Primeira rocks in 16 fathoms, haul in for Mangalore roadstead to 7, 6, and 5 fathoms. Coming from the *southward*, and having made Mount Dilly (or Yelly Paud), the coast may be approached, provided that proper attention be given to the lead, and a good look-out kept.

The river is navigable only by small vessels, the bar having but 10 or 11 feet of water on it.

Mount Dilly is a bold, bluff headland, very conspicuous, owing to the coast north and south of it being low and wooded; its position is, Lat. 12° 0¼′ N., Long. 75° 11½′ E. The shore is bold, and may be safely approached; at 2 miles' distance there are 7 to 8 fathoms, and at 10 miles' distance 20 fathoms: the edge of the bank of sounding between Mount Dilly and Mangalore is about 40 to 45 miles from the shore.

CANNANORE.—The anchorage is abreast the fort in 5½ to 6 fathoms; 4½ fathoms is close to the point, and near a dangerous reef of rocks under water.

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Light.—A *fixed white* light is exhibited on a flagstaff on the fort at an elevation of 110 feet, visible 12 miles. The Admiralty light notice says it is extinguished during the S.W. Monsoon from May 20th to August 10th; but this is not certain; probably it is lowered to 85 feet during the S.W. Monsoon, in bad weather. Position, Lat. 11° 51′ 20″ N., Long. 75° 21′ 40″ E.

TELLICHERRY.—The anchorage is in 5½ to 6 fathoms, soft mud, with the flagstaff bearing N.E. by N., and Green island N.N.W.—2 miles off the town; in unsettled weather not less than 7 or 8 fathoms. Under 4 fathoms the ground is foul and rocky between Tellicherry and Green island for a distance of 4 miles; therefore the coast should not be approached under 7 or 8 fathoms.

Light.—Two *bright fixed* lights—in the same tower of the fort wall—are exhibited at an elevation of 140 and 104 feet respectively, visible 12 miles. The high light is lowered to 112 feet during the S.W. Monsoon, from May 16th to Sept. 14th. Position, Lat. 11° 44′ 50″ N., Long. 75° 28′ 30″ E.

Coast.—Between Mount Dilly and Tellicherry the bank of soundings is from 40 to 50 miles off the coast; 30 to 35 fathoms at 22 miles; and 20 fathoms at 12 to 15 miles.

Sacrifice Rock, 4¾ miles from the coast, in Lat. 11° 29¾′ N., is 40 feet high, and having a whitish appearance is visible 18 to 20 miles off: it is steep all round, with 12 fathoms close to, and 16 fathoms 2 to 3 miles off it: the channel between it and the main is good—10 fathoms close to the rock, and 7 fathoms in mid-channel. Passing the rock during the night, do not come under 16 or 17 fathoms.

Off **Ruddelur** or **Cotta Point,** in Lat. 11° 28′ N., a reef projects 2½ miles from the shore; a ship passing should not come under 10 or 12 fathoms.

CALICUT.—The best anchorage is with the lighthouse bearing from East to E. by N. ½ N. in 5 to 6 fathoms,—or with the tombs to the northward of the town bearing E.N.E. to E.N.E. ½ N., about 2½ to 3 miles off shore. Great caution is requisite, as the shore is fronted by shoals which have several rocky heads and are very dangerous.

Light.—A *fixed white* light is exhibited from a column near the beach at a height of 105 feet above the sea, visible 12 miles; it is extinguished during the S.W. Monsoon, from May 20th to August 10th. Position, Lat. 11° 15′ 10″ N., Long. 75° 45′ 35″ E.

Bound from the northward, do not come under 8 fathoms until the lighthouse bears E. by S. or E. The 30-fathoms line of soundings is about 25 miles off shore,—the 20-fathoms line about 14 miles.

The trade of Calicut is in pepper, spices, and timber.

Beypur.—The entrance to the river is in Lat. 11° 10′ N.; there are some shoals here, near the coast, on each side of the river's entrance.

Between Calicut and Cochin the coast may be approached to 7 or 10 fathoms.

COCHIN.—The town is on the south side of entrance of a considerable river, which, though barred, is deep inside.

Light.—A *fixed white* light is exhibited on a staff above the tower on the S. side of entrance, at an elevation of 114 feet, and visible 12 miles: it is lowered to 62 feet during the S.W. Monsoon. Position, Lat. 9° 58′ 5″ N., Long. 76° 13′ 55″ E.

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The bar, 1¼ miles west of the flagstaff and light, is navigable by ships drawing 14 feet; it is buoyed—a north buoy and a south buoy, between which is the entrance. The rise and fall of tide is greatest when the moon's perigee coincides with a syzygy, being then sometimes 3 feet, but it is commonly not more than 1½ feet. The night tides are highest from November till March, and the day tides from May to August, in the other months the two are equal: both ebb and flood are very strong; and the stream sometimes runs in for many hours without raising the level of the water. There is, at times, a heavy surf on the bar, occasioned by the strong ebbs running over the shoal parts against the sea breeze.

In 1860 the fairway between the buoys was the Pilot's Cocoa-nut Tree in line with Builder's (or Nypeen) point—both on the north bank of entrance. Having crossed the bar, and approaching the mouth of the river, there is a *black* buoy in 18 feet, to the southward of which LIEUT. TAYLOR'S I. N. chart (1860) gives 30 to 33 feet, low-water springs. It is said the buoys are removed during the S.W. Monsoon.

The common anchorage is with the flagstaff or light bearing E. ½ N. to E.N.E., in 4½ to 5½ fathoms, soft bottom, and about 2¼ to 3 miles off shore. During the S.W. Monsoon, vessels should not anchor in less than 6 fathoms, as there is then a heavy swell rolling in on the coast.

The following is from a letter, dated Cochin, May 9th, 1865:—

There is a good Master Attendant; but, considering the magnificent harbour, the lighthouse arrangements are singularly defective. There are about 1600*l.* to the credit of the harbour from Port Dues, and it is estimated 2200*l.* would give a proper lighthouse. Proper wharfage is also required, and elevators for loading and unloading.

The great danger is in the S.W. Monsoon. There are 13½ feet of water on the bar, which could easily be deepened, when there would be a harbour of refuge fit for a thousand vessels. There is now a steam-tug at this port. Narrakel, 6 miles off, is a safe anchorage in the Monsoon.

Cochin is connected by telegraph with Bombay, Madras, and Calcutta,—and, consequently, by the Indo-European line, with England. The water communication is excellent. There are three lines of steamers calling here.

The coffee, oil, and other trades are all on the increase. Ginger and coprah are also important items of commerce; and the sea teems with fish. If English capital and skill were applied, much larger quantities would be taken than at present by the rude native process. The Bank of Madras has an agency here, but money is scarce.

Cochin is built on the north extremity of an island, and along the southern entrance from the sea to the "Backwater"—an inland harbour or lagoon, which extends nearly 120 miles, being separated from the sea by a narrow peninsular tract. Large supplies of teak are floated by the rivers, from the forests, into the Backwater—some of which is exported and some used in shipbuilding: the other exports are sandal wood, pepper, cardamoms, cocoa-nuts, coir, cordage, sussin, and fish maws.

SUPPLIES of all kinds can be obtained at Cochin.

NARRAKEL, OR NARAKET.—The first notice of this port appeared in the *Mercantile Marine Magazine*, June, 1863, given by CAPTAIN D. COWEN, of the *Euphrates*, as follows:—

"The roadstead of Narrakel, 6 miles north of the entrance to Cochin harbour, was first made known by MESSRS. PEARCE, LESLIE, and Co., merchants, of Cochin,

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about twenty years since. It is a good and safe anchorage in the S.W. Monsoon. A ship may run in and bring up in 3 and 4 fathoms, and find smooth water at all times—the sea breaking very heavily outside this depth. The bottom is mud, and the anchor sinks down many feet into it. I discharged a cargo of salt, with the S.W. Monsoon blowing very strong, and with a heavy sea in the offing, but quite smooth where we were discharging. I could at all times go on shore in my gig. The Master Attendant of Cochin has placed a mast or flag-staff, about E. by S., off the best anchorage; but that is no guide to ships going into the roadstead, as the cocoa-nut trees at the back of it hide it until you get close in shore. It can be seen from Cochin along shore, but not when in the offing. If a *white* landmark were put up, it would be a guide to shipmasters."

And again, in the *Mer. Mar. Magazine* for January, 1864, CAPTAIN LEWIS BILTON, R.N.R., writes:—

"Having picked up some information about Narrakel, I hasten to tell it you, giving also the experience of others, who have had better means of information, from living on the spot. In August, 1863, being abreast of Alipey, and finding my fore-topsail yard badly sprung, I anchored to procure another, but failed in doing so. Alipey is situated in the dominions of the Rajah of Travancore, and, until Sedashigur and Narrakel had been opened up, the only port on the Malabar coast where vessels could load during all the S.W. Monsoon, in safety—a fact I believe not generally known in England. It seems, however, very doubtful if Narrakel is known at all; it is situated about six miles north of Cochin, and is formed by a mud bank, deposited there within the last few years, and where ships lie in perfectly smooth water, during the S.W. Monsoon—as certified by a correspondent of the *Times of India*:—

"'The port of Narrakel, in the state of Cochin, promises to succeed; three vessels have been lying there since the commencement of the Monsoon, and business has been transacted with perfect ease and safety—a circumstance that places the accessibility of the new port at all times of the year beyond the possibility of a doubt.' The weather is very wet and stormy, and in fact just what the Monsoon is expected to be. A resident merchant of Cochin, writing to the *Times of India*, under date of July 7th, 1863, says:—'There is no doubt considerable diversity of opinion as to the S.W. Monsoon, and its effects on this coast—viz., whether it is possible, or not, to carry on communication by sea with the different ports. It is not our purpose here to argue the point, and we content ourselves by remarking, that with the exception of Sedashigur, Narrakel, and Alipey, we believe the S.W. Monsoon may be said to close the ports on the western coast of India, excepting, as a matter of course, the great port of Bombay. We have taken upon ourselves, however, to address you with respect to one of the places above mentioned—viz., Narrakel, and its capabilities as a port, more particularly during the S.W. Monsoon. It is hardly possible that all which has been written, printed, and published with respect to it should have been altogether delusive; and the experience of the last few weeks has considerably brought us to the conviction that the port is a good one. But for facts—

"'1st. When the Monsoon broke, communication was all but impossible with the outer roads (Cochin), and boats could not be got to take cargo outside; the *Charlotte Jane*, 619 tons, CAPTAIN BURGOYNE, on the berth for London, was moved up to Narrakel, and there finished her loading.

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"'2nd. The barque *Salvia*, 347 tons, CAPTAIN REES, came in here (to the outer roadstead) about the 6th ult., and the captain finding Narrakel a more comfortable berth, moved his ship up there, where she lay safely and quietly for a week, he having the means of communication with the shore every day.

"'3rd. The barque *Armenian*, 347 tons, arrived here about the 24th ult., when communication from the shore off Cochin was quite impossible; and the captain, by the advice of the Dubash (who in the previous case, as well as in this, had boarded the vessel from Narrakel,) proceeded there, went on shore, got his orders from Cochin, and proceeded.

"'4th. The *Anatoon Apear* (980 tons) steamer, arrived here on the 6th instant, the weather being exceedingly boisterous and wet, and signalled for boats to come off to her. The chief officer made an attempt to land in the life-boat, but did not succeed. On the following morning the steamer was boarded from Narrakel, and the captain was induced, from the representations made to him, to shift his berth to that port, where he has lain in 5 fathoms, smooth water, and shipped 80 tons of coals. CAPTAIN DE SMIDT, of the above steamer, expressed his great surprise at finding his vessel in smooth water, and at being able to land in his own boat, and step ashore from it without the least difficulty. His expression was "that there was not a ripple on the beach." We doubt not CAPTAIN DE SMIDT will corroborate this fully, if applied to. These facts, in our opinion, entirely prove what has before been asserted respecting the advantages Narrakel offers to vessels requiring to touch on the coast during the S.W. Monsoon, but it does not appear that these facilities are generally known, or if so, that they are not believed, for in the cases adduced, none of the Masters were aware that there was such a place as Narrakel; and in the case of the *Lowick* (which arrived about the 17th ult.) whose Captain, we have reason to believe, did know of the place, and also of that of the B. I. S. N. Co.'s S. S. *Kurrachee*, no attempt even was made to test the capabilities of Narrakel. We therefore hope, that should you think with us, that it would be to the advantage of the trading community of this coast, that the port of Narrakel should be more generally known, you will take such steps as you think most likely to attain that result, and give a wide circulation to the government directions for making the port.'

"I have therefore deemed it of importance to bring the matter to your notice, for the benefit of my brother shipmasters, or of owners who may be induced by a knowledge of these facts to trust their property on such a voyage, as there seems no reason to doubt that vessels can load at Narrakel during the whole S.W. Monsoon without any risk or difficulty."

ALIPEY.—This is a safe roadstead all the year round, and the town carries on a considerable trade; the shore is fronted by hard patches, alternating with soft mud.

Light.—A *revolving white* light, attaining its greatest brilliancy *every minute*, is placed in a tower at an elevation of 130 feet above the sea, visible 15 miles; position, Lat. 9° 30′ N., Long. 76° 20′ E.

Two miles south of the lighthouse a shoal bank of 6 to 9 feet extends 1½ miles off shore.

Coming from the north, Alipey may be known by a *large white house*, off which, when it bears N.E. by E., a large vessel may anchor in 5½ fathoms; also with the light or lighthouse bearing E. by N. you may anchor in 4½ to 6 fathoms, according to the size of the vessel.

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Captain Lewis Bilton, R.N.R., writes:—

"All that has been written of Narrakel may with equal truth be said of Alipey, as it enjoys exactly similar advantages, viz.:—a mud bank sheltering the anchorage and landing-place, in the same manner as at Narrakel. I touched there as before-mentioned for the first time, on the present voyage, and remained till next day, and found it all that had been represented; I could have easily landed in the smallest boat in the ship; I was, however, disappointed in procuring a spar, not finding them plentiful, the longest to be obtained was only 45 feet, whereas I required one 66 feet, and I was not disposed to stay and have one made in two pieces, but fixed the broken one in the most substantial way our means admitted of, and proceeded. Found a very strong S.E. current setting along the coast, with an in-shore tendency that requires to be guarded against in thick rainy weather, and at night.

"The port of Alipey is under the charge of Captain Hugh Crawford, who is Commercial Agent, Master Attendant, Custom Master and Superintendent of Police to the Rajah; he resides on the spot. The only other European inhabitants are the clergyman, and an old skipper who keeps an hotel. There is also one American merchant. There is a large Mussulman population, and some of the merchants very wealthy, carrying on a steady trade with the Red Sea and Persian Gulf; they reside here in preference to Cochin for the facility of trading from the port in the S.W. Monsoon. The town is well built, and does not display the ruined appearance of most native towns; and the streets well kept; it is, however, completely hidden from seaward by the dense vegetation, and nothing is visible but the lighthouse and flag-staff, except a long barn-like building on the beach, from whence goods are shipped and landed, and which is connected with the town by a tramway; a canal also runs through the town, by which trade is chiefly carried on along the coast in the bad season, as it extends north nearly to Beypur, and south to Cape Comorin, as I was informed. The principal exports are cocoa-nut oil, cassia, coir, molasses, timber, paddy, turmeric, hides, arica nuts, mats, cinnamon, flour, coffee, pepper, arrow-root, croten seed, sapan wood, &c. The English system of postage stamps has been adopted and seems to succeed; in fact, everything seems here to be carried out in the English method. The present Rajah, Rumah Vurmah, is now thirty-one years old, and he is a very intelligent man; he resides at Trivandrum, the capital, where he has a number of Europeans occupying various situations under his Government. His army is commanded by English officers. The Hospitals (public and private), an Observatory, a Museum, Printing Presses, Schools (government and free), and various other institutions, are all under European superintendence, and are flourishing. The Law Offices and Courts also boast of an intermixture of the European element. Few of the Rajah's predecessors, I suspect, were as liberal as he is. Large quantities of pepper were formerly exported from Alipey, but this branch of trade has fallen off in consequence of the Rajah having given up the Government monopoly in the article, and also from competition. Formerly, all the pepper grown in the country was delivered to the Government at a fixed rate; and the large godowns where it was stored, dried, and shipped from, yet remain, but they are now fast going to decay, and do not seem to be used for any purpose. A duty of fifteen rupees per candy of 500 lbs. is now levied instead on all pepper, and the producers allowed to ship or sell it as they please. Salt is imported in large quantities from various sources—also tobacco, piece goods, cotton, thread, bullocks and buffaloes, iron, copper, coriander, gingelly and cummin seeds, liquors, wheat dholl, ghee, gram, camphor,

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sugar, &c. The boats at present employed are a species of canoe, hollowed out of a single tree, and of great length, but Masoolah boats similar to those in use on the Coromandel coast are being introduced by the enterprising agent at Alipey, and I saw several building. Good roads have been made to intersect the country in all directions, with commodious bungalows at intervals, for the accommodation of European travellers.

"The anchorage in the roads during the S.W. Monsoon is with the lighthouse bearing from E. by N. to N.E. by E. in 3½, 4, or 4½ fathoms, soft mud, where ships will be in perfectly smooth water, with a ridge of breakers in 6½ fathoms water (in bad weather) to seaward of them. It is very seldom that there is any surf on the beach at Alipey, even in the worst weather, so that ships' boats can at all times communicate with the shore. In very heavy weather, for a number of years back, the sea has broken in six fathoms, inside of which it is quite smooth, and Arab ships of 600 to 1000 tons anchor inside of these breakers in 3½ to 4 fathoms, landing their cargoes during the whole of the bad season. Ships may procure water from a well on the beach, and good vegetables and fruit can be obtained (generally) in abundance. Fish is plentiful, and of the best description and variety; and live stock abundant, and only half the price they cost at Bombay. The whole of the adjacent country is one continuous tope of cocoa-nut trees, and the green nuts are a great luxury on board ship, and cost but little. There were formerly no very distinctive marks by which Alipey could be known, unless a ship was very close in, except a long white building, with an archway in the centre; this is now completely hidden by the dense and luxuriant vegetation around it; nor is the church tower now visible. The new lighthouse, however, is a very conspicuous object, and *painted white*, it cannot be mistaken in either Monsoon; it was red, being constructed of the red laterite which forms the superincumbent strata all along the Malabar coast; it is a credit to the architectural talent of the worthy Master Attendant, who superintended the construction himself—without any engineering assistance whatever.

"Bound from the *southward*, from the Bay of Bengal and the Coromandel coast to Alipey, in the S.W. Monsoon:—Ships bound to Alipey from any of the above-mentioned places in the S.W. Monsoon, should steer north until in Lat. 9° 30′, then run down east for Alipey, making an allowance for a 3-knot southerly current after passing the vicinity of Kalpeni island.

"A large ship from the *northward* ought not to come under 7 fathoms, if drawing much water, until the lighthouse bears to the eastward of S.E., as there are some shoal patches (with only 4 fathoms) in-shore of those soundings.

"Alipey and Narrakel are the only ports on this part of the Malabar coast which a ship can run for, if disabled during the S.W. Monsoon,—the water being so perfectly smooth that repairs of any kind could be conducted with ease and facility. Captain Cope, an old navigator, calls this place Mud bay, and says, '*It is one of ye most curious places in ye world;*' and I certainly never, during the 22 years I have been trading to Bombay, had the remotest idea that I could land anywhere on this coast in the bad season, and I believe most of shipmasters are in equal ignorance.

"Ships from Colombo, or Tuticorin, bound to Alipey in the S.W. Monsoon, should, on leaving those ports, be in good sailing trim, and have good sails bent, as the weather will in all likelihood be bad. From Colombo roads, or the Gulf of Manaar, a W.N.W. course should be steered, close-hauled, for the coast of Tinnevelly; should

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the wind hang to the southward, advantage may be taken of the same, and endeavour to get in with the land about Cape Comorin, after rounding which it often happens that a ship will carry the southerly wind all the way up the coast; at all events, a ship which sails moderately well by the wind after having rounded Cape Comorin, will always be able to make the passage to Alipey in 8 or 10 days, there being often a favourable current along the coast, to the northward, after a slant of wind from the south; and a well-found ship, taking every advantage of the shifts of wind, will be able to make a much better passage, and with less wear and tear than by the southern route. The general direction of the wind in the S.W. Monsoon at Alipey and along the coast to the south is from the west,—perhaps to the northward of west. These directions (amended to the present time by me), were drawn up at the request of a few merchants and captains of ships in 1851, to whom the advantages of Alipey were known. Since then, English, French, Swedish, and Russian ships have loaded throughout the bad season; and the vessels at Cochin (before the discovery of Narrakel) that have been unable, from bad weather, to complete their loading there, have come to Alipey, their cargoes having been sent down in boats by back water."

QUILON is in Lat. 8° 53½′ N., Long. 76° 34′ E.; it is a projecting part of the coast, and the foul ground fronting it should not be approached under 13 to 15 fathoms.

Anjengo is in Lat. 8° 39¾′ N., Long. 76° 45′ E. Between Cochin and Anjengo the depths are 20 to 24 fathoms about 7 miles off the coast, and 30 to 35 fathoms at 15 to 16 miles off. The edge of soundings to the S.W. of Anjengo is 24 miles distant from the coast.

The Enciam Islands, or Inni yebiparare, in about Lat. 8° 13′ N., are near the shore, and there are several rocks above and under water.

The coast thence curves rapidly to the S.E.-ward.

Off **Cadiapatam Point** are the Kotah and Adumdah islets, distant respectively 1 and 2¼ miles off the point; they are surrounded by foul ground and rocks under water. **Crocodile Rock** is also 2¾ miles off the point, and close to it, at 1½ miles, are 13 to 14 fathoms. The sea does not always break on it. From this rock Cape Comorin bears East distant 5¼ leagues, Cadiapatam point N.N.E. ½ E., and Adumdah islet N. ¾ W.

Wadge Bank is in Lat. 7° 24′ to 7° 44′ N., Long. 76° 30′ to 76° 42′ E.: the least water reported is 7 fathoms. On its northern end there are 17 to 18 fathoms, and 42 fathoms towards the centre and southern part.

Cape Comorin is a low, sandy point in Lat. 8° 5¼′ N., Long. 77° 32½′ E. About 2 or 3 cables from the S.E. part of the point is a rocky islet, with several rocks about it, on which the sea breaks. Opposite the cape the edge of soundings is 46 miles distant, and there are 20 fathoms 5 miles off it.

Having passed Cadiapatam point, the coast may be approached to 20 fathoms; but in hazy weather, or during the night, stand further off. (*See also* pp. 442-443 for a description of Cape Comorin and the navigation of the Tinevelly coast.)

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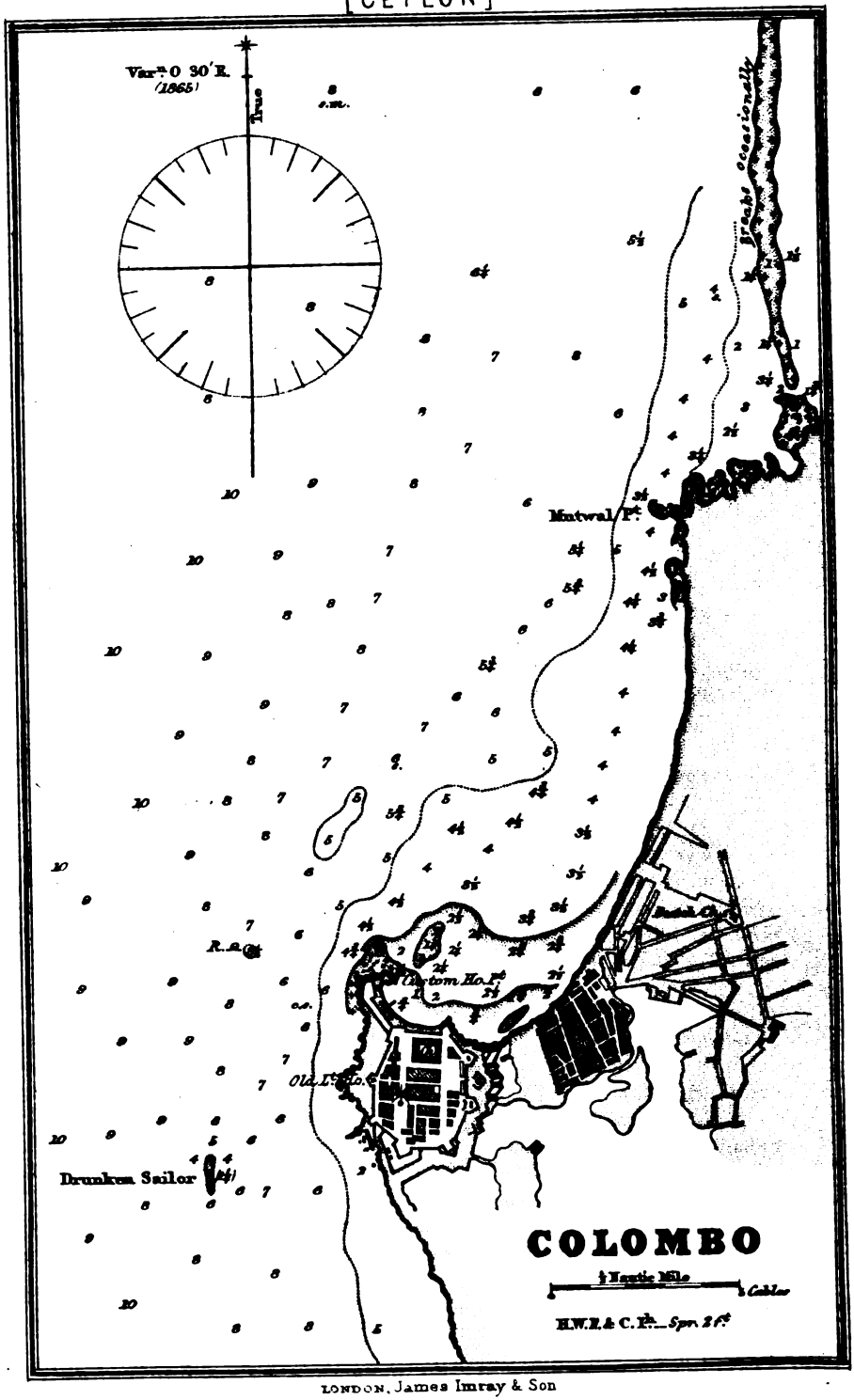

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THE ISLAND OF CEYLON.

PORT OF COLOMBO.

The following directions are by Mr. James Donnan, Master Attendant at Colombo, 6th July, 1864:—

Port of Colombo.—The roadstead of Colombo, although exposed to the S.W. Monsoon, is a safe one for vessels well found in ground tackle. Vessels generally ride out the Monsoon at single anchor, with a long scope of chain. A gale of wind may occur about the changes of the Monsoon, in the months of May, June, November, and even as late as December; though a gale in the latter month is very rare, and several years sometimes pass away without any beyond a stiff Monsoon breeze. These gales are seldom violent, and it is only during them that casualties occur to the shipping. Only five vessels have been wrecked within the last thirty-two years. Communication between the shore and shipping is seldom interrupted, although there are occasional spells of squally weather and a high sea during the S.W. Monsoon, which make the passage over the bar difficult and dangerous, especially for small boat .

A vessel may anchor anywhere in the outer roads with the flagstaff bearing from S. ½ E. to S.E. by E. in 6½ to 9½ fathoms water, and distant from the north bastion of the fort from half to one mile. The best anchorage is with the flag-staff bearing about S.S.E. ¾ E., in 8 fathoms water. Vessels arriving during the S.W. Monsoon, or about the changes of the Monsoon, should not anchor nearer the north bastion than half a mile, or bring the rocky point at Mutwal (which is about 1½ miles northward of the fort) to bear northward of N.E. ½ E.; and they are recommended to ride with not less than 80 fathoms cable to the hawse, and to have all the shackles looked to, and the small pins well secured, before coming to an anchor. The constant pitching motions which vessels are subject to cause the cables at some distance from the hawse to beat and chafe on the ground, and the shackle pins frequently work out, if not well secured. The small pins should be of iron with large heads, and the other ends well clinched over a ring; if not clinched they invariably loosen, and work out.

The Inner road or harbour is mostly occupied by the native coasting vessels. It is considerably sheltered from the S.W. Monsoon by the north bastion of the fort and bar, and affords good and safe anchorage for vessels drawing not over 11 feet. The bar is a shifting sand-bank, extending for about 1½ cables' length from the north bastion in a direction towards Mutwal point; there are 7 to 12 feet water on it, and 3½ fathoms inside and beyond it. Strangers should not enter the Inner road without a pilot; and as the sea sometimes breaks on the bar during the S.W. Monsoon, and several lives have been lost by boats being swamped, they should not use their own boats in landing, but employ one of the outrigger canoes, which are always available, until they become acquainted with the passage over it.

The Ballast Ground during the S.W. Monsoon is in 15 fathoms water with the flagstaff bearing about East; and during the N.E. Monsoon in the same depth of water with the flagstaff about E.S.E., where vessels may discharge their ballast overboard.

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Tides and Current.—The current off Colombo, and in the Gulf of Manaar, is subject to considerable variation, particularly about the changes of the Monsoon, when it is the strongest but, generally speaking, it sets with the Monsoon, and is never so strong as to inconvenience vessels making Colombo. The greatest difference between high and low water recorded at Colombo is not more than 2 feet 10 inches. In the S.W. Monsoon, when the mean level of the ocean is the lowest, the difference between high and low water is from 5 to 15 inches. On those days when the difference between high and low water is not more than 6 inches, the rise and fall has been observed to take place four times within twenty-four hours.

Directions.—Vessels bound to Colombo during the S.W. Monsoon from south of the Equator, should not cross it to the eastward of 78°, as between 3° N. and the coast of Ceylon a strong current sets to the eastward, and the wind frequently hangs from West until the Gulf of Manaar is entered, thus making it difficult to fetch the port, if not well to windward. The coast for 30 miles south of Colombo may be approached with safety to a distance of 2 miles.

The coast about Colombo is low, and not visible from seaward more than 10 miles. About one mile northward of the fort near Mutwal there are some lofty fir-trees, which are generally seen (when approaching from seaward) before the lighthouse or flagstaff. They afford a good landmark for Colombo, as, when viewed from seaward, they appear considerably elevated above the surrounding cocoa-nut trees, and seem as one *tope* rather thinly planted. No other part of the coast either north or south of Colombo affords a similar mark to this.

There are some isolated hills at a distance in the country, and the high mountain on it a sharp cone called Adam's Peak, about 7420 feet above the level of the sea, has been seen in clear weather at a distance of 30 leagues. In the N.E. Monsoon it is generally visible in the morning, and sometimes throughout the day, but is rarely seen in the S.W. Monsoon through the humid atmosphere which prevails in that season.

Light.—A *fixed white* light is exhibited every night from the clock tower, a square, grey-looking building standing in the centre of the fort. The light is elevated 133 feet above the level of the sea, and visible in clear weather from a ship's poop 18 to 20 miles.

Approaching the roadstead from the southward, the Drunken Sailor must be avoided; it is a ledge of rocks with only 6 feet water over the shallowest part, which bears W. by S. ¾ S., from the light tower, and is distant off shore about half-a-mile. This danger is clearly defined during the S.W. Monsoon by a constant break of the sea; but during the N.E. Monsoon, with smooth water, there is no break, and it will then be prudent not to come under 9 fathoms water, when in the vicinity of these rocks, as there are 8 fathoms close outside them; a more prudent course, however, would be not to approach the shore within 1½ miles until the light tower bears eastward of E. by N., then to stand in for the shipping, as no advantage can be gained by steering close to these rocks at any time.

The approach from the westward is quite clear, and also from the northward, with the exception of a ledge of rocks that stretches along shore to the northward from Mutwal; but as this ledge is only about a quarter of a mile off shore, and so much out of the usual track of shipping, it is scarce worthy of note as a danger.

A rock, with 24 feet of water on it, has been discovered in the southern part of

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Colombo roadstead, which is now marked by a *red buoy*. Vessels arriving in the roadstead must give the buoy a clear berth of half a cable's length, as there is foul ground for some distance around it.

NEGOMBA, 16 miles to the northward of Colombo, is in Lat. 7° 12½′ N., Long. 79° 48′ E.; it is a place of some trade, but ought not to be visited during the S.W. Monsoon, or at least from May to August inclusive. It may be recognised from seaward by a point well covered with cocoa-nut trees, whence there projects in a N. by W. ¾ W. direction for the distance of 3½ miles, a reef, or rocky ledge; near the shore this ledge, for the distance of a quarter of a mile, consists principally of rocks awash, thence there is a depth of 3, 4, and 5 fathoms in places, but the extremity is a coral patch, with not more than 9 to 12 feet over it. Bound to Negomba from the southward, the fort should be brought to bear S.E. by S., then steer direct for it, and anchor abreast the fort in 5 or 6 fathoms.

The bottom between Negomba and Colombo is mostly mud, with regular soundings, but the coast should not be approached nearer than 4 miles, nor under 10 or 12 fathoms, until Negomba flagstaff bears S.E. by S. To the northward of Colombo, and opposite the river Mutwal (or Kalany Grange), some rocks, with a line of breakers upwards of 4 miles long, stretch about a mile from the coast.

The following additional remarks are from MR. J. J. FRANKLIN'S "Instructions for Navigating the Gulf of Manaar," 1846, &c.:—

Chilaw Bungalow, in Lat. 7° 34′, may be known by its high, red-tiled roof, seen 8 or 9 miles off in clear weather. Some rocks, once supposed to be at some distance from the shore, are now known to be not more than ¾ mile off, and consequently cannot be considered as forming any obstacle to general navigation; they are situated 5 miles due North of the bungalow, and are in a line between it and the next point. North of the bungalow, at the distance of 21 miles, and off Narakadoo, uneven soundings on rock to as little as 3¼ fathoms are found from 3 to 4 miles off shore, with 6 and 8 fathoms immediately outside; large vessels, therefore, ought to be careful not to come within this distance of the land hereabouts, although small craft can at all times go over the shoal. The coast between Narakadoo (Lat. 7° 59½′) and Dutch bay, must not be approached under 20 to 25 fathoms, for at 10 to 6 fathoms, much foul ground extends thence to the shore.

Dutch Bay, in Lat. 8° 19′ N., is well sheltered from all winds, but more particularly from the S.W., which are the strongest on the coast. Vessels can anchor here in 2½ to 3 fathoms stiff mud, close inside the neck of sand that forms the western side of the bay, with a cocoa-nut tope and house called Paringethoray bearing S.S.W. The only dangers in the approach to it are a rocky patch with 2¾ fathoms over it at low water, 2 miles W.S.W. of the North end of the neck of sand before mentioned; and some shoal water 3 miles N.N.W. of the same point, and 2½ miles West of some palmyra trees, a few of which are leafless, on the island of Karateevo. This last extends North and South about 2 miles, with an average breadth of 1, having over it from 3 feet to 3 fathoms, with a small patch of sand, generally dry, due West of the above trees. There are 4 to 5 fathoms to the Eastward of this reef, but no person, without being well acquainted with the coast, ought to attempt the passage inside. From seaward the North end of the neck of sand ought to be brought to

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bear S.E. ½ E., when it can be steered for and passed within 50 yards, carrying 3 to 4 fathoms sand.

Very good anchorage in the S.W. Monsoon may also be found under the lee of Kodramallai point in Lat. 8° 32′ N., which may be known by the three long hills seen over the low land of Karateevo. In steering for this anchorage, the North end of the hills ought to be kept about E. by S. till well past the island, when the anchor may be let go in 2½ to 3½ fathoms sand, with the rocky promontory bearing S.S.W. to S.W., ½ to 1½ miles off.

No vessels ought to proceed on the Ceylon side further towards the head of the Gulf than this, as there are many shoal places at some distance from the shore, and no good holding-ground. In the S.W. Monsoon a strong current is found setting to the Northward over Adam's Bridge, which abates as the Indian coast is approached; and a confused sea is generally found to prevail near Manaar.

The coast between Colombo and Point de Galle has many outlying dangers near it, especially that part nearer to Galle; they consist of coral reefs, shoals, and rocky islets, but all are well cleared by not approaching the shore nearer than 3 to 4 miles, at which distance off Caltura (Lat. 6° 35′ N., Long. 79° 57′ E.) as well as north and south of it, there are soundings of 14 to 16 fathoms; southward of 6° 21′ N., and thence to Galle, the soundings vary from 20 to 35 fathoms at that distance from the coast, although the dangers stretch further to seaward along this part.

In the immediate vicinity of Point de Galle there are several rocks and shoals very dangerous to navigation.

Whale Reef, nearly 1½ miles wide, stretches westward from Point de Galle lighthouse to the distance of 3 miles, and has on it a general depth of from 4 to 10 fathoms, but there are several very shoal spots. The **Whale Rock,** 1½ miles from the shore, and W. 4° N., 2¾ miles from the flagstaff, always breaks, but in fine weather only once in four or five minutes. **Little Whale Rock** is small, and above water; it lies half way between the Whale rock and Galle flagstaff, and has several dangerous rocks between it and the shore. Between the Whale and Little Whale rocks there is a clear channel with 8 to 10 fathoms, but this should never be attempted except through sheer necessity.

North-westward of Whale reef lies **Gindurah Rock,** with only 9 feet on its shoalest part, and 4 to 5 fathoms within a cable's length of it. This dangerous rock is opposite the entrance to Gindurah river, distant 2¼ miles, and bears W. by N. ¼ N., 4½ miles from Point de Galle flagstaff. A coral spot, with only 3 fathoms on it, lies E. by N. ½ N. ¾ of a mile from the Gindurah rock; and there is a depth of 16 fathoms between the two shoals. The soundings between Whale and Gindurah rocks deepen gradually from 8 fathoms near each to 20 fathoms in mid-channel.

S.W. ½ W., 3 miles from Point de Galle lighthouse, is Gallehogalle bank, with 17 fathoms water on it; from north to south it is ¾ of a mile long, and ½ a mile wide from east to west.

Should the wind fail, and the current be unfavourable, ships may anchor on the bank of soundings extending 3 or 4 leagues to the southward of Point de Galle; the bottom is generally sand and gravel, but occasionally rocky. *During the night,* vessels coasting between Galle and Caltura should not come under 40 fathoms, and between Caltura and Colombo not under 20 fathoms.

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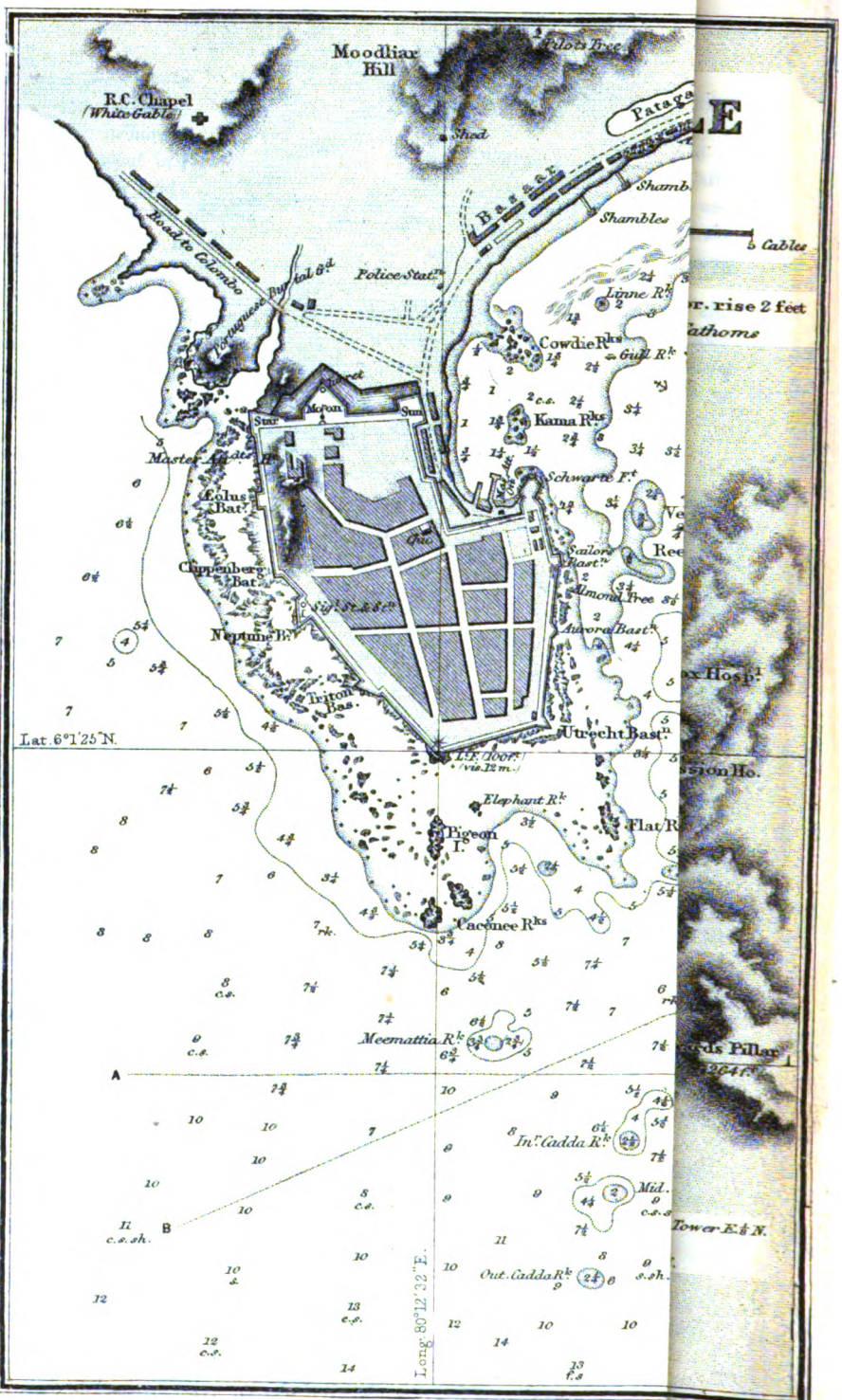

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POINT DE GALLE BAY.

The Bay of Point de Galle was re-surveyed in 1860 by GEORGE F. McDOUGALL, Master, R.N.; and the following Sailing Directions and description of the dangers in the vicinity of the Bay have been issued:—

Point de Galle Bay is formed between Point de Galle and the sloping land to the eastward, on the highest part of which, at an elevation of 264 feet, stands Edward's Pillar, painted *white*; thence the land trends to the S.E., and terminates in Oonawatty point, which projects farther seaward than the true point.

The inner part of the bay is between Point de Galle (which is low) and a rocky bluff to the eastward, named Watering point, which has a natural *red* patch on the slope of its western face. The distance between the two points is a little more than a mile in an E. by S. ½ S. direction; the actual entrance, however, is narrowed, and the anchorage within is much confined by numerous dangerous reefs, having only from 3 to 15 feet water over them. At the head of the bay is a low sandy beach bordered with cocoa-nut trees. Near the centre are two rocky promontories, known as Gibbet island and Glosenburg.

The anchorage frequented by shipping is in from 6 to 4 fathoms, sandy bottom, on the western side of the bay, abreast the fort, where supplies of every kind may be procured; but the space is too limited to accommodate the yearly increasing number of vessels visiting this port.

The land in the vicinity of Point de Galle is comparatively low and ill-defined, but the position of the bay may be readily known by the *lighthouse* which stands at the southern extremity of the western point of entrance. On this point the fort and town are built, the sea front being rendered inaccessible by a line of coral reefs, on which the sea breaks heavily.

Several rocky islets extend a quarter of a mile to the southward from the light-house point; on one of these (Pigeon island) stands a solitary cocoa-nut tree (1860). The dangers are all above water, and may therefore be easily avoided.

Light.—A *Fixed White* Light is exhibited from an iron tower, 80 feet high and painted *white*, on the south bastion of the fort of Point de Galle; the Light, elevated 100 feet above the sea level, is visible at a distance of 12 miles.

Anchorage.—During the N.E. Monsoon, the best anchorage in the roadstead off Point de Galle Bay is in 16 fathoms, with the Pilots' Tree and the Church in the Fort *in line*, and the rocks off Oonawatty point on with a point to the eastward of Oonawatty. In the S.W. Monsoon, vessels seldom anchor in the road, but should they do so, the best temporary anchorage will be in 16 fathoms, with the lighthouse bearing N.E., and distant about 1½ miles off shore.

Tides.—The tidal stream does not exercise any perceptible influence in this bay. The streams are regular, east and west, rather more than 1 knot.

SUPPLIES.—Point de Galle is now much frequented as a port of call for orders, in consequence of the Electric Telegraph, which is in communication with every part of India. Supplies of every kind, including coal, can be obtained. Water may be procured from a small bay within Watering point, where there is an excellent spring and a wooden pier. Native boats and crews can be hired to supply ships with water.

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The Off-lying Dangers are as follows:—

The Cadda Rocks consist of a series of disconnected patches, nearly 2 cables in extent, N. by E. and S. by W., and having 2 fathoms on the shoalest part. There is deep water between the rocks. During the S.W. Monsoon, heavy breakers extend the whole length of the reef, but in the N.E. Monsoon there is seldom a break.

The Outer Cadda, on which the least water is 13 feet, lies S. ½ E., about two-thirds of a mile from the lighthouse, with the Pilots' Tree* and Sailors' bastion in line, and the *white* mark on the western side of the bay almost shut in with Watering point.

The Middle Cadda, with 2 fathoms on it, lies with the Pilot's Tree open of the Almond Tree, and the *white* mark a sail's breadth open of Watering point.

The Inner Cadda has 15 feet on its shoalest part, from which the Pilots' Tree is in line with Flat rock, and the signal-staff on Neptune's bastion is open east of the cocoa-nut tree on Pigeon island.

Para Rock, having 5 fathoms over it, never breaks. From it the lighthouse and east end of Elephant rock are in line, and the *white* mark is shut in with Watering point.

Meemattia Rock is half a cable in extent, has 17 feet on it, and breaks in bad weather during the S.W. Monsoon. It lies nearly in mid-channel, between the Inner Cadda and the islets extending south of the lighthouse; from it the east turret of the Church in Fort is seen touching the west side of Elephant rock, and Flat rock is in line with Cutcherry police station.

The Dangers in Galle Bay are as follows:—

Polcatte Rock has only 3 feet on it, and always breaks. The marks for it are, the lighthouse open south of Flat rock, and the Button rock on with left high shoulder of Moodliar hill. A *black* buoy is moored in 6¾ fathoms, about 30 yards E.S.E. of the rock.

Mata-Mada Rocks form two distinct patches about three-quarters of a cable apart, and always break. A *red* buoy is moored in 6 fathoms west, about 30 yards of the inner and shoalest patch of 6 feet, from which the white gabled Chapel, on an eminence outside the fortifications, is just open of Schwarte fort, and the cocoa-nut tree on Pigeon island is on with the north end of Flat rock.

Bellicatua Rock, with 2½ fathoms on it, forms with the inner Mata-Mada Patch, distant 1½ cables in an E. by N. direction, the narrowest part of entrance to the western portion of the bay. The marks for it are, the Pilots' Tree just open eastward of the Gull rock, and the cocoa-nut tree on Pigeon island on with north end of Flat rock. This rock breaks in bad weather during the S.W. Monsoon.

Wara Rocks always break, having only 3 feet on their shoalest part, from which the Pilots' tree is in line with the Arrack store; and the Church in Fort is on with the Almond Tree.

Kapera Rock, on the west side of the bay, has on it a shoal patch of only 9 feet water, from which the cocoa-nut tree on Pigeon island is on with the centre of

* The Pilots' Tree stands on Moodliar hill, and forms one of the most important leading marks into the bay. It is large and mushroom-shaped, but being almost hidden by the growth of trees in its neighbourhood, it has been recommended that these latter be removed, that this valuable mark may be more easily recognised.

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Elephant rock, and the Sun bastion is touching the end of Schwarte fort. A *red* buoy is moored in 5 fathoms at a third of a cable E. by N. from the 9 feet patch.

Cata Rocks consist of a long ledge, extending in a southerly direction from near the west end of Gibbet island, towards the Wara rocks. There are several detached patches on the ledge, with from 1 to 3 fathoms on them, and deep water around. From the westernmost patch in 2 fathoms, the garrison flagstaff is on with north end of Schwarte fort, and the lighthouse is seen over the angle of Utrecht bastion; a *red* buoy is moored in 5¼ fathoms, about 80 yards west of this patch.

Avareea Rock, with 4 fathoms on it, lies directly in the channel, midway between the Kapera and Wara rocks, with the lighthouse open of Utrecht bastion, and the Sun bastion on with rocks off Schwarte fort.

Vellicocco Reef consists of two rocky patches, carrying from 3 to 9 feet water. The shoalest part of the northern patch, with only 3 feet on it, is the spot on which the Peninsular and Oriental Company's steamship *Malabar* struck, causing her total loss, in May, 1860. From it the Pilots' Tree is seen just open east of the Gull rock, and Edward's Pillar, its own breadth, south of the white mark; a *red* buoy is moored in 4 fathoms East, 40 yards from this patch.

Tanna Rock, with 3½ fathoms on it, lies with the cocoa-nut tree on Pigeon island open of Utrecht bastion, and the Pilots' Tree nearly midway between the Arrack store and Alexander's house (a little nearer the former).

The Gull is a small round rock, about 5 feet in diameter, and 3 feet above the sea level. There is a large iron ring on its summit, to which native vessels secure their stern hawsers.

Imburynha Rock, with 4 fathoms on it, never breaks. It is the southernmost part of a rocky ridge of 5 fathoms, one cable in length north and south, and distant a quarter of a mile in a W.N.W. direction from Watering point, with a general depth of 7 fathoms between. The marks for it are, the Pilots' Tree on with the middle of the Arrack store, and the lighthouse in line with Flat rock.

Deumba-Dava Rock has 12 feet on it, and breaks during the S.W. Monsoon. From it the white gabled Chapel on an eminence outside the fortifications is just open of Schwarte fort, and Elephant rock is on with south end of Flat rock.

Cabeera Rocks are two patches, half a cable apart, north and south, with 5 and 6 fathoms between. From the northern and shoaler patch in 3 fathoms, the Chapel just mentioned is in line with Cowdie High rock, and the Church in Fort is open north of the Almond Tree.

Kette Rock, on which the least water is 15 feet, lies with the belfry just open of Schwarte fort, and the Pilots' Tree opens its own breadth west of Alexander's house.

Bocolosava Rock is well on the eastern shore of the bay, and is distant a ¼ of a mile in a N. by E. direction from the nearest part of Watering point. The least water on it is 3½ fathoms, from which the Church in Fort appears open north of the Almond tree, and the Cutcherry police station is seen over the neck of Gibbet island.

Directions for making the Bay.—As the approaches to Point de Galle bay are rendered dangerous by numerous sunken reefs, it is essentially necessary that vessels should obtain the services of a pilot. In most cases, the pilot canoe, with flag displayed (white, red, white, horizontal) awaits a ship beyond the limits of the

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off-lying dangers; but as circumstances may possibly compel a vessel to seek a place of refuge when the heavy sea precludes the possibility of a boat leaving the bay, the following directions, if closely attended to, will lead into safety:—

During the N.E. Monsoon, from December to March (inclusive), the bay is at all times accessible, and an anchorage can be obtained with facility; for a sea breeze varying from S.S.E. to W. generally prevails during some part of each day. Early in the morning, the wind is generally off the land from the northward, and enables vessels to leave the bay.

During the S.W. Monsoon, from April to November (inclusive), though the wind frequently veers round even to the northward of west, there is generally a heavy swell setting directly into the mouth of the bay from the southward; this sometimes occasions much difficulty in bringing a vessel up in an anchorage already so over-crowded as to compel vessels to be moored by means of stern hawsers, which, if required, are supplied by the local authorities.

Approaching the bay from the westward, by bringing Point de Galle lighthouse E. by N. ½ N., a vessel will pass clear to the southward of the Whale and Little Whale Rocks, both of which are nearly in the same line of bearing, about W. ½ N. from the lighthouse, the former being distant 2½ miles, and the latter about 1¼ miles.

The rocky islets off the lighthouse may be approached in safety so long as the Church in the Fort is kept westward of the lighthouse; here the pilot's boat will generally be found.

To pass north of the Cadda rocks, keep the *white* mark on the east side of the harbour well open of Watering point, or Edward's Pillar on with a natural *red* patch on Watering point; both will lead between the Meemattia rock and the Inner Cadda rock. Proceed with these marks on, until the west turret of the Church in the Fort* is on with Elephant rock (which is a high, smooth, round-topped rock, unlike any other), then steer for Gravet point (the termination of the high land in the N.E. corner of the bay), until the signal-staff on Neptune bastion is in line with the lighthouse. Then haul up for the Cutcherry police station, N. by E. ½ E., which will lead through in mid-channel between the *black* buoy of Polcatté and the *red* buoy of Mata-Mada. When the lighthouse is shut in with Utrecht bastion, anchor in about 6 fathoms.

To pass south of the Cadda rocks, keep the Church in the Fort west of the lighthouse until the *white* mark is *well* shut in with Watering point; the rocks off Oonawatty point will then be open of the point, and in line with a distant point to the eastward. Then steer to the eastward until the Pilots' Tree (the large mushroom-shaped tree on the summit of Moodliar hill) bears N. by W.; the left shoulder of the hill will then be clear of the Almond Tree, near Sailors' bastion. Haul up for the Pilots' Tree until the Signal-staff and Lighthouse are in line, then proceed as above directed, between the Polcatté and Mata-Mada buoys.

Caution.—Sailing vessels approaching Galle should be careful to keep a weatherly position to enable them to sail in, and it should be borne in mind that the current sets along the line of coast with great velocity—to the eastward during the S.W. Monsoon, and to the westward during the N.E. Monsoon.

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* Care must be taken not to confound the white gabled Chapel on an eminence outside the fortifications with the Church in the Fort.

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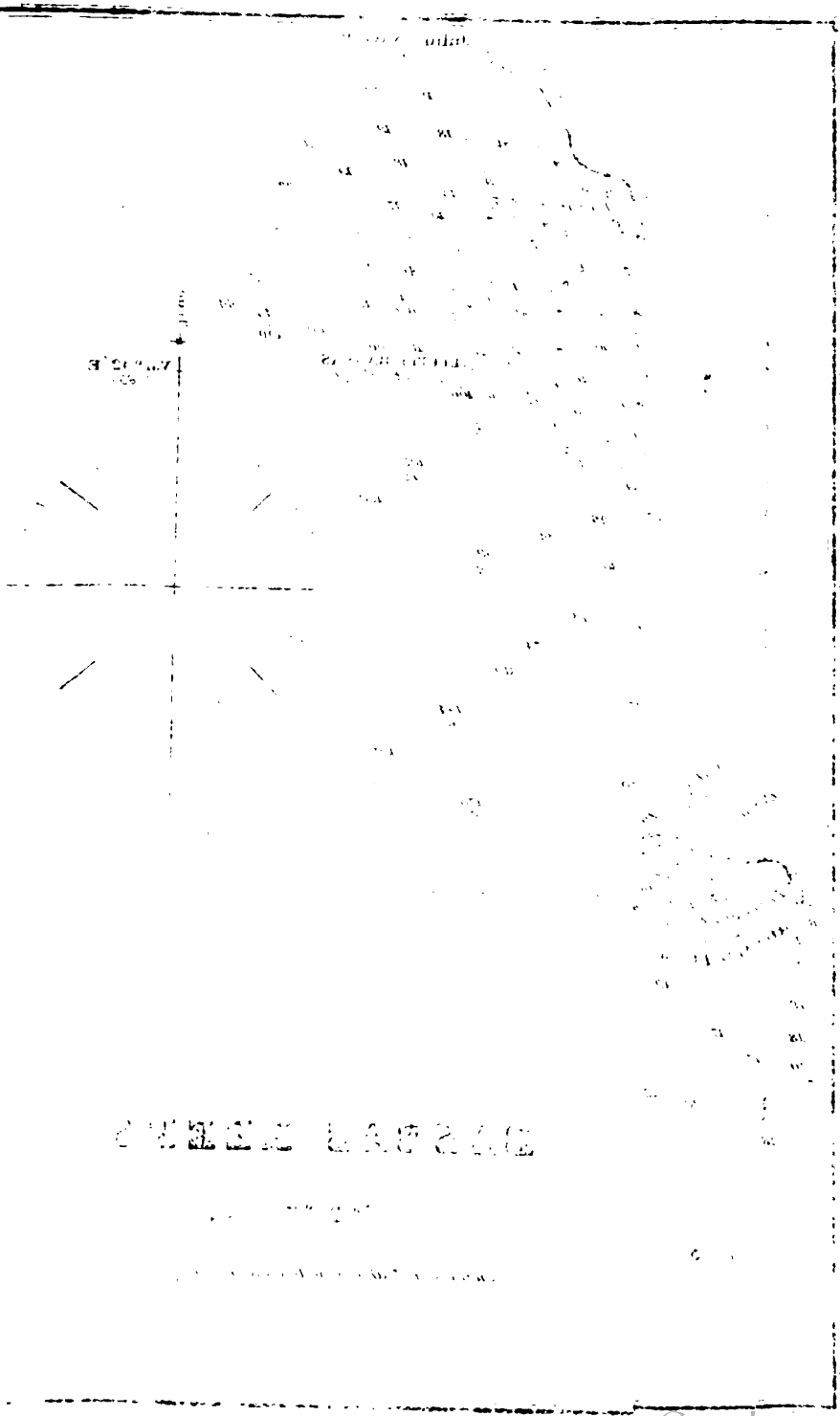

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C E Y L
Kattregamme Hill
(1972 ft.)
Elephant Hill
(480 ft.)
Rocky Knob
Anadowe Pt.
Leray Pt.
Pultopane Fort
Pultopane Pt.
Kirinde
Mahagam Pt.
Oorance Pt.
Kulha Pt.
Kulha R.
Dorava Pt.
Dorava R.
Boondoy Modere
Boondoy Pt.
Pattarajah Pt.
Mast & Bell
Long. 81° 28' E.
Lat.

Vessels during the S.W. Monsoon, by getting to leeward of the port, have taken weeks to regain their position, and in some instances have been compelled to bear up for Trincomalee.

Coast between Point de Galle and the Great Bassas. — From Point de Galle to Dondra head the coast is low and sandy, with intervening rocky projections: from Dondra head to Tangalle it is more rugged, and thence to the eastward is again sandy and barren.

Dondra Head, the southernmost point of Ceylon, in Lat. 5°55′ N., Long. 80° 35½′ E., is low, with a grove of tall cocoa-nut trees on its extremity; from it a reef of rocks projects to the westward, having only 9 to 10 feet on it.

The ground is more or less foul within a mile of the coast-line, the whole distance between Galle and Kirinde (N.W. of the Great Bassas), and should not be approached within 3 miles (nor under 25 or 30 fathoms), which will clear all dangers: during the night, it would be prudent to draw more off shore.

THE BASSAS REEFS.

The GREAT BASSAS* is a dangerous reef of rocks 6 miles distant from the nearest part of the south-east coast of Ceylon. It is about half a mile broad and a mile long in a N.E. ½ E. and S.W. ½ W. direction, and being only about 8 feet above the surface of the ocean, is the terror of the mariner at all times when he has to round the southern point of that island in his passage to or from the Bay of Bengal.

A series of good observations with the sea horizon at the anchorage of H.M.S. *Cyclops* on their northern side, during the survey of these dangers and the adjacent coast, in the course of May, June, and July, places the north-east and highest part of the reef (distinguished by a pole) in Lat. 6° 9′ 53″ N., and 1° 15′ 30″ E., from Point de Galle lighthouse, and therefore in Long. 81° 28′ 2″ E. from Greenwich, assuming that lighthouse to be in 80° 12′ 32″ E.† This result being obtained with nine excellent chronometers from many good observations of meridian distance run both ways, not only between the Bassas and Galle, but also between Galle and the station on shore at Potana point, with which the Bassas is connected by triangulation, may be considered well worthy of confidence.

The reef is one continuous rocky field, portions only showing here and there in the wash of the sea: the north-eastern part is the highest and broadest, forming a rocky wedge-shaped ledge, 70 yards long, N.E. and S.W., by about 30 yards broad, and from 6 to 8 feet above high water. A mast with ball, 68 feet above the sea level, was erected on it in 1858.

The reef has deep water to within half a mile of it on all sides; there being 16 to 19 fathoms on the southern side, 11 and 12 fathoms on the western, 9 and 10 fathoms on the northern, and 7 and 8 on the eastern sides; but beyond these depths, on the western side, about 1 mile from the reef, there is a patch of 8 fathoms; and on the eastern side at 1½ miles, there is another of 5 fathoms, with deeper water between it and the reef.

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* These directions are from the Survey of CAPT. W. J. S. PULLEN, R.N., H.M.S. *Cyclops*.

† This is the longitude of the Admiralty Chart. SIR ED. BELCHER gives it as 80° 16′ 53″ E.; RAPER, in his "Maritime Positions," 80° 13′ E., which latter will probably prove to be nearer the truth.

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From the pole on the reef, Kattregamme peak bears N.W. by N.; Elephant hill, North a little westerly; Chimney hill, N.N.E.; and Nipple peak, N. ¾ E. This latter line of direction also passes a little eastward of Little Elephant hill, a round-topped hill of 105 feet elevation close to the beach, on the west point of the bay next west of Potana.

Anchorage.—The proper station for a light-vessel for the Great Bassas would be in 10 or 12 fathoms water, sand and stones, with the pole on the highest part of the reef, bearing S.S.W. ½ W. to S.W. by W. distant half a mile. This was the usual anchorage of the *Cyclops*, where she rode out many strong breezes.

LITTLE BASSAS.—The centre of this reef bears N.E. ½ E. (N. 49° 45′ E. true), distant 20 miles from the pole on the Great Bassas, and from being only about 2 feet above water, is even more dangerous. It appears to consist of large boulders, which even by daylight are scarcely perceptible from a ship till close up to them.

The extent of that portion usually shown by breakers is not more than a quarter of a mile across, about E. by S. ½ S. and W. by N. ½ N.; but W.S.W. from its western part are many sunken patches, breaking so much in heavy weather that occasionally the sea covered with surf is 1½ miles in extent. The anchorage of the *Cyclops* was on the north-east side of the reef, and from observations similarly obtained as those at the Great Bassas anchorage, the centre of the reef is in Lat. 6° 22′ 48″ N., Long. 81° 43′ 23″ E., being 1° 30′ 51″ East of Galle lighthouse.

The Little Bassas is not more than 4½ miles from the nearest part of Ceylon; and on its northern side are several patches of shoal water, one of which, named the 3-fathoms tail carrying the least water, 3 fathoms, bears N. by W. distant 1½ miles from it. This patch is of very limited extent, having 3½ and 4 fathoms water close to on its southern and western sides, and 6 and 7 to the northward and eastward. From a description by HORSBURGH, it is concluded to be the shoal on which the *Atlas* (one of the fleet of Indiamen under convoy of H.M.S. *Dædalus*), first grazed over on the morning of the 2nd of July, 1813.

The Atlas reef, bearing N.E. ¾ N. 1½ miles (nearly) from the centre of the Little Bassas, is another patch of 3 fathoms, with 4 and 5 fathoms water close around it, and being most probable where the *Atlas* grazed the second time in getting out clear of the shoal water on that eventful morning, is so named in consequence.

There is much difficulty sometimes in discovering the Little Bassas (the light-vessel will now point out their position), especially when approaching them from the westward, while the sun is in the eastern horizon. The *Cyclops*, when sounding off the coast, in hauling in from deep water for her friendly mark, the Chimney hill, had no bottom with 110 fathoms of line, and almost the next cast had soundings in 9 or 10 fathoms, with the breakers just perceptible, close aboard of her,—a practical proof of the steep nature of the bank in the vicinity of the reef on its outer side, and the danger of approaching it from the eastward and southward in that direction on any course from N.N.W. to N. by E. inclusive.

The following are the bearings from the reef:—Chimney peak, N.W.; Nipple peak, N.W. by W. ½ W.; Elephant hill, W. ¾ S.; and Kattregamme peak, W. ¼ S. By seeing either of these objects on the bearings stated against it, the mariner will know that the Little Bassas reef is in the same direction. The reef should always be approached with caution, and a vessel should never attempt to pass between it and the Ceylon shore.

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Anchorage.—Between the Atlas and Little Bassas, and clear of the 5-fathoms line of soundings around the reefs, is a space at least half a mile wide, with depths varying from 5½ to 8 fathoms water, where the *Cyclops*, while examining these shoals, in 1860, usually anchored on a bottom of sand and small stones. This being good holding ground, is the position best adapted for a light-vessel for the Little Bassas; and if moored in 6 fathoms of water nearly, with the Little Bassas S.S.W., distant two-thirds of a mile, about half way and a little westward of an imaginary line from this reef to the Atlas shoal, it would be sufficiently clear from tailing into shoal water in either the S.W. or N.E. Monsoon. Some experience of this anchorage in the S.W. Monsoon has led to the conclusion that there need be no kind of apprehension whatever for the safety of the light-vessel.

Light-vessel.—A light-vessel is now moored (1st of June, 1863) inside the Little Bassas reef, the centre rocks of the reef bearing S. by W. ½ W., distant about one-third of a mile. She exhibits between the hours of sunset and sunrise a *flashing* white light at intervals of *one minute and a half*. The light is 33 feet above the sea, and to a ship within 7 miles of it, in fine weather, it will not entirely disappear; and it is visible from a ship's deck 18 feet above water at the distance of 11 miles.

Coast.—The foregoing being a description of the off-lying dangers, the following is a brief account of the coast, as well as of the high conspicuous land in its vicinity, the heights of which may be used in the daytime, on certain bearings, to point out the position of these dangerous reefs.

The south-east coast of Ceylon between Dorava and Julius Nave points, a space of 30 miles, trends nearly N.E. and S.W., with ranges of high mountains inland, often obscured, however, by the hazy state of the atmosphere, said to be peculiar to this part of the island, particularly during the S.W. Monsoon.

Near the coast inside the line of the Bassas, are several hills of a remarkable form (about to be described), which from their position form admirable landmarks, during daylight and fine weather, for navigating in the vicinity of the Bassas.

The shore is comparatively low and barren, fringed with a belt of sand, but without any marked salient features; the points are generally rounded and sandy, rising to elevations of about 100 feet. Off the pitch of all the points are rocky patches, extending in some cases to the distance of a quarter of a mile. Along the whole line of coast the surf breaks heavily on the beach, the first roller rising at the average distance of a cable's length from the shore.

Kattregamme Hill.—The most prominent land seen when approaching the Bassas from the westward is the Kattregamme range of hills, the nearest and highest of which is between 7 and 8 miles distant from the sea. These hills are sometimes conspicuous both from the eastward and westward, when others nearer to the sea are hardly discernible. Their summit presents an irregular ridge, the north-east peak of which is the highest, being 1972 feet above the sea.

Elephant Hill, the next height to the eastward, is conspicuous from standing alone on the low land near the shore, and bearing a remarkable resemblance to the animal from which it is named. It is 2 miles from the beach, bare and destitute of trees on its summit, which is 480 feet above the sea.

Little Elephant Hill, in shape resembling a haycock, stands on the extreme point forming the western horn of Elephant bay; its elevation is 105 feet, and from it Elephant hill bears N.W. ½ N. 2 miles.

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Off this point, at the distance of one-third of a mile in an E.S.E. direction, is a rock just above the water.

Anadowe Point, next west of Little Elephant, may be known by its off-lying rocks. The outer one, which is about 4 feet above the sea level, is distant three-eighths of a mile from the shore, and is steep-to on the outside, having 7 fathoms within a cable's length.

Nipple Hill, farther inland, bears from Elephant hill N. by E. ¾ E. distant about 9 miles. Rendered conspicuous by its superior elevation, 903 feet above the sea, which places it as if alone, this peak is also distinguished by a flattened summit, with two lumps (one at each end) in a direction about W.S.W. and E.N.E., from which it derives its name; the western of these nipples is the higher, the position of which was determined. This hill may also be known by a remarkable cone W.S.W. of it, generally distinguishable, but more so from the eastward, although only 520 feet above the sea.

Chimney Hill, next in succession eastward, is of much service to a vessel for ascertaining her position in reference to the Bassas. It is 4½ miles from the nearest beach, 445 feet above the sea, and very conspicuous, being the highest part of a low range which takes an east and west direction; it appears to be separated from the western part of the range, and derives its name from its resemblance to a chimney. From the Great Bassas it is not easily seen, being in fact sometimes entirely concealed by the haze which generally hangs over the land, especially in the S.W. Monsoon.

Potana Point is rather more than one-third the distance along the coast, between Elephant and Chimney hills. The station on this point, a sand-hill 105 feet above the sea, is in Lat. 6° 21′ N., Long. 81° 33′ 23·45″ E., depending on the position assumed for Galle lighthouse, and is the mean of the runs to and from Galle, being 1° 20′ 51·45″ E. of that lighthouse. The station bears from the pole on the Great Bassas, N. 24° 35′ E. (true) distant 12¾ miles; and from the centre of Little Bassas S. 79° 10′ W. (true), distant 10 miles.

Potana point forms perhaps the deepest bay on this coast, and would afford shelter, in the S.W. Monsoon, for small craft not drawing more than 10 feet, but a heavy sea always setting into it, throws the surf up to its innermost south-west angle, permitting no one to land or embark without a good wetting. Off the point, and also to the westward of it, the shore is beset with detached rocks for about a mile out, with some showing and others covered, on which the sea is always breaking; thus presenting the characteristic feature of the coast—viz., a rocky sandy shore, wherever there is any tendency to a point.

Off Potana point is the only anchorage in-shore that was used or was even found available for the *Cyclops* in the course of the survey. She anchored in from 5 to 6 fathoms water, with the point bearing about W.S.W.

DANGERS WITHIN THE BASSAS.—**Elephant Reef** is 1½ miles in length, N.E. ½ E. and S.W. ½ W., and a quarter of a mile broad. The north-east breaker on it is 1½ miles from Little Elephant hill, which is in line with Elephant hill.

The south-west extremity is S.E. ½ E., seven-eighths of a mile from the detached rocks of Anadowe point. Between is a clear channel carrying 8 to 9 fathoms.

Potana Reef, the centre of which lies E. by N. ¾ N. 1½ miles from the north-east end of Elephant reef, and N.N.E. from the pole on the Great Bassas, is a rocky patch about half a mile broad and nearly square, on which the sea always breaks. No

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broken water was seen between it and the Elephant reef, and there may be deep water between them, but the space could not be examined owing to the heavy sea, and should not therefore be attempted.

Cyclops Reef is a hard, narrow, sandy ridge, with patches of rock and boulders, having only 2 fathoms on it in some places. It is 3¾ miles long, E. by N. ½ N., and W. by S. ½ S., and from a quarter to half a mile in breadth.

From its west end, in 3 fathoms, Potana point bears N. two miles; and from its eastern end, in 4 fathoms, Chimney hill bears N. ¼ W., the shore in that direction being 3½ miles distant. This reef is more dangerous than either of the former, in consequence of the sea breaking only occasionally on it, and from its having deep water close-to on each side. In the course of the survey the *Cyclops* struck on it three times, in different places.

There is a channel between the western extreme of the Cyclops reef and the Potana reef 2 miles wide, with from 8 to 10 fathoms, frequently used by the *Cyclops* in passing between her anchorage at Potana and the great Bassas. Chimney hill, on with Potana point, leads through in mid-channel.

Two lines of soundings were taken across the Cyclops reef with 5 fathoms being the least water, so that it is possible a clear channel may yet be found there; but the least depth on the reef was 2 fathoms, besides many patches of 2½ and 3 fathoms.

Dædalus Reef is a small narrow patch of 15 feet water, lying N.N.W. 3½ miles from the Little Bassas, and 1½ miles off shore, with Chimney-hill bearing N.W. by W. In the course of the survey the *Cyclops* struck on this shoal heavily, and lifted her rudder several times, but from its being so narrow, was soon off it, and could not again find the exact place with the lead. The depth, therefore, was determined by the ship's draught of water, for on sounding around her there were no less than 4½ fathoms at the bows, 4¾ in starboard chains, 3¾ in port chains, and 3¼ fathoms astern. From HORSBURGH's description, this is evidently the shoal on which the *Dædalus* was wrecked, for it states, "she fell over and went down," the only spot where this could happen, from the deep water close around it. The *Cyclops* had 7 fathoms as soon as she was off.

Directions.—There is a deep channel within all the before-mentioned dangers that may be taken in case of necessity, by keeping about midway between the Elephant, Potana, and Cyclops shoals on one hand and the main land on the other, or a mile off shore. The Dædalus may be passed on either side. If passing inside from the westward, keep about a mile from the shore till up to Julius Nave point, then edge farther from it; if passing outside, keep about half way between the Little Bassas and the shore; but no stranger should attempt the inner passage unless in case of sheer necessity, as the coast does not permit of any leading or back mark being given.

There is deep water between the Great Bassas and the land, the shore of which is clear at the distance of 2 to 3 miles from it all the way to Galle.

Should a vessel, from unforeseen circumstances, find herself at night inside the line of the Bassas, it would be better to anchor and wait for daylight to obtain her exact position by cross bearings.

A vessel bound westward, after clearing the Little Bassas, and certain of daylight, if keeping a good look-out, may haul in and pass inside the Great Bassas; she may also do the same going eastward, but when clear of the Great Bassas she must haul

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to the southward to pass outside the Little Bassas, the light-vessel marking which will now be a good guide.

The coast is clear as far as Galle, and may be approached safely to 2 miles distance, but, as a rule, only in daylight, as it is impossible to judge of distances accurately by night.

Caution.—In Lat. 7° 1′ N., at 1 mile south of Saugheman-kande, the eastern point of Ceylon, the *Cyclops* sounded on the south end of a bank, which was found to extend 4 miles in a N.N.E. direction, with every appearance of a deep channel in shore. Four fathoms was the least water obtained, but the bottom was distinctly seen from the ship whilst skirting its outer edge in 8 and 10 fathoms, and it is probable that much less water exists. An offing of 4 miles is, therefore, recommended to strangers between the parallels of 7° and 7° 5′ N.

Currents and Tides.—The currents in the vicinity of the Great and Little Bassas reefs are alike remarkable for their rapidity and eccentricity. In the line of and between the two reefs, that is, about 6 miles off shore, the current, during the S.W. Monsoon, sets along the coast to the N.E., at the rate of 1 to 2 miles per hour, only diverging from this, its apparently natural course, when within the influence of the broken ground of the reefs.

The rate appears to be influenced by the strength of the wind, and is, consequently, most irregular; the only way, therefore, of avoiding danger is to give the rocks a wide berth, although it may incur a great loss of time. Instances are known, where vessels, most providentially, only have escaped wreck, particularly the *Dalhousie*, on her way from Madras to Galle: to have seen the pole on the Great Bassas in a dark night must have placed her close to it.

The *Cyclops*, towards the close of July, running a meridian distance to the Great Bassas from Galle, passed Dondra head at 6 P.M.; her position was well ascertained just before dark, showing the distance of 57 miles to the western reef, bearing E. by N. ½ N. The wind was aft, moderate, and a S.W. swell; sail was shortened, the fires had been banked, and wheels disconnected some time, so that the distance might not be overrun, and a large allowance made for current.

At 3h. 45m. the next morning the wind was somewhat fresher, and the vessel was rounded to, with head southerly, supposed to be 10 miles from the Bassas, after allowing fully 10 miles easterly current. At 4h. a cast of 45 fathoms was obtained, plainly showing from previous sounding the ship had drifted outside the line of the Bassas reefs; and at daylight, instead of having them in sight, she was at least 10 miles to the S.E. of them, and no bottom with 100 fathoms of line; set by a current of 26⅓ miles in 14 hours, or 1·85 the hour, on about a S. by E. course.

Had this current been more northerly, as might reasonably have been expected from former observations, serious consequences might have resulted. Nor was this the strongest current experienced, nor in the only place. About half-way between the two reefs a current of 2½ knots, on an E. by N. course, was found.

Midway between the line of the reefs and the shore the direction of the current assumes a more northerly trend, and the rate is reduced, until it at length becomes absorbed in an in-shore eddy, which was almost invariably found setting along the coast to the S.W. at the rate of half a mile per hour.

Between Point de Galle and the Bassas the current sets along the line of coast, the

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rates varying at different times, without any apparent cause, from 1 to 2 miles per hour (it is said to attain sometimes the rate of even 4 knots); but to the northward of the Little Bassas, close in on the eastern shore, a decided southerly set was experienced, at the rate of nearly a mile an hour, which increased to a velocity of 2 knots near Trincomalie.

While lying under the Little Bassas, or within them, this set directly to windward was occasionally felt, the wind blowing strong enough at the time to keep the ship quite broadside on; but this seldom or never lasted more than a couple of hours. At the Great Bassas it was never felt, and only occasionally as far west as the anchorage off Potana point, and the greatest strength found at the Little Bassas was three-quarters of a knot.

Coast between the Little Bassas and Trincomalie.—From the vicinity of the Dædalus and Atlas rocks, northward, the coast is supposed to be clear of danger as far as Lat. 7° N., and ships may safely approach it in fine weather to the distance of 3 or 4 miles, in 14 to 20 fathoms water. Between 7° 1′ N. and 7° 5′ N. there is a bank of shoaler soundings (4 fathoms or less) running N. by E., which must be avoided, —the coastline opposite to it trending for a short distance to the N.W.-ward; ships should not go nearer to it than 5 or 6 miles, where the depth is 16 fathoms and upwards. Thence to Lat. 7° 20′ the coast is again free from shoals; but beyond, and especially for the next 10 miles, ships are cautioned not to make bold with the shore, for there are several rocks and reefs in the vicinity—one of which, the Alphee (reported in July, 1864), lies 2 miles from shore, in Lat. 7° 24′ N., Long. 81° 50′ 30″ E.; it is from 100 to 150 yards in length (N. and S)., with about 19½ feet water upon it, and 12 to 14 fathoms close-to; bottom, white, with black patches, distinctly visible.* Nearly all the projecting points of land thence to Trincomalie are dangerous to approach on account of outlying foul ground, with rocks and shoals extending some distance seaward. Therefore, to be safe, do not stand in under 22 to 30 fathoms, or 5 to 6 miles from the shore, unless provided with a chart on a large scale.

Although the coastline above described is generally low, there are several remarkable objects inland:—the Friar's Hood, 1563 feet high, is in Lat. 7° 26½′ N., and 6¼ leagues from the sea; when bearing S.W.-ly it has the appearance of a friar's hood, but seen to the N.W.-ward it has the form of a pyramid. Gunner's Quoin, 1320 feet high, in Lat. 7° 52½′ N., is frequently seen 40 miles off.

TRINCOMALIE.

TRINCOMALIE, with its harbour and bay, is distinguished by the flagstaff near Fort Frederick (to the northward), and a lighthouse on Foul point (to the southward); both are conspicuous objects from seaward.

Flagstaff point, in Lat. 8° 35¾′ N., Long. 81° 14¼′ E., is high, steep to seaward, and covered with trees; it is the extremity of a narrow strip of land which, projecting about ¾ of a mile to the north-eastward, forms with Elizabeth point a large open bay 3 miles wide and 1 mile deep, known as the *Back bay* of Trincomalie. There is

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* H.M.S. *Vigilant* searched for this shoal in December, 1864, and found 6, 8, and 10 fathoms, but did not come on the 19 feet, as reported by LIEUT. J. GEHENNE, of the French Imperial steamship *Alphee*, from which it was inferred the shoal is closer in-shore.

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a conspicuous detached rock off Flagstaff point. The peninsula which stretches to the southward and eastward from the town is steep and bluff on the seaward front, and is, therefore, easily recognised, as the coast north and south of it is low near the sea. The S.E. point of the peninsula has an islet off it, named Chapel island, off which, to the N.E. ½ E., distant ¾ of a mile, lies a reef of rocks; they are nearly on the edge of soundings, and have 20 to 30 fathoms very close to them on the east and south sides. Chapel rock, on the inner part of the reef, is above water. At two spots on the east side of the peninsula projecting rocky points stretch from a ¼ to a ½ of a mile seaward, and ought not to be approached under 15 fathoms. The detached rock open of Flagstaff point clears all these dangers. The S.W. point of the peninsula (Elephant point) has Elephant island near it—to the S.E.—from which a reef named Elephant rock projects to the westward, and has only 4 feet water on its shoalest part; this is marked by a *white* buoy.

Foul point, the outer S.E. point of Trincomalie inlet, is now marked by a lighthouse, and has a reef projecting from it to the northward for ¾ of a mile.

Lights.—A *white* light, showing a *flash* every *half minute*, and visible 17 miles, is exhibited from a lighthouse 104 feet high, recently erected on Foul point, the south-eastern point of approach to the great bay of Trincomalie. Beyond the distance of 7 miles the eclipses are total between the flashes, but within that distance there is a faint continuous light; the tower stands in Lat. 8° 32′ 10″ N., Long. 81° 18′ 50″ E.

A *fixed white* light, visible 10 miles, is also exhibited from a lighthouse recently erected on Round island, at the entrance to Trincomalie harbour.

The light on Flagstaff point is now discontinued.

Directions.—There is some difficulty in making a landfall about Trincomalie during October and November, from the strong current which sets to the southward at the rate of 2½ or 3 knots, and from the light variable winds, with occasional squalls and thick weather, prevalent just before the N.E. Monsoon sets in. Endeavour, therefore, to make the land in about Lat. 9° N., as, indeed, is advisable from the end of September to the end of March, if bound to Trincomalie during that period. The coast is clear on that parallel, and may be safely approached to the depth of 20 fathoms, even by night. If the land be made towards the close of the day, stand off to the N.N.E. or N.E. at the rate of 3 or 4 knots per hour during the night. Should the wind be N.E., keep working to windward, and when standing in shore keep the lead going *very frequently*, not failing to tack as soon as the water shoals to 22 or 20 fathoms.

At daylight, run in for the land on a N.W. or W.N.W. course, keeping outside Pigeon island (in Lat. 8° 43¼′ N.) a rock 99 feet high, and about 1⅔ miles from the shore. The coastline for 15 miles N.W.-rd of this island is, here and there, foul, but no rocks extend beyond a mile from the shore; but to the southward of the island, for the distance of 5½ miles, the foul ground extends nearly 2 miles off shore in some places.

Pigeon Island, about N. by W. ¾ W., 8 miles from Flagstaff point, and N.W. by N. 13 miles from the light-tower on Foul point, is a rocky island with some shrubs on it; being encompassed by islets, and rocks (above and under water)—especially between it and the shore—there is no safe passage inside except for boats. When passing, it is advisable to keep outside it at the distance of 2 miles *at least*, in soundings of 21 to 24 fathoms, although it may be approached to 18 fathoms.

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Rocks.—*Diomede Rock*, on which H.M.S. *Diomede* struck, lies 1¾ miles S.E. ½ S. from Pigeon island, and 1½ miles off shore; the depths close to it are 9, 10, and 11 fathoms. Fairlie rock, on which the *Fairlie* struck, is 3½ miles S.S.E. ½ E. from Pigeon island, and nearly a mile off shore; it is about 40 yards in diameter, with 16 feet water on it, and has 9 to 11 fathoms close-to all round. Lively rocks ½ a mile nearly due east of Elizabeth point, and Heroine rock ¾ of a mile S.S.E. ½ E. of the same point, are about the size of a boat, and have 6 to 7 fathoms close to them.

In consequence of the foul ground in the locality just indicated, it is dangerous for ships to make too free with the shore, therefore do not haul in until 3 or 4 miles south of Pigeon island, then steer direct for Flagstaff point.

From March to September, during the S.W. Monsoon, there is no difficulty in making Trincomalie, for although the current in the offing sets to the northward, it seldom runs more than one knot near the shore. Between the parallels of 7° 30′ and 9° 30′ N., the coast may be safely approached to 22 fathoms at night, and to 15 fathoms by day.

Back Bay.—*Coming from the northward*, Pigeon island (in Lat. 8° 43½′ N.) being rounded at the distance of about 2 miles, steer S. ½ E., and having made out the flagstaff, approach it on that bearing, hauling more into the bay as soon as the Lively rocks are passed; the anchorage is in the southern part of the bay to the north-eastward of the town of Trincomalie, with Flagstaff point bearing S. by E. to S.E. by S., distant ½ a mile, in 7 to 10 fathoms (according to the size of the ship), sandy bottom. The soundings decrease gradually to the sandy beach, except about a mile to the N.W. of the point where rocks stretch from the shore to 4 fathoms. *Coming from the southward*, as soon as the flagstaff is distinguished steer for it, rounding Flagstaff point close, and bringing up as above. This anchorage is safe between the middle of March and the middle of October, the period of the S.W. Monsoon.

To Enter the Harbour.—If the wind be fair keep in mid-channel, and when Round island and Marble point (beyond it) are made out, steer about W. by S. ½ S., keeping the high land of the point open to the northward of the island until the entrance to the harbour is open; then steer midway between Round and Elephant islands, and between Minden and Elephant rocks, both of which are marked by buoys. When to the northward of these rocks, steer direct for the entrance of the harbour, which is about ¼ of a mile wide between Ostenberg point and Small Sober island,—either of which, however, may be approached within a vessel's length. On the hill of Ostenberg point there is a battery. Inside the entrance above indicated a spacious harbour, completely land-locked, is opened out, with several coves convenient for heaving down ships. After rounding the shoal (*buoyed*) to the northward of Ostenberg point, the *anchorage off the dockyard* is south of York shoal (also *buoyed*); but intending to anchor *off the town* in the usual position for merchant ships, when through the entrance between Ostenberg point and Small Sober island, steer N.N.W. until past the buoy on York shoal, then haul up to the N.E.-rd, and anchor abreast the Victualling store, and ½ a mile from the wharf, in 6 fathoms water.

The shoal just inside Ostenberg point has only 3 feet on its shoalest part, and York shoal only 5 feet. When making for the merchant anchorage, pass midway between Powder rocks and York island.

At night, when approaching Trincomalie harbour *from the southward*, bring Foul

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point light to bear W. distant 2 miles, and then steer N.W. until Round island light bears W.S.W.; then steer for this latter light until Chapel hill, the high bluff eastern extreme of land on the northern side of entrance, and easily seen in the darkest night, bears N. distant about 1½ miles; then steer W. by N. until Round island light bears S. by E. ¼ E.; lastly, steer N. by W. ¼ W., passing midway between Ostenberg point and Sober island, and anchor with the light bearing S. by E. ¼ E., in 12 fathoms water.

After passing Ostenberg point the water shoals rapidly from 25 to 12 fathoms.

Approaching *from the northward at night*, when Foul point light is seen, bring it to bear S. by E. ¼ E., and steer for it until Round island light bears S.W. ¼ W.; then steer for Round island light until the extreme point of Chapel hill bears N. by E. ¼ E.; afterwards proceed as above.

Working In.—When the wind blows strong from the westward, a strong outset renders it difficult to work in (at times) during the S.W. Monsoon; ships then bound to Trincomalie generally fall in with the land to the southward of the port. Passing Foul point, it is safe to stand into 14 fathoms, or go about when Marble point just opens northward of Round island. To avoid the outset from the inlet, it is recommended to work in abreast of Back bay and Flagstaff point, taking care when near Rocky and Chapel points to keep the *detached* rock off Flagstaff point well open of that point to clear Chapel rock, and the dangers northward of it. When round the rock, Chapel and Elephant islands may be borrowed on, for they are steep-to; but in standing to the southward, do not borrow under 20 fathoms towards the dangers off Norway point and island. Being to the westward of Norway island, do not stand too soon to the southward, towards the bottom of Great bay, on account of the sand-bank, with 3 fathoms on it, extending about a mile to the S.S.W. of that island, having 15 and 16 fathoms water within half a ship's length of it, and at a small distance no soundings. In approaching the bottom of Great Bay, the lead must be kept going; for although there are no soundings within a mile of the shore in some places, the first cast may be 35 or 40 fathoms, then 18 or 20, and the next cast probably 10 or 12 fathoms. It would be imprudent to go under 12 or 14 fathoms, as the distance from these depths is not more than 1 or 2 cables' length in some places to 4 fathoms, at the distance of ¼ or ⅓ a mile off shore: but to the southward of the bank stretching from Norway point, in the S.E. corner of Great bay, the soundings are more regular, and extend farther out, and here ships may anchor. In standing to the northward for the entrance of the harbour, pass close to the eastern side of Round island, which is steep-to, and you will probably reach the harbour's mouth without tacking, keeping the weather shore on board in entering.

The N.E. Coast of Ceylon. — Mœletivœ house, in Lat. 9° 16¼′ N., Long. 80° 49¼′ E., stands close to the sea, and bears about N.W. by N. from Pigeon island, distant 13⅓ leagues; the coast between them is low, and safe to approach to 18 or 20 fathoms in the night, if the lead is kept going, or to 12 fathoms, occasionally, when working in daylight.

Mœletivœ Shoal.—From Mœletivœ house, a dangerous coral shoal, having only 6 to 12 feet water on it, called Mœletivœ shoal, extends eastward and N.E. nearly 4 miles from the shore, which ought not to be approached nearer than 13

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fathoms. As there are 20 and 21 fathoms about 6 miles from the shore, and 4 or 5 miles to the S.E. of the shoal, a ship should edge out a little when near it; but when abreast of its eastern extremity, she may with the land-wind borrow towards it to 13 or 14 fathoms. The North side of this shoal is not so steep, but is composed of detached knolls, the depths decreasing regularly to 9 or 10 fathoms close to its northern verge, and to 6 and 7 fathoms along the N.W. part, close to the shore. From this shoal the coast is low to the N.E. point of Ceylon, with 7 fathoms water near the sandy beach; but care is requisite to avoid the following danger.

Point Pedro Shoal encompasses the N.E. extremity of the island, and from thence stretches nearly parallel to the coast about 8 leagues to the S.E., having only 2¼ to 4 fathoms on it in many places, and 2¼ fathoms on two patches in Lat. 9° 50½′ N. and 9° 55½′ N.: one of these bears nearly E. ¾ S. from point Palmyra, the N.E. extreme of Ceylon, distant about 5 miles; the other N. ¼ E. from the same point, distant 4 miles. Between this extensive narrow shoal and the coast there is a safe channel about 2½ to 3 miles wide, with regular soundings, soft mud, 7 fathoms close to the shore, 7, 8, or 9 fathoms in mid-channel, and 5 or 6 fathoms close to the inner edge of the shoal. To the eastward of it the bank of soundings is also flat, with regular depths, decreasing to 5 and 6 fathoms close to the S.E. and eastern parts of the shoal, and to 4 fathoms, coarse brown sand, close to its N.E. verge. Mark house (in Lat. 9° 32¾′ N.), bearing S.W. by W. ½ W., clears the south end of Pedro shoal.

THE GULF OF MANAAR AND TUTICORIN.

The Navigation of the Gulf.—It was formerly considered a hazardous undertaking for a vessel of any size to proceed far up into the GULF OF MANAAR—more particularly during the S.W. Monsoon, when it was supposed to be impossible to beat out again. Later experience, however, has shown that no dangers exist that may not be avoided by ordinary care and attention; and that as regards working to windward against the Monsoons, no difficulty will be experienced if the following instructions be attended to.

During the N.E. Monsoon—that is, from November to March inclusive—fine weather, with land and sea breezes, will be found to prevail on the Ceylon side of the gulf, where good anchorage may always be selected between Colombo and Chilaw, at 1½ to 3 miles off shore, in 6 to 9 fathoms sand. Vessels wishing to beat up during the first three months, ought therefore to keep over on that side till they have advanced sufficiently far to make certain of their port, if bound to the Indian coast, as the breezes there may be expected to blow steadily and strong from N.N.E. with a strong lee current. In rounding cape Comorin at this time, the Indian shore may be kept on board till abreast of Manapaud point, a high promontory with a small white church erected on its summit. A vessel may then stretch across with advantage, and probably in the next tack fetch Tuticorin, the only port on the Indian coast frequented by large vessels.

Small vessels of light draught will also find this the easiest method of working up; and if bound to Paumben, had better keep the Ceylon shore till abreast of Calpentyn, which they may know by the three long hills of Kodramallai, the only ones near the coast. They can then stand across, and make Paumben either by the

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EASTERN CHANNEL between the island of Rameseram and the reef and islands south of that port, or by the WESTERN CHANNEL between Freshwater and Anapaar islands at Valinookum point.

During the S.W. Monsoon a ship ought to keep over on the Indian side till near Manapaud point, when she will generally be able to fetch to windward of Colombo, and be clear of all dangers. The only safe place for vessels of size to anchor in on the Ceylon coast during this Monsoon is at Colombo, where the current from the Kalany Gange or Mutwal River running to windward, takes much of the strain off the cables of vessels riding there. If obliged to slip, it is safe to stand across the gulf to Tuticorin, which being situated on the weather side affords good shelter and anchorage.

Small craft working down from Paumben will do well to keep inside the islands till they reach the Western entrance of the inland navigation at Valinookum point. They can now work down near the coast as far as Manapaud point, when their fetching Colombo on the starboard tack may be considered certain.

The breezes in the gulf of Manaar are generally stronger than on the adjacent coasts, the only moderate months being April and October; yet if the instructions already given be attended to, no difficulty will be found in working up or down against them. The N.E. Monsoon sets in with force about the middle of November, and lasts till the end of January, bringing with it a current of from 20 to 30 miles a day to the S.W. It blows steadily from N.N.E. along the Indian shore, but on the opposite side is modified into land and sea breezes with very fine weather. In February, land and sea breezes commence on the Indian side; and by April the general set of the wind in the gulf will be found to have drawn round to the Southward, the sea breezes being from S.E. to S.W., according to the coast on which they prevail. These now increase in force till about the middle of May, when the regular S.W. Monsoon sets in, blowing with great violence from W.S.W. on the Indian coast, and S.W. on the coast of Ceylon, where it commences rather earlier, and is attended with heavy fall of rain, thunder, and lightning. In August, the strength of the Monsoon abates, but strong Southerly winds are still experienced in this and the next month, becoming lighter as the season advances. Variable and gentle breezes, with smooth water, may usually be expected in October, lasting till the setting in of the N.E. Monsoon, which is ushered in on the Indian side by 15 or 20 days of heavy rain.

CURRENT.—The current will generally be found to set with the wind in the strength of the Monsoons; but this is not invariably the case. Care and attention must therefore be paid to the soundings, and unless a good pilot be on board, a vessel ought not to shoal her water during the night to less than 12 fathoms above, or 18 or 20 fathoms below Manapaud, on the coast of India, or to less than 10 fathoms above and 20 below Colombo, increasing the depth to 40 till abreast of Point de Galle, on the coast of Ceylon; excepting, of course, her position be ascertained by the bearing of the light at Tuticorin or Colombo.

TIDES.—The flood sets in about E.N.E. and the ebb about S.W., but their direction is greatly influenced by the wind.

Cape Comorin, as already noticed (p. 422), is low, rising in a gradual slope, and covered on the east side with palmyra trees, may be easily distinguished by the reddish appearance of the soil and a large white Choultry, situated near the beach. Two large rocks, with a small one outside, on which the sea at all times breaks with much

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violence, stretch to the distance of ¼ mile from the shore. They are steep-to, and may with a fair wind be approached within ¼ mile in 8 or 8½ fathoms, but with a scant wind caution is necessary, as the current sets rapidly round the point, and may drift a vessel into danger. CAPTAIN HOPE, of H.M.S. *Thalia*, saw breakers N.W. ½ W., ¾ of a mile distant, cape Comorin bearing W. by S.; extreme eastern land N.E. by N.; sounded, and shoaled suddenly from 11 to 3½ fathoms.

The **Tinevelly Coast,** which forms the west side of the gulf of Manaar, is more or less foul from the parallel of 8° 14½′ N., and thence to the northward; the shoal spots in many places extend as much as 9 to 11 miles from the land.

Manapaud Point, situated E.N.E. ¾ N., 36 miles from cape Comorin, is a high sandy promontory, jutting out boldly into the sea. It has a small whitewashed church on its summit, visible in clear weather 12 to 13 miles off, which appears at first like a ship under sail. Some foul ground (4 to 10 fathoms) is situated off this point extending E.N.E. and W.S.W. 10 miles, with an average breadth of 1 mile. The following are the bearings of the two shoalest parts:—

Inner shoal part	Manapaud church . . . N. 54° W. 5 miles	4½ fathoms sand.	
	Trichendore pagoda. . . N. 1° W. 10¼ „		
Centre shoal part	Manapaud church . . . N. 54° W. 8 „	4 fathoms sand.	
	Trichendore pagoda. . . N. 12° W. 12½ „		

There are many other patches with 5½ and 6 fathoms, over which a vessel might pass, yet the safest plan when going between the reef and the point, is not to bring the church to the West of North till within 2 or 3 miles of it; an E.N.E. course will then take a vessel out clear.

Trichendore Point, in Lat. 8° 29′ 55″ N., is 8½ miles N.N.E. ¼ E. of Manapaud point, and 18 miles S. by W. (westerly) of Tuticorin light, and may be known by its having a high dark pagoda on its extremity, seen in ordinary weather 12 to 15 miles off.

TUTICORIN.—This port is a place of resort for ships of the largest class to fill up with cocoa-nut oil, cotton, &c.; but being fronted with some extensive mud-banks, the anchorage is a considerable distance from the town.

Light.—On Hare island, 2½ miles E. of Tuticorin, a *fixed white* light is exhibited on an obelisk, at an elevation of 43 feet above the sea; it is visible between the bearings of N. by E., round by W., to S. by E., or 202° open to the East; it may be seen at the distance of 12 miles; position, Lat. 8° 47′ 17″ N., Long. 78° 11′ 17″ E. The following are the instructions relative to it:—

Directions.—A vessel making the port at night may anchor with the light bearing from W.N.W. to W. by S. about 1¾ to 2 miles off shore, where good holding-ground will be found in 6 to 6½ fathoms. At 3½ miles distance with the same bearings, the ground is foul on pearl banks.

Approaching from the *southward*, the light may be kept about N.N.W. till within 3 or 4 miles, when the above anchorage may be selected; but should a vessel suddenly deepen her water from 7 or 8 fathoms to 12, 15, or 20, she should immediately steer North till she makes the light, taking care to keep farther to seaward if it bears North of N.N.W. The outer part of this deep water lies a little to the North of the head of the Coilnapatam reef, and bears S. by E. 10 miles from the Tuticorin light.

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Approaching from the *northward*, a vessel may keep the light about S.W. till within 3 or 4 miles, when she must steer more out for the anchorage; but in no instance ought the water to be shoaled under 6½ fathoms, excepting with the bearings on for the anchorage, and then not under 6.

During the N.E. Monsoon, vessels should lie with a good scope of cable out; as, although the seas are not heavy, they are sharp, and occasion a chain to jerk. The sea-breeze at this time blows on the reef, and a second anchor (with chain ranged) ought always to be kept ready for letting go.

During the S.W. Monsoon, which usually lasts from the middle of May to the middle of August, the port may be made without fear, for, although the winds are very violent, they are invariably off shore (from W. to S.W.), accompanied by smooth water. At this time vessels may approach the reef to 5 fathoms, but should always have a stream anchor to seaward, as occasionally, during the lulls of the Monsoon, a light air comes in from the eastward.

As a rule, large vessels ought not to approach the land above Tuticorin nearer than 6 or 7 miles, as 2½ or 3 fathoms are found 5 miles off, in some places. When some large clumpy trees at Putnurmadoor, seen 10 miles off, bear North of West, no other object on shore being visible, the shoal water is to the northward.

There are two channels for small craft into Tuticorin harbour, but that to the north is so intricate as to be seldom used. The Southern channel leads between the southernmost island and the main land, the reef connecting them being crossed in 12 to 14 feet at a distance of ½ to 1½ miles of the island. This being passed, a course may be steered for Devil's point on the main, after closely rounding which a small vessel may stand direct for the town of Tuticorin, carrying 11 to 9 feet. Before passing Devil's point 2½ fathoms are found, sand and mud.

At the distance of 2½ miles due East of the Penacoil tope, a scanty tope to the south of a large ruined building, 9 miles from Devil's point, is situated the inner edge of an extraordinary natural basin in the rocks, 4½ miles east and west, and averaging 1¼ miles in breadth; the outer part being the broadest and deepest. The bottom is composed of fine sand and mud in 7 fathoms on the Western to 18 and 20 fathoms on the Eastern extreme, from which it suddenly shoals to 9, 8, and 7½ fathoms on a pearl bank. In standing up the coast during the night with a scant wind, this is good ground for ascertaining a vessel's position, as no similar spot exists from Paumben to Comorin. From the outer part in 15 to 20 fathoms, the anchorage off Tuticorin bears N. by E. 9½ miles.

Good anchorage in 3 to 4 fathoms mud, with this tope bearing west 1 to 1½ miles, is to be found here during southerly winds under the lee of a reef which commences 2½ miles N.E. by N. of the next point (Coilnapatam), and continues with little exception to cape Comorin. As far as Manapaud point, this reef varies in its distance from the land from 1 to 2¾ miles, but thence to Comorin it seldom exceeds ½ mile. The head of this reef lies S. by W. 10½ miles from Tuticorin light.

The following remarks and directions (pp. 444 to 447) are by Mr. J. T. FRANKLIN, who had charge of the Manaar Survey (1846).

Sailing Directions for Palk's Bay.—There are two good entrances into Palk's

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bay from the eastward: one between point Calimere and the northern end of the Middle banks, having 19 to 24 feet; the other between the southern end of the same banks and the north coast of Ceylon, with 5½ to 8 fathoms. Sailing directions were published some years back for the northern passage, but I would strongly recommend all commanders, with a vessel drawing 12 feet, to make use of that to the southward, except with a leading wind or with the aid of steam.

Paumben bears from point Calimere S. 31° W. 73 miles; and after rounding the spit that stretches off to rather more than a mile east of the latter place in about 3½ fathoms, 3 miles off shore, a vessel may stand S.W. ½ S., keeping in 3½ to 4 fathoms, till two tall detached palmyra trees to the westward bear about north. She is then clear of the banks. This channel, through the centre of which the foregoing directions lead, is 3 miles wide, having a small sandy knoll, with only 2¼ fathoms on, about a mile inside its southern boundary, and 4 miles S.S.E. of the point. The depths on each side vary from 2 to 3 fathoms, with a bottom of hard sand, while that of the channel itself is mostly mud.

The Middle banks from this stretch in a southerly direction, to within 8 miles of the Ceylon coast, having an average breadth of 3 miles, with uneven soundings from 2 to 3½ fathoms; and in one place only 9 feet. This is situated 8½ miles S. 20° E. from point Calimere, and 9½ miles S. 44° E. from the two remarkable trees already noticed. It is composed of hard, fine sand, and should be carefully avoided. There is always what is called a swash over these banks, which renders it hazardous to be on them in an open boat during a breeze.

In beating into the bay against the S.W. Monsoon, a vessel should stand over to the north coast of Ceylon, and work down to the island of Delft, or Nedoen Teevo, whence a stretch may be made across the bay to its western side, where land and sea breezes will be met with, accompanied by smooth water. In the N.E. Monsoon, a vessel bound against it should also work upon the Ceylon side as far as Kayts; when she may stand over to the coast of India, and creep to windward in smooth water. With the strong currents ever attendant on the Monsoons in the middle of the bay, it is impossible to contend against them without thus taking advantage of smooth water and weather shores.

A well-known shoal extends from about 17 miles S.S.E. of point Pedro to about 6 or 7 miles N.W. of it, having a good channel of 2½ to 3 miles wide, with 7, 8, and 9 fathoms mud, between it and the shore. The most dangerous part on its northern end bears from the point due east, 4½ miles off shore, to E. 28° S., 4 miles off shore. It has in some parts as little as 2¼ fathoms, and a vessel in passing it ought not to shoal her water on the bank to less than 6 fathoms, when she will be about 3 miles off shore, with deep water inside.

To clear the north end of this bank, having 3¾ fathoms on, the break in the trees at Tondimanaar, which is plainly perceptible some few miles at sea, ought not to bear west of S.S.W. till within 4 or 5 miles of the land. Inside this, a vessel working to the westward may approach the shore with safety to within half a mile, carrying from 6 to 8 fathoms sand and mud, till abreast of Kangasenthoray, which may be known from its two bungalows, each built on a rocky platform washed by the sea. To avoid some foul ground which, diverging from the beach at this place, reaches to a distance of 2 miles from the shore a little farther west, she must now be careful not to shoal her water to less than 6 fathoms on her in-shore tack, or to less than 5 fathoms on her seaboard; as the southern end of the Middle banks, with 2¾ and 3

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fathoms over it, lies to the north. The channel is 6 miles broad from the foul ground to the end of the banks, with 5½ to 8 fathoms, sand and mud, in it. When the opening between Kara Teevo (Amsterdam island) and the main leads due south the foul ground is passed; and when Fort Hammonhiel is well open of the N.W. point of Kara Teevo, the banks are to the eastward. A vessel can then shape a course to any part of the bay, having good anchorage in 4 to 5 fathoms, ½ to ¾ of a mile outside any of the islands. If bound to Jaffna, she should, after passing Kayts, stand southerly, rounding Elewa Teevo, Anella Teevo, and Naina Teevo, at a distance of 1 to 2 miles, till within 2 or 3 miles of Nedoen Teevo (Delft), which she will make ahead. She may then steer easterly, keeping about a mile off Poongree Teevo, and taking care not to haul to the North of East till that island has been left 4 or 5 miles behind; and anchor according to the directions about to be given. Following out these instructions, a vessel from point Pedro ought not to shoal her water to less than 4¼ fathoms; but more generally have a depth of 5 to 6 fathoms.

Directions for Kayts.—No vessel drawing more than 8 feet should attempt to enter the harbour of Kayts; for, although there are 7½ feet in the channel at low-water springs, the greatest rise is not more than 15 inches. To avoid the foul ground, extending 1½ miles to the westward of the N.W. end of Kara Teevo, a vessel ought to keep in 5 fathoms till Elewa Teevo bears S. by W. She may then stand for that island, shoaling her water to 3 fathoms, till Fort Hammonhiel, built on a rock at the north side of the entrance, bears S.E. by S., when she can steer for it, keeping the Custom House point, on which is a large clumpy tree, over the low sandy point of Kara Teevo till within a quarter of a mile. She will now be in 9 feet smooth water, and, keeping more to the south, may round the fort at a distance of from 200 to 700 yards, according to circumstances; care being taken, when inside, to borrow over on the north side of the harbour till past an old bungalow on that side. Any anchorage may then be selected, but the best is off the Custom House, in 11 or 12 feet mud.

Outside, good anchorage is obtained in either Monsoon in 13 or 14 feet smooth water, with the fort bearing S.E. 1½ miles; the north end of Elewa Teevo S.W. 1¼ miles; and the N.W. end of Amsterdam island N.E. In the S.W. Monsoon the bank off Elewa Teevo may be approached a little closer; and in the N.E., the foul ground off Amsterdam, which will give a vessel a little more room for weighing. Large vessels should of course anchor farther out.

Directions for Jaffna.—A rock was supposed to exist in the approach to Jaffna from the westward; but after a careful examination no such danger could be discovered; and, although some pilots declare that it is still there, they are unable to point out the precise spot. This, added to the testimony of some divers, who declare that they never met with it, although employed in the neighbourhood from childhood, may lead us safely to infer that the pilots are in error, and that no impediment is offered to the safe navigation of this part of the coast. A small vessel, having Calmoene point E. by N. to N.E., may steer for it till she opens Jaffna Fort church clear of the island of Mande Teevo; when she can stand freely for the opening, carrying from 4 to 2½ fathoms over a rocky ledge to 2¾ and 3 fathoms inside on sand; and anchor with the following bearings:—Calmoene point, East; Fort Church, N. ¼ W. to N. by W. ¼ W. But care must be taken not to approach Calmoene point within 600 or 700 yards, as there are some rocky heads some distance from it.

The best anchorage for a large vessel is outside the rocky ledge, with the Fort

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church bearing N. by E., over the centre of a small island called "Small Pox island," just clear of the small cocoa-nut tope on Mande Teevo, and Calmoene point N.E. by E. She would then be in 4½ fathoms, sand, about 2 miles off the island. It must be borne in mind, however, that this anchorage ought not to be used from the middle of May to the middle of August, when the S.W. Monsoon, from which there is no shelter, blows with great violence.

Dangers in Palk's Bay.—1. The Middle Banks, already described.

2. A long sandy spit, with from 1 to 2 fathoms over it, stretching E. by S., 13 miles from a low point above Kotipatnam, on the coast of India. It has generally a heavy swash of a sea over it, and should not be approached from the eastward nearer than 6 fathoms. CAPTAIN POWELL places its eastern extremity in Lat. 9°59′ N., and Long. 79° 29½′ E. Its bearing from Paumben is N. 22° E. 45 miles; and from point Calimere S. 49° W. 29 miles.

3. The foul ground off the N.W. end of Ceylon, to the eastward of the opening between that and Kara Teevo, where the coast ought not to be approached nearer than 2 miles, for although at present there are 12 to 15 feet over the knolls, the depths may decrease, as they are composed of coral.

4. A detached rock, about the size of a ship's boat, with only 2 feet water over it, between Paale Teevo and the Devil's point, having the following bearings:—Devil's Point, South 3 miles; South end of Paale Teevo, E.S.E. 2½ miles.

Lastly.—Some rocks awash which lie about 1½ miles off the N.E. end of Rameseram island, where the soundings ought not be shoaled to less than 5 fathoms. Care should be taken in the N.E. Monsoon not to get into the bay to the east of this island, as it becomes a difficult matter to work out again.

Adrampatam.—The town of Adrampatam (Lat. 12° 20′ N.) is situated about 28 miles west (northerly) of point Calimere. A vessel, after passing through the North channel as above directed, may steer about W. by N. She will make the Shallavenaikapatam pagoda, which can be seen 15 miles off, ahead, and should anchor with the town of Adrampatam north, from 3 to 3½ miles, and the pagoda west about 6 miles. She will then be in 2½ to 3 fathoms, sand. Small craft drawing 6 or 7 feet water may approach to within 1½ miles of the town, bearing N.N.W., and anchor in 2 fathoms.

The anchorage is good at this port during the N.E. Monsoon, but with S.-ly and S.E.-ly winds a heavy swell sets into the bay of Adrampatam, rendering it less secure at those seasons.

The **Light** on the east side of Paumben Pass, Palk's Bay, is visible all round the compass to the distance of 12 miles; position—Lat. 9° 17½′ N., Long. 79° 12½′ E.

The directions from pages 440 to 447 are principally from the observations of MR. J. T. FRANKLIN and the Officers engaged in the survey of the Gulf of Manaar and Palk's Strait.

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EAST COAST OF INDIA.

Calimere Point, in Lat. 10° 18′ N., Long. 79° 52½′ E., is low, and covered with cocoa-nut trees; off it a shoal flat projects some distance seaward, in consequence of which it should not be approached in passing, under 6 to 7 fathoms. Two pagodas, near each other, about a mile from the shore, and 5½ miles N.W.-ward of the point, are in Lat. 10° 22½′ N. (For a description of the shoals off this point, see p. 445.)

Negapatam Shoal, the centre of which is in Lat. 10° 35′ N., is about 7 miles long, but only a few cables wide, having on it 24 feet water at its S. extremity, and 19 feet at its N. end; and it consists chiefly of hard sand and stones: between the shoal and the main the channel is from 3 to 4 miles in width, having 3½ to 5 fathoms in its deepest parts, near the inner edge of the shoal; outside, there are 6 to 7 fathoms close-to, consequently it ought not to be approached under 8 fathoms; some knolls near the N. part of the shoal have overfalls of 7 to 5 fathoms on them.

NEGAPATAM is a place of considerable trade for small coasting vessels.

Light.—A *fixed white* light, visible between the bearings of N.N.W. to S.S.W., by the westward, is exhibited S. of the town from the bastion of the fort, on a flagstaff 100 feet above the sea, and may be seen 12 miles; during the N.E. Monsoon it is lowered to 88 feet. Position—Lat. 10° 46′ N., Long. 79° 50′ E.

The coast being very low, a *black* pagoda 1½ miles N.N.W. of the fort is a conspicuous object on approaching it.

The **Anchorage** during the fine season is 1½ to 2 miles off shore in 5 to 5½ fathoms, with the flagstaff bearing W. to W. by S., soft bottom. But ships must keep farther out in unsettled weather, at which time, in 6 to 7 fathoms, with the flagstaff W. ½ S., and the highest of the five *white* pagodas N.W., there is good holding ground.

Supplies.—Water, fresh provisions, fruit, vegetables, rice, &c., may be procured here; but firewood is scarce.

Coming from the *southward* during the S.W. Monsoon, keep in soundings, otherwise it will be difficult to make the coast between Calimere point and Negapatam, owing to the prevalent westerly winds and strong northerly current. Negapatam shoal is cleared by keeping in 8 fathoms, and when a *white* house (5 miles south of Negapatam) bears W. (southerly) you may haul in with safety towards the anchorage

Nagore, in Lat. 10° 49′ N., and 4 miles northward of Negapatam, has a large trade, carried on by natives, with the ports on the east side of the bay of Bengal, and with Sumatra; it is readily distinguished by five *white* pagodas; the coast is low and swampy, and at times inundated near the mouth of the river.

The anchorage in the roadstead is 2½ miles off the entrance to the river, in 5 to 6 fathoms, with the five *white* pagodas bearing W.S.W. or W. by S.

Carricall.—Ships anchor abreast the river in 5 to 6 fathoms. There is a *fixed white* light, exhibited from a flagstaff 65 feet above the sea, and visible 8 miles. Position—Lat. 10° 55′ N., Long. 79° 49′ 36″ E.

At **Tranquebar,** in Lat. 11° 1′ N., there is said to be a shoal opposite the mouth of the river, 10 miles off shore, but it is unknown to the fishermen of Carricall.

Coleroon River is in Lat. 11° 23′ N.; Coleroon shoal fringes the coast for several miles, and projects seaward 5 or 6 miles from the entrance of the river: here a large

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ship should not come under 12 to 14 fathoms by day, nor 16 to 20 fathoms by night. The south end of the shoal is marked by the southernmost of the Chalambaram pagoda on with the south part of Coleroon wood; the two pagodas in one (W.S.W.), and Porto Novo flagstaff, bearing W. by N. ½ N., marks the north end of the shoal.

Porto Novo, in Lat. 11° 30′ N., is sheltered to the S.E. by the Coleroon shoal; ships anchor here in 6 fathoms, 2 miles off shore—the flagstaff bearing W. ½ N., and the southernmost of the Chalambaram pagodas S.W. ¼ W.; rounding Coleroon shoal bring the flagstaff to bear W. by N. ¼ N., or if in 18 to 20 fathoms water, haul in when the flagstaff bears W.N.W.

Cuddalore is in Lat. 11° 43′ N.; the anchorage is in 5 to 6 fathoms, with the flagstaff N.W. by N. to N.W. ½ N.; the river is small and barred. Supplies of all kinds may be procured. Off the ruins of Fort St. David, 2 miles northward of Cuddalore, a bank projects from ½ to ¾ of a mile seawards.

PONDICHERRY, in Lat. 11° 56′ N., is a French town standing on a flat, sandy plain, close to the sea. The first conspicuous object on making the coast hereabouts is a grove of trees on a flat hill, N.W. of the town; the river is small, and can only be entered by small country vessels.

Light.—A *fixed white* light is exhibited from the square in the town, at an elevation of 130 feet above the sea, and visible 15 miles on all points of the sea horizon. Position.—Lat. 11° 55′ 40″ N., Long. 79° 49′ E. Take care not to confound this light with that from the chimney of the foundry at Porto Novo.

Anchorage.—During the S.W. Monsoon, and in fine weather, the anchorage is in 7 to 8 fathoms, abreast of and ¾ of a mile from the town; but small ships come into 5½ or 6 fathoms; at night, bring the lights bearing West to W. by N. before anchoring. During the stormy period of the N.E. Monsoon, the anchorage is in the outer roadstead in 12 to 14 fathoms. During the night, there is convenient anchorage in 10 to 12 fathoms, with the light bearing W. to W.N.W.

Directions.—Coasting along from point Calimere to Pondicherry, 10 to 14 fathoms may be kept, except when approaching Coleroon shoal, where it is not safe to come under 14 or 15 fathoms, since the water shoals very suddenly in places thereabouts. Between Cuddalore and Pondicherry there are 7 fathoms at 1 to 1½ miles off shore, and 40 to 45 fathoms 18 to 20 miles off; the bank thence becoming very rapidly steep.

The coast between Pondicherry and Sadras is generally low, with sand-hills here and there fronting the sea; and off Conjimeer, in Lat. 12° 8′ to 12° 11′, a bank of 5 fathoms is stated to exist about 5 miles off shore.

Sadras is in Lat. 12° 32′ N. The coast may be known by an irregular ridge of hills (Sadras hills) inland, at the back of the town; some of these are very rugged, and when the highest bears N.W. the ship is nearly abreast of Sadras.

About 7 miles northward of Sadras are the seven Moolivaram pagodas, two of which are now close to the sea, though it is stated that at one time they were some distance inland; they are not clearly discernible unless well in with the land.

Tripaloor Shoal.—To the northward of the seven Moolivaram pagodas, between them and Covelong, the rocky shoal of Tripaloor, with very foul ground near it, stretches from 1 to 3 miles off shore; the *Rockingham* was wrecked on it in Lat. 12° 43′ N.

Soundings of 5 to 7 fathoms were also reported in 1820, by Captain Barclay, of

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the *Bulmer*, stated to be on a bank in Lat. 12° 26′ N., 10 miles off shore; and another bank of 4 to 6 fathoms, in Lat. 12° 45′ to 12° 47′ N., about 40 to 45 miles off shore; neither of these seem probable.

The distance from point Calimere to Pondicherry is about 97 miles, and the course nearly due north, except to the northward of the Coleroon shoal, where the coast curves slightly inwards. From Pondicherry to Sadras the distance is about 43 miles, and the direction of the coast nearly N.N.E.; thence to Madras the distance is about 34 miles, and the coast line first N. by E. and then N. ½ E. The shore is generally low and sandy—with occasional sand-hills—and the surf at all times beats heavily on the shore, so that there are few spots where a landing can be effected from the ship's boats; hence the peculiar boats of the natives, called Masoolah boats, are everywhere in requisition. Although the shores are low, they are generally well-wooded, generally with Palmyra and cocoa-nut trees, and the aspect of the country is fertile. To the northward of the parallel of 12° N., the country inland becomes mountainous—the eastern Ghauts, with several offshoots, stretching towards the sea shore.

St. Thomas, or Milapore, is a small town close to the sea, in Lat. 13° 1′ N.; the country inland is hilly; the northernmost hill, 4½ miles from the sea, in Lat. 13° 0½′ N., has a church on it, by which it may be distinguished when sailing along.

MADRAS.

MADRAS is the seat of Government of the Madras Presidency, and the principal town on the Coromandel coast. Fort St. George, in which is the Governor's house and the Government offices, stands close to the sea, and is strongly fortified. The native town is to the north of the fort, separated from it by the esplanade, and though extensive is not well built. Madras is a place of extensive trade—both the exports and imports being large. The limits of Madras roadstead (in 8 or 9 fathoms) are comprised within the following bearings—viz., from the northward, the lighthouse will bear S. 56° W.; and from the southward, N. 81° W., or from S.W. by W. to W. ¾ N.

Light.—The lighthouse, 125 feet high, stands on the esplanade, N. of the fort, and exhibits a *fixed white* light, varied by a *flash* every two minutes, visible from 17 to 24 miles. Position.—Lat. 13° 5′ 10″ N., Long. 80° 16′ 30″ E.

Pulicat Shoals.—With the original light notice the following *caution* was issued respecting the Pulicat shoals to the northward of the roadstead:—From the S.E. extremity of the Pulicat shoals the new lighthouse bears S. 23° W., distant 13 miles; but no ship, when hauling in from the northward for Madras roadstead, should bring the light to bear to the southward of S. 28° W., or S.S.W. ½ W., unless her position is well ascertained. Commanders are warned of the serious risk they incur by incautiously approaching the dangerous vicinity of the Pulicat shoals, as hazy weather, or other causes, may obscure the light; true soundings, therefore, and a vigilant look-out are imperatively called for.

The **Master Attendant's Instructions** are to the following effect:—

All ships, other than native vessels, are to anchor with the following bearings—viz., the Master-Attendant's flagstaff from N.W. to W. ½ N., which will be found convenient anchorage for merchant vessels, and the southern limits of the roadstead

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usually resorted to by men-of-war may be ascertained as within the position denoted by bringing the lighthouse to bear from W. by N. to W., in from 9 to 7 fathoms—which is the range of soundings throughout. Ships should take up such a berth as will enable them to wear clear of all danger in the event of casting in shore when they weigh or part from their anchors—especially as the ground-swell, so prevalent here, tends (against all precaution) to cast a vessel in shore.

Bringing-up in Madras roads, a buoy should always be attached to the anchor, whereby giving foul berths may be avoided, and the position of lost anchors will be indicated. Ships have frequently parted, and accidents have happened by riding with too short a scope; no vessel, therefore, is safe with less than 60 fathoms of cable in moderate weather, and 80 fathoms or more when there is a swell. Also, to those who are not acquainted with the roadstead, should any jerk be felt when riding with a chain (from the heavy swell that rolls in at times), either on the windlass or bitts, cable should be veered until the jerk is no longer felt; and a second anchor should always be ready. Efficient ground tackling is essential to the safety of vessels in Madras roads.

Signals.—When the surf is so high as in the opinion of the Master Attendant, or his assistant, to render communication with the shore dangerous, a *red* and *white chequered* flag will be hoisted at the Master-Attendant's flagstaff; when the surf is impassable, the *first distinguishing pendant* will be displayed *under* that flag; when the current is too strong, the *rendezvous* flag will be hoisted.

Should the weather assume such a threatening appearance as may in the opinion of the Master Attendant indicate an approaching gale, and render it advisable that ships should put to sea, the following signals will be hoisted at the Master Attendant's flagstaff, but the commander is not to wait the display of signals if he deems it prudent to put to sea;—

1. The weather is suspicious, prepare to put to sea—*White* flag, with *blue* cross.
2. Cut, or slip—*Red* flag, with swallow-tail.

Upon the indication of an approaching gale of wind after sunset, three good lights will be hoisted at the Master-Attendant's flagstaff—one at the mast-head, and one at each yard-arm; and a gun will be fired from the ramparts of Fort St. George every five minutes for an hour, or such time as may be deemed necessary; these signals are to be acknowledged by hoisting a good light at the peak, or other conspicuous place.

Commanders are warned of their own extreme responsibility if these signals do not receive timely attention; and they are also advised to have their ships always prepared to put to sea, especially on or about the change of each Monsoon, and to pay strict attention to the necessity of having good sails bent, which, in the event of being driven to sea, or compelled to slip, is of the utmost consequence. Their first object should be to gain a good offing, under treble or close-reefed topsails and reefed courses, carefully attending to the lead and soundings, and guarding against a strong current, which generally varies its course according to the strength and direction of the wind. When the weather is threatening or doubtful, commanders should repair on board their respective ships before sunset.

Anchorage.—The roadstead of Madras is open to all winds, except those from the westward (or off the land); and the prevalent swell causes vessels to labour and roll

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considerably at times. Vessels discharging cargo often moor in 8½ to 9 fathoms abreast the flagstaff, with it bearing W., or W. by N. A good position for large vessels is with the flagstaff bearing N.W. ½ W. to W.N.W. in 9 fathoms, 2 miles from the shore. In many parts the bottom is stiff mud, from which the anchor is extricated with difficulty.

The caution to anchor well out, and to be always prepared to proceed to sea, is essentially requisite, for the gales generally commence at N.W., blowing strong from the land, with which an offing can be gained before the wind veers to N.E. and E., when it would be impossible to do so. The most dangerous season for all the ports on this coast is from the beginning of October to the middle of December; heavy gales have occurred in April and May, but not frequently. If a vessel is ready to weigh or slip, and gets to sea at the approach of the gale, little danger is likely to befal her, and it often happens that the wind is not so strong as near the land; but if she remain, she may possibly be driven on shore, with very little chance of saving even the lives of those on board.

Currents.—DIRECTIONS: At the beginning and during the strength of the N.E. Monsoon, the current sets to the southward along the coast at the rate of 1½ to 2 miles, consequently the land should be made to the northward of Madras at that season; this current slackens towards January. During the S.W. Monsoon, and generally after the beginning of February, the current frequently sets as strongly to the northward, therefore the land should be made direct if possible, or even to the south of the port—say on a N.W. bearing—never to the northward of the port, at this period.

Both the strength and direction of the current on this side of the bay of Bengal are however variable, and liable to uncertain changes. COMMANDER R. HOBSON, H.M.S. *Vigilant*, in a letter from Madras, dated August, 1864, reports, that during a passage from Cuddalore to that place, an unusually strong N.E.-ly current of at least 3 knots an hour was experienced.

Madras Observatory is estimated, from a vast number of observations, to be in Long. 80° 14′ 19″·5 E.

The breakwater, commenced some time since at Madras, is now completed, and ships' boats land passengers there.

Pulicat Shoals.—About 9½ miles N. by E. ½ E. from Madras is a conspicuous house close to the sea, and 1¼ miles south of a village; this is Enore House, to the northward of which position commences a bank on which are the Pulicat shoals, that have always been so notoriously disastrous to shipping. The southern extremity of the bank is in Lat. 13° 15′ N., whence it stretches in a general N. ¼ E. direction to Lat. 13° 33′ N., and on this bank the shoals lie in patches.

The first dangerous patch is 2 miles long, in a N.E. ½ E. and S.W. ½ W. direction, its outer edge being about 2 miles from the shore, and having on it from 1½ to 2½ fathoms water. The southern extremity is in Lat. 13° 16′ N.; its northern extremity, in Lat. 13° 18′ N.; here the water breaks 1½ miles from the shore.

The next patches are 3 miles more to the northward, in Lat. 13° 20½′ N., extending about 1½ miles in a N. by E. direction, and lie from 2 to 2½ miles off shore; these have from 2½ to 3½ fathoms on them, and are *very* dangerous, inasmuch as there are 6 to 10 fathoms close-to.

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The northernmost patch of 3½ fathoms, in Lat. 13° 23′ N., lies about 3½ miles off shore, with 4½ to 7 fathoms close-to.

Between the southernmost and middle patches there is a channel leading to Pulicat road, but large ships should keep outside, and not shoal their water under 13 to 14 fathoms, which clears all danger; then, if bound to Pulicat, haul in when the flagstaff bears W. by N., crossing the N. part of the bank in 5½ to 6 fathoms.

The southernmost of the Pulicat shoals is 12 miles from Madras flagstaff, and the northernmost nearly 20 miles; when passing along, they should not be approached under 16 to 17 fathoms for safety; and if Madras light is visible, it should not be brought to bear to the southward of S.S.W. ¼ W.

The depths on approaching the bank decrease rapidly from 18 to 15, 11, 4½, and 4 fathoms. On the outer edge of soundings the depths are 40 to 50 fathoms at the distance of 18 to 20 miles off shore, and 18 to 20 fathoms 4 to 4½ miles off.

Pulicat roadstead is 20¼ miles from Madras flagstaff.

Light.—A lighthouse exhibits a *fixed red* light, 56 feet above the sea, visible 6 or 7 miles. Position.—Lat. 13° 25′ N., Long. 80° 19′ 40″ E.

Approaching Pulicat, when the light bears W. ½ N., you are to the northward of all the shoals. The anchorage is in 7 to 8 fathoms abreast of the lighthouse, 1½ to 2 miles off shore.

The chain of mountains inland, known as Pulicat hills, has, near the southern end, a piece of flat table-land, usually called the Kettle Bottom, which bears West from Pulicat flagstaff, W. ½ N. from the middle of Pulicat bank, and W.N.W. from Enore house. Naggery Nose, in Lat. 13° 22′ N., is another remarkable hill to the southward of the Kettle Bottom.

From Pulicat to Poondy point, in Lat. 13° 47′ N., the distance is 22 miles, and the coast is slightly concave. Off the point, shoal ground of 1 to 3 fathoms stretches to the S.E.-ward for the distance of 2 miles.

Armogham Shoal. — Immediately northward (N.N.E. 2 miles) of Poondy point, commences a bank which in some parts has not more than 1½ to 2½ fathoms water on it. This is the Armogham bank, extending from Lat. 13° 48½′ to 14° 7′ N. It does not exactly follow the line of the coast, being 6½ miles off it at its northern end, while at its southern extremity it approaches within 1½ miles, nearly joining the shoal off Poondy point: its shoalest parts lie between Lat. 13° 48½′ and 13° 57′ N.

Light.—Near the village of Moona or Moonapolium, 1 mile from the shore, there is a lighthouse, 95 feet high, showing a *fixed white* light, visible 15 miles. Position. —Lat. 13° 52′ 50″ N., Long. 80° 12′ E.

This light is due West from the shoalest part (9 feet), which is 6 miles off shore, and where it occasionally breaks. On the outer edge there are from 7 to 10 fathoms, deepening to 28 or 30 fathoms 3 or 4 miles off.

Blackwood Harbour is the name given to the space included between the inner edge of the Armogham shoal and the coast; it is from 3 to 4 miles wide, with depths varying from 4½ fathoms near the shore to 6 or 7 fathoms contiguous to the edge of the shoal. The entrance is by the north end of the shoal, in not less than 6 fathoms, with Armogham hill bearing W. ¼ S.; and there is safe anchorage in the fine Monsoon off the entrance to Armogham river, with the hill bearing W. ¼ S. There is

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often a haze on this part of the coast, partially obscuring it, and making it appear more distant than it really is. The channel by the South of the shoal should not be attempted.

Bound northward from Madras, do not approach the Armogham shoal under 12 to 14 fathoms. Armogham hill is in Lat. 14° 3′ N.

Shoals.—Northward of the Middy river, in Lat. 14° 15½′ N., and thence to Lat. 14° 24′ N., a bank of 2½ fathoms stretches to the N.E.-ward,—in some places 2½ miles off shore.

From the parallel of 15° N. and to False Divy point (in Lat. 15° 45′ N.), where the coast forms an extensive bight, there are several shoal spots inside the line of 11 fathoms soundings, on what is known as the **Mootapolli Bank.** The most dangerous spot is the Mootapolli shoal, opposite Kuttowputtam, on the parallel of 15° 25′ N., and 8 miles off the coast, having on it only 2½ fathoms water; the patch lies N.E. and S.W. between Lat. 15° 23½′ and 15° 27′, having on it from 4 to 6 fathoms; inside this shoal there are others of 2½ to 3 fathoms, 3 miles off shore.

The Mootapolli bank, which extends many miles around these shoals, is generally of coarse sand and broken shells, and has on it overfalls in places. Passing here at night do not come under 20 to 24 fathoms, nor under 15 fathoms during the day. Immediately outside this bank the depths shelve to 18 or 20 fathoms within a short distance, and to 60 fathoms 6 miles off.

False Divy Point is in Lat. 15° 45′ N., Long. 80° 51′ E.; it is a low projecting flat, with an extensive mangrove jungle, through which the Kistna river discharges its waters into the ocean. The bank, of 3½ to 4 fathoms soundings, extends 4 and 4½ miles off the coast hereabouts; thence the increase of depth is rapid to seaward, there being 15 fathoms 8 miles off the shore—and consequently the more dangerous, as a ship approaching the land shoals her water very suddenly. The coast is also frequently enveloped in haze, which gives a false appearance as to distance.

POINT DIVY is low, and bears N.E. by E. distant 20 miles from False Divy point.

Light.—Two miles to the N.W. of point Divy, in Lat. 15° 58′ 55″ N., Long. 81° 9′ 30″ E., there is a lighthouse 90 feet high, which exhibits a *fixed white* light, visible when bearing North to S.W. by the westward, and may be seen to the distance of 12 miles.

The shoal flat which has been described in connexion with False Divy point extends to Divy point, and thence to the northward beyond Masulipatam and Narsapoor point.

MASULIPATAM was at one time the principal place on the Coromandel coast; it is still a populous town, with a very considerable trade. The fort is 1½ miles from the sea-shore. The coast is very flat all round the bay, and liable to inundation when the cyclone winds of the bay of Bengal make it a dead lee shore.

Light.—A *red* light is exhibited from a flagstaff on the fort, at an elevation of 95 feet, visible from all parts of the sea horizon, to the distance of 7 or 8 miles. Position.—Lat. 16° 9′ 6″ N., Long. 81° 8′ 12″ E.

The **Port Instructions** (dated 1860), are to the following effect:—Two first-class buoys have been laid down to mark the anchorage in Masulipatam roads; a *red* buoy is placed in 3½ fathoms, with the flagstaff on the fort bearing West

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(northerly); and in-shore, due West from the red buoy, is a *white* one, placed in 3 fathoms low water. The best anchorage at all times of the year will be in a line with the buoys; but when strong westerly winds prevail, in May and June, ships should anchor to the southward of the buoys.

Anchorage.—The best anchorage in Masulipatam roads is with the flagstaff bearing W. ½ N. to W.N.W.,—the ship's draught of water being the guide as to how close she may approach; with the above bearings a vessel in 3½ fathoms will be about 3½ miles from the mouth of the river. Commanders should bear in mind that with these bearings the water shoals very gradually, and that coming in as close as the ship's draught admits will go far to expedite the loading or discharging of cargo, and lessen the cost of boat-hire. The holding ground in the roads is good, and with good ground-tackle a vessel may ride out very heavy weather.

No cargo can be landed in ships' boats; any attempt to do so is attended by a penalty of 50 rupees and confiscation of boat.

No ballast is to be thrown overboard in less than 10 fathoms; nor is any to be discharged on the beach or elsewhere, from which it might be washed into the port; the penalty for infringing this is 200 rupees.

Signals.—When the surf is so high as to render communication with the shore dangerous, a *red* and *white* chequered flag will be hoisted at the Master Attendant's flagstaff; when the surf is impassable the *first distinguishing pendant* will be displayed under that flag. Should a boat be urgently required during the night, three lights should be hoisted horizontally; and in case of danger from fire or other causes blue lights should be burnt and guns fired.

Directions.—A ship from the southward rounding Divy point in 6 to 8 fathoms (according to draught of vessel), after bringing Divy light to bear West, should make a northerly course, when she will carry regular soundings, shoaling gradually as she approaches Masulipatam; great care, however, is necessary, as the currents between point Narsapoor and point Divy are at times very strong, and the lead is the only sure guide. Vessels shoaling to 4 fathoms should haul to the eastward during the daytime; as a ship approaches Masulipatam the flagstaff and buildings will be seen if the weather is at all clear. At night the light at Masulipatam will not be seen until 4 or 5 miles north of Divy light. Coming to Masulipatam from Madras, although a ship should keep in soundings, yet when passing Armogham and Mootapolli shoals during the night, these should not be approached under 20 fathoms.

A memorandum by Mr. W. Blow mentions that the light on Divy point is very bad at times; that the lead is the only guide for any vessel approaching this part of the coast, and that its indications ought to receive careful attention, as the sandbank off the point extends much further out than laid down on any chart; also, Masulipatam light can scarcely be seen from the shipping, especially if the atmosphere is thick.

Narsapoor Point is in Lat. 16° 18′ N., Long. 81° 42′ E.; it bears N.E. by E. 36 miles from point Divy. Masulipatam is situated in the bight between these two points and the bank of shoal soundings, which commences south of the parallel of 15° N., terminates 12 miles to the N.E.-ward from Narsapoor point. There is anchorage in Narsapoor roads in 4½ to 5½ fathoms to the westward of the shoal that projects off the mouth of the river,—but the river itself is barred.

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The coast from Narsapoor point to Gordeware point, in Lat. 16° 49′ N., Long. 80° 20′ E., is first N.E. by E. for the distance of about 27 miles, then N.E. for 14 miles, and lastly N. by E. for 9 miles. Round Gordeware point and Hope island, to the westward, is Coringa or Cocanada bay.

CORINGA AND COCANADA.—The principal mouths of the Godavery river enter the bay of Bengal, in Lat. 16° 15′ N.; here there is an accumulation of sand-banks and mud-flats, a large proportion of which is flooded at high water. Having made Gordeware point or Hope island lighthouse, great caution is necessary in approaching the coast if bound to either Coringa or Cocanada; for not only are the banks and shoals dangerous, but it is quite possible hereabouts to misjudge distance from the land, owing to its being so very low. If not bound to either port, a ship in passing ought not to come under 20 to 30 fathoms.

Lights.—The Gordeware or Godavery point lighthouse stands on the south side of Hope island; it exhibits a *fixed white* light at an elevation of 73 feet above the sea, and is visible when bearing from South round by the westward to N.N.W. to the distance of 15 miles. Position.—Lat. 16° 49′ 5″ N., Long. 82° 18′ 25″ E. The light-house is painted in horizontal black and white bands to distinguish it during the day from that on point Divy, which is white.

A lighthouse has also been erected at Cocanada, as a guide for the anchorage; it exhibits a *fixed white* light.

Buoys have also been placed as a guide to Cocanada anchorage. Their position is as follows:—

1. The *Outer*, or *Bell* buoy bears from Hope island lighthouse N.E. ¾ N. about 6 miles, and lies in 6 fathoms. 2. The *Middle* buoy bears from Hope island light-house N. by E. about 8 miles, and lies in 5 fathoms. And 3, the *Inner* buoy bears from Hope island lighthouse N. ½ W. about 9 miles, in 3 fathoms.

Vessels should on no account attempt to go inside, or to the southward and west-ward of any of these buoys.

On approaching the Godavery or N.E. point of Hope island from the southward by night in the S.W. Monsoon, vessels should on no account attempt to round the point till the lighthouse on Hope island bears S.W. by S., and the Bell buoy S. by W. ¼ W.; and not come under 8 fathoms. They can then haul in N.W. ½ N. in about 7 to 8 fathoms, and when Hope island lighthouse and Middle buoy bear S. by W. in about 7 fathoms, they can haul in N.W. by W. ½ W., which will bring them past the Inner buoy—the lighthouse bearing S. ½ E. The shipping in Cocanada roadstead will then be distinctly seen, and they can anchor with Hope island light-house from S. by E. ½ E. to S.S.E. in 4 to 6 fathoms, according to the vessel's draught.

It is advisable for ships in the N.E. Monsoon to take up a position in the S.E. quarter of the anchorage, with the lighthouse on Hope island, bearing S. by E. to S. by E. ½ E., and the tower of the new lighthouse at Cocanada S.W. by W., in about 5 fathoms; and in the S.W. Monsoon, a little further to the N.W. in about 4 fathoms, with the lighthouse on Hope island bearing S. by E. ½ E. to S.S.E. and tower of the new lighthouse S. W. ¼ S. (See also p. 459-460.)

If captains would adhere to the above suggestions, communication with the shore and the shipping would be more readily obtained, and ships would be in a better position for getting under weigh when required, than they usually now are, and would be in smoother water for loading and discharging.

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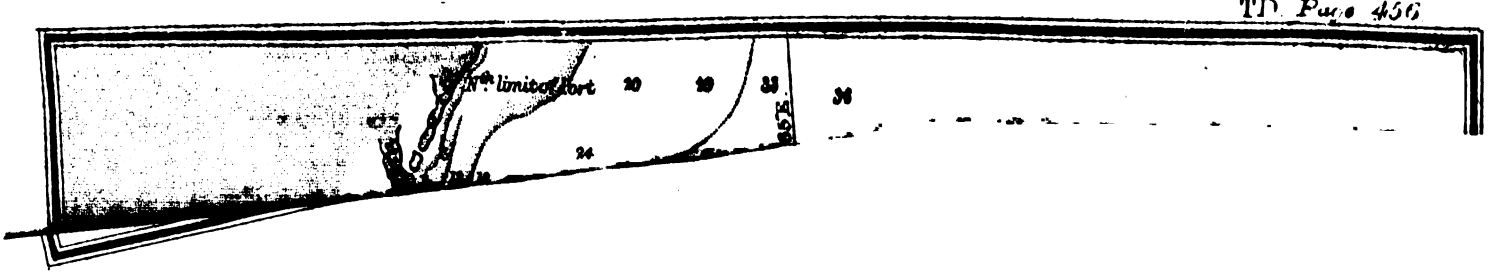

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Ships coming in the N.E. Monsoon during the night must pay every attention to their lead and look out; and they are recommended, when approaching the shipping, to anchor in 8 or 10 fathoms till daylight, when they can run in and pick up a berth as above recommended.

Commanders should on no account throw ballast of any kind out of their vessels to the westward of a line with the Middle or large *black* buoy on with the lighthouse on Hope island bearing S. by W., and in not less than 10 fathoms, or they will incur a penalty for so doing.

The Coringa river cannot be entered without a pilot; indeed, it is now closed for large vessels, and these generally bring up opposite Cocanada.

Bound to either place from the northward, during the S.W. Monsoon, haul in towards the land when just south of the Dolphin's Nose, off Vizagapatam, and beat to windward as close along shore as possible; not, however, coming under 12 to 14 fathoms, until past Wattara and Pentacotta (Lat. 17° 19′ N.)—the latter known by a conical hill a short distance inland. Here the coast may be approached to 9 or 10 fathoms; and when approaching Cocanada (within 10 or 12 miles), stand in shore to 5 fathoms. During the N.E. Monsoon, there is a strong southerly current along this coast.

Bound from the southward, during the S.W. Monsoon, the land may be made about Narsapoor point, but do not come under 9 fathoms; after which haul out, and do not make Hope island lighthouse under 12 or 14 fathoms.

The coast is very dangerous hereabouts, and must be approached with caution.

During the N.E. Monsoon, work well to the northward of your port.

The bay is only open from N.E. to S.E. by S., and the anchorage is on good holding ground.

Coringa is 10 miles southward of the anchorage off Cocanada.

Pillar Rock.—In Lat. 17° 26′ N., Long. 82° 52′ E., is the small town of WATTARA, near the entrance to a small river; N.E. by E. ½ E., and distant 9 miles from that place is the Pillar rock, about ¾ of a mile from the shore; it is also 20 miles S.W.-ward of Vizagapatam; its position is, Lat. 17° 29¾′ N., Long. 83° 0¼′ E.

Pigeon Island, in a small bight on the coast, is in Lat. 17° 38′ N., Long. 83° 13¾′ E.; it being low, it is not seen until near it.

VIZAGAPATAM, in Lat. 17° 42′ N., Long. 83° 17′ E., is distant 74 miles from Coconada roadstead in a N.E. by E. direction. The river is barred, and the sand shifting. From seaward, Vizagapatam may be known by the bluff promontory on the S.W. of the roadstead, called the Dolphin's Nose. The village of Waltair is 3 miles to the N.E.-ward of the flagstaff.

Anchorage.—In the N.E. Monsoon there is anchorage in 8 fathoms 1½ to 2 miles off shore, with Waltair house on with the west side of Sugar-loaf hill; and the top of Green-hill, open with the Dolphin's Nose. During the S.W. Monsoon, the anchorage for large vessels is in 8 to 9 fathoms, with the Bar battery bearing N.W. by W.; the Sugar-loaf hill in one with Waltair house; and Green-hill to the southward of the Dolphin's Nose; small vessels may go into 6 fathoms. The anchorage further out in 11 to 12 fathoms cannot be recommended, for the bottom in those depths is stiff mud, and there is danger of losing the anchors.

Between Coconada roadstead and Vizagapatam the coast is safe to approach to 14

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or 16 fathoms, within 2 or 3 miles off shore, but approaching Vizagapatam anchorage, the water shoals very rapidly. The land is higher in the vicinity of Wattara and Vizagapatam than at Coringa and Cocanada, but at a short distance inland there is a conspicuous ridge of mountains nearly parallel with the coast.

Bimlipatam is in Lat. 17° 53′ N., Long. 83° 27′ E., and lies 16 miles N.E.-ward of Vizagapatam; the anchorage is off the mouth of the river, in 6 to 9 fathoms.

During the N.E. Monsoon, it is advisable to anchor a little to the northward of the usual place of bring-up in the S.W. Monsoon.

The Santipilly Rocks.—About E.N.E. ½ N., distant 15 miles from the anchorage of Bimlipatam, and 5 miles from the nearest point of the coast, are the dangerous Santipilly rocks, having 1¾ fathoms least water on them.

Light.—To mark the position of these rocks, a lighthouse has been erected on Conada hill, ¾ of a mile from the coast; it exhibits a *fixed white* light, at an elevation of 150 feet above the sea, and is visible 14 miles; its position is Lat. 18° 3½′ N., Long. 83° 36½′ E.,—N.W. by W. ½ W. from the rocks.

The centre of these rocks is in Lat. 18° 0½ N., Long. 83° 42½′ E.; they are steep-to, on all sides, and their extent is not above 200 yards in length. When there is but little wind, and the sea is smooth, this shoal presents no indication by broken or discoloured water; as LIEUTENANT FELL, when in search of it during very fine weather, brought the surveying brig *Kristna* to anchor within 100 yards of the rocks before he could observe the slightest appearance of a shoal. Proceeding in a boat over the rocks, 10½ feet was found on the shoalest part, 7 and 10 fathoms on the eastern side, and on the western limit 10½ fathoms, rocky bottom.

Subsequently (1846) the Master Attendant of Madras (CAPTAIN BIDEN) surveyed the Santipilly rocks during fine weather, having a moderate breeze from S.W., with a ground swell; the breakers were clearly discerned from the masthead at the distance of 6 or 7 miles, bearing due South. When in 7 fathoms, about 2 miles off shore, Santipilly peak bearing W. by N., the breakers were soon after seen from the deck. Approaching the reef, which broke with considerable force, the vessel was anchored in 9½ fathoms, coarse sand and shells, distant from the coast 3 miles, the reef bearing from S. 56° E. to S. 57° E., and distant 2 miles, Santipilly peak bearing N. 43° W.;—latitude, by an indifferent observation, 18° 1′ N.

Two boats, under CAPTAIN CRAWFORD, went to examine the reef, and from the vessel they carried regular soundings of 9 and 9½ fathoms, until within a quarter of a mile; at less than 100 yards from the breakers, found 10¼ and 10½ fathoms rocky bottom. The breakers being too high to admit of the boats crossing the reef, CAPTAIN CRAWFORD pulled round it, and gave as his opinion that the shoal, which lies N.N.W. and S.S.E., is in circumference about a quarter of a mile, with 10 fathoms close-to all round; from the surveying vessel the breakers seemed to extend the length of 200 yards.

The Inner channel is safe for ships of every class, as soundings of 5 fathoms within a mile of the coast, and 9½ fathoms within a ¼ of a mile of the rocks, afford a clear space of nearly 4 miles in breadth.

In fair weather, when Santipilly peak is visible, that lofty and remarkable landmark affords an infallible guide to the true position of the Santipilly rocks; this peak is at least 2000 feet above the level of the sea, and presents a striking contrast

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to all the hills in its vicinity; it bears N.W. from the rocks, and the base of the mountain is not more than 7 or 8 miles inland. In cloudy weather, when the peak may be obscured, there are two remarkable hillocks close to the beach, which are named the Great and Little Conada, appearing like a saddle-hill at 3 miles S.W. from the anchorage already mentioned as near the rocks. The northernmost, or Little Conada hill, on which is the lighthouse, is not more than ⅓ a mile from the beach, and 150 feet above the level of the sea; when it bore N. ¼ W., the Santipilly reef was then plainly visible from the deck bearing E. ¼ N., distant 4 miles; at the same time, Sanitpilly peak bore N. 29° W., the vessel being in 8 fathoms about 2 miles off-shore. But in thick weather, when no defined landmark is discernible, great care and caution become absolutely necessary in approaching the coast between Ganjam and Vizagapatam. Change of current, and the absence of all means by night or day of obtaining a single observation, may, without strict and unremitting attention to soundings, place a vessel in imminent peril close to or upon the Santipilly rocks, which should not be approached from the eastward by day or night, under 17 to 20 fathoms.

Later observations have not added to the information given above, with the exception that the patch is rather larger than was supposed, and that it carries 7 to 8 feet least water; its limits are Lat. 17° 59¾′ to 18° 1¼′ N., Long. 83° 41⅓′ to 83° 43′ E.

The following Notes on MADRAS, COCANADA, VIZAGAPATAM, BIMLIPATAM, and PONDICHERRY, are by CAPT. LEWIS BILTON, R.N.R.:—

"**Madras**, with the bright sun above, and the blue sea dashing in thunder on the beach, was delightful after the burning ghaut at Calcutta; every one felt a sense of life and enjoyment he had long been a stranger to—a feeling which was experienced, more or less, all the time we were on the coast. Madras, with its park, museum, and many pleasant drives, is a place to remember; there is more resemblance to home than in any other place I have seen in India. A railway is now in full operation, running to Beypur, on the west coast. The station at Madras is equal to, if not superior to some of the best in England; the pier, which has been run out to facilitate landing, is nearly finished. I got all my cargo out by the 8th of May, and fixed my ship again to load a cargo on the coast at Cocanada, Vizagapatam, Bimlipatam, and Pondicherry, for London. I took the sand off the beach for ballast, which is supplied at about 3*s*. per ton, including boat-hire; the sea being very rough I had great difficulty in getting the boatmen to bring it off, but at length resolved to give no rice to any who did not bring ballast, otherwise I should have been detained an indefinite time. The sailing directions recommend anchoring in 9 fathoms; a ship, however, would lose much time by doing so; I went into 6 fathoms—close to the pier—and found my advantage in doing so, by getting discharged quickly, as the boatmen will always flock to the nearest vessel—being paid by the trip. With one day's exception we had tolerable weather. The surf was high on the beach at times, but generally we could land cargo at some pier during the day. On the one day mentioned, the wind set in from the East and N.E., and after blowing a few hours and knocking up a terrible dust on shore, it veered round to the old quarter—viz., S.W.-rd.

"I left Madras on the 9th of May, for **Cocanada**, arriving there on the evening of the 11th, and was obliged to anchor in the offing in 9 fathoms, on account of a

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heavy north-wester, which came on as I was nearly in with the shipping. There is a good *fixed* light on Hope island, near Coringa, to guide ships clear of the dangers off cape Gordeware and the entrance of the river Godavery—which is one mass of sand banks and breakers. This is the only safe port on the extensive line of coast, during the S.W. Monsoon, and the anchorage is completely protected from the heavy sea which constantly rolls along it at that season; but in the N.E. Monsoon it must be equally bad. The harbour of Coringa is fast filling up, and no loaded vessel (of any size) can go there; they have docks, however, and continue to build and repair ships; and numbers of large native craft are owned and lie up there during the S.W. Monsoon.

"A new lighthouse has been built at Cocanada, as a guide for the anchorage off that port. I found MR. THOMPSON, the Master-Attendant, very obliging. He informed me that Cocanada harbour is also rapidly filling up. Two piers have been built along the entrance of that branch of the river on which Cocanada stands, and every effort is made, by dredging, to keep the navigation open; none but small vessels, however, enter the river. The shipping lie a long way from Cocanada, which is very inconvenient. There are no streets, that can be called such, in the place, nor, with the exception of about half a mile, is there a road on which a carriage of any description can drive. The town consists for the most part of native huts, and, indeed, the bulk of the trade is in native hands; there are, however, a few European merchants (so called). There are two very indifferent hotels, and a small, neat church, but no parson, the collector (as at Karachi) being everything, and in addition to his regular duties acts as parson and notary public. I was detained at this place from sheer neglect and carelessness on the part of those who ought to have facilitated my despatch. The shipper was a native, who seems to rule the place, and no one dared interfere with him; to save a few rupees he was allowed to detain the ship in a most shameful manner.

"I left Cocanada gladly, on the evening of the 26th, about 9 P.M., for **Vizagapatam**, where I arrived next day about noon. The high mountainous coast of Orissa commences a little to the north of Cocanada, and is a good guide, from the offing, to make the port—in the absence of observations. I found but one ship here—a Frenchman—loading seeds. I anchored in 9 fathoms outside of him—the land south of the Dolphin's Nose just open to the eastward of it, and the centre of Green hill bearing W. ½ N.; a heavy swell was running along shore, and the ship rolling, gunwales under. The entrance to the inner harbour is by a small river, with a very bad bar. Here we had the Masoolah boats, each of which, as at Madras, brings off 35 bags, and other goods in proportion, as established by a regular tariff, by the Master-Attendant, who is expected to see that they are kept in repair, and a sufficient number allotted to each vessel. The boatmen are the same merry, reckless fellows as at Madras, and their occupation is a hard and dangerous one. Finding the ship too far out, and detention in loading likely to occur therefrom, I got under way, and stood out under easy sail to enable me to go further in shore ahead of the Frenchman; when I had got off about 4 or 5 miles, the wind fell light and variable, and I was unable to reach the anchorage again till 9h. next morning, bringing up in 7 fathoms with 60 fathoms of cable—Dolphin's Nose S.W. ½ S., and centre of Green hill W.N.W. This is undoubtedly the best berth for a large ship during S.W. Monsoon; but no part of the road is protected, consequently, a ship rolls fearfully, and much of the cargo gets very wet. Inside the bar

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there are about 4 fathoms in the river, and numbers of large native vessels were laid up there during the Monsoon, completely land-locked. The town is prettily situated. It is a military station, clean, and well-built, and the native houses had not that generally ruinous look so common in the East. There is but one hotel here, kept by a native Christian, named David; he and his brother are also Dubashes, and are very decent, honest, obliging men. The scenery around is magnificent, and I have seldom seen a finer view than is visible from the anchorage.

"I had good despatch at Vizagapatam, and sailed again on June 2nd, for **Bimlipatam**, which I reached in 2½ hours, anchoring in 6 fathoms (with 50 fathoms of cable to the water's edge), the flagstaff in one with the Master-Attendant's office, bearing about W.N.W., and well to windward of all the other ships, of which I found four there. I found my advantage in every case on this coast in taking up a berth to windward of all the shipping, as the boatmen prefer coming to a ship in that position; they can pull easily to windward when loaded, and get back easily after discharging; generally they are awfully afraid of falling to leeward. Also, should a cyclone set in, you are *then* to leeward of all the shipping, and can get to sea without danger of collision, as the wind generally blows from a direction opposite to that of the prevailing wind. Here they have about 40 Masoolah boats—too few for the number of ships frequenting the port. I think the landing at Bimlipatam much better than that at Vizagapatam, as a projecting reef of rocks protects the landing-place, and a small outlay would make the port good in both Monsoons, by running out a short pier on the before-mentioned reef. I found the Master-Attendant, Mr. Meppin, very obliging.

"There is no light either at Vizagapatam or Bimlipatam, and ships occasionally run past them, causing a tedious beat to windward again, with an adverse current. Both are easily recognised, however, during the day: the former by the Dolphin's Nose and Pigeon island, and the latter by a detached round hill, close to the beach, having a large and very old pagoda on the face of it, and a few scattered trees on the summit. Bimlipatam is built between the beach and this hill, on an inclined plane, and is very picturesque, though small and insignificant. The merchants, however, are effecting great reforms, draining and making good roads, and they are building a small church capable of containing about 150 sitters. There are two sugar refineries here, one belonging to Messrs. Arbuthnot and Co., of Madras, the other established by a Frenchman, but now stopped for want of funds. Bimlipatam is a place of considerable trade in sugar, seeds, hides, and horns. There are two hotels here, one French, the other English; the latter, a very good one, is kept by a native, and is well frequented. I got quick despatch here, notwithstanding that the weather was extremely unfavourable, with a heavy sea. Away again on the 11th June, bound to Pondicherry. I must here certify a matter which ought to be made known to ship-masters; the Dubashes at Madras, and all the other ports, will tell them that a ship can get no bazaar at Vizagapatam or Bimlipatam, and advise them to carry bullocks, sheep, and potatoes, &c. with them, having a view to their own emolument in supplying them. This, however, is nonsense; every description of fresh provisions, except, perhaps, potatoes, are to be procured at both places, and at reasonable prices.

"June 11th I sailed for Pondicherry, finding it a tough job working along the coast against the Monsoon and an adverse current, which ran about 36 miles a day to the N.E., and had in addition heavy squalls at night, requiring constant close

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attention. A ship working to windward along this coast, should not approach the land till near her destination, but keep about a degree off. By so doing, better weather is experienced, the current is weaker, and advantage can be taken of the shifts, to tack as the wind favours her. I reached Pondicherry on the 22nd at day-break, and followed my usual custom of anchoring to windward, and well in, and found the advantage of doing so by getting off boats when no other ship could. Here we have Masoolah boats again,—and a heavy S.E. sea constantly rolling in on our port bow, rendering the ship very uneasy. Pondicherry is a pretty clean town, and well laid out; the streets all at right angles, wide, and kept in beautiful order, with an avenue of trees shading the side-walks, and even the centre in some of the wider ones; the houses are spacious and well built. There is a good light here; indeed, the lights along all this coast are good. Supplies, however, are neither so good nor so reasonable as at the British ports; and many articles required not to be got at all. A steamer from Calcutta touches here, and at all the other principal ports on the coast, and stores can be got down by her from Madras, every fortnight. There are two passably good hotels, which are generally well filled. This was the first time in my life I ever had business with Frenchmen; I found them very pleasant and agreeable. There are seldom less than 14 or 15 ships in the roads, and trade seems to be carried on with all parts of the world. They ship extensively indigo, blue cloths, rice, seeds, oil, ground nuts, hides, skins, horns, &c.; they also send coolies to Mauritius and the West Indies.

"I finished loading on the 8th July, having in two months, since leaving Madras, visited four ports, with awkward passages between them; discharged about 500 tons of ballast, and loaded about 2000 tons of cargo, weight and measurement, in the face of many difficulties. A heavy thunder squall came on the evening previous to my sailing, in which the ship dragged her anchor, which afterwards turned out to be foul, and we narrowly escaped falling athwart a country ship, just bringing up in her hawse with a second anchor; I was therefore obliged, next morning, to drop through the whole fleet, not having room to pass to windward, and the wind was very faint, with a high swell on our port bow, as usual; I, however, got away safely, and out in the offing, when it fell dead calm till noon. The S.W. Monsoon was moderate at the bottom of the bay, but with the usual amount of squalls and rain."

N.E.-ward from Conada point, distant about 18 miles, is **Chicacole** river; the coast between is high, and may be approached to 10 or 12 fathoms at about 2 or 3 miles off shore.

Calingapatam is, E.N.E.-ly, distant about 14 miles from Chicacole; the sandy point, at the southern entrance of the river, is in Lat. 18° 19′ N. It may be recognised in clear weather by Garah hill, having a pagoda on its declivity, near which is a single tree; a stone beacon, 64 feet high, has also been erected on the sandy point, —which is long and low, having a reef of rocks extending ½ a mile seaward. There is **anchorage** in 6½ to 7½ fathoms, with the extremity of the sandy point bearing S.W. by S., distant 2 to 3 miles, and the highest upper-roomed house near the shore bearing from W.N.W. to N.W. by W., distant 1½ to 2 miles.

Bapanapadoo, in Lat. 18° 34′ N., is a small port 23 miles N.E. of Calingapatam; the coast is low,—with a succession of sand drifts; the village, consisting principally of fishermen's huts and godowns, is marked by a column 50 feet high, standing near the beach, coloured black and white; the usual anchorage is S.E. of the column.

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Poondy, in Lat. 18° 40′ N., is 7 miles N.E. of Bapanapadoo; it is marked by a white obelisk 50 feet high, to the eastward of which is a flagstaff 75 feet high; also to the northward of the obelisk stands the traveller's bungalow. The three objects close together form good marks for the usual anchorage, which is S.E. by E. of the obelisk; hereabouts several rocks project a considerable distance seaward.

Barwah, in Lat. 18° 52½′ N., is a small port 16 miles N.N.E. of Poondy; to the S. and W. of Barwah are large topes of cocoa-nut trees; to the northward is a plain of sand drifts. It is marked by two columns, coloured black and white, 50 feet high, and bearing N.W. from the usual anchorage.

Soonapoor.—This place, in Lat. 19° 5½ N., is marked by a white obelisk and a white column, each 50 feet high, built nearly at sea-level; at 120 feet from the column, and N.E. of it, stands the flagstaff, 75 feet high, and between the column and flagstaff is the Custom-house, all nearly at sea-level. The flagstaff bears W.N.W. from the anchorage.

Monsoorcottah, or **Gopaulpore,** in Lat. 19° 13′ N.; the anchorage, 1½ miles off the shore, is in 9½ fathoms, bottom of sand and mud, with the flagstaff on the beach bearing about N.W. by W., and Saddle hill S.W. by W. ½ W.; closer in (in 7 fathoms) the bottom is sand, and the holding-ground not so good, and, in fact, too near the shore. In December, 1857, the *Alnwick Castle* (1200 tons), anchored in 9½ fathoms with the flagstaff bearing W.N.W. ½ W. During the S.W. Monsoon the anchorage is a little further out (in 9¾ fathoms), with the flagstaff about N.W. by W. In March the S.E.-ly winds are often very strong, and send in a heavy sea towards the shore; the S.W. Monsoon blows *along* the land. At the periods of change—in October or November, and again in May or June—there is always bad weather here.

Ganjam is in Lat. 19° 22′ N. It is much frequented, and carries on a considerable trade by means of coasting vessels, many of which can enter the river. The anchorage in the roadstead is abreast the fort or river's entrance, in 8 to 9 fathoms, 2 miles off shore. Between Calingapatam and Ganjam the coast may be approached to 3 miles in 12 to 14 fathoms.

When *coasting* between Vizagapatam and Ganjam, a depth of 20 to 30 fathoms may be preserved with advantage when the wind is fair; at 12 to 15 miles off shore the bank of soundings gives 40 to 45 fathoms, speedily deepening to no bottom. Though the coast is generally low, it is backed by a chain of high hills, which gradually approach the sea towards the north, near Lake Chilka.

Manikpatam, in Lat. 19° 45′ N., is distant about 42 miles N.E. by E. from Ganjam. The inlet leads to the north end of Chilka lake; a sandbank is said to project 2 miles off the coast, the water shoaling suddenly from 10 to 4 fathoms. In passing do not come under 12 fathoms.

The **Juggernaut Pagodas** are the most celebrated in India. At a distance, and when bearing W. by N., they appear as one building; seen to N.N.W. and N.W. they show as three distinct buildings; the ground is low and well clothed with trees. Lat. 19° 48½′ N., Long. 85° 48′ E.

The **Black Pagoda,** in Lat. 19° 52′ N., Long. 86° 6′ E., stands by itself near the sea; it is on low ground destitute of trees, though there are three clumps to the N.E. and one to the S.W. Coasting along, do not come under 16 to 18 fathoms, about 4 or 5 miles off shore, though the steep sandy beach between the Juggernaut Pagodas and the Black Pagoda *may be* approached to 12 fathoms; but the land being low,

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the lead must be used even with the greater depths, as the first indication of danger during the night will be the noise of the surf on the beach. All these pagodas, when viewed from a distance, appear as a ship under sail,—in some directions as a large black rock.

False point bears N.E. ½ E., distant 48 miles from the Black pagoda; it is low and wooded, with many outlying dangers near it, and several small sandy islets,—one of which, following the line of coast in a curved form, extends 8 miles.

Light.—About 2 miles S.W. of False point, in Lat. 20° 20′ N., Long. 86° 45′ E., a lighthouse 120 feet high has been erected, having a large white star in the centre; it exhibits a *fixed white* light visible 18 miles; to verify their position, vessels should never come under 8 fathoms when making the light or lighthouse, after which they should haul out into 13 to 18 fathoms.

In **False bay,** to the north of False point, the bottom is of soft green mud, shoaling very gradually to the shore.

Palmyra point, in Lat. 20° 44′ N., is fronted by shoals (Palmyra shoals) to the distance of 12 miles; the lighthouse has been long washed away, being undermined by the sea; on the shoals the depth varies from 1 to 4 fathoms, suddenly deepening to 10 fathoms. Bound to Balasore roads from False point, do not come under 12 to 14 fathoms; when Palmyra shoals are rounded, if the wind be strong from S. or S.W. there is anchorage to the north of them in 10 fathoms, with good shelter.

Kunka River.—To the N.W.-ward of Palmyra point is Kunka river, which is wide at its entrance, and navigable for vessels drawing 12 or 13 feet water; but it is necessary to employ a pilot. It is much frequented by the coasting-vessels belonging to the natives, who carry rice and various articles of trade from hence to Madras and other parts of the coast, during the favourable Monsoon. Latterly, vessels belonging to European residents at Calcutta have been employed in conveying stores from Fort William to the Kunka, returning with salt, corn, and rice. Some native vessels from the Maldeeves trade to the Kunka.

N.N.W. of the Kunka, distant 24 miles, is **Churinga** river, or CHURRIMOON CREEK, situated in a bay affording good anchorage to small vessels in the S.W. Monsoon.

Balasore, in Lat. about 21° 30′ N., was formerly a considerable town, but at present is only a mile long, and half a mile broad in the widest part. It is built along the river Boorabullung, the entrance to which is in Lat. 21° 28′. Boats from the Maldivh islands arrive in fleets of twenty or thirty, in the months of June and July, bringing with them the produce of their islands, consisting of corn, cocoa-nuts, cowries, salt-fish, tortoise-shell, &c., and return in December, laden with broad-cloths, coarse cottons, cutlery, hardware, looking-glasses, rice, silk goods, sugar, tobacco, and other commodities,—the produce of Europe, India, and China.

Pipley is about 18 miles E.N.E. from the entrance of Balasore river. It is situated on the banks of a river, and is known by a pagoda to the west, and a thicket of trees very near it. Pipley was once the mart of this country; but the waters washing away a great part of the town, at the same time that a dangerous bar was formed at the mouth of the river, the merchants removed to Balasore.

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THE SUNDERBUNDS.—The province of Bengal is intersected by the Ganges, which in its lower course joins the Brahmapootra. About 500 miles from the sea, the Ganges is deep and rapid, but in its progress seaward it widens, becomes more sluggish, and separates into a vast number of streams—all which causes combined, deprive it of the force necessary to sweep away the banks of sand and mud thrown across its mouth by strong southerly winds. The delta of the Ganges commences about 300 miles from the sea, reckoning the windings of the river, and the Hoogly, on which is the port of Calcutta, is formed by the union of two of its westerly branches. That part of the delta bordering on the sea is composed of a labyrinth of rivers, creeks, and inlets, all of which are salt except those that immediately communicate with the principal arm of the Ganges. This tract, which presents a sea front of 250 miles in a direct line nearly East and West, is known as the **Sunderbunds**; it consists of a multitude of low islands covered with jungle, and from which project the low and dangerous banks which make the navigation hereabouts so precarious.

It would be a work of supererogation to minutely describe either the banks or channels of the Ganges, or any of its branches; they are subject to such great and rapid changes that a good chart and accurate local knowledge are at all times necessary for their navigation. A pilot is required for the Calcutta river.

ENTRANCE TO THE HOOGLY OR CALCUTTA RIVER.

Lights.—Five lights mark the entrance to the Hoogly:—

1. The PILOT RIDGE LIGHTVESSEL, a brig, is moored in 21½ fathoms during the S.W. Monsoon, from March 15th to September 15th: it exhibits a *fixed white* light from the fore yardarm; a blue light is burnt every hour, and a maroon at the intermediate half hours; a gun is fired when a vessel is visible. Position.—Lat. 20° 49′ 30″ N., Long. 87° 40′ E.

2. The LOWER LIGHTVESSEL, at the entrance to the eastern channel of the Hoogly, is moored in 7½ fathoms, and exhibits a *fixed white* light; a blue light is burnt every half hour, and a maroon every quarter of an hour, commencing at 7h. P.M. during the S.W. Monsoon, from March 15th to September 15th; during the N.E. Monsoon, from October to March, a maroon or torch is burnt every half hour, and a blue light every hour. Position.—Lat. 21° 3′ 30″ N., Long. 88° 12′ E.;—but during the S.W. Monsoon, the vessel is moored in Lat. 21° N.

3. The UPPER LIGHTVESSEL in Gaspar channel, N. by W. 25 miles from the Lower Lightvessel, and S. 16° E. 12 miles from Saugor light, is moored in 3½ fathoms; it exhibits a *fixed white* light, and blue lights and maroons are burnt at intervals throughout the night. Position.—About Lat. 21° 26′ 15″ N., Long. 88° 5′ 20″ E., but it is slightly altered as the channel shifts.

4. SAUGOR ISLAND lighthouse is on Middleton point, the S.W. extremity of Saugor island, 200 yards from low-water mark; it exhibits a *fixed white* light, *flashing* every 20 seconds, at an elevation of 88 feet above the sea, and is visible 15 miles. Position.—Lat. 21° 38′ 43″ N., Long. 88° 2′ 10″ E.

5. COWCOLLY, or KAOKALI lighthouse is 2 miles S.W. of Kedgeree point; it exhibits a *fixed white* light at an elevation of 62 feet above the sea, visible 15 miles: it is now used as an anchoring light. Position.—Lat. 21° 50′ 12″ N., Long. 87° 57′ 47″ E.

For a description of the lightvessel at the entrance to the Mutlah river, see p. 470.

Tides.—The tides in the channels have a rotatory movement with the sun: first-

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quarter flood W.N.W., round by North to the last quarter E.N.E.; first-quart
E.S.E. round by South to the last quarter W.S.W. The strength of the tide r
the direction of the channels N.N.W. and S.S.E., about 3 knots at springs, and
neaps.

The PILOT'S RIDGE is the bank of soundings—shelly sand and gravel—v
from 15 to 20 fathoms, lying to the S.W.-ward of the Pilot's Ridge lightvess

The WESTERN CHANNEL lies between the WESTERN and the EASTER
REEFS; southward of the entrance is the principal pilot's station.

The EASTERN CHANNEL is between the EASTERN SEA REEF and SAUGOR
at the entrance is the Eastern Channel lightvessel.

Caution.—Hoisting of Signals by Vessels passing Signal Station

1. The master of every inward or outward bound vessel, on arriving within
distance of any signal station established within the limits of the river Hoo
within the limits of any channel which may be made subject to the provi
Act XXII. of 1855, shall, on the requisition of the pilot who may be in charg
vessel, signify the name of the vessel by hoisting the number by which she is
or by adopting such other means to this end as may be practicable and usu
shall keep the signal flying until it be answered from the signal station.

2. Any master of a vessel arriving as aforesaid, who shall refuse or neg
conform to the above rule, shall be liable on conviction, for each instance of
or neglect, to a fine not exceeding 1000 rupees.

3. Every pilot in charge of a vessel shall require the number of the vessel o
he is in charge to be duly signalled as provided under section I. of this Act.
on a requisition from the pilot to that effect, the master of a vessel, not empl
the service of Government, shall refuse to hoist the number of a vessel, or t
such other means of making her name known as may be practicable and us
pilot in charge of such vessel may, on arrival at the first place of safe anc
anchor the vessel in question, and refuse to proceed on his course until the req
shall have been complied with.

4. Any pilot in charge of a vessel, who may be proved guilty of neglect to
of connivance with the master of such vessel in disobeying the provisions of t
shall be liable to a penalty not exceeding 500 rupees for each instance of
or connivance, and in addition shall be liable to dismissal from his
ment.

5. This Act shall be taken and read as part of Act XXII. of 1855, and th
ties provided by this Act shall be recoverable under section 55 of that Act.

The Pilot's Station is a little to the southward of the *south buoy*, whic
12 fathoms at the entrance to the Western channel into the Hoogly, and bea
False point lighthouse N.E. by E. $\frac{1}{4}$ E., distant 83 miles. Vessels approach
station during the day must show the usual signal for a pilot, and by night fi
burn blue lights, and exhibit two lights in a vertical position where best se
avoid as much as possible running for the station at night, or in threateni
weather; under such circumstances put the vessel under snug canvas while
in deep water, and keep the sea. To mark the station one of the pilot vess
show during the day a large flag (*white with red cross*) at the maintop-gallan
head, and a good masthead light at night, and will burn a blue light an
alternately every half hour, and fire a gun at 8 P.M., at midnight, and at 4 A.

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In the N.E. Monsoon the pilot vessels are found at the entrance of the Eastern channel, and they generally anchor on the Eastern Sea reef at night, or during the flood in the day.

Directions.—With the lighthouse on False point, bearing W.S.W. 12 or 15 miles, steer E.N.E. so as to increase the soundings from 13 to 23 fathoms, when some of the pilot vessels are sure to be met with. If a vessel gets accidentally on the tail of any of the Sea reefs, she ought to tack and haul off immediately into deep water, or anchor until the ebb tide enables her to work to the southward; the sea runs high upon the reefs in the S.W. Monsoon.

Mr. D. Robertson, the Master Attendant at Calcutta, gives the following directions:—A vessel after making the lighthouse on False point (in passing which she ought not to go into less than 12 fathoms), should bring it to bear about W.S.W., 10 or 15 miles distant, when she will be in 11 or 12 fathoms; and then steer E.N.E., when the soundings will gradually increase to 23 fathoms on the eastern edge of the Pilot's ridge. She should then regulate her course so as to keep between the ridge and the depth of 27 fathoms; when, by attention to the lead and to the nature of the soundings, as well as to the course and distance run, it will be almost impossible to avoid making the pilot-vessels, as their cruising ground is immediately to the N.E. of the light-vessel, which, during the S.W. Monsoon, is stationed close to the buoy on the ridge. The soundings to seaward of the ridge are, in general, a greenish or olive-coloured mud, with (occasionally) a few bits of broken shells among it; while those on the ridge are of a shelly sand, or minute gravel, of a reddish or rusty-brown colour. Vessels approaching the station are warned to be careful in avoiding collision, when either communicating with the light-vessel or the supplying pilot-vessel; and on making the former at night they are recommended to heave-to, at a proper distance, till daylight, by which they will avoid the probability of passing the supplying pilot-vessel in the darkness of the night.

Directions for Approaching the Mouth of the River Hoogly.

Bound to Calcutta *in the strength of the S.W. Monsoon* the land should be made about Poondy, Lat. 18¾°, or between it and Ganjam, where it is high, for in the latter part of March, or early in April, the weather is generally hazy, from which cause the land cannot be discerned, unless it is very near; a vessel certainly ought not to get to the northward of the Juggernaut pagodas before getting in with the coast.

When to the northward of 18° N. and the vessel's position is not correctly known, haul in and sight the coast. In the night or in thick weather the lead will be a good guide if attended to with care; for although the bank of soundings extends but a few leagues from the coast, there is generally from 30 to 35 fathoms about 6 or 9 miles off, between Poondy and the Black pagoda; about Ganjam the water shoals fast under 20 fathoms towards the shore. When the position is known, steer along the coast, (keeping in 18 or 20 fathoms in the night, or with unsettled weather) until abreast of Manikapatam; then if it be daylight and the wind favourable, haul into 14 or 15 fathoms to sight Juggernaut and the Black pagodas in passing;—they will be seen in hazy weather when in 17 or 18 fathoms, but with a commanding breeze the coast may be approached with safety to 12 or 13 fathoms, about 3 or 4 miles from the shore. At night do not come under 15 fathoms, nor deepen above 17 or 18 fathoms, for the coast is low and sandy close to the sea, and it will not be seen unless close to

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it, and in hazy weather the noise of the surf on the beach would probably be the fi indication.

When about 10 miles past the Black pagoda, steer so as to obtain proper soundin off False point. The depths decrease gradually towards the bank surrounding Fa point, but keep in 14 or 15 fathoms at night when passing it, or in 16 fathoms the wind is S.E. As the flood inclines towards the shore, and the ebb from it, and 15 fathoms are good depths to preserve with a fair wind when steering fr False point. (For the description of the light on False point, *see* p. 464.)

When False point bears W.N.W. and the vessel in 14 or 15 fathoms, steer N. 30 miles to pass outside Palmiras reef, keeping in 14 or 15 fathoms with a co manding breeze, or in 16 fathoms if the wind is S.E. If blowing strong from t S.W. in rounding Palmiras reef in daylight, a vessel may steer along the edge of in 12 or 14 fathoms, taking care not to approach the north-east part under 12 or fathoms, where it is dangerous and steep-to under 10 or 11 fathoms. When p the reef she may haul to the N.W. and anchor to the northward of the Mypu sand, where she will be sheltered from the sea by the reef. False point has son times been mistaken for Palmiras point, and the latter sometimes for the form whereby several vessels in the first case have been wrecked by hauling into False b instead of Balasore bay, and others have got to the eastward of the Sea reefs keeping too far off shore. A lighthouse being now on False point, this can rarely the case.

If the coast or the pagodas have not been seen, and in steering along in 14 or fathoms, the bottom is sand, shells, and black specks, which are thought to be th off False point, but uncertain whether they may not be those off Palmiras poi then bear in mind that the water will not deepen in steering N.E. from the depth 15 fathoms off False point, but in steering that course from the depth of 15 fatho on the edge of the bank off Palmiras reef it will deepen gradually to 17 and fathoms; a vessel ought then to steer N.N.W. or N.W. until the soundings are or 17 fathoms, in which depths the pilot vessels generally anchor at night in Ba sore roads during the S.W. Monsoon.

The above directions are given while the Monsoon prevails steady from the S. and westward; but towards the close of the Monsoon, or in September, this route likely to cause inconvenience and delay, for the wind then often hangs to the ea ward, and the current sets strong to the S.W. through False bay. During th month, if the latitude can be observed, or the lighthouse or light on False po can be recognised, there can be little occasion for making the land so far to southward.

During the N.E. Monsoon a vessel will generally have to beat up the b After passing about 100 or 150 miles to the westward of the north-west coast Sumatra, the west side of the Nicobar islands may be approached. If the wi inclines to keep to the westward, give the islands a good berth; if at E.N.E. N.E. steer up the bay, close hauled, to the westward of the islands. On the para of 16° or 17° N. the wind often veers to the northward, and favourable tacks m then be made to the eastward, at times, to keep from the western coast of the b Neither should the eastern coast be approached, but vessels should work to northward in the open sea, where there is smooth water and moderate breez which will enable them speedily to reach the Sea reefs, at the entrance of Hoogly.

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It has frequently happened in the strength of the N.E. Monsoon, that vessels, by passing close along the western coasts of the Nicobar islands, have reached the Sea reefs without making a tack. If the equator is crossed late in February or in March, keep well to the westward in passing up the bay, for the current at that time runs to the northward along the Coromandel coast, and the winds will be found between S.W. and S.E.; in the middle of the bay they are light and variable from N.W. to N.E. during these months, with a drain of current at times setting to the southward.

The **MUTLAH RIVER.**—Within the last few years a new port (PORT CANNING) has sprung up in the Mutlah branch of the Ganges. It is thus spoken of by CAPT. W. S. FITZSIMONS, of the *Fulwood*:—

"I will now point out to you the advantages which I experienced there last year (1858), and what they are as compared with those of the Hoogly. When I arrived at the Sand Heads I found a pilot brig doing duty as a lightvessel; on speaking her, it appeared they had no pilots on board for the river. Seeing that was the case, I immediately made sail, and proceeded upwards by the Bulcherry channel; while proceeding through the Channel, made the buoys out distinctly, and after passing through between the Western Spit buoy of the Roymutlah Sand and the Bulcherry Sand, we anchored for the night a little to the northward of No. 3 Bulcherry buoy. At daylight the following morning weighed anchor and proceeded northward for the entrance of the river. When abreast of Halliday island we got a pilot on board, and continued on all day with a light wind, and in the evening passed the Cattalee, and anchored for the night off Ward's point. Now, one thing I would point out to you in our progress upwards was the absence of any obstruction in the shape of bars or shoal places in any portion of the Channel, and the facility with which we entered the river. Take the entrance of the Hoogly and compare them, where you most probably would not have got over the Gaspar sand until you very likely would have had to anchor (for the flood-tide coming in to allow you to pass over), obstruction first, in one of the most exposed anchorages known to seamen; then, again, you have Lloyd's Channel, another stopping-place, if you had not a strong favourable wind, or a powerful steamer to assist. Next in turn comes the Rangafulla, most probably another stoppage. In all of these places a ship is lying much exposed, and very likely sheering about in a strong tideway. All these places are a much less distance from sea than we got during our first day's progress with very light winds. See the delay which has already taken place in a ship's progress thus far up the Hoogly, where a ship will have had the assistance of an experienced pilot all the time. Then, again, see the advantages which ships have in hard weather during the S.W. Monsoon on arriving at the Sand Heads. Where, when bound to the Hoogly, a ship comes on the pilot station, and no pilots out (which is a frequent occurrence), she is signalled to from a pilot vessel that they cannot put a pilot on board, or that there are none on the station, and the vessel is recommended to stand to sea again, probably continuing that way for several days, or until the weather moderates sufficiently to enable them to place a pilot on board; and it frequently occurs that ships have to proceed to sea even with a pilot on board. Compare all these with the channels leading to the Mutlah, and you will see that it will not often occur, in which a perfect stranger to the place may, with common

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prudence, proceed upwards, and be able in a few hours to have his ship i safety.

"Then, again, without particularizing the upper parts of either, you take the cha of the Mutlah, you will nowhere find less than 4½ fathoms water in the prop channel, even at dead low water spring tides, as high up as Ellengunge. Althoug I acknowledge it to be necessary, when proceeding up or down from Cattalee in large ship deeply laden, to have the assistance of a steam tug, yet as she will be ab to proceed with all safety from morning to evening without stopping, a vast expen of time and money is saved. Then, again, the tides run with little more than ha the velocity which they do in the Hoogly; you will be able to acknowledge it to b a much safer navigation; you will be able to recollect that I had a steamer roun from Calcutta to tow the *Fulwood* to sea, and I believe her to have been one of th poorest boats belonging to Calcutta, yet she took the ship to sea in much less tha two days, although the wind was blowing strong from the southward nearly all th time. I can with all confidence assure you that there are few such navigable rive as the Mutlah without having some great drawback to their safe navigation."

Light.—A temporary lightvessel has been moored in 9 fathoms; it exhibits *fixed white* light, visible 7 miles. A red flag is shown at the mainmast-head b day; and if in her position, a rocket is fired from March 16th to October 16th, 8 P.M., at midnight, and at 4 A.M.

The following **Sailing Instructions** FOR ENTERING THE **River Mutlah fro Sea,** are by MR. T. HILL, Assistant Master-Attendant, 1856:—

"The channels leading from sea into the river Mutlah having been buoyed o the following notice is published for general information:

"The Western (or Ward's) channel is bounded on the west by the Bulcherry ree or sand, extending southerly from the island of that name, and on the east by th Roymutlah sand, part of which dries at low water. This channel is from 2 to miles wide, and is marked off by six buoys, four *red* or western, and two *black* c eastern.

"The outermost or Reef buoy is a first-class spire buoy, with two baskets on it; is painted *red* and marked with the letter M; it lies in 4½ fathoms low water sprin tides; Lat. 21° 11′ N., Long. 88° 42′ 45″ E., and bears from the eastern chann floating light buoy, E. by N. ½ N., distant 32 miles.

"The centre Bulcherry buoy is a second-class spire buoy, with one basket on it; is painted *red*, and marked Mutlah in full; it lies in 4 fathoms low water, about miles N.N.W. from the outer or Reef buoy.

"The Bulcherry spit buoy is also a spire buoy, painted *red;* it lies in 4 fathom low water on a spit of the sand, about 9 miles N. ½ W. from the centre buoy.

"The upper Bulcherry buoy is also a spire buoy, painted *red;* it lies in ¼ less fathoms, about 6 miles N. by W. from the Spit buoy, and W. by S. ¾ S. from th flag-staff on Dalhousie point.

"The outer Easternmost buoy of this channel is a second-class spire buoy, painte *black*, with one basket on it; it lies in 4¼ fathoms low water, on the S.W. verge the Roymutlah sand, N.E. by N. from the Reef buoy distant about 5½ miles.

"The Roymutlah Western spit buoy is a second class spire buoy, painted *black;* lies in 4 fathoms low water N.W. ½ N. from the outer black buoy, distant abou 10 miles, and North about 6 miles from the centre Bulcherry buoy.

"The mid-channel course from sea to abreast of the above Spit buoy i

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N.N.W. ½ W. 15 miles. From that point, North 15 miles will carry a vessel up to Halliday island.

"The Eastern or Roymutlah channel, is bounded by the Roymutlah sand to the westward, and the Bangadoon or Dalhousie sand or reef to the eastward, and is marked off with four buoys, three *red* or western, one *black* or eastern.

"The outermost buoy is a second-class spire buoy, with one basket upon it; it is painted *red*, marked $\frac{R}{MUTLAH}$; it lies in 5 fathoms low water, on the S.E. verge of the Roymutlah sand, N.E. by E., about 10 miles from the Bulcherry Reef buoy.

"The Roymutlah Eastern spit buoy is painted *red;* it lies in 5 fathoms low water, N.N.W. ½ W., about 6 miles from the outer buoy.

"The upper Roymutlah buoy is painted *red;* it lies in 4¾ fathoms low water N.W. of the Spit buoy, distant about 5½ miles.

"The innermost buoy of this channel is painted *black;* it lies in 5 fathoms low water on the south verge of a flat extending from Dalhousie point to the S.S.E.; it bears from the upper Roymutlah buoy N. by W., distant about 4 miles.

"The mid-channel course in the Roymutlah channel is N.W. ½ N. to the black buoy, and from that point N.N.W. to N. by W. to Halliday island.

"Vessels resorting to the River Mutlah during the S.W. Monsoon should adopt a similar route, and conform to the directions for making the pilot station at the entrance to the River Hoogly, taking their departure from the Eastern Channel floating light, steering E. by N. ½ N. to cross the tail of the eastern prong of Saugor sand in 5 fathoms, off which they would deepen into 7 fathoms, shoaling again on the light house sand to 5½ or 6 fathoms, deepening off into 6½ or 7, and crossing the Bulcherry reef in 4½ to 5 fathoms a little south of the Reef buoy.

"Commanders of vessels doubtful about crossing the tails of sands in a heavy swell, could steer more to the southward, and keep in 8 or 9 fathoms soft ground; but great care would be requisite not to overrun the distance.

"During the N.E. Monsoon, commanders of vessels confident of the correctness of their reckoning, should work up direct for the Bulcherry Reef buoy; but during cloudy or thick weather, crossing the swatch of no ground in about the latitude of the buoy, and running down upon it would be advisable.

"It is high water full and change about 9 hours 15 minutes; at the Bulcherry Reef buoy the tides set round, as in the channels to the Hoogly; the floods making to the west, the ebbs to the eastward, having a velocity during the springs from 2½ to 3 miles per hour, and a rise of 9 feet.

"The bottom throughout the channels is mud; the sands exceedingly hard, and the lead an excellent and safe guide towards them. The least water in the Western or Ward's channel is 4 fathoms; in the Roymutlah 5 fathoms, low water springs.

"From Halliday island the course continues North, up to the "Cattalee," where the river takes a sharp turn to the westward, and the channel contracts. Up to this point a stranger, with Ward's chart and ordinary care, could, without a pilot, conduct his ship with safety, attending to the set of the tides, leaving the red buoys to the westward, and black buoys east of his course."

Houses of Refuge.—Houses of Refuge for shipwrecked mariners, cast ashore on the sea face of the Sunderbunds, have been put up as follows:—

No. 1.—*Painted Red.* Just to the northward of Jackson's grove on Seyers' point, forming the eastern entrance to Channel creek. It is on an extensive plain,

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covered with short grass, inside or to the eastward of some high sand-hills that here line the shore.

No. 2.—*Painted White.* At the eastern entrance to the Subtermookey channel, 400 yards to the northward of the point that forms from Bulcherry island, and 200 yards from high-water mark. It is in the midst of thick low jungle.

No. 3.—*Painted Black.* At the eastern entrance to the Jumera channel, 400 yards to the north of the point that forms from the entrance of the Subtermookey channel, and 200 yards from high-water mark.

No. 4.—*Painted White.* On the south-east part of Dalhousie island, at the eastern entrance of the Mutlah river, on a sandy patch, about five feet above high-water mark, and about 100 feet in shore, distinguishable by a White Flag from a long spar and bamboo, which have been put up close alongside of the house, visible above the surrounding trees.

No. 5.—*Painted White.* On Bangadoonee island, about seven miles eastward of No. 4. It stands on the south-eastern part of the island, above a small sandy beach about 100 feet from high-water mark. A long spar and bamboo, with a flag, have been put up alongside, and may be seen considerably above the trees.

In each house there is a supply of water and biscuit, a catamaran and paddles, a letter of instructions, and a chart of the Sunderbunds.

Persons cast away, reaching land to the east of Saugor, should make search for the Houses of Refuge; and it should be borne in mind, that when a vessel is lost with a pilot on board, the fact would soon become known at the Pilot Station, and in Calcutta. Parties, therefore, finding their way to the houses, should remain there, and husband the means of subsistence, in the assurance that succour will speedily reach them; or if compelled to leave, endeavour to travel westward to Saugor island, and travel along the beach until they arrive at the lighthouse; or make their way to a large fishing village, situated on the south-east side of Saugor island, using the catamaran as far as practicable.

EAST COAST OF THE BAY OF BENGAL.

CHITTAGONG RIVER.—The entrance to this river is in Lat. 22° 14′ 24″ N., and Long. 91° 50′ E. It is less than a mile in width, and (according to the survey of 1840) has soundings over the deepest part of the bar of 6 to 10 feet at low water spring tides, this deepest part being close under the north point of the river. Inside the bar the depth increases to 3¼, 4, and in some places 5 and 6 fathoms. The town is 8 miles from the sea, following the course of the river, and is situate on its north shore. We believe that two white buoys mark the north side of the bar, and two black ones the south side.

Owing to frequent changes in the banks of the Chittagong river, instructions for entering are useless; the assistance of a pilot is therefore indispensable.

Between the Chittagong river and the north end of Kootubdeah island, a distance of 17 miles, the bottom is represented to be stiff and good for holding. When waiting for a pilot to take the vessel into the river, it used to be customary to anchor abreast of the Fakir's tree in about 4½ fathoms, at 2 miles from the shore, and then to fire a gun, which could be heard in the river, when a pilot would come

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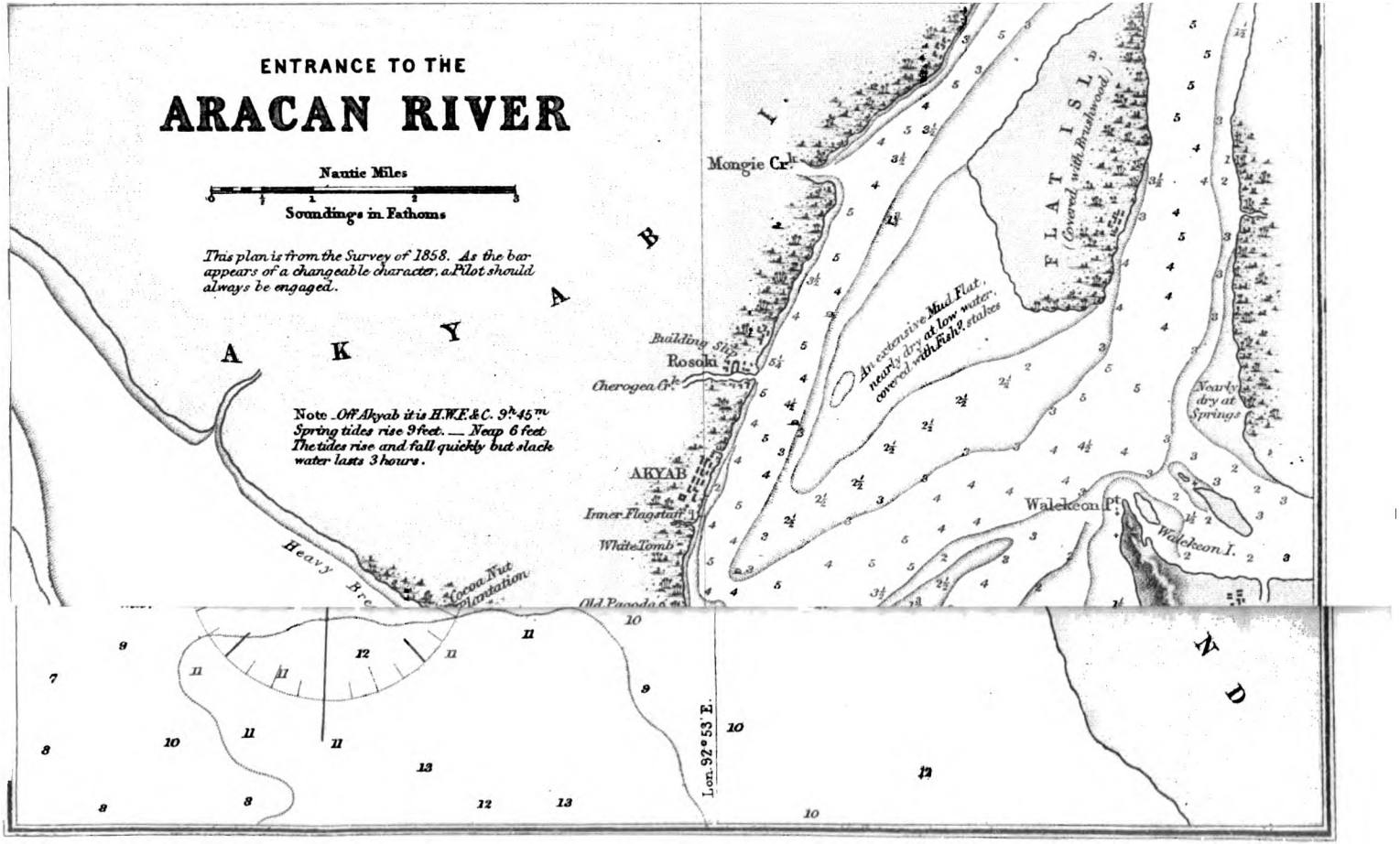
ENTRANCE TO THE
ARACAN RIVER
Nautic Miles
0 1 2 3
Soundings in Fathoms
This plan is from the Survey of 1858. As the bar appears of a changeable character, a Pilot should always be engaged.
Note.—Off Akyab it is H.W.F.&C. 9h 45m
Spring tides rise 9 feet.—Neap 6 feet.
The tides rise and fall quickly but slack water lasts 3 hours.
A K Y A B
I.
Mongie Cr.
Building Ship
Rosoki
Cherogea Cr.
AKYAB
Inner Flagstaff
White Tomb
Old Pagoda
Heavy Bre
Cocoa Nut Plantation
FLAT I S L.
(Covered with Brushwood)
An extensive Mud Flat, nearly dry at low water, covered with Fish Stakes
Nearly dry at Springs
Waleekeon Pt.
Waleekeon I.
Lon. 92° 53' E.
10
11
12
13

t; this custom may still be followed, although the recommendation to anchor does t appear to be good, as there is a very heavy, short, breaking sea, dangerous to nall vessels when the wind blows with any strength. The Fakir's tree, thick and ushy, is situate at about 3 miles southward of the entrance to the Chittagong, and easily recognised, being close to the shore.

Kootubdeah Island.—At about 18 miles southward from the Chittagong river the north end of Kootubdeah, a low wooded island, which extends southward 3 miles in a direction parallel to the coast from which it is separated by a narrow nt difficult channel of 8 fathoms to 9 feet.

Light.—A lighthouse near the north end of the island shows a *fixed* light, visible om a distance of about 15 miles.

Following the coast southward from Kootubdeah island, we pass Matrabari and uscal islands, which are also separated from the shore by a narrow channel fficiently deep to be navigated by native vessels.

The west and south coasts of Kootubdeah island are dangerous to approach, as ul ground extends from them a considerable distance. These reefs are rendered the ore dangerous by the circumstance that there is a depth of so much as 10 and fathoms close to their outer edges, decreasing seaward to 5 and 6 fathoms at about leagues westward from them. From the south end of Kootubdeah island, the outh extremity of the Kootubdeah reef (10 feet) bears S. by W. ½ W. 12 miles. he reef surrounding Muscal islands extends from the south end of the southernmost nd largest island about 7 miles.

In lat. 21° 20′ there are some white sandy cliffs, which are valuable as a landmark n fine weather when the sun shines brightly upon them, as although they have not nuch elevation, they can then be seen from a distance of 15 to 18 miles.

AKYAB.—The principal mouth of the Aracan river, that which forms the port of kyab, is in Lat. 20° 5′ N., and Long. 92° 52′ E. It is here 2¼ miles wide, reckoning rom Fakir point, on the north shore, to Hodge point, the north end of Borongo sland, on the south shore; but the navigable channel has a breadth of less than a nile, being narrowed by reefs from each shore. On the edge of the southern reef, nd in nearly the middle of the river, there is a small islet, named Savage island, pon which is a lighthouse.

The bar of Aracan river, according to the survey of 1858, has soundings upon it f 12 feet to 6 fathoms at low tide. Having crossed this, the depth increases to 10 nd 20 fathoms, the last being in the middle of the stream, immediately opposite Savage island; thence it rapidly decreases to 3 and 4½ fathoms off the town of Akyab, which is situate on the western bank at about 2 miles from the sea.

Aracan river, like other barred rivers on this coast, brings down large quanities of soil in the rainy season, and the banks at the entrance are subject to frequent changes; hence *strangers must obtain a pilot's assistance* when ound in.

Light.—The lighthouse on Savage island, on the south side of the entrance to the river, shows a *fixed* light at 106 feet above the sea, visible 12 to 14 miles. A lighthouse was also building in 1859 on the table land of Borongo island, at about 5 miles outh-eastward from Savage island; this, we believe, is now lighted.

When approaching the port of Akyab from north-westward there are some dangerous reefs, situate at various distances from the coast, which require great care to

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avoid. These are named St. Martin's, Asseergurh, Oyster Island, and Oyster I the two last-mentioned reefs lie about 9 miles from the shore, and in the im vicinity of the port.

St. Martin's Reef.—This reef is in Lat. 20° 37¾′ N., and Long. 92° 14′ has not been thoroughly examined, but is believed to be of considerable exte N. by W. and S. by E. direction. The depth close to its western edge is a fathoms, and close to its eastern edge about 8 fathoms, which thence gradu creases to the reef surrounding the shore of St. Martin's island, about 5 miles Its position is usually indicated by breakers. When in the vicinity of this ship should be put about immediately the soundings become less than 20 fat

Asseergurh Reef.—Upon this reef there is a depth of only 8 feet at lo it is consequently sufficiently shallow to endanger even a small vessel. It is 6 miles from the shore, in Lat. 20° 28′ N., and Long. 92° 30′ E., at about south-eastward from the south end of St. Martin's island. Close to its west are soundings of 7 and 8 fathoms, and there are soundings of 7 fathoms imm off its eastern side, which thence gradually decrease to the bank bordering th Breakers generally indicate the position of this reef.

A bank of 3½ to 6 fathoms exists between the Asseergurh reef and St. I island, upon the northern end of which there is a rock,—we believe, awash.

Oyster Island and Reef.—Oyster Island is a small islet situate in Lat. N. and Long. 92° 32½′ E., and distant about 10 miles from the mainland. was, covered with brushwood, and is said to be visible from a distance of 5 or Vessels can pass between this island and the coast, as there is a deep channe 6 fathoms, but a shallow flat extends off from the land at least 4 miles; he passage inside the island is not recommended, and vessels bound to Akyab keep outside, passing the island on its west side. The shallow flat fro entrance of the river Myou, and forms the bar to that river; thence it co south-eastward along the shore, and fronts also the Aracan river.

The shoal or reef surrounding Oyster island extends from its east, north, a sides about a mile, but on its south-east side about 3½ miles; its direction t corresponds with the coast-line. The depth on the shoal is 4 to 12 and 18 f its edge is steep on all sides except the south-east, where the soundings p increase gradually to 4½ and 5 fathoms. To avoid this reef vessels sho approach its west side nearer than a depth of 15 fathoms.

Oyster Reef.—This is a dangerous reef of 4½ to 10 feet at low tide, si Lat. 20° 5½′ N. and Long. 92° 38½′ E., or about 14 miles West from the lig on Savage island at the entrance to Aracan river. It is probably not more miles in extent N.N.W. and S.S.E., and has soundings of 6 fathoms almost it; at 2 miles westward from it the depth is 12 fathoms. Its position is g indicated by breakers except in fine weather during the N.E. Monsoon. S dable is this reef to vessels approaching or leaving Akyab, that it should alwa a wide berth. It has been proposed to moor a lightvessel off its south end.

Heckford Shoal.—This shoal is inserted in charts on the authority of Heckford, of the Mercantile Marine, who discovered it in 1855, and descrit follows:—

"Heckford's shoal (composed of rock, coral, and pebbles), is 13 miles S.W from Savage island lighthouse; W. by S. ½ S. from the table-land of Borong and W.N.W. from the south extremity of that island. It has 4½ fathoms

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(probably less), is in the direct track of vessels, and is surrounded by the following (mud and mixed) soundings—viz., 20 fathoms 1½ miles to the westward and southward of it, 15 to 13 fathoms to the eastward, and 12 to 13 fathoms 2 miles from its north-east end; shoaling towards Oyster reef. Commanders of vessels of heavy draught are therefore advised to be particular in the bearing of the table-land when approaching it from the westward, and warned not to pass over the shoal, as the lighthouse is not visible when you are close to the south-west of it."

Although it has been mentioned that Aracan river should be entered only with a pilot's assistance, the changes of the bar being frequent, we add the following instructions (copied from the Admiralty chart of the river, No. 1884, ed. 1865), as they may be useful in an emergency:—

"Ships of heavy draught coming from the westward in the south-west Monsoon, should steer East for the Table lighthouse until Savage island lighthouse bears N. by W., then haul up for it, and when abreast of the Bar buoy steer N.N.W. ½ W. until Passage rock bears E.N.E., when haul over to the north-eastward for the anchorage. A vessel may anchor with the Savage light S.S.W., or the North and South Hummocks in one, in 5 fathoms. The deepest water for large ships is off the Cherogea creek, within 70 yards of the shore.

"An excellent and safe passage for boats and small schooners is found between Savage island and the north end of Borongo island, sheltered from all seas in the south-west Monsoon.

"**Caution.**—When coming in with the flood, great care is required in allowing for it, as it sets right on to the White rocks. In coming out with the ebb tide, keep as close to these rocks as prudence will allow, in order to prevent being set on the western bank."

A reef projects from Fakir point, the north side of the river, some distance in a south-easterly direction, the extremity of which is, we believe, marked by a buoy; upon it are some rocks above water. The official instructions for entering the river, issued in 1844, say:—

"Ships sailing for Akyab during the south-west Monsoon should steer for the south end of the western Borongo, in Lat. 19° 50′ N., Long. 93° 1′ E., and then stand along the coast northward and westward at 5 or 6 miles off shore until the light on Savage island at the entrance of Aracan river is sighted." (Here follow instructions for entering, which are superseded by those just given). "Having entered the river, Fakir point should be brought to bear N.W. by N. to N.W., when you may anchor. A stranger should not attempt to run in at night, particularly in the rains, except at high or low water, as the ebb tide runs very rapidly in strong eddies off the Passage rock, over the dangerous flat to the westward, and the flood in strong eddies upon the rocks.

"During the north-east Monsoon ships bound to Akyab from northward, should endeavour to make the table land of the western Borongo in Lat. 20° 1′ N., then by steering due East they will avoid the Oyster reef in Lat. 20° 5′ N., Long. 92° 38½ E., which is distant from the Savage light fifteen miles due West. This course is recommended, as, although in favourable weather, Savage light is seen outside the reef in 16 to 17 fathoms water, the depth suddenly decreases, and the probability of hazy or rainy weather would prevent the light being seen; and steering boldly in to sight it, to the northward of Lat. 20° 1′, would endanger the safety of the vessel by suddenly falling upon Oyster rock or reef before sighting the lighthouse.

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"Strangers are advised never to make use of the channel inside of Oyster rock or reef."

The south end of western Borongo island has a reef extending from it about 3 miles in a southerly direction, upon parts of which the sea breaks when there is a swell. The water is very deep close to the edge of this reef, soundings having been obtained there of 15 and 18 fathoms.

Terrible Rocks.—This very dangerous group of rocks extends from Lat. 19° 21½′ N., and Long. 93° 17½′ E., to Lat. 19° 28¼′ N., and Long. 93° 20′ E. It is distant from the nearest shore (north end of Ramree island) about 11 miles, and at about midway between there is a shoal of 2 to 4 fathoms, named Irawaddy. At a mile westward of the rocks the depth is not less than 18 fathoms; hence they require the utmost care to avoid when sailing down the coast. It has been proposed to erect a lighthouse on the south rock.

The Terribles consist of three groups of rocks, extending in a N.N.E. and S.S.W. direction, some of which are about 14 feet above the water at low tide; between and around them, or scattered about in their vicinity, are many rocks under water. The northernmost reef is probably at 1¾ miles northward from the northern rock, and the southernmost reef at about the same distance S. by E. from the southern rock. From the north rock the high peak of Nondogee island (Combermere bay) bears N. 49° E. (*true*) 19½ miles.

The Terribles were partially examined in 1841 by Commander Halstead, R.N., by whom soundings of 18 and 19 fathoms were obtained at 1¾ miles westward from the south rock; this depth is believed to increase gradually seaward, bottom having been obtained in 20 fathoms at 9 miles West from the same rock. Until there is a more complete survey of the rocks, a nearer approach to them than 30 or 28 fathoms should not be made at night.

Cape Negrais, the S.W. extremity of the coast of Ava, is situate in Lat. 16° 1½′ N., and Long. 94° 13½′ E. The high land in the vicinity and northward of the cape is visible from a distance of 27 or 30 miles. No part of this coast has been thoroughly examined, hence it will be prudent when running down it from northward to keep outside the depth of 12 fathoms, by adopting which course, a ship (according to the chart of Capt. Crawford, of the Bombay Marine) will go clear of danger.

At about 6 miles S.S.E.-ward from cape Negrais is Thay-gin, or Pagoda point, on the west side of the entrance to Bassein river. On this point there is a pagoda—hence its name. From this point red cliffs extend towards cape Negrais, and are fronted by a reef, which runs out 1¾ miles seaward. This reef terminates at the north end of the red cliffs near the cape, and should not be approached nearer than the depth of 10 fathoms in a large ship. Northward of the red cliffs the shore is more bold, there being from 11 to 12 fathoms soft ground within 2 or 3 miles of the cape; but between the latter and the Brother hills, a distance of 6½ miles, straggling rocks or reefs project 1½ miles from the shore, and should not be approached nearer than a depth of 12 or 11 fathoms.

Bassein River.—This large river is 12 miles wide at its entrance, Pagoda and Porian points, its seaward boundaries, being that much distant from each other on a N.W. by W. and S.E. by E. direction; but it rapidly decreases to 2½ miles opposite the town of Dalhousie, only 9 miles from the sea. Hingie, an

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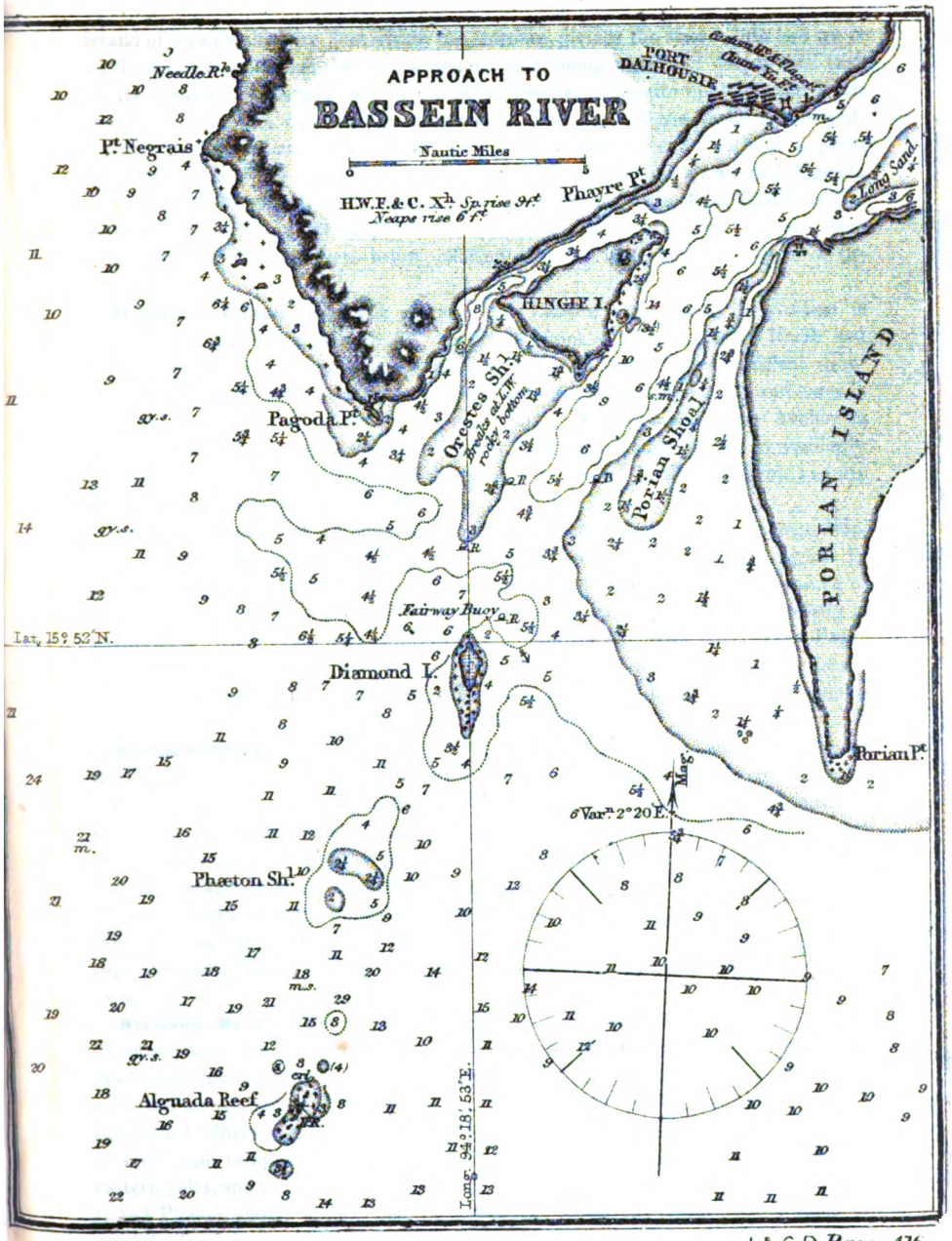

Alguada reef side, passing about half a mile from the north-eastern most visible rock, and not lessening the water under 11 fathoms,—if at high water the breakers

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and Portail pointe, its seaward boundaries, being that much distant from each other on a N.W. by W. and S.E. by E. direction; but it rapidly decreases to 2½ miles opposite the town of Dalhousie, only 9 miles from the sea. Hingie, an

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island of considerable size, just within the entrance, divides the stream into two navigable channels, of which that on its eastern side, being wider and deeper than that on its western, is generally used by sea-going vessels. Opposite the town the depth is 6 to 4 fathoms in the middle of the river. The edges of the shoals are buoyed, notwithstanding which it will not be prudent to attempt to enter without a pilot. Outside the river are the following—Diamond island, Phæton shoal, and Alguada reef; and at 36 miles from the latter, in a south-westerly direction Thalia reef, in Lat. 15° 15′ N., Long. 93° 48¾′ E. As these are met with in the approach from westward, we describe them before offering remarks upon the navigation of the river.

Diamond Island faces the entrance of Bassein river, and its position is Lat. 15° 52′ N., Long. 94° 18′ 53″ E. It is about a mile in extent North and South, and half a mile broad, is low, and covered with trees, but of sufficient elevation to be visible from a distance of 15 miles. A reef surrounds it, and extends from it in a southerly direction about a mile. Vessels occasionally anchor in 5 fathoms at about a mile eastward from it, and wait until they can conveniently enter the river; they are then near the fairway buoy, and in the immediate vicinity of the principal channel into the river.

Diamond island must be approached with great care, especially in a large ship. The west and east sides of the reef extending southward from it, do not appear to have been closely examined; and LIEUTENANT WARD'S chart shows a sounding of only 2 fathoms at half a mile westward from the island; hence the necessity of extra caution when in its near neighbourhood. On the authority of CAPTAIN FELL, of the Indian navy, the best leading mark for passing northward of the island between it and the flat extending from Porian island, is the bluff of Pagoda point a very little open with the extreme point of cape Negrais.

Phæton Shoal.—In a S.S.W. ¼ W. direction from Diamond island about 3 miles, is the north end of the Phæton shoal, which thence extends in the same direction 3¾ miles. It is 1½ miles broad, has soundings upon it of 4 to 8 fathoms, but in its centre, for about 1¼ miles, a depth of only 12 to 15 feet; this shoal part lies between the bearings of N. ½ E. and N.N.E. from Alguada lighthouse.

The passage between Diamond island and Phæton shoal should never be attempted except in great necessity, there being no good mark as a guide, and the bottom being very irregular. The best mark is said to be the extreme point of cape Negrais, N. by W. ¼ W.; keep the lead going, and maintain a good look-out.

Alguada Reef.—This very dangerous reef is situated 15 miles in a S.S.W. direction from the entrance to Bassein river. Its extent is 1¼ miles North and South, and many of the rocks are only just above the water at low tide. Close to it all round are soundings of 3 to 8 fathoms, which rapidly deepen to the westward and southward; there is also a patch of 3½ fathoms at nearly a mile from its south end. It should not be approached nearer than a depth of 15 fathoms on its southern and eastern sides, and 20 fathoms on its western side, and the channel north of it (between it and Phæton shoal) should only be attempted in an emergency, there being no good leading marks to carry a vessel through; should, however, circumstances compel a vessel to go through this northern channel, it will be well to borrow on the Alguada reef side, passing about half a mile from the north-eastern most visible rock, and not lessening the water under 11 fathoms,—if at high water the breakers

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will show the rocks. On the eastern side of the reef the high land of Hingie well open eastward of Diamond island clears all danger.

The tides, when uninfluenced by the wind, set across Alguada reef, and wit siderable strength between the reef and Phæton shoal. It is chiefly for this that vessels are recommended not to approach its north-western side nearer depth of 20 fathoms; moreover, the soundings decrease suddenly on thi especially towards the south-west part of the rocks.

Light.—A lighthouse, 160 feet high, has been erected on Alguada reef; it s light revolving every minute at 147 feet above high water level, visible 18 or 2 Its position is Lat. 15° 42′ N., Long. 94° 14′ E., and from it cape Negrai N. ½ W.; the pagoda on Pagoda point N. ½ E.; extremity of Porian N.E. ¾ E.; and the centre of Diamond island N. by E. ¾ E.

In Horsburgh's Directory, vol. i., is the following:—

"The bottom is chiefly uneven and rocky between Diamond island and A reef, with a heavy turbulent swell, occasioned by the sea beating on the ree the strong tides, about 2 knots per hour, which here set the flood to the E. and the ebb to the W. by N. The rise of tide is about 9 to 12 feet on the s high water about 10½ hours on full and change of the moon, in the entrance river. From the heavy confused swell that generally prevails in this dan channel, even during calm weather, it is often called the Race of Negrais, a tainly should be avoided by ships; for by rounding the south end of Alguad they are but a few miles farther out in a safe and spacious channel, 17 leagues wide, between it and Preparis island.

"When the sea is smooth in the North-east Monsoon, the breakers on A reef are not high; but when the weather is clear, the approach to it may alw known by the bearing of the land; for when the west end of Diamond isl coming into contact with the east end of the hill on Hingie island, Algua is then in the same direction, bearing N.N.E., and the western extreme o Negrais will bear nearly North. At 4 or 5 miles distance from Alguada ree eastward and westward, the depths are generally from 15 to 18 fathoms, blu and southward from it at the same distance, 19 and 20 fathoms. It is prude to approach Alguada reef nearer than 2 leagues on the east side, nor under 3 l on the N.W. side, on account of the rock situated to the S.W. of Diamond Soundings extend from Alguada reef to Preparis island, and the depths incr 40 and 50 fathoms in the track between them; near to Preparis island th irregular in some places, but on the east side of the island decrease to 8 fa within less than a mile of the shore."

Captain N. Heckford says:* "If, on approaching Alguada reef from the in thick weather, and without observations, you try for soundings and find 36 fathoms, mud, broken shells, and specks, steer to the southward until the na them are shells, stones, and rotten coral. You may then shape a course S.E., provided your depth of water is above 25 fathoms, or you have no me ascertaining the nature of your soundings, to know when you are in the fai for passing the reef in thick weather. If in steering to the south-east you shoal, you may proceed with safety; but if from 40 to 35 you decrease to 30 f

* "Sailing Direction, and Coasting Guide from the Sand Heads to Rangoon, Maulm Akyab, and *vice versâ*," by N. Heckford. A work that should be in the hands of a masters bound to the ports on the east coast of the Bay of Bengal.

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fathoms, haul to the southward until you deepen, then keep away to the south-east as requisite.

"The nature of the soundings west, south-west, and south of the Alguada reef, is so various that it is impossible to particularise them with any degree of clearness; they may be summed up in the fact, that with the reef bearing from E. to N.E., and N. by E., little or no mud will be found mixed with them. But it must be borne in mind that, with it bearing S.E. by E. you have mud and mixed soundings, and these extend northward until you are clear to westward of cape Negrais; moreover, you will not find two casts alike, although the lead be constantly hove. In mid-channel, or nearer the reef, they consist of stones, small broken shells, and sand, with black specks, in from 26 to 24 fathoms. The nearer the reef the coarser the bottom. When it bears due North in 22 fathoms, you will have coarse sand, stones, broken shells, and black and white specks; and when it bears N. by W. in 23 fathoms, a slight mixture of green mud; and N.N.W. in 23 fathoms, you will have dark green mud mixed with black and white specks. From this position until off the south-west limit of Bragu sand in 16 fathoms they will be the same, excepting that the mud shades lighter as you proceed eastward from the reef; these remarks are applicable to north of Lat. 15° 16′ N. And it is deserving of particular notice, that there are no pure mud soundings in the direct track until you are eastward of Bragu sand."

Thalia Reef.—This small coral patch is situated, as noticed (p. 477), in Lat. 15° 15′ N., and Long. 93° 48½′ E. Its extent is 1¾ miles N.N.W. and S.S.E., and close to its western side are soundings of 37 and 50 fathoms, and to its eastern side 23 to 28 fathoms.

The River.—In the entrance to the river is Hingie, a triangular-shaped island, having its apex to the north-eastward; it is about 3 miles in extent, and is easily recognised from seaward by a hill on its north-east end, the easternmost high land on the coast. A shallow flat of 6 to 18 and 21 feet, named Orestes shoal, extends out 4½ miles in a south-westerly direction from this island, and leaves between it and the northern shore of the river a narrow channel of 3½ to 6 fathoms depth, *or less;* but which is considered unsafe for vessels drawing more than 14 feet. The navigable channel on the east side of Orestes shoal and Hingie island is 1½ miles wide, and 4½ to 9 and 7 fathoms deep (reckoning from seaward), its eastern boundary being the extensive Porian shoal, a flat of 6 to 15 feet, which lines the eastern side of the entrance to the river; this eastern shore is low land, terminating in point Porian, a headland formed of white cliffs, sufficiently elevated to be visible from a distance of about 6 leagues. This eastern channel was buoyed in the following manner in 1859: a *red* buoy on the extreme south end of the Orestes shoal, and another on its extreme eastern limit; a *black* buoy on the extreme edge of the flat extending from the Porian shore; and a *red* buoy, marked "Fairway" in white letters, north-eastward from Diamond island. With the assistance of these buoys and Lieut. Ward's chart,* the river is not difficult to enter, still, strangers are recommended to obtain a pilot.

When the buoys were moored at the entrance to the river in 1859, the following information was officially issued by Lieutenant T. W. Aylesbury, Master-Attendant:—

"*Vessels coming from the southward* should bring Diamond island to bear N.W.,

* Published by the Hydrographic Office, Admiralty. No. 884.

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