

AFRICA PILOT.
PART. III.

SOUTH AND EAST COASTS

SIXTH EDITION
1897.

(To be pasted on inside of cover of all Sailing Directions.)

NOTATIONS OF SUPPLEMENTS OR HYDROGRAPHIC NOTICES RELATING TO THIS BOOK.

To be filled in by Navigating Officer.

[In Chart Depôts the two first columns are alone to be filled up.]

Whether Supplement or Hyd. Notice.	Date of Publication and Number.	Whether pasted in or noted in Margins of book, and date of such correction.

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THE
AFRICA PILOT,
PART III.

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SOUTH AND EAST COASTS OF AFRICA

FROM THE
CAPE OF GOOD HOPE TO RAS ASIR (CAPE GUARDAFUI),

INCLUDING
THE COMORO ISLANDS.

ORIGINALLY COMPILED

BY CAPTAIN ALGERNON F. R. DE HORSEY, R.N.

SIXTH EDITION.

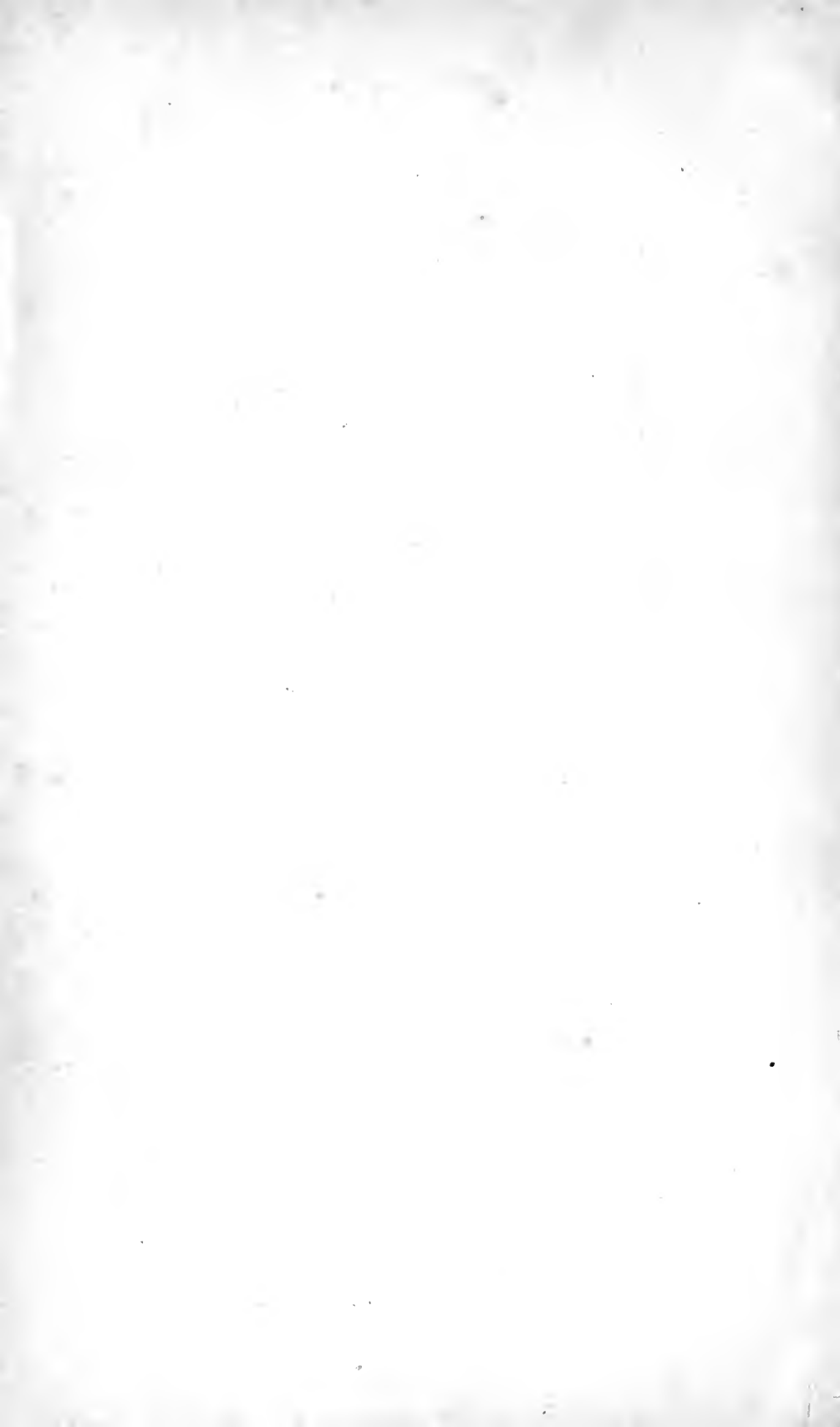
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ADVERTISEMENT TO THE SIXTH EDITION.

THE Sixth Edition of Africa Pilot, Part III., comprises Sailing Directions for the east coast of Africa, between the Cape of Good Hope and Ras Asír (cape Guardafui), including the Comoro islands.

The surveys and directions for the coast between the cape of Good Hope and port Natal are by Captain Dayman, Commander Simpson and Nav. Lieutenants Skead and Archdeacon, R.N., 1852-67. Between cape St. Lucia and Delagoa bay, Zavora point to the Bazaruto islands, and the harbours of Chilúan, Innambán and Kilimán,—Captain P. Aldrich, H.M.S. *Sylvia*, 1884-85. Between Ras Pekawi and Kiswere—Lieutenant Gray, H.M.S. *Nassau*, 1874-75. The islands and channels of Mafia, Zanzibar and Pemba; the coast from Songa Manara island to Pangani bay; and the harbours of Tanga, Manda, and Kisimayu,—Commander Wharton, H.M. Ships *Shearwater* and *Fawn*, 1874-77. Between Pangani bay and Wasin, from German Government surveys, 1894-5. A portion of Pemba, ports Mombasa, Kilindini, Wasin and Kilifi,—Commander T. F. Pullen, H.M.S. *Stork*, 1888-9. Formosa bay and Lamu harbour,—Lieutenant Smyth, H.M.S. *Stork*, 1892. Chinde river and Malindi anchorages,—Lieutenant Balfour, H.M.S. *Stork*, 1889.

The description of the remaining portions of the coast is chiefly derived from the running surveys of the late Captains W. F. W. Owen and A. T. E. Vidal, R.N., 1823-25; from the observations of Captain de Horsey; the remark books of officers of H.M. Ships and other documents in the Hydrographic Department, Admiralty.

The longitude of places given in the text of this work between the cape of Good Hope and Delagoa bay depend upon Cape observatory being in $18^{\circ} 28' 45''$ E. of Greenwich. The longitudes between Delagoa bay and Kisimayu (Refuge bay) depend upon Zanzibar (British Consulate) being in $39^{\circ} 11' 11''$ E. (By the latest determination, the Cape observatory is considered to be in long. $18^{\circ} 28' 40''$ E., and Zanzibar in long. $39^{\circ} 11' 8''$ E., but the places dependent on them have not been altered). Between Kisimayu and Ras Asír or cape Guardafui the longitudes depend upon Aden (local telegraph office) being in $44^{\circ} 59' 7''$ E. of Greenwich.

The first edition of this work, compiled by Captain A. F. R. De Horsey, was published in 1864. The second edition in 1865. The third edition in 1878. The fourth edition with an appendix in 1884. The fifth edition in 1889.

The present edition is by Staff Captain C. H. C. Langdon, R.N., of the Hydrographic Department.

Officers of the Royal and Mercantile Marine are requested to transmit to the Secretary of the Admiralty any notices of errors or omissions they may discover, as well as any fresh information they may obtain, in order that this work may be improved for the general benefit of the navigator.

By the publication of this work, all Hydrographic Notices relating to former editions and all notices to Mariners, inclusive of No. 435 of 1897 are cancelled.

W. J. L. W.

*Hydrographic Office,
Admiralty, London.
July, 1897.*

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GLOSSARY OF A FEW NATIVE GEOGRAPHICAL TERMS OCCUR-
RING IN THE CHARTS AND SAILING DIRECTIONS, BETWEEN
MOZAMBIQUE AND RAS ASÍR.

Name.	Signification.
Chombo ; Jombo -	Dhow ; very large dhow.
Fungu -	Bank or sandy reef.
Geneza, Ngome -	Castle.
Bandari, Bundari -	Harbour.
Khari -	Creek.
Khor -	Salt water inlet, usually tidal.
Kilele -	Peak.
Kilíma -	Hill.
Kisiwa -	Island.
Masíka -	Rainy season.
Mlango -	Channel.
Mlima -	Mountain.
Mto -	River, inlet or creek.
Mwamba -	Reef (rocky).
Pwani -	Coast.
Ras -	Cape or point.

NAMES OF DIFFERENT KINDS OF DHOWS MET WITH.

Bágala -	Large dhows with very high square sterns, tall poops, and long projecting prows.
Bedéni -	A dhow with a sharp stern, high rudder head, and a perpendicular cut water.
Bétela -	The common dhow of Zanzibar ; it has a square stern with a low poop.
Dau -	A small open vessel, sharp at the stern, with a square matting sail.
Mtépe -	A large open vessel, sharp at the stern, with a large square matting sail ; the prow is made to resemble a camel's head. These belong generally to the neighbourhood of Lamu.

SYSTEM OF ORTHOGRAPHY.

AS far as has been found possible with existing knowledge the native names in this book are spelt in accordance with the following system, which is being gradually introduced into all Admiralty Sailing Directions :—

1. Where native names have been so long written in a form, which, though not in accordance with this system, has become familiar to English eyes from being so spelt in all charts and maps, they are retained, and no European names are changed from the correct orthography.

2. The true sound of the word as locally pronounced is taken as the basis of the spelling.

3. An approximation of the sound is alone aimed at. A system which would attempt to represent the more delicate inflections of sound and accent would be so complicated as only to defeat itself.

4. The broad features of the system adopted are that vowels are pronounced as in Italian and consonants as in English, *every letter being pronounced*. One accent only is used, the acute, to denote the syllable on which stress is laid. This is very important, as the sounds of many names are entirely altered by the misplacement of this "stress."

5. When two vowels come together, each one is sounded, though the result, when spoken quickly, is sometimes scarcely to be distinguished from a single sound, as in *ai, au, ei*.

The amplification of the rules is given on the following pages.

Information as to the proper spelling of native names, so as to produce the nearest approximation to the true sound, by this system, is invited.

Letters.	Pronunciation and Remarks.	Examples.
a	<i>ah, a</i> as in <i>father</i> - - - -	Java, Banána, Somáli, Bari.
e	<i>eh, e</i> as in <i>benefit</i> ; <i>a</i> as in <i>fate</i> - -	Tel-el-Kebír, Oléleh, Yezo, Levúka, Peru.
i	English <i>e</i> ; <i>i</i> as in <i>ravine</i> ; the sound of <i>ee</i> in <i>beet</i> . Thus, not <i>Feejee</i> , but	Fiji, Hindi.
o	<i>o</i> as in <i>mole</i> - - - -	Tokyo.
u	long <i>u</i> as in <i>flute</i> ; the sound of <i>oo</i> in <i>boot</i> . <i>oo</i> or <i>ou</i> should never be employed for this sound. Thus, not <i>Zooloo</i> or <i>Zoulou</i> , but All vowels are shortened in sound by doubling the following consonant.	Zulu, Sumatra. Yarra, Tanna, Mecca, Jidda, Bonny.*
	Doubling of a vowel is only necessary where there is a distinct repetition of the single sound.	Nuulúa.
ai	English <i>i</i> as in <i>ice</i> - - - -	Shanghai.
au	<i>ow</i> as in <i>how</i> . Thus, not <i>Foochow</i> , but	Fuchau.
ao	is slightly different from <i>au</i> - - - -	Macao.
ei	is the sound of the two Italian vowels, but is frequently slurred over, when it is scarcely to be distinguished from <i>ey</i> in the English <i>they</i> , or <i>ei</i> in <i>eight</i> .	Beirút, Beilul.
b	English <i>b</i> .	
c	is always soft, but is so nearly the sound of <i>s</i> that it should be seldom used. If <i>Celébes</i> were not already recognised it would be written <i>Selébes</i> .	Celébes.
ch	is always soft as in <i>church</i> - - - -	Chingchin.
d	English <i>d</i> .	
f	English <i>f</i> . <i>Ph</i> should not be used for the sound of <i>f</i> . Thus, not <i>Haiphong</i> , but	Haifong, Nafa.
g	is always hard. (Soft <i>g</i> is given by <i>j</i>) -	Galápagos.
h	is always pronounced when used.	
hw	as in <i>what</i> ; better rendered by <i>hw</i> than <i>wh</i> , or <i>h</i> followed by a vowel. Thus, <i>Hwang ho</i> , not <i>Whang ho</i> , or <i>Hoang ho</i> .	Hwang ho; Ngan hwi.
j	English <i>j</i> . <i>Dj</i> should never be put for this sound.	Japan, Jinchuen.
k	English <i>k</i> . It should always be put for the hard <i>c</i> . Thus, not <i>Corea</i> , but	Korea.
kh	The Oriental guttural - - - -	Khan.
gh	is another guttural, as in the Turkish -	Dagh, Ghazi.
l		
m		
n	} As in English.	

* The *y* is retained as a terminal in this word under rule 1. The word is given as a familiar example of the alteration in sound caused by the second consonant.

Letters.	Pronunciation and Remarks.	Examples.
ng	has two separate sounds, the one hard as in the English word <i>finger</i> , the other as in <i>singer</i> . As these two sounds are rarely employed in the same locality, no attempt is made to distinguish between them.	
p	As in English.	
ph	As in <i>loophole</i> - - - - -	Mokpho, Chemulpho.
th	Stands both for its sound in <i>thing</i> , and as in <i>this</i> . The former is most common.	Bethlehem.
q	should never be employed; the sound of <i>qu</i> in <i>quiver</i> is given as <i>kw</i> . When <i>qu</i> has the sound of <i>k</i> , as in <i>quoit</i> , it should be given by <i>k</i> .	Kwangtung.
r	As in English.	
s	As in <i>sin</i> .	
sh	} As in English.	
t		
v		
w		
x		
y	is always a consonant, as in <i>yard</i> , and therefore should never be used as a terminal, <i>i</i> or <i>e</i> being substituted.	Kikūyu.
	Thus, not <i>Mikindány</i> or <i>Wady</i> , but not <i>Kwaly</i> , but	Mikindáni, Wadi.
z	English <i>z</i> - - - - -	Kwale.
zh	French <i>j</i> , or as <i>s</i> in <i>treasure</i> - - - - -	Zulu.
	Accents should not generally be used, but where there is a very decided emphatic syllable or stress which affects the sound of the word, it should be marked by an <i>acute</i> accent.	Tongatábu, Galápagos, Paláwan, Saráwak.

NOTE.—With reference to the last clause of Rule 1 :—In this volume the Dutch names in the Cape Colony are retained as written by the Dutch, but native names rendered by the Dutch or Portuguese after their own orthographic systems are given in accordance with the one here adopted. Thus, the Portuguese form *Quiloa* is spelt *Kilwa*.

INFORMATION RELATING TO CHARTS, SAILING DIRECTIONS, AND THE GENERAL NAVIGATION OF H.M. SHIPS.

ON THE CORRECTION OF CHARTS, LIGHT LISTS, AND SAILING DIRECTIONS.

THERE are three descriptions of publications as guides to navigation—the charts, the sailing directions, and the light lists—which are all affected by the continual changes and alterations that take place.

Of these the charts should always be, so far as our knowledge permits, absolutely correct to date; and the light lists should be noted for the recent alterations, though space will not permit of full details being always inserted. The sailing directions, however, cannot, from their nature, be so corrected, and *in all cases where they differ from charts, the charts must be taken as the guide.*

1. *Charts.*—When issued to a ship on commissioning, the charts have received all necessary corrections to date. As sent from the Hydrographic Office they are, as a rule, fresh from the plates. They then receive such corrections by hand in the depôts as are required, and are so issued to the ships.

All small but important corrections that can be made by hand are notified by Notices to Mariners, and should at once be placed on the charts to which they refer.

Large corrections that cannot be conveniently thus made are put upon the plates, and fresh copies are issued to the ships to replace the others, which are directed to be destroyed to prevent the possibility of their being used in the navigation of the ship.

The dates on which these large corrections are made are noted on the chart plates in the middle of the lower edge; those of the smaller corrections at the left-hand lower corners.

In all cases of quotations of charts, these dates of corrections should be given, as well as the number of the chart (which will be found in the lower right-hand corner), in order that at the Admiralty it may be known what edition of the chart is referred to.

2. *The Light Lists*, annually published at the beginning of each year, are not corrected in the depôts before issue, but appendices are issued every two months, giving the alterations that have taken place, copies of which are put into the chart boxes.

It is the duty of the navigating officer when he receives the set of charts to make notations in the light lists from these appendices, and from the Notices to Mariners in the box; and to keep them so corrected from time to time.

The Light Lists should always be consulted as to the details of a light, as the description in the Sailing Directions may be obsolete, in consequence of changes made since publication.

3. *The Sailing Directions* are not corrected before issue, except occasionally for very important new rocks or dangers. Hydrographic Notices and Supplements referring to each volume are published from time to time.

Supplements contain all the information received up to date since the publication of the volume to which they refer, and cancel all previous Hydrographic Notices.

Hydrographic Notices contain all information up to date since the publication of the volume, or since the last Supplement or Hydrographic Notice, but endeavour is made to issue no more than one of these affecting each volume, and, on the collection of fresh information, to include the former Notice in a Supplement.

The existence of Supplements or Hydrographic Notices is to be noted, in the tabulated form placed for the purpose inside the cover of each volume, in cases when such notations have not been made before issue, and also on receipt of further Notices after commission.

Notes should be made in the margin of the volume of sailing directions affected, as references to the Supplements or Hydrographic Notices when the latter are printed on both sides.

To enable the books to be more conveniently corrected, however, such Supplements and Hydrographic Notices as are of moderate size are now being printed on one side only, and two copies are issued to each ship; one to cut up, the slips being pasted in at the appropriate place; the other to retain intact for reference.

To make these notations or paste in these slips is one of the early duties of a navigating officer after drawing his box of charts and books, and similar notes are to be made from Notices to Mariners that may thereafter be received.

It must, however, be thoroughly understood that sailing directions will never be correct in all details, except up to the date of the last Hydrographic Notice or Supplement, and that, as already stated, when differences exist, the chart, which should be corrected from the most recent information, should be taken as the guide; for which purpose, for ordinary navigation, they are sufficient.

THE USE OF CHARTS AS NAVIGATIONAL AIDS, AND GENERAL REMARKS RELATING TO PRACTICAL NAVIGATION.

1. *Accuracy of a Chart.*—The value of a chart must manifestly depend upon the accuracy of the survey on which it is based, and this becomes more important the larger is the scale of the chart.

To estimate this, the date of the survey, which is always given in the title, is a good guide. Besides the changes that, in waters where sand or mud prevails, may have taken place since the date of the survey, the earlier surveys were mostly made under circumstances that precluded great accuracy of detail, and until a plan founded on such a survey is tested, it should be regarded with caution. It may, indeed, be said that, except in well-frequented harbours and their approaches, no surveys yet made have been so minute in their examination of the bottom as to make it certain that all dangers have been found. The fullness or scantiness of the soundings is another method of estimating the completeness of a chart. When the soundings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail.

Blank spaces among soundings mean that no soundings have been obtained in these spots. When the surrounding soundings are deep it may with fairness be assumed that in the blanks the water is also deep; but when they are shallow, or it can be seen from the rest of the chart that reefs or banks are present, such blanks should be regarded with suspicion. This is especially the case in coral regions and off rocky coasts, and it should be remembered that in waters where rocks abound it is always possible that a survey, however complete and detailed, may have failed to find every small patch.

A wide berth should therefore be given to every rocky shore or patch, **and this rule should be invariably followed, viz., that instead of considering a coast to be clear unless it is shown to be foul, the contrary should be assumed.**

2. *Fathom Lines a Caution.*—Except in plans of harbours that have been surveyed in detail, the five-fathom line on most Admiralty charts is to be considered as a caution or danger line against unnecessarily approaching the shore or bank within that line, on account of the possibility of the existence of undiscovered inequalities of the bottom, which nothing but an elaborate detailed survey could reveal. In general surveys of coasts or of little frequented anchorages, the necessities of navigation do not demand the great expenditure of time required for such a detailed survey. It is not contemplated that ships will approach the shores in such localities without taking special precautions.

The ten-fathom line is, on rocky shores, another warning, especially for ships of heavy draught.

Charts where no fathom lines are marked must be especially regarded with caution, as it generally means that soundings were too scanty, and the bottom too uneven, to enable them to be drawn with accuracy.

Isolated soundings, shoaler than surrounding depths, should always be avoided, especially if ringed round, as there is no knowing how closely the spot may have been examined.

3. *Chart on largest scale always to be used.*—It sometimes happens that, from press of work, only the copper plate of the larger scale chart of a particular locality can at once receive any extensive re-arrangement of coastline or soundings. This is an additional reason, besides the obvious one of the greater detail shown on a larger scale chart, why this largest scale chart should always be used for navigating.

4. *Caution in using small Scale Charts.*—In approaching the land or dangerous banks, regard must always be had to the scale of the chart used. A small error in laying down a position means only yards on a large scale chart, whereas, on a small scale, the same amount of displacement means large fractions of a mile. This is particularly to be observed when coming to an anchor on a narrow ledge of convenient depth at some distance from the shore.

For the same reason bearings to objects near should be used in preference to objects farther off, although the latter may be more prominent, as a small error in bearing or in laying it down on the chart has a greater effect in misplacing the position the longer the line to be drawn.

5. *Distortion of Printed Charts.*—The paper on which charts are printed has to be damped. On drying distortion takes place, from the inequalities in the paper, which greatly varies with different paper and the amount of the original damping; but it does not affect navigation. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree, when carefully plotted upon the chart, especially if the lines to objects be long. The larger the chart the greater the amount of this distortion.

6. *Buoys.*—It is manifestly impossible that any reliance can be placed on buoys always maintaining their exact position. Buoys should therefore be regarded as warnings and not as infallible navigating marks, especially when in exposed positions; and a ship should always, when possible, be navigated by bearings or angles of fixed objects on shore and not by buoys.

Gas Buoys.—The lights shown by gas buoys cannot be implicitly relied on as, if occulting, the apparatus may get out of order, or the light may be altogether extinguished.

7. *Lights.*—Circles drawn on charts round a light are not intended to give information as to the distance at which it can be seen, but solely indicate, in the case of lights which do not show equally in all directions, the bearings between which the variation, or visibility, or obscuration of the light occurs.

All the distances given in the Light Lists and on the charts for the visibility of lights are calculated for a height of an observer's eye of 15 feet. The table of distances visible due to height at end of each Light List, affords a means of ascertaining how much more or less the light is visible should the height of the bridge be

more or less. The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Again, refraction may often cause a light to be seen farther than under ordinary circumstances.

When looking out for a light at night, the fact is often forgotten that from aloft the range of vision is much increased. By noting a star immediately over the light a very correct bearing may be afterwards obtained from the standard compass.

The intrinsic power of a light should always be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen.

The power of a light can be estimated by remarking its order, as given in the Light Lists, and in some cases by noting how much its visibility in clear weather falls short of the range due to the height at which it is placed. Thus, a light standing 200 feet above the sea and only recorded as visible at 10 miles in clear weather, is manifestly of little brilliancy, as its height would permit it to be seen over 20 miles, if of any power. (*See table in Light List above-mentioned.*)

8. *Fog Signals.*—Sound is conveyed in a very capricious way through the atmosphere. Apart from wind, large areas of silence have been found in different directions and at different distances from the origin of a sound, even in clear weather. Therefore too much confidence should not be felt in hearing a fog signal. The apparatus, moreover, for sounding the signal often requires some time before it is in readiness to act. A fog often creeps imperceptibly towards the land, and is not observed by the people at a lighthouse until it is upon them; whereas a ship may have been for many hours in it, and approaching the land. In such a case no signal may be sounded. When sound has to travel against the wind, it may be thrown upwards; in such a case, a man aloft might hear it when it is inaudible on deck.

Taken together, these facts should induce the utmost caution in closing the land in fogs. The lead is generally the only safe guide.

9. *Tides and Tidal Streams.*—In navigating coasts where the tidal range is considerable, caution is always necessary. It should be remembered that there are indraughts to all bays and bights, although the general run of the stream may be parallel to the shore.

The turn of the tidal stream off shore is seldom coincident with the time of high and low water on the shore. In open channels, the tidal stream ordinarily overruns the turn of the vertical movement of the tide by three hours, forming what is usually known as tide and half-tide, the effect of which is that at high and low water by the shore the stream is running at its greatest velocity.

In crossing a bar or shallow flats, the table (B) at page 98 of the Tide Tables will be found of great assistance in calculating how much the water has risen or fallen at any hour of the tide.

On coasts where there is much diurnal inequality in the tides, the amount of rise and fall can never be depended upon, and additional caution is necessary.

It should also be remembered that at times the tide falls below the level of low-water ordinary springs. This always occurs in temperate regions at the equinoxes, but wind may produce it at any time, and the amount varies with locality. When the moon's perigee coincides with the full or new moon the same effect is often produced.

10. *Current Arrows* on charts only show the most usual or the mean direction of a tidal stream or current. It must never be assumed that the direction of a stream will not vary from that indicated by the arrow. In the same manner, the rate of a stream constantly varies with circumstances, and the rate given on the chart is merely the mean of those found during the survey, possibly from very few observations.

11. *Fixing Position*.—The most accurate method of fixing a position relative to the shore is by angles between well-defined objects on the chart. All ships are now being supplied with a station pointer, and this method should be used whenever possible.

Two things are, however, necessary to its successful employment. First, that the objects be well chosen; and second, that the observer is skilful and rapid in his use of the sextant.

For the former, reference can be had to the pamphlet on the use of the station pointer, which is in every chart box.

The latter is only to be obtained by practice.

It will readily be seen that in war time, when the compass may be knocked away, or rifle-fire may make it undesirable to expose the person more than necessary, a sextant offers great advantages, as

angles can be obtained from any position whence the objects are visible. It is this contingency that makes it especially desirable that all navigating officers should become expert in this method of fixing a ship's position.

In many narrow waters also, where the objects may yet be at some distance, as in coral harbours or narrow passages among mud banks, navigation by sextant and station-pointer is invaluable, as a true position can only be obtained by its means. A small error in either taking or plotting a bearing under such circumstances may put the ship ashore.

It is not intended that the use of the compass to fix the ship should be given up; there are many circumstances in which it may be usefully employed, but errors more readily creep into a position so fixed. In all cases where great accuracy of position is desired, angles should invariably be used, such as the fixing of a rock or shoal, or of additions to a chart, as fresh soundings or new buildings. In all such cases angles should be taken to several objects, the more the better; but five objects is a good number, as the four angles thus obtained not only prevent any errors, but they at once furnish a means of checking the accuracy of the chart itself. In the case of ordinary soundings, it is only necessary to take a third angle now and then; firstly, to check the general accuracy of the chart as above stated; secondly, to make certain that the more important soundings, as at the end of a line, are correctly placed.

Sometimes, when only two objects are visible, a compass bearing and sextant angle may be used with advantage.

In passing near a point of land, or an island, the method of fixing by doubling the angle on the bow is invaluable. The ordinary form of it, the so-called "four-point bearing," when the bearing is taken four points on the bow, and on the beam, the distance from the object at the latter position being the distance run between the times of taking the two bearings, gives an excellent fix for a departure, but does not ensure safety, as the point, and probably the rocks off it, are abeam before the position is obtained.

By taking the bearings of two points and four points on the bow, a very good position is obtained before the object is passed; the distance of the latter at the second position being, as before, equal to the distance run in the interval, allowing for current.

A table of factors, by which to multiply the distance run, to obtain the distance of the object when any number of degrees between the two bearings has been observed, is now supplied in all chart boxes.

The use of a danger angle in passing outlying rocks with land behind should also not be forgotten. In employing this method, however, caution is necessary, as should the chart be not accurate, *i.e.*, should the objects selected be not quite correctly placed, the angle taken off from it may not serve the purpose. It should not, therefore, be employed when the survey is old or manifestly imperfect.

In fixing by the compass, it must always be remembered that two bearings only are liable to error. An absolute error may be made in either bearing observed; errors may be made in applying the deviation; or errors may creep in in laying them on to the chart. For these reasons a third or check bearing of some other object should be taken, especially when near the shore or dangers. The coincidence of these three lines will prevent any mistakes.

In ships still fitted with the Admiralty standard compass, the tripod supplied to hold the lamp will be found of great service in fixing position at night, as by its aid a bearing can be as accurately taken as in daylight. With Thomson's compass bearings can also be accurately observed at night. The utility of this in connection with ascertaining the change of bearing of an approaching ship's light should not be forgotten.

Amongst astronomical methods of fixing a ship's position, attention is drawn to the great utility of Sumner's method. A Sumner line, that is, a line drawn through the position (obtained by an assumed latitude and longitude by chronometer) at right angles to the bearing of the sun, as obtained from the azimuth tables, gives at times, invaluable information, as the ship must be somewhere on that line provided the chronometer is correct. A deep cast at the same time may often serve to get an approximate position on the line. An early and very accurate position can be also obtained by Sumner's method, by getting longitude by a bright star at daylight when the horizon is well visible, and another longitude by the sun when a few degrees above the horizon, or by observing two or more stars at twilight. The Sumner lines drawn through the two positions thus

obtained will, if the bearing of sun and star differ three points or more, give an excellent result.

12. *Change of Variation of the Compass.*—The gradual change in the variation must not be forgotten in laying down positions by bearing on charts. The magnetic compasses placed on the charts for the purpose of facilitating plotting become in time slightly in error, and in some cases, such as with small scales, or when the lines are long, the displacement of position from neglect of this change may be of importance. The compasses are re-engraved when the error amounts to a quarter of a point, but the chart plates cannot be corrected more frequently from the impossibility of making alterations too often on one spot in a copper plate.

The geographical change in the variation is in some parts of the world sufficiently rapid to need consideration. For instance, in approaching Halifax from Newfoundland the variation changes 10° in less than 500 miles. The variation chart should be consulted on this head.

13. *Local Magnetic Disturbance of the Compass on board Ship.*—The term “local magnetic disturbance” has reference only to the effects on the compass of magnetic masses external to the ship in which it is placed. Observation shows that disturbance of the compass in a ship afloat is experienced only in a few places on the globe.

Magnetic laws do not permit of the supposition that it is the visible land which causes such disturbance, because the effect of a magnetic force diminishes in such rapid proportion as the distance from it increases, that it would require a local centre of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflections of the compass are due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow, and the force strong, the compass may be temporarily deflected when passing over such a spot, but the area of disturbance will be small, unless there are many centres near together.

The law which has hitherto been found to hold good as regards local magnetic disturbance is, that north of the magnetic equator the north end of the compass needle is attracted towards any centre of disturbance ; south of the magnetic equator it is repelled,

It is very desirable that whenever a ship passes over an area of local magnetic disturbance, the position should be fixed, and the facts reported as far as they can be ascertained.

14. Use of Oil for Modifying the Effect of Breaking Waves.—Many experiences of late years have shown that the utility of oil for this purpose is undoubted, and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil, skilfully applied, may prevent much damage both to ships (especially the smaller classes) and to boats, by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows :—

1. On free waves, *i.e.*, waves in deep water, the effect is greatest.

2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain ; as nothing can prevent the larger waves from breaking under such circumstances ; but even here it is of some service.

3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use ; crude petroleum is serviceable when nothing else is obtainable ; but all animal and vegetable oils, such as waste oil from the engines, have great effect.

4. A small quantity of oil suffices, if applied in such a manner as to spread to windward.

5. It is useful in a ship or boat, both when running, or lying to, or in wearing.

6. No experiences are related of its use when hoisting a boat up in a sea-way at sea, but it is highly probable that much time and injury to the boat would be saved by its application on such occasions.

7. In cold water, the oil, being thickened by the lower temperature, and not being able to spread freely, will have its effect much reduced. This will vary with the description of oil used.

8. The best method of application in a ship at sea appears to be : hanging over the side, in such a manner as to be in the water, small canvas bags, capable of holding from one to two gallons of oil, such bags being pricked with a sail needle to facilitate leakage of the oil,

The position of these bags should vary with the circumstances. Running before the wind they should be hung on either bow—*e.g.*, from the cathead—and allowed to tow in the water.

With the wind on the quarter the effect seems to be less than in any other position, as the oil goes astern while the waves come up on the quarter.

Lying to, the weather bow and another position farther aft seem the best places from which to hang the bags, with a sufficient length of line to permit them to draw to windward, while the ship drifts.

9. Crossing a bar with a flood tide, oil poured overboard and allowed to float in ahead of the boat which would follow with a bag towing astern, would appear to be the best plan. As before remarked, under these circumstances the effect cannot be so much trusted.

On a bar with the ebb tide it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside. The effect in this case must greatly depend upon the set of the current, and the circumstances of the depth of water.

11. For a boat riding in bad weather from a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil is diffused well ahead of the boat, and the bag can be readily hauled on board for refilling if necessary.

IN THIS WORK THE BEARINGS ARE ALL MAGNETIC,
EXCEPT WHERE MARKED AS TRUE.

THE DISTANCES ARE EXPRESSED IN SEA MILES OF
60 TO A DEGREE OF LATITUDE.

A CABLE'S LENGTH IS ASSUMED TO BE EQUAL TO
100 FATHOMS, OR THE TENTH PART OF A MILE.

THE SOUNDINGS ARE REDUCED TO LOW WATER OF
ORDINARY SPRING TIDES.

THE BEARINGS OF SECTORS OF LIGHT ARE GIVEN
FROM SEAWARDS OR TOWARD THE LIGHT.

35°

40°

45°

50°

INDEX TO
ADMIRALTY PUBLISHED CHARTS
ALLUDED TO IN THIS WORK

A number against the name of a place shows that a separate plan is published bearing that number, *671 shows that a plan of the place against which it is written is given on sheet 671, *against a name shows that a plan of that place is given on the chart shown by the diagram to embrace it.

For details of scales, prices, &c. see Admiralty Catalogue.

See also general charts Indian Ocean 748 A & B
and also 597 & 2483.

NOTE

The charts and plans shown on this Index represent those published at the date given at the foot. They are liable to alteration and amendment.

10°

5°

0°

5°

10°

15°

10°

5°

0°

5°

10°

15°

C. Guardafui or Ras Amir

Obiat 671 *

Althelet Warsheik & 671 *
Mogdishu

* 671 Merka
* 671 Brawa

671 Juba R. Entrance
860 Kisiwayu B.
425 Birikau R.

* 1747 Lamu H.
1747 Ozi &
Lamu B. to Kwiyu B.
& Patia Bays } 668

P. Malindi 667
Pemba I.

See compartment
for larger scales.

674 Dar es Salaam
640
662
664

1037 A. Matia L. & Channel 458
Kilwa Kisiwani 661
Kisiwere H. 687
Mehinga B. 677

681 Lindi B.
* 681 Mgau Mwanid
Mikindani B. to C. Delgado 690
C. Delgado

Plans on 1578
Lusumbwe B.
Old Livingstonia
Chisumda
M' Bampa Cove
Kaango
Chisanga
Pachia
Sumba
Chikole
M' Luluka
Losewa
Chilowelo

1809 Ibo H. *
Pomba B. *
Atmeida B. *
Fernando Velosa B. *

Comoro I^s

Conduca Mozambique & Mokumbo 653
Mozambique H. 652
Mojankwale R. *

* Antonio R.
Inyisse Bar *
Primeira I.

MADAGASCAR

For charts & plans South of this
see other Index.

35°

40°

Longitude 45° East from Greenwich 50°

INDEX TO

ADMIRALTY PUBLISHED CHARTS

ALLUDED TO IN THIS WORK

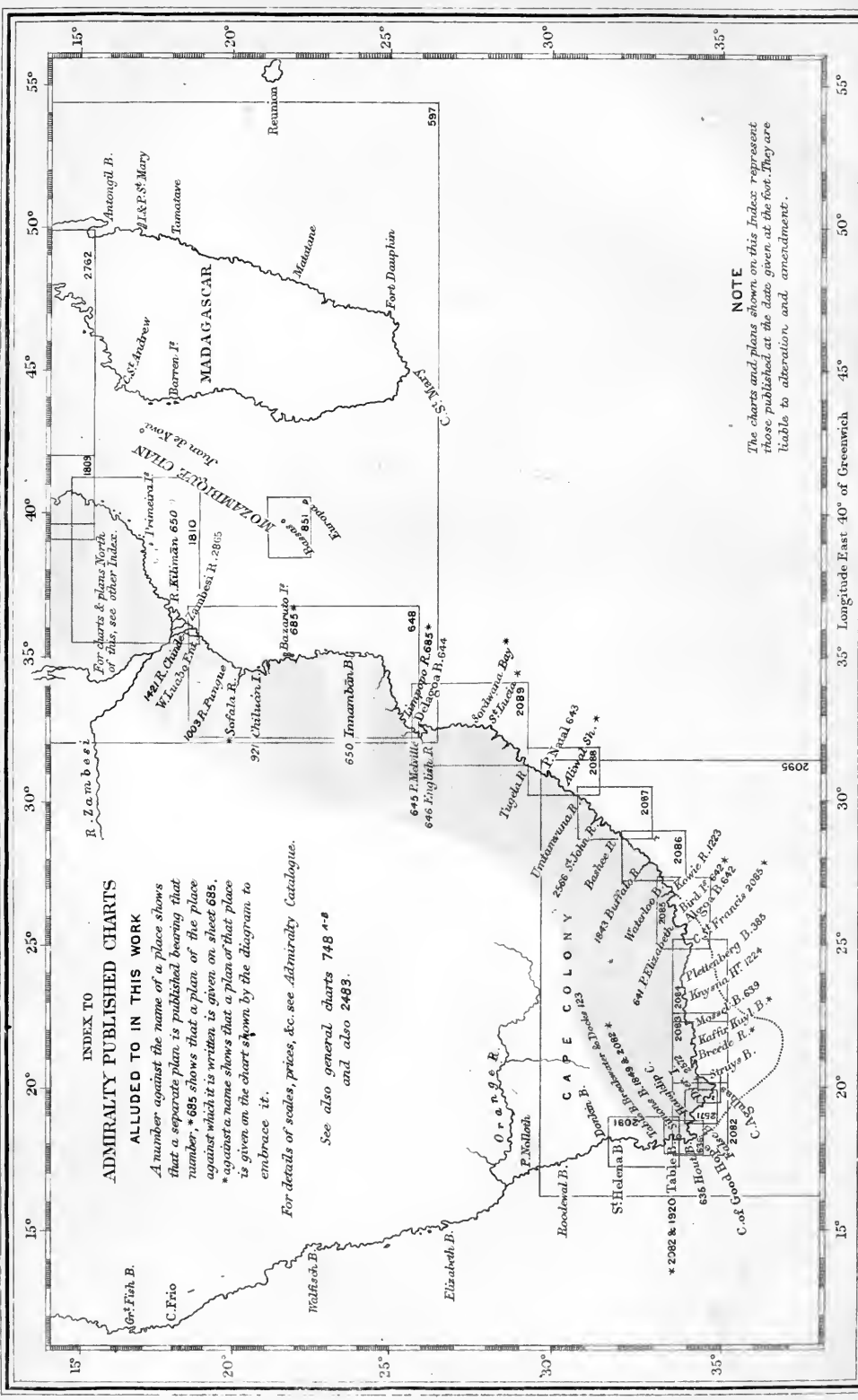
A number against the name of a place shows that a separate plan is published bearing that number. *685 shows that a plan of the place against which it is written is given on sheet 685. *against a name shows that a plan of that place is given on the chart shown by the diagram to embrace it.

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See also general charts 748 * * and also 2483.

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THE AFRICA PILOT.

PART III.

CHAPTER I.

GENERAL REMARKS ON THE SOUTH AND EAST COASTS OF AFRICA.—
COMMUNICATIONS.—COAL.—DOCKS.—WINDS AND WEATHER.—
CYCLONES. — BAROMETER. — TEMPERATURE. — ICEBERGS. —
CLIMATE.—CURRENTS.—PASSAGES.

Chapter I. treats generally of information that is common to the whole of the South and East coasts of Africa. Particular information, such as winds and currents prevailing at or near certain places, will be found with the descriptions of those places.

That portion of Chapter II. of this work, relating to Table and Simons bays, being in part identical with a portion of Chapter IX. in Africa Pilot, part 2, the seaman should consult the book containing the latest information.

The CAPE COLONY.—Extent.—The Cape of Good Hope, strictly speaking, is the small promontory forming the south-west extremity of the continent of Africa. But the extensive Colony of that name is washed by the waters of the South Atlantic and Indian oceans on the west and south; is bounded on the north, to the west of the meridian of 22° E., by the Orange river, on the north-east by the Orange Free State and Natal, and on the east by Pondoland. The Cape Colony, with the Transkei, contains an area of 221,311 square miles.

In 1844, Letters Patent was issued annexing Natal to the Cape, but in 1856 it was constituted a separate Colony.

Twelve islands off Angra Pequena, on the coast of Damaraland, with the adjacent rocks, were annexed in 1867, and added to the Cape Colony in 1874.

In 1879, three large tracts of Kaffraria, namely, Fingoland, Idutywa Reserve and No Man's Land, were incorporated with Cape Colony.

In 1878, the port of Walfisch bay was proclaimed British territory ; it was annexed to the Colony in 1884. In 1880, the province of Griqualand West was incorporated with Cape Colony.

In 1885, the territories of Tembuland, Emigrant, Tambookieland, Bomvanaland and Goalekaland were annexed to the Colony ; in 1881, the St. John's river territory was also added.

The Xesibe country (mount Ayliff), near Griqualand, and the Rode valley, Pondoland, were annexed in 1886.

Basutoland, now an independent Colony, formed part of the Cape from 1871 to 1884.

In 1895, British Bechuanaland was incorporated with Cape Colony.

Capital.—Cape Town, the capital of the Colony, and the seat of government, stands on the western shores of Table bay, between it and the foot of Table mountain, and is well laid out, with numerous public buildings, schools, hospitals, churches, and several good squares. Cape Town is connected with the principal places in the Colony by railway and telegraph.

History.—The Cape of Good Hope was discovered in 1486 by Bartholomew Diaz, who named it Cabo Tormentoso, or Stormy cape ; but King John II. of Portugal, convinced of its being the turning point of the long-desired route to India, gave the name of Boa Esperança, or Cape of Good Hope ; his convictions were confirmed eleven years after by Vasco de Gama, who then rounded the cape.

In the year 1652 the territory was colonized by the Dutch East India company, under Van Riebeck, and continued in their possession until 1795, when the British Government took possession, but at the peace of Amiens in 1802, the Colony was ceded to its former possessors. In 1806 it was again taken by the English, and its possession confirmed at the general peace in 1815, since it has continued a British Colony.

The country directly south of the Orange river consists of a series of terraces divided by mountain ranges varying in height from 4,000 to 8,000 feet, and rising gradually from south to north as far as

the parallel of 32° S., whence it gradually declines in a series of open sterile plains to the river itself; the culminating point is the Spitzkoss or Compass Berg, 8,500 feet above the sea level; the passages from one plateau to another are by well made passes through the narrow and difficult gorges or Kloofs. One of these plateaus is known as the great Karroo, 300 miles in length, east and west, with a breadth of 70 miles. Where streams exist the wondrous fertility of this plain is apparent, as also immediately after thunderstorms, when the whole area is covered by a profuse and varied vegetation. The rivers, though numerous, are practically useless either for navigation or irrigation; most of them flow in deep and precipitous ravines, and except when swollen by the rains are mere shallow torrents; even the largest of them have bars at their mouths, which render in most cases entrance both difficult and dangerous; but much has been done in recent years to render some of the bars navigable.

The Population of Cape Colony, from the census of 1891, was found to be 1,527,224, comprising 376,987 Europeans, 13,907 Malays, 50,388 Hottentots, 229,680 Fingoes, 608,456 Kaffirs, and other coloured persons, 247,806. Cape Town had (1891) with its suburbs, a population of 83,898. The population of the other principal towns was—Kimberley, 28,718, Port Elizabeth, 23,266, Beaconsfield, 10,498, Grahamstown, 10,498, Paarl, 7,668, King Williams town, 7,266, &c.

Products. — Trade. — Generally speaking, the eastern and southern portions of Cape Colony receive an abundant water supply, are well wooded, and extremely fertile.

The colonists are chiefly employed in the production of wool and wine; in the rearing of horses, cattle, sheep, and ostriches, and the culture of wheat, barley, oats, and maize. Valuable forests cover large areas, and are extensively worked. The waters around the coast abound in fish. The colony is rich in minerals, principally coal, copper, diamonds and manganese. The output of coal in 1894 was 69,690 tons; it is extensively used on the Eastern system of railways. Diamonds are the most valuable of the exports, chiefly found in the district of Kimberley, of which the declared value in 1894 was £3,510,152; the value of wool is about one half that of the diamonds. The value of the various industries in 1890 (the latest return available) was £9,238,870.

The total exports of the Colony for the year ending June 1896 (including specie) amounted to £16,988,047, and the imports to £20,377,589.

The external trade is considerable, and chiefly carried on in British and Colonial vessels, as is shown by the tonnage for the year 1894. Entered and cleared—British vessels, 8,838,985 tonnage; total 9,227,938 tonnage.

Total registered shipping of the colony (1895)—steam vessels, 21 of 2,659 tons; sailing, 8 of 772 tons; total, 29 of 3,431 tons.

Ports in Cape Colony.—The Cape Colony is destitute of natural harbours or sheltered anchorages for large vessels, with the exception of Saldanha bay on the west coast, and Simons bay, and to supply this deficiency large sums of money, amounting in the aggregate to over two million pounds sterling, have been spent in executing protective works; the harbour and docks at Cape Town, Port Elizabeth, and East London, under the direction of local boards, being the most important. Being exposed to the swell of the Southern Ocean, the sea breaks heavily on the whole of the iron-bound coast of the Cape Colony, particularly during on-shore winds, and a vessel touching on any part of it has not the slightest chance of escaping destruction.

Landing consequently, is difficult, and at times dangerous, even from the anchorages.

The principal ports and anchorages are :—Table bay breakwater and docks, and Simons bay, the naval establishment, affording good shelter and accommodation for all classes of vessels; Port Elizabeth, which is considered secure at all times, if provided with good ground tackle, and East London. Other seaports and anchorages are :—Mossel bay; Knysna; Plettenberg bay; port Alfred; and St. John river; several of these are situated in the mouths of rivers with shallow bars across the entrances, and are not available during stormy weather, as the bars then usually break. Vessels at anchor in the roads off these places have sometimes to proceed to sea on the approach of a gale; information is usually given from the Port Office, which receives a weather report daily from Cape Town. *See* page 21. During the heavy westerly gales of winter, good anchorage will be found in Mossel, Plettenberg, and Algoa bays, by vessels working westward round the Cape of Good Hope. Fuller information is given with the description of each port.

NATAL.—The Colony of Natal derives its name from the fact of its discovery by the celebrated Portuguese navigator, Vasco de Gama, on Christmas Day, 1497. In 1837, the Governor of the Cape took military possession of the district, and in 1844 the district of Natal was proclaimed a British colony. In 1856 it was erected into

a distinct and separate colony, free from the control of the Governor of the Cape. It is bounded on the north-east by the Tugela and and its tributary the Buffalo; on the south-west by the Umtamvuna river; on the south-east by the Indian ocean; and on the north-west by the Drakensberg mountains; it comprises an area of about 20,461 square miles with a seaboard of 170 miles. The sea coast of its dependencies, Zululand and Pondoland, extends from the Tugela river north-eastward to the parallel of 26° 39' S., northward of which is Portuguese territory.

Mountains.—Rivers.—The scenery in Natal is in many parts picturesque in the extreme. Starting from the coast the Colony, by a series of almost regular steppes, attains a height of 12,000 feet in the often snow-clad peaks of the Drakensberg. The first terrace or steppe extends about 14 miles inland, and attains a height of about 1,000 feet; the next, 20 miles in breadth, or 34 miles from the coast, attains a height of 2,500 feet. The third, 25 miles in breadth, attains a height of 3,700 feet; the fourth, about the same breadth, to 5,000 feet; the next and last, to 6,000 feet, from which rise the Champagne castle or Cathkin peak, 12,000 feet in height, Giant's castle, 11,000 feet, Mout aux Sources of the same height, Tintwa, 7,500 feet, and the Amajuba, 7,000 feet.

The principal rivers are the Tugela, the Umkomass, and the Umzimkulu; these traverse the Colony from the Drakensberg mountains to the sea, but owing to the nature of the country, above mentioned, the two last mentioned only are navigable, and only by small craft for a short distance within their mouths.

The Tugela is the longest and most beautiful; from its source in the Drakensberg, it leaps over a precipice 1,800 feet sheer into the Colony, 200 miles from its mouth; at 60 miles from the sea it is joined by the Buffalo river, where gold mining is in progress. There are about 23 other and less important streams.

Landing.—Like the Cape Colony, landing is extremely difficult, and dangerous at times on the coast of Natal, and as far north-eastward as Delagoa bay.

Capital.—Pietermaritzburg, the capital and seat of government, with a population of 18,000 at the last census, is situated about 50 miles inland from Durban or Port Natal, with which it is connected by telegraph, and by a railway 70 miles in length.

The population of the Colony, 1891, consisted of—Whites, 46,788; natives, 455,983; and Indian coolies, 41,142.

Communication.—*See* pp. 13–15.

Products.—Trade.—The coast region, extending about 15 miles inland, is highly fertile, and has a climate almost tropical, though perfectly healthy. Sugar, coffee, tea, indigo, arrowroot, ginger, tobacco, rice, pepper and cotton thrive well; the midland district is more adapted for cereals and other European crops, while the upper district is chiefly grazing land, and sheep farming is the principal occupation of the inhabitants. Horses and cattle are also reared in large numbers. The chief mineral products are coal and lime, but gold is being found in certain districts. The railway from Ladysmith to the coal mines, 18 miles in length, brings them in connection with Durban; about 140,000 tons were raised in 1894. Large forests of valuable timber abound in the kloofs of the mountain ranges, and many tracts of the coast are also well wooded.

The chief exports are wool, sugar, ivory, hides, maize, angora hair, and ostrich feathers, and the total value for the year 1894 amounted to £1,197,611. Imports:—£2,316,596.

In 1895, 165,700 tons of cargo were landed at the wharves at Durban, and 44,500 discharged from vessels in the roads from 232 steam vessels and 79 sailing vessels. 435 steam vessels and 83 sailing vessels entered and cleared.

Ports.—Natal may be said to have only one harbour, Durban or Port Natal, which is completely landlocked; it admits vessels of 15 to 19 feet draught, according to the condition of the bar. Though much has been done to improve the latter, permanency in depth has not yet been attained. Works are still in progress for deepening both bar and harbour. Harbour works are also in progress at the mouth of the Umziinkulu (port Shepstone) to deepen the bar, and it is now available for small coasting steamers. The Umkomass is also available for small craft.

PORTUGUESE EAST AFRICA, formerly known as the province of Mozambique, has a coast line of about 1,400 miles, and is situated between the parallel extending eastward from the junction of Maputa and Pongolo rivers to the coast (about Kosi river) southward of Delagoa bay, and the parallel of 10° 40' S. on the coast, near cape Delgado, thence inland until it strikes the Rovuma river.

The Portuguese arrived in these parts in 1497, and took possession of the coast, which was famed for its gold, from the Arabs. In 1508

they built a fort at Mozambique port, and the town which grew up around it was made the capital of the province in 1813.

By a decree of 1891, the colony of Mozambique was constituted as the state of East Africa and divided into two provinces, viz., that of Mozambique north of the river Zambezi, with the city of the same name for its capital, and that of Lorenzo Marques, south of the Zambezi, with the town of that name for its capital. The state is administered by Royal Commission appointed for three years, and residing in the capitals of the provinces alternately.

The province of Mozambique includes, besides the districts of Mozambique and Kilimán, three *intendencias* in the region conceded to the Cape Delgado Company, while the province of Lorenzo Marques includes, besides the district of that name, three *intendencias* in the region conceded to the Innambán Company, and three in the region conceded to the Mozambique Company. The state has a colonial military force and a small navy. Every settlement on the coast has its municipality, police, tribunals of justice, &c.

Communication.—Railways.—See pages 14, 15.

Trade.—Products.—The chief products are oil-nuts and seeds, caoutchouc and ivory. The sugar industry is being developed at Kilimán, from whence 600 tons were shipped in 1894 to Portugal and 10,000 gallons of rum sold in the neighbourhood. The chief imports are, cotton goods, spirits, beer and wine.

In 1894 the value of the exports from Mozambique was £67,588, and the imports £109,677, and at Kilimán, including the Chinde, £87,792 and £94,039.

In 1894, 98 vessels of 140,885 tons (39 of 81,630 tons, British) entered the port of Mozambique; 131 of 37,632 tons (52 of 11,849 tons, British) entered the port of Kilimán; and 266 vessels of 416,515 tons (195 of 331,051 tons, British) entered and cleared at Lorenzo Marques.

Population.—The population of Portuguese East Africa is about 1,500,000, and the area of the territory about 261,700 square miles.

Harbours.—The principal trading ports, beginning from the southward, are:—Delagoa bay, Innambán, Chiluan, Beira, Chinde mouth of the Zambezi, Kilimán, Angoche, Mozambique, and Ibo. Delagoa bay, with its fine harbour and its railway now open to the Transvaal, is becoming a port of considerable importance.

The Zambezi and Limpopo are the principal rivers, of which a full account will be found in the description of the coast.

Landing, like in the Cape Colony and Natal, is difficult and dangerous on the coast of the southern part of Portuguese East Africa, and in many places impracticable, but farther northward the coast is more broken up into bays, and fronted in places by islands or reefs, which afford protection to leeward of them.

CHARTERED COMPANY'S Territory.—The large British territories southward of the Zambezi, lying north and north-west of the Transvaal, are, by Royal Charter, under the control of the British South Africa Company. The principal settlements, Bulawayo, Gwelo, forts Victoria and Salisbury, &c., are connected by telegraph with Cape Colony, *via* the Transvaal, and with Beira on the east coast. Mafeking (580 miles from Bulawayo, and 800 miles from fort Salisbury) is connected with the Cape Colony railway system. The extension of the line from Mafeking to Gaborone and Palapye (the latter about 170 miles from Bulawayo) is in progress. The railway from Beira, on the east coast, is nearly completed to the border of the Company's territory. *See* p. 224.

By the new postal route, *via* Bulawayo, it is possible to communicate by letter between London and Salisbury in from 30 to 33 days. The mails also run weekly between Salisbury, Umtali, and Beira, thus providing a local East coast service.

The territories of the Chartered Company do not touch the coast at any part.

BRITISH CENTRAL AFRICA Protectorate, constituted as such on May 14th, 1891, lies along the southern and western shores of lake Nyasa, and extends towards the Zambezi. It is administered under the Foreign Office by H.M. Commissioner, and is divided into twelve districts, in each of which are two administrative officials.

The chief town is Blantyre, in the Shiré highlands, with a population of about 100 Europeans and 6,000 natives. In the same region is Zomba, the seat of the Administration, and there, or on the Shiré river, are nine or more settlements. Near or on lake Nyasa are fort Johnston and about nine other settlements. There are sixteen post offices and thirteen customs houses. The Shiré province contains most of the European population of the Protectorate. Good roads are being made, and life and property are safe; seven missionary societies are at work.

The climate, though not salubrious for European settlers in general, is said to be healthier than the greater part of Central Africa. See page 261.

There is an armed force of 200 Sikhs from the Indian Army, with from 200 to 300 black police, recruited locally. This force has English officers and Sikh non-commissioned officers. There is also a Naval force on the rivers Zambezi and Shiré and on lake Nyasa consisting of five gunboats, with English officers and seamen.

Communication.—There are good roads from Blantyre, &c., to Chirimo on the Shiré, whence communication with the coast is maintained by H.M. gunboats, the steamers of the African Lakes Company, and Sharrer's Zambezi Traffic Company, thence by the several mail steamers calling off the Chinde. The Portuguese contemplate connecting Kilimán with the Ruo river, near Chiromo, by railway.

A telegraph line from Tete on the Zambezi, through the Protectorate to Tanganyika, is being constructed. Tete is connected with Zomba and Blantyre in the Shiré highlands, and with Kilimán, *viâ* Chinde. Chinde is situated on the river of the same name, at present the most navigable mouth of the Zambezi. At this port, the Portuguese Government has granted a piece of land, called the "British Concession," where goods in transit for British Central Africa may be landed and re-shipped free of customs duty.

Produce.—Trade.—Within the Shiré province coffee planting has been greatly extended during the last few years; rice is grown to perfection and wheat promises to be successful. Oats and barley thrive on the uplands, where merino sheep and Natal ponies seem also likely to prosper. The trade for the year ending March 1895, was :—imports, value £95,000; exports, £12,000. The chief imports were cotton goods, machinery, provisions, hardware and agricultural implements; the chief exports, ivory, coffee and tobacco.

GERMAN EAST AFRICA.—The parallel of 10° 40' S., near cape Delgado, thence inland until it strikes the Rovuma river, is the southern boundary of German East Africa; its northern coast limit is the mouth of the Uмба river, in about lat. 4° 41' S.; Mafia island forms part of the Protectorate.

The German East Africa Company, founded in 1885, had established fifteen stations, but most of them were ruined and abandoned

by the outbreak of the natives in 1889, peace being restored in 1890. Commercial enterprise has again begun, the German Government granting subsidies for railways and steamers, and in other ways supporting the operations of the Company. The German Emperor is represented in this region by an Imperial Governor.

Products.—Trade.—The chief products are gum copal, coconuts, copra, sesame, caoutchouc and ivory. The chief imports are cottons, colonial wares, rice, oil, spirits, wine and beer. In 1894, the value of the exports was 1,982,272 dollars, and the imports 2,913,317 dollars.

Harbours.—The principal port of commerce is Dar-es-Salaam. Next in importance are (from the southward) Mikindani, Lindi, Kilwa Kisiwani, Kilwa Kivinje, Bagamoyo, Pangani and Tanga.

The Rovuma, Rufiji, Kingani, and Pangani are the principal rivers on this coast, but they are very shallow and scarcely navigable by anything larger than a steam launch.

Communication.—*See* page 15.

BRITISH EAST AFRICA.—From the mouth of the Uмба river to the Juba river, including the adjacent islands, also the islands of Zanzibar and Pemba, and the province of Uganda and others in the interior, are under the protection of Great Britain. The total area is over 1,000,000 square miles.

The boundary between the spheres of influence of Great Britain and Italy ascends the channel of the Juba from its mouth to lat. 6° N., thence it follows the parallel of 6° N. as far as long. 35° E., whence it trends north to the Blue Nile, &c.*

The administration of the coastal district of the mainland is placed under the control of Her Majesty's Consul-General at Zanzibar. Uganda proper is under a Commissioner subordinate to the Consul-General.

Products.—Trade.—The principal products and exports are, sesame seed, ivory, india-rubber, cloves, gum, copra, coir, orchilla weed, hides, &c. The imports are, Manchester goods, Bombay cloth, iron and copper wire, beads, &c. The greater portion of the coast trade is in the hands of Banians, but there are several European establishments at Zanzibar.

* These boundaries are not to be considered absolute, but are merely given to afford the mariner some knowledge of the various claims to the country.

In 1893, the exports were valued at 1,287,399 rupees, and the imports at 1,807,208 rupees.

Shipping entered (1893), 100,602 tons ; cleared, 100,308 tons.

Harbours.—British East Africa has several good harbours and anchorages, many of which may be entered by large vessels. Zanzibar, on Zanzibar island, and Mombasa and Kilindini on the mainland are the principal, and are available for all vessels. Kilifi, Lamu and Kisimayu are perhaps next in importance.

Landing may generally be effected from most of the anchorages, but at certain points of the coast exposed to the ocean, landing is at times difficult. Northward of Pemba, with on-shore winds, it is at times dangerous. In many places the coast is fronted by islands and detached reefs, which afford smooth water to leeward of them.

Zanzibar.—The dominions of Zanzibar are governed by an Arab Sultan of the blood of the Imaums of Maskat, and are now under British protection.

Trade.—Population.—The population of Zanzibar is estimated at 150,000, and that of Pemba at 50,000. There are about 7,000 British and Indian subjects, through whose hands almost the whole of the trade of Zanzibar and of British East Africa passes directly or indirectly. The town of Zanzibar has a population of about 30,000.

There is a regular army of about 1,000 men under a general.

The imports in 1894 amounted in value to £1,197,681, and were distributed as follows :—From foreign countries, £722,212 ; German Coast, £219,746 ; Sultan's dominions, £177,171 ; British East Africa, £47,369 ; Benadir ports (Brawa, &c.), £31,183.

The exports in 1894 amounted in value to £1,096,240, the chief articles being ivory, cloves, copra, rubber, gums and hides.

In the year 1894, 126 vessels (other than coasting vessels and men-of-war) entered the port of Zanzibar. These included 44 vessels of 71,235 tons, British ; 46 of 66,862 tons, German ; and 28 of 47,776 tons, French.

The English Consular Court is also a Naval Prize Court.

ITALIAN EAST AFRICA.—Somali Land.—The coast from the Juba river (*see* British East Africa, p. 10) northward to Ras Asír, and round that cape to about long. 49° E., is under the protection of Italy. Somali land is in the form of a triangle, with its apex at

Ras Asír. Its western boundary begins at the head of the gulf of Tajúra, in the gulf of Aden, passes eastward of Harar, follows the Haines river for some distance, and then crosses over to the Juba, thence by that river to the coast.

As far as is known, the whole of the Somali country has a gradual slope from the heights which border the gulf of Aden, south-eastward towards the Indian ocean. With the exception of the Juba, there appears to be but one permanently flowing stream, namely the Haines or Doho, locally known as the Wobbi (meaning river). Some of its tributaries flow past Harar, others from the more eastern mountain range, the highlands of Gurage. This river flows through the Ogaden country, a famous pastoral region, where the Somali have large herds of camels, ponies, cows, and sheep, and where gazelles and antelopes roam about in vast herds. Numerous agricultural settlements extend along this river. Near Mogdishu the river approaches the coast, and, running parallel with it, terminates inland of Brawa in a marsh, which, after rain, expands into a considerable lake. The Haines river has a rapid current at times, but to a steam launch (which would have to be taken there in sections) its navigation appears to present no difficulty as high up as the town of Imi.

The Juba has been ascended to 20 miles above Bardera, about 400 miles above its mouth, but it undoubtedly rises far inland.

The coast from the equator nearly to Ras Asswad is principally composed of low hills, some covered with stunted bushes, but becoming bare to the northward; with the exception of the high land between Ras Asswad and Ras Awath, the coast is low, rocky, and sterile, with sand hills in places, as far as Ras Hafún; very little is known of it.

Products.—Hides, orchilla weed and oil seeds, with a little ivory and some ostrich feathers from the interior, are the principal products; these are exchanged for sugar, dates, salt fish, and arms, brought by the dhows in the north-east monsoon period trading between Arabia and Zanzibar. The ports are known as the Benadir ports and their trade is referred to under Zanzibar, p. 11.

Harbours.—This eastern coast of Somali land possesses no harbours of any importance; the anchorages at Mogdishu and Brawa afford protection within the reefs for dhows only. Kisimayu or Refuge bay, in British territory, in lat. $0^{\circ} 23' S.$, is the most northern harbour for large vessels on this coast. There is thus a stretch of sterile coast 800 miles in length without shelter, as far north as Ras Hafún peninsula, under which there is shelter on either side, depending on the prevailing monsoon.

RAILWAYS.—Cape Colony.—Transvaal, &c.—There are 2,441 miles of railway open in the Cape Colony. The railways of Cape Colony originally consisted of three separate systems, the Western, Midland, and Eastern, having their starting points on the seaboard at Cape Town, Port Elizabeth, and East London, respectively. The Western and Midland are connected by a junction at De Aar (500 miles from Cape Town and 340 miles from Port Elizabeth), and carried forward thence as one trunk line to Kimberley (647 miles from Cape Town). From Kimberley the line is now carried northward to Mafeking, in British Bechuanaland (870 miles from Cape Town); a further extension towards Mashonaland is in progress.

The extension from Colesberg to Bloemfontein, in the Orange Free State (143 miles), was opened in 1890; since that date the line has been carried through the Free State over the Vaal river into the Transvaal. The line as far as the Vaal river belongs to and is worked by the Cape Government; thence the Cape Government trains, by virtue of a convention, run through to Johannesburg and Pretoria, the latter being 1,040 miles from Cape Town. Pretoria is connected by rail with Delagoa bay.

The Eastern system extends from East London through Queen's Town to Aliwal North, adjacent to the Basutoland and Orange Free State frontiers; in 1892 it was extended to join the Cape railways within the Free State at Springfontein, so forming a direct line to Bloemfontein and Johannesburg (*see* Natal connections below). Cape Town is also connected with Wellington (45 miles), and with Simons Town, *via* Wynberg, about 20 miles.

The line between Grahamstown and Port Alfred (43 miles) was opened in 1883, in which year powers were given to construct a line from Worcester on the Western main line, down the Breede river valley as far as Montagu. This line is open past Robertson to Ashton, about 42 miles.

The Cape Copper Company own and work a mineral line from Port Nolloth to Vokiep (92 miles). There is also a private line of $3\frac{3}{4}$ miles from Cape Town to Sea point. A private line of 7 miles connects the Twartkop salt pan with the Midland system.

Natal.—In the Colony of Natal there are 399 miles of railway open, all worked by the Government. The main line extends from the port of Durban to Pietermaritzburg, the capital (73 miles), and from thence to Charlestown on the border of the South African Republic, 306 miles from Durban. Connections with

Johannesberg and Pretoria were opened in 1895. There is a branch from the main line near Ladysmith to Harrismith in the Orange Free State ($59\frac{1}{2}$ miles). A branch line also extends from Durban to Verulam, $19\frac{3}{4}$ miles north-eastward, and another from South coast junction to Isipingo, $6\frac{3}{4}$ miles south-westward.

Portuguese East Africa.—From Delagoa bay there is railway communication to Pretoria, a distance of 346 miles, 57 miles of which are in Portuguese territory. Delagoa bay is thus connected with the Cape Colony railways. From Beira on the Pungue river, there is a railway to Bandoola, distant about 175 miles, *via* Fontesville and Chimoio; works are in progress to complete it to the border of the Chartered Company's territory, about 22 miles. See also p. 224.

A railway is projected from Kilimán to the Ruo river, but nothing has yet been done.

German East Africa.—A railway is projected from Dar-es-Salaam (with a branch to Bagamoyo) to lake Tanganyika, *via* Mrogoro and Tabora, and from Tabora to lake Victoria Nyanza.

British East Africa.—A survey has been made for the construction of a line of railway some 650 miles in length, from Mombasa to Victoria Nyanza. The terminus is on the west side of Mombasa island, near port Kilindini, from whence the line crosses to the mainland over a bridge at the north-west side of the island. About 30 miles were completed in 1896. It is anticipated that by the end of 1898 the railway will be completed to Kikuyu, 300 miles from Mombasa. There is a good road to the Victoria Nyanza, 350 miles from Kikuyu.

TELEGRAPH.—Cape Colony, Natal, the Transvaal, Delagoa bay, British Bechuanaland, forts Salisbury and Victoria, are connected by telegraph. Beira is connected with Cape Colony *via* fort Salisbury. Tete, Blantyre, fort Johnston, Chinde and Kilimán on the Zambezi are connected together. It is anticipated that Tete will be connected with fort Salisbury about June 1897. A few of the principal ports in German East Africa are connected with Dar-es-Salaam by land lines, thence to Zanzibar by submarine cable. Mombasa is connected with Lamu, *via* Golbanti (Tana river) and Witu, by land lines, and by submarine cable with Zanzibar.

Submarine cables.—From Natal a submarine telegraph cable is laid to Aden, *via* Delagoa bay, Mozambique and Zanzibar. Zanzibar is also connected by cable with the Seychelles and Mauritius, Dar-es-Salaam, and also with Mombasa. There is also

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submarine cable connection between Cape Town and England, *via* the west coast ports, and St. Vincent, &c., rendering the circuit of Africa complete. A French cable connects Mozambique with Madagascar.

Lloyd's Signal stations, &c.—There are Lloyd's signal stations at Cape point, cape Agulhas and the Bluff at Port Natal connected with the telegraph systems of the colonies. Cape St. Francis lighthouse is also connected. There is a private signal in Mazeppa bay, connected with East London *via* Butterworth.

Time signals.—The time kept in Cape Colony is that of the meridian of $22\frac{1}{2}^{\circ}$ E., or 1h. 30m. in advance of Greenwich mean time. In Natal, that of the meridian of 30° E., or two hours in advance of Greenwich. Time signals are made at Cape Town, Simon's Town, Port Elizabeth, Port Alfred, East London and Natal.

MAIL COMMUNICATION.—The English mail is carried to Cape Colony and Natal, weekly, by the Union and Castle Lines of steamers alternately, whence mails are despatched from Cape Town to Delagoa bay, Mashonaland, &c., by rail. The steamers call at Cape Town, Port Elizabeth, East London and Durban. Each company despatch an intermediate steamer, fortnightly, calling at the same ports, and thence to Delagoa bay. The Union vessel calls at Mossel bay also, but does not go beyond Delagoa bay. The Castle Line continues on to Madagascar and Mauritius. There is also coastal service by those steamers in Cape Colony.

Durban and Delagoa bay are ports common to the south and east coast mail services.

The "Deutsche Ost Afrika Linie" run a three-weekly service from Europe *via* Aden and all the East Africa ports (*see* branch service below) between Tanga and Durban. Their service from Bombay to Zanzibar (at intervals of 18 and 24 days), taking Lamu and Mombasa northward of Tanga, by alternate steamers. This company has a branch service from Tanga and another from Beira, to ports in their neighbourhood. They also run a line to Durban, Delagoa bay and Innambán every two months, *via* Cape of Good Hope.

The British India run a four-weekly service from Bombay *via* Seychelles to Zanzibar, Mozambique, Beira and Innambán, to Delagoa bay. The same company run a four-weekly service from Aden to Zanzibar *via* Mombasa.

The Rennie Company's steamers run about every three weeks from Natal to ports as far northward as Kilimán.

The Messageries Maritime runs a steamer monthly from Diego Suarez (Madagascar) to Delagoa bay and back, *via* Mozambique and Beira, in connection with the Mauritius steamers, &c. There is also a French line of steamers, the Chargeurs Reunis, of Havre, *via* West African ports, to Cape Town, Delagoa bay, Beira, Mozambique, and Madagascar. These services are subject to alterations from time to time.

COAL may be obtained at the following ports in South and East Africa:—Cape Town; Simons Town; Mossel bay, small quantity; Port Elizabeth; Port Alfred, possibly a small quantity; East London; Durban; Delagoa bay; Mozambique, Zanzibar, Mombasa, and possibly a small quantity at Tanga. Details of coaling are given with the description of the ports.

DOCK ACCOMMODATION.—Cape Town is the only place included in this work provided with a dock suitable for large vessels.

This dock has a depth of 24½ feet on the sill at high water ordinary springs. There is also a patent slip capable of taking vessels of 1,000 burthen. The patent slip at Simons Town will take up vessels of 1,000 tons, lightened to 14 feet. The patent slip at Durban will take up vessels of 500 tons burthen. For details, *see* the ports referred to.

PILOTS.—The statement in certain places in this work that the employment of pilots is compulsory, does not apply to H.M. ships of war.

WINDS AND WEATHER.*

OFF THE CAPE COLONY.†—**General remarks.**—The district under discussion lies between lat. 30° to 50° S., long. 10° to 40° E. Near the coast of Cape Colony, easterly and westerly winds alternate. In summer, easterly winds prevail; and in winter, westerly winds. Southerly winds (south-west to south-east) prevail throughout the year in the north-western part of the district (north-west of the Cape), but they extend further south in summer than in winter.

North and north-east winds prevail on the eastern side of the district (off, and southward of Natal); but at Natal the north-east and

* *See* also Weather Tables, p. 593–599.

† *See* Admiralty Wind and Current Atlas; for more detailed information, *see* the Meteorological charts of the ocean district adjacent to the Cape of Good Hope, by Captain Toynbee, F.R.A.S.

south-west winds appear to be equally divided. The prevailing winds at the different ports are mentioned with the description of the ports.

The summer months, the period of south-east winds, is the worst time for anchoring off the ports of Cape Colony.

Summer months.—From October to April, the summer months, the prevailing winds are south-easterly, which occasionally rise to gales and last for three days, and at times for a longer period, being followed by calms and light westerly winds. These winds follow the trend of the whole coast of South Africa, being nearly from east between Natal and Algoa bay; south-east from Algoa bay to cape Agulhas, and from S.S.E. into False bay. In strength, the south-easters are singularly local at times; for instance, being light at cape Hanglip and Danger point to the south-eastward, when it may be blowing a heavy gale from the same quarter in Simons and Table bays.

Westerly winds and heavy westerly gales are nevertheless not unfrequent in this season; the best chance of avoiding them is to keep well in with the land; there is also considerably less sea over the Agulhas bank than there is southward of it.

Winter months.—From April to October westerly winds prevail, and gales are especially severe and frequent south-eastward of the Agulhas bank in the months of June and July. In May, August and September, between the coast and lat. 37° S., the east and west winds are about equally divided; easterly winds occasionally occur in the other winter months.

The Roaring Forties.—It was formerly thought that between 40° and 50° South latitude, the wind was continually blowing from the westward. Modern investigation has shown that the winds here are cyclonic in their character, and that as the central depression is generally to the southward of 45° S., of large area, and has a progressive movement to the eastward, the winds blowing in the northern semicircle are mostly from the northern quarter, and commencing at about North will back to the north-west freshening as it does so, and frequently shifting more or less suddenly to the south-west where the strongest blow will be, with a rising barometer. A vessel steering eastwards, will, therefore, hold the fair wind for a longer or shorter time, dependent on her own speed, and the velocity of the translation of the system, and when the latter is moderate, may carry the westerly winds with her for days.

From what has been said of the usual high latitude of the lowest barometer, it will be seen that though a vessel may have less wind

about the parallel of 40° S., she will probably have a greater proportion of westerly wind than if she went further south, and that generally speaking the sea will not be so heavy. Hence this parallel is recommended as the best for making easting when proceeding from the Cape either to Mauritius, India, China, or Australia. From the shortening of the distance effected by following an approximation to the Great Circle track to Australia, vessels sometimes make quicker passages, but it is frequently at the expense of much straining and anxiety.

Should the area of lowest barometer of any system be further north than usual, the system of wind above sketched will not be followed, and the wind will veer instead of backing, and a hard easterly or south-easterly gale will follow.

GALES.—The severity of the gales off the Cape district is well known to navigators, as also the rapidity with which they succeed one another, and their violence during the winter months.

The proportion of gales in the usual track of outward bound vessels (about 40° S.), is as follows :—N.W., 42 per cent. ; S.W., 29 ; N.E., 5 ; S.E., 7 ; exceptional, 17 ; and in the usual track of homeward bound vessels (near the coast), N.W., 27 ; S.W., 36 ; N.E., 8 ; S.E., 13 ; exceptional, 16. It has been found that, when during summer the barometer falls to 29.5, bad weather may be expected, and during winter that a fall to 29.75 will indicate a similar change.

A falling barometer when the wind is southerly, and the weather threatening, is a most useful warning in this part of the sea.

The probability of meeting with gales is as follows :—

	Outward route (40° S. and South- ward of).	Homeward route (near the coast).
January - - -	8 per cent. - -	6 per cent.
April - - -	10 „ - -	6 „
July - - -	14 „ - -	13 „
October - - -	9 „ - -	10 „

The greatest number of gales are experienced between the south-east edge of the Agulhas bank and about 40° S., where the Agulhas current, deflected to the southward by the bank, meets the north-easterly drift from the Antarctic ; here the struggle takes place between the warm and cold currents of the sea, and the warm and cold currents of the air, which go as it were hand in hand. On the south-east edge of the bank, in the months of June and July, about 30 per cent. of the winds are recorded as gales.

The gales in this area are frequently circumscribed in their limits, and consequently, the shifts of wind are sudden and violent, and may take place in any direction. The sea is, therefore, at times very heavy, particularly during south-west gales, and this area should, if possible, be carefully avoided by the seaman.

It frequently happens that a gale, which is blowing in this area for a lengthened period, is either moderate or not felt near the shore.

Westerly Gales amount to about two-thirds of the whole number experienced, and are of two classes, north-west and south-west gales. N.W. gales generally commence with a falling barometer, and sometimes their extreme force is not felt until the wind is about West. S.W. gales begin from the same quarter as N.W. gales, the first fall of the barometer coming with a northerly wind shifting to north-west, the chief difference being that with S.W. gale systems, the north-west wind does not attain the force of a gale.

Easterly Gales.—N.E. Gales form about 6 per cent. of the number experienced in the Cape region, and are usually met with in the eastern portion of the area (30° to 40° E.). They are generally short and of slight force, and frequently lose the force of a gale before the lowest barometer occurs. Lightning is sometimes seen at the same time. The chief danger in connection with them lies in the fact of their being generally followed by north-westerly, south-westerly to southerly, or even south-east winds, and that in many cases these winds attain the force of a heavy gale. Sometimes the second gale sets in with a sudden change of wind. Hence great precaution is necessary in watching the barometer, weather, sea, etc., during a N.E. gale, more especially when met with near the south-east coast of Africa.*

S.E. Gales form about 10 per cent. of all gales met with off the Cape and south coast. They are of two classes, namely, those preceded by northerly and north-westerly winds, and those preceded by southerly or south-east winds. Those preceded by northerly winds resemble south-west gales in their character, setting in after the lowest barometer has passed, and lightning often occurs before the wind changes from the northward and westward to the south-eastward.

* Many vessels have been taken aback, and have foundered through neglecting these signs, particularly in the neighbourhood of Algoa bay.

Those preceded by southerly winds are again subdivided, namely, (1) those fine weather gales generally met with near the Cape of Good Hope, more especially during the summer months, and which are accompanied by a slight fall of the barometer; these are closely related to the south-easters common to Table bay.

(2) Those related to the south-west side of cyclonic wind systems, moving southward or south-eastward. These are generally accompanied by bad weather, and are sometimes very severe; as these gales progress the wind often veers to the westward of south, the change generally taking place after the lowest barometer has been recorded. If necessary to heave-to in such a gale, the starboard tack should be preferred, as it is the coming up tack.

Exceptional Gales form about 16 per cent. of all gales met with off the Cape and South Coast. These are gales which change quickly from one quarter to another, or for some other cause cannot be classed under those previously referred to. A very dangerous type of exceptional gale is one that changes quickly from N.E. to N.W. or S.W.; it is frequently met with, but more especially near the south-east coast of Africa.

It is not possible to manœuvre so as to avoid these, which shift suddenly from one quarter to another, so that when lightning and other weather signs, or the direction of the swell indicate such a change, the chief precaution lies in reducing sail, especially on the main and mizen masts. In gales which only shift from N.E. to N.W., and in which the barometer begins to rise as the wind goes to N.W., and also in those which shift quickly from N.E. through north to S.W., the port tack should be preferred, if requisite to heave-to.

Temperature.*—Southward of Cape Colony, the air, like the sea, is warmest in February and coldest in July, strongly influenced by the temperature of the Agulhas current. It averages about 62° in February and 56° in July, on the parallel of 40° S., and 70° and 60° respectively near the coast. For temperature in Cape Colony, &c., see *Climate and Rainfall*, pages 27, 28.

The sea temperatures off the Cape are given with the description of the Agulhas current, pages 30, 31.

Icebergs are rarely fallen in with off the Cape of Good Hope to the northward of 40° S., or it may be said of 43° S.; nevertheless,

* See also the diagrams of Lines of Equal Pressure and Lines of Equal Temperature in "Wind and Current Atlas for Pacific, Indian Ocean, &c."

there are instances of icebergs being seen near the cape in April and in September, and it is therefore desirable to keep a good look out for them at all seasons. From December to April icebergs are numerous near and southward of 45° S. Fogs are also prevalent south of that parallel. Icebergs are farthest north in the months of November to February, and therefore more liable to be met with; and least so in the months of June and July.*

In approaching icebergs there may be a marked diminution in the temperature of the air and sea, the indications^d therefore of the thermometer should never be neglected, though it must not be assumed to be an infallible guide.

Weather signal.—A weather chart, from information telegraphed by the Meteorological Commission of the Cape Colony, is exhibited at each of the seaports in the Colony, soon after 10 a.m. daily, for the information of masters of vessels and others.

MOZAMBIQUE CHANNEL.

General remarks.—The winds in the Mozambique channel are dependent upon the monsoons of the Arabian sea, but do not, however, blow here with the same regularity that is found further north. The northerly monsoon commences between mid-September and mid-October, and the southerly monsoon between mid-March and mid-April. The change is generally accompanied by squally weather. To the southward of lat. 20° S., from abreast the centre of Madagascar, the northerly monsoon is not felt and the winds are variable, with a greater prevalence of South and S.S.E. winds than any other, particularly on the Madagascar side, near the south-west end of which, S.E. and E.S.E. winds prevail all the year round, but do not extend far up the coast. See also Winds at Natal, p. 179, and weather table for Delagoa bay, p. 593.

Although the southerly monsoon is the fine weather and healthy season, the northerly monsoon is the period of less wind and consequently of smoother water in most of the anchorages from Delagoa bay northward; it is, however, the unhealthy season.

The northerly monsoon in the Mozambique channel, from its commencement to nearly the end of December is light and variable, with smooth water and usually fine weather; westerly winds and calms intervene. Towards the end of December the monsoon sets in

* See Ice chart of the southern hemisphere, No. 1241; also Admiralty chart, No. 2095, on which icebergs that have been met with near the Cape Colony are shown.

strong; for three consecutive years the first decided blow was observed to occur at the Comoro islands, on the 25th December. It continues with some force until about the beginning of February, at which time, in the southern part of the channel, the southerly wind begins to make itself felt, and about the end of February it is fully established, though not with any force until April. Near the Mozambique coast, from and after December, calms, variables, and rain will be met with; though in mid-channel it is usually fine with a fresh breeze. During this northerly monsoon the southerly winds which prevail at the southern end of the channel often amount to a gale, producing a considerable sea; at such times they commonly force their way northward, overcoming the monsoon even as far north as the Comoro islands, and blow a double-reefed topsail breeze. This weather is preceded by heavy banks of cloud to the southward, with gloomy weather, but does not last long.

The southerly monsoon blows from S.S.E. to S.S.W. between Europa island and the Comoro group; it attains its greatest westing in May and June (S.S.W.); from July it gradually backs to the eastward; September to November calm and light winds are prevalent until northerly monsoon is established. The southerly monsoon is called the fine weather season, and is generally free from gales; but there is much more wind and sea at this time in the Mozambique channel than during the northerly monsoon; vessels proceeding to the southward will frequently find a hard double-reef topsail breeze and heavy sea.

On the coast of Madagascar, land and sea breezes prevail; the former being very light and lasting from about midnight till noon; the sea breeze generally sets in during the afternoon, increasing in force till sunset, when it subsides and gradually dies away towards midnight, followed by the land wind. In the evening, within 20 miles of the coast, lightning and thick banks of clouds are common, having a threatening appearance, but generally harmless.

At the Comoro islands the south-west monsoon sets in about the middle of March, when heavy squalls from the westward and much rain may be expected; thence the monsoon forces its way up the African coast.

Calms.—During the northerly monsoon the frequency of calms is about 25 per cent., and in the southerly monsoon 10. In November they are most prevalent, being about three times as many as in June. The Madagascar coast is most subject to them.

Gales.—The Mozambique channel is subjected at times to hard gales and severe weather, independent of an occasional cyclone. These gales generally occur in the north-east monsoon period, and mostly begin with the monsoon freshening to a force of 6 to 7; it then slackens, with a steady barometer, the wind then shifts rapidly through west and then sets in as a violent gale from South to S.W.; occasionally the wind shifts through east. At times, also, the steep gradients are to the eastward, when the northerly wind will remain steady in direction but increases to a violent gale. The approach of these gales is generally foretold by a threatening sky to the westward, with lightning. Sometimes these gales occur after several days calm.

Cyclones.—The Indian ocean cyclones, which at times do so much damage in the vicinity of Mauritius, between the months of December and April, are usually intercepted by Madagascar before reaching the Mozambique channel, but occasionally one passes northward of the island into the Mozambique. One of these, the last recorded, crossed the Mozambique channel on January 28th–30th, 1887, in a westerly direction from northward of cape St. Andrew, its centre passing over the Castle Line s.s. *Courland* in lat. 20° S., long. 37° E., about 50 miles southward of the Zambezi. This vessel experienced strong S.S.E. winds when proceeding up the coast from Delagoa bay, with violent squalls, a constantly increasing sea and falling barometer; eventually she was compelled to head the terrific sea, when the centre passed over her. The only noticeable feature in an almost uniformly overcast sky—over which the drift scudded furiously—was a peculiar leaden blue in the zenith; there was no heavy solid banking up of clouds, and very little thunder and lightning; but the rain was heavy and continuous. The barometer, however, proved a true friend, and fell from 29.61 at noon 29th, to 28.98 at 8 p.m. on 30th, at which time the centre passed over the ship, and the stars became visible overhead. The cyclone, blowing from northward on the coast of Madagascar, caused an extraordinary high tide and considerable sea at Mourandava, threatening the destruction of the houses, which hitherto had been considered far above the reach of the sea.

Cyclones have occurred towards the latter end of January in Mozambique harbour in former years, notably in the years 1841–2–3, see page 300, and that place was visited by a severe one on the 1st and 2nd of April 1858, during which several vessels were driven from their anchors in the harbour, and much damage was done.

The relative frequency of cyclones in the South Indian ocean for the 35 years ending 1885, for the several months, are as follows:—

For full details, with yearly and monthly charts showing the tracks of these storms, see "Cyclone tracks in the South Indian ocean," from information compiled by Dr. Meldrum, C.M.G., F.R.S., published under the authority of the Meteorological Council, 1891.

Month.	Progressive Storms.		Stationary Storms.		Totals.	
	Total.	Frequency.	Total.	Frequency.	Stationary and Progressive.	Frequency.
October	2	1 in 18 years.	3	1 in 12 years.	5	1 in 7 years.
November	12	1 ,, 3 ,,	13	1 ,, 3 ,,	25	5 ,, 7 ,,
December	23	2 ,, 3 ,,	10	2 ,, 7 ,,	33	1 ,, 1 ,,
January	52	3 ,, 2 ,,	19	1 ,, 2 ,,	71	2 ,, 1 ,,
February	55	5 ,, 3 ,,	6	1 ,, 6 ,,	61	5 ,, 3 ,,
March	40	4 ,, 3 ,,	19	1 ,, 2 ,,	59	5 ,, 3 ,,
April	26	3 ,, 4 ,,	24	2 ,, 3 ,,	50	3 ,, 2 ,,
May	8	2 ,, 9 ,,	11	1 ,, 3 ,,	19	1 ,, 2 ,,
June	1	1 ,, 35 ,,	2	1 ,, 18 ,,	3	1 ,, 12 ,,
July	1	1 ,, 35 ,,	1	1 ,, 35 ,,	2	1 ,, 18 ,,
August	0	—	—	—	—	—
September	0	—	—	—	—	—

EAST COAST OF AFRICA NORTH OF CAPE DELGADO.*

On this part of the coast, and in the ocean to the eastward, the winds consist of the monsoons known as North-east and South-west.

The north-east monsoon commences in the Arabian sea about the middle of October, but does not at times reach the coast of Africa and Zanzibar until the middle or end of November; the changes which may occupy a fortnight or more, is accompanied by shifts of winds, calms, squalls of rain and obscured sky. Occasionally the north-east monsoon is so light that many dhows from Arabia fail to reach Zanzibar, and have to put into Mombasa.

From cape Delgado to the equator, during the months of February and March, although part of the northerly monsoon period, winds

prevail from E.N.E. to E.S.E. At this season, therefore, it is practicable for dhows to make their way thus far northward. The weather hereabout during these months is fine, with occasional showers and sometimes thunder and lightning, but no heavy squalls.

The south-west monsoon.—After an interval of calms and light winds, the south-west monsoon sets in, reaching Zanzibar some time in March, Ras Asir about the end of April, and Bombay about the first week in June. Southward and eastward of Sokótra it attains its full force in June and continues until September, blowing stronger and steadier, and accompanied by a heavier sea at a distance from the land than near it. On the east coast of Africa it blows very strong from about S.S.W. following the land, and continues with full force through the channel between Sokótra and Ras Asir. In May it has been observed to be influenced by land and sea breezes near Ras Asir, the wind hanging a great deal to the southward and eastward, with heavy squalls, rain, and overcast sky.

Off Zanzibar and to the southward as far as cape Delgado the so-called south-west monsoon blows from S.S.E., hauling south and S.S.W. as it approaches the land.

The winds from 20 to 40 miles from the coast of Africa have been observed in the south-west monsoon, for a period extending over many passages of the B. I. S. N. Co.'s vessels, as follows:—

Zanzibar to 4° N.

May, June, July—Strong S.E.—S.—S.S.W., rain. August—Light to moderate. September—Light S.S.E.—South. October—Light, southerly.

From 4° N. to Ras Hafún.

May—Light, variable, squalls, and rain. June—Strong wind, increasing, S.S.W. July, August—Moderate gale, S.S.W. September—Strong wind, S.S.W. October—Light winds, calm, N.E. to East, rain.

Ras Hafún to Ras Asir.

May—Light variable winds. June, July, August—Strong gale, S.S.W. September—Strong wind, S.S.W. October—Light from East to N.E.

A cyclone, the only one on record, occurred at Zanzibar, commencing at 9h. p.m., on the 14th April 1872, blowing strong from S.S.W., accompanied by rain; it increased in force and backed to

South till about 1h. 30m. p.m. of the 15th, when it suddenly became calm, the barometer having fallen 0·9 inches below the normal height. At 2h. 15m. p.m. the barometer commenced to rise, and the cyclone burst upon the town and harbour from the opposite quarter N.N.E., backing by North to W.N.W., where it settled, but moderated considerably between 4h. and 8h. p.m. One English steamer alone did not part her cables; all the other vessels in the harbour, including several vessels of war belonging to the Sultan, and numerous native vessels were driven ashore and wrecked.

On the island of Zanzibar, the cyclone swept over the island and destroyed all in its path, but leaving the southern part uninjured. *See* remarks on cyclones, pp. 23, 24.

BAROMETER.*

The average range of the barometer in the higher latitudes between 50° and 60° is about 1·5 inches, but on extraordinary occasions ranges of 2·75 and 3·0 inches have been recorded.

In the track of outward bound vessels round the Cape, on the parallel of 40° S., the average height of the barometer is 29·9 inches, being about 0·15 higher in winter than in summer; it is higher towards the coast and lower towards the pole. The mean reading at Cape Town is 30·07, and at Durban 30·10; this, however, gives but an imperfect representation of the pressure in a district through which the areas of high and low pressure are constantly moving eastward, accompanied by their respective systems of wind.

In the intertropical regions the range varies from 0·4 to 0·2 inches, and in the neighbourhood of the equator it seldom exceeds 0·15 inches, this small change being in great measure due to the regular diurnal variation. The average movement of the barometer within the tropics being thus confined within small limits, any interruption of the law may be deemed a warning of the approach of bad weather. The mean reading at Mozambique is 30·05; Zanzibar, 30·0, and Ras Asir 29·9 inches. During the S.W. monsoon period, at Mozambique it is 0·5 higher, and at Ras Asir 0·10 lower; Zanzibar varies but little.

The fall of the barometer in and near cyclonic disturbances ranges from 1·0 to 2·5 inches; the rapidity of the fall and the depression of the mercury increases as the centre of the storm approaches.

* *See* also the diagrams of Lines of Equal Pressure and Lines of Equal Temperature in "Wind and Current Atlas for Pacific, Indian ocean, &c."

In the southern hemisphere the effect of the shifting of the wind on the barometer is according to the following law :—

With East, N.E., and North winds the barometer falls.

„ N.W. winds the barometer ceases to fall, and begins to rise.

„ West, S.W., and South winds the barometer rises.

„ S.E. winds the barometer ceases to rise, and begins to fall.

In the northern hemisphere the effect of the veering of the wind on the barometer is according to the following law :—

With East, S.E., and South winds the barometer falls.

„ S.W. winds the barometer ceases to fall, and begins to rise.

„ West, N.W., and North winds the barometer rises.

„ N.E. winds the barometer ceases to rise, and begins to fall.

CLIMATE AND RAINFALL.*

CAPE COLONY AND NATAL.—The cape possesses a healthy climate, which is doubtless attributable to the uniformity of temperature; it is much favoured by Europeans suffering from pulmonary complaints. The mean temperature at Cape Town is about 76° in February, and 59° in July. The summer may be said to commence in November, and continue until April.

The Colony of Natal, though nearer the tropics, is extremely healthy; the summer heat being greatly tempered by clouds and rain, whereas in winter the sky is usually cloudless. The steppes rise from sea level to an altitude of 12,000 feet in a distance of little more than a hundred miles. The various climates of these steppes are clearly defined, thereby rendering the Colony one of the finest of health resorts. At Pietermaritzberg, the capital, 2,218 feet, the average yearly temperature is about 64° . At rare intervals it rises to 98° , while in winter it sometimes falls as low as 28° . At Durban the average is $69\frac{1}{2}^{\circ}$, and the extremes 98° and 42° . The average daily range does not, however, exceed 20° . In the winter months frost is sometimes seen on the coast lands, even at the sea level. Snow storms occur yearly in the uplands, and snow-clad peaks are not uncommon on the Drakensberg. Thunder and hailstorms are of frequent occurrence in Natal in summer, October to April, the wet season.

* For temperature of the air and sea at various places, if not found here nor in the body of the work, the reader is referred to the diagrams in the Wind and Current Atlas.

The Rainy Season in the western portion of Cape Colony, as far eastward as Cape St. Francis, is during the winter (the rains being brought by the westerly winds from the South Atlantic), June being the wettest month; but there is still a fair proportion of fine weather during that month. Smart showers begin about March, increasing gradually up to June, thence decreasing in like proportion until October. December and January are dry months. The rainy season in the eastern portion of Cape Colony, eastward of Cape St. Francis and Natal, is during the opposite or summer season, the rain being brought by the easterly winds from the Indian Ocean. The neighbourhood of Cape St. Francis, lying between the regions watered by winter rains on the west, and summer rains on the east, has rain nearly equally distributed throughout the year, though the greatest quantity falls at Port Elizabeth between July and December.

The average rainfall is as follows:—Cape Town, 23 inches; Mossel bay, 14 inches; Port Elizabeth, 22 inches; coast lands of Natal, 45 inches. The fall is considerably less generally, inland, as at Worcester, 50 miles from Cape Town, it is but 14; the same distance inland from Mossel bay, 8 inches.

At Durban, in Natal, the annual rainfall amounts to about 40 inches (38·4 inches for the year 1892, 71·2 inches for 1893, and 37·3 inches for 1894), and at Maritzburg, 50 miles inland from Durban, it is about 38 inches. The average number of days in which rain falls at Durban is 61, and at Maritzburg 58. An average of about 5 inches falls every summer month, and 2 inches in every winter month. For this reason the summer is called the wet season, and the winter the dry.

PORTUGUESE EAST AFRICA.—Delagoa bay to Cape Delgado.—Nearly the whole of this coast consists of marshy land, and the large rivers during floods bring down immense quantities of decaying vegetable matter, particularly in Delagoa bay, and the delta of the Zambesi. The heavy rains which succeed great heat, the nightly dews and the exhalations produced by a powerful sun, all constitute natural causes which tend to the insalubrity of this coast. Innambán is considered to be the least unhealthy of the Portuguese stations, the temperature there being as low as 62° in July; but from November to May fevers should be specially guarded against. The best precautions are temperate living and non-exposure to the hot sun.

In the neighbourhood of Delagoa bay the rainy season is from September to March, or April; none in the winter; *see* Table, p. 593. The Gaza country between High Transvaal and Matabele Kafir land is rainless.

From the Limpopo to the Zambesi the rainy season is from November to April. The valley of the Zambesi is reached by the lesser rains late in October, when the sun is passing south; these diminish in December, and are heaviest from January to the end of March or middle of April, when the sun is passing northward again; the river soon begins to fall and is then most unhealthy. Near Ibo, however, the most unhealthy time is said to be from January to March, during the heavy rains.

At Mozambique harbour the rainy season is from November to March, or later; between Mozambique and lake Nyasa from November to May.

CAPE DELGADO TO RAS ASÍR.—The climate has a bad reputation, but although there is undoubtedly much of a severe and sometimes fatal type of fever, its ordinary virulence and effects have been somewhat exaggerated. Europeans should, if possible, avoid being on shore at night until they are acclimatized, and especially so when they are in the vicinity of rivers.

The worst season for white people is from February to May, but the blacks seem to suffer more in July and August.

July, August, and September are the coolest months, the thermometer on board ship ranging by day from 77° to 81°, and by night it occasionally falls to 73°. During January, February, and March, the hottest months, the day range is from 83° to 90°, and at night the temperature falls below 80°.

The Masika, or heavy rains, is ushered in by the south-west monsoon, with squalls, about the end of March, and last until the end of May; the Mcho are occasional showers which fall through a month or six weeks in June and July; the Vuli, or lesser rains, continue for three or four weeks from the latter part of September nearly through October. The yearly amount, perhaps, averages 150 inches, but the quantity, as well as the seasons are exceedingly irregular.

On the coast about Mombasa, the seasons are remarkably regular, the heavy rains are from end of March through June; after a pause, followed by the Mcho in July; August and September are dry; in October and November the lesser rains fall; then the dry season comes, November to April, when the sun blazes furiously, calling up a deadly haze, giving the country a dreary aspect, but after the first fall of the Masika all is life again. See Weather Table, p. 599.

At the equator, near the coast, the lesser rains fail altogether, but the sky at that time is often heavily clouded. In March west winds begin to blow, and land and sea breezes alternate, the south-west monsoon then sets in with heavy squalls and rain. The climate at Brawa and neighbourhood is reported to be healthy. From the equator to Ras Asir the rainy season is the same, from end of March to the end of June, and to July in the interior. The remaining months are dry, and the Juba river sinks rapidly towards the end of September. From Ras Asir, westward, rain also falls from November to February.

CURRENTS.

GENERAL REMARKS.—The currents on the south and east coasts of Africa are formed by the great trade drift of the South Indian ocean, which, advancing westward, and meeting with resistance from the island of Madagascar, begins to split near the islands of Mauritius and Bourbon; one portion passes northward of Madagascar and strikes the African coast near and northward of cape Delgado, between lat. 11° and 10° S., depending on the monsoon, being at its northern limit during the north-east monsoon period; here it again splits, one portion flowing southward through the Mozambique channel along the coast, past cape Corrientes and on to Natal. The southern portion of the main drift passes southward of Mauritius, thence southward of Madagascar and direct for Natal, uniting with the stream from the Mozambique, the two together forming the great Agulhas current.

The northern branch of the current, which divides near cape Delgado, flows northward past Zanzibar, and thence to Ras Asir during the south-west monsoon; during the north-east monsoon it is deflected from the land to the eastward before reaching the equator. The main currents will now be described in detail. The currents which prevail off the various ports are mentioned with the description of the ports.

THE AGULHAS CURRENT is formed by the two streams meeting, as before mentioned, north-eastward of Natal, in about lat. $28^{\circ} 30'$ S., long. 35° E.; these form an enormous body of warm water, which runs to the south-west and westward, skirting the coast of Africa at from 3 to about 120 miles off, and attaining considerable velocity between port Natal and the meridian of about 23° E., at times running from 3 to $4\frac{1}{2}$ miles an hour, its greatest strength being near the edge of the bank.

The current in its progress to the south-west becomes weaker, and on reaching the Agulhas bank, does not, as a rule, run over the bank, but follows its contour or edge with a tendency to branch off, and in long. about 22° E., the main body is deflected to the southward as far as the parallel of 40° S., whence a large part, being opposed by the north-easterly set from the Antarctic, recurves to the eastward, thus flowing back into the Indian ocean, but with diminished strength and temperature.

It has generally been considered that in the summer season (January–March) the Agulhas current attains its maximum strength and volume, and in the winter season (July–September) that it diminishes in force and extent, but from recent investigations it is considered that the current does not vary much in strength and direction throughout the year. The velocity of the current is said to be checked at times by westerly gales, and to run with increased strength afterwards, but it usually runs in the teeth of the gale, causing a dangerous high sea, especially near the south-east edge of the bank.

A small portion of the Agulhas current passes round and over the southern part of Agulhas bank, and branching off to the north-west, past the Cape of Good Hope, is joined by the connecting current of the South Atlantic ocean, collectively forming a wide stream running northward along the coast, at the rate of one or $1\frac{1}{2}$ miles an hour, with a tendency towards the coast at times, which must be guarded against. This warm water seldom reaches into Table bay, the water there being much colder than Simons bay. The sea temperature in the latter is from 62° to 64° in November; this warm water during long north-west gales is occasionally driven out and replaced by water from the South Atlantic, at a temperature of about 50° , with a counter easterly set. At such times the northern branch of the Agulhas is probably deflected to the southward with the main portion of the current.

The range of sea temperature near the land is greatest in January and February, reaching 20° . In August, September, and October the range is less than 15° . The area in which the range amount to 15° is greatest in April. Off Natal the average temperature is 73° , and off the south-east edge of Agulhas bank 67° . In the neighbourhood of 40° S., where the warm and cold currents meet, the 20° range of temperature exists throughout the year. It is rather larger in the winter and spring than in the summer and autumn months.*

* See the Admiralty Wind and Current charts, with Temperature charts.

Caution.—Inner edge of the Agulhas.—Although the southern edge of the Agulhas current has a tendency to set from the land, the northern edge on the contrary has a tendency to set towards the land, more especially to the westward of Algoa bay, where during and after south-east, westerly, and north-westerly gales, the current is at times deflected from its general course and turned directly towards the land, causing a very dangerous element in the navigation of the south-east coast of Africa, if disregarded and not allowed for.

From this cause a large number of valuable vessels have been wrecked, more especially between Algoa bay and cape Agulhas, and the necessity of guarding against these insidious dangers cannot be too strongly impressed on those in charge of vessels proceeding along this coast. *See* Inshore counter current, mentioned below, also p. 88.

Agulhas Counter Current.—The remarkable recurving of the main body of the Agulhas current is due to the action of a polar or cold water current flowing from the south-west; the junction of the hot and cold waters of the two streams notably taking place off the Agulhas bank, giving rise to the confused sea, the irregular set of the currents, and by their effect on the atmosphere to those severe and fitful gales so well known to seamen rounding the Cape of Good Hope. The meeting of these currents is frequently denoted by a broken, confused, and heaped up sea, the warm current is also indicated by a marked change in the colour of the water, which, combined with the agitation of the sea, frequently conveys the impression that the vessel is in soundings.

The large body of water deflected and turned to the eastward runs chiefly between the parallels of 37° and 40° S., and though its strength is variable its average rate may be about $1\frac{1}{2}$ miles an hour. It is rather stronger and more northerly in the summer than in the winter, owing probably in some degree to the melting of the ice in high southern latitudes, and to the smaller amount of westerly winds experienced to the northward of 40° S. in summer. It becomes more extensive than the Agulhas current and to the eastward of the meridian of 28° E., it is traced northward to about latitude 36° S. A current of 3 miles an hour has been experienced in latitude 39° S.

Inshore Counter Current.—Near the land, between the capes Hangklip and Agulhas, the current occasionally sets in an E.S.E. direction, or dangerously towards the land, at a rate of over

one mile an hour; many vessels have been lost here by not allowing for this possible set and thus keeping a sufficient offing.

Between cape Agulhas and Kowieriver (longitude 27° E.), an inshore current setting eastward at about the same rate is also frequently experienced in fine weather, and except off the mouths of the rivers, it follows the trend of the land, and is said to extend from one to 6 miles off-shore. *See* caution on pages 32 and 88.

MOZAMBIQUE CHANNEL.—As previously stated (page 30), the northern branch of the Indian ocean trade-drift splits in the neighbourhood of cape Delgado, about latitude 11° S.; ranging as far north as 10° S. during the north-east monsoon period. The portion of this branch which turns to the southward along the Mozambique coast, averages 2 miles an hour, increasing at times during the strength of the northerly monsoon to 3 to 4 miles, and decreasing during the southerly monsoon period to about one to 2 miles, and at times during its strength to nothing. This main stream lies between the coast reefs and a distance of 50 to 80 miles from the land, beyond which a counter or variable current will generally be experienced. Off Mozambique the current has been known to set S.E. by E. 4 miles an hour, and 60 miles to the southward N.N.W. and W.N.W., from one to $2\frac{1}{2}$ miles, and as before stated, at times it is nil; so that repeated observations for position are necessary as well as a careful estimation for the strength of the current likely caused by the prevailing monsoon. Between the Comoro islands and the outer edge of the southerly coast current, and thence southward until past the narrow part of the Mozambique channel, there is no dependence to be placed on the direction or force of the current—it may run 3 miles an hour one way, and at times as much another.

In the vicinity of the Comoro islands the current generally runs to the westward, but a little to the southward of the islands there is frequently a counter current setting to the eastward. Northward of the Comoro islands a north-westerly current of one of $1\frac{1}{2}$ miles an hour is generally found.

The current apparently sets north-westward from the south extreme of Madagascar, between the months of May and August (the strength of the southerly monsoon) as far west as 40° E., up past Europa island and northward along the African coast, but it is not to be depended on.

In the middle of Mozambique channel, southward of lat. 18° S., there is more often a northerly than a southerly current, the wind being generally from the southward. In the vicinity of Europa

island, in November, it has been found setting north-westward from 2 to $2\frac{1}{2}$ miles an hour, causing strong tide rips. As the rate and direction of these currents may not be the same for two consecutive days, frequent observations for the vessel's position are imperative, especially when in the vicinity of Europa island where the current is very variable.

The current setting westward, north of Madagascar, averages 2 miles an hour, not unfrequently 3 miles, but this strength does not extend more than 50 miles northward of cape Amber.

Near the north-west coast of Madagascar there is generally a north-easterly counter-set of about one mile an hour, but more in the offing the current is not to be depended on, especially during the northerly monsoons period. Off Cape St. Andrew the current often sets strongly to the westward.*

Between Innambán and Sofala, on the African coast, there is often a counter current for a considerable distance off-shore, especially towards Sofala ; in May, a rate of 35 miles a day has been recorded.

EAST AFRICA COAST CURRENT.—The velocity of the northern portion of the northern branch of the Indian ocean trade drift, which splits near cape Delgado, is much influenced by the monsoons ; its average rate may be taken at 2 miles an hour, but during the south-west monsoon it runs past Mafia, Latham, Zanzibar, and Pemba islands and channels at from 2 to 4 miles an hour, and in the north-east monsoon from one to 2 miles an hour, as far as about lat. 2° S.

During the south-west monsoon period the whole mass of water continues north-eastward along the coast, across the equator, on to Ras Asír and Sokótra, at the rate of from 36 to 100 miles a day ; the greater rate has been experienced on the equator near the coast, and also near Raś Hafún and Ras Asír during the strength of the monsoon. The current becomes weaker as the distance from the shore is increased ; on the equator, in from 48° to 52° E., or about 300 miles from the land, there appears to be little or no current.

Also, the northerly current has been found and lost at about 100 miles eastward of Zanzibar ; in the early part of August, it was found setting but little to the northward of West, *true*, and continued so with little variation at the rate of one to 2 miles an hour until

* The currents on the coasts of Madagascar will be found more fully described in the Sailing Directions for Islands in the Southern Indian Ocean, &c. ; see also Monthly Current charts of the Indian ocean.

to the northward of lat. 6° S., in long. 49° E., from whence to the Seychelles to the northward of that parallel an easterly set of about three-quarters of a mile an hour was experienced.

Southward of Sokótra, at a distance of about 150 miles, is a great whirl of current, caused possibly by the interposition of the island; or, it may be, that shoaler water exists at this spot; it commences about the parallel of Ras Hafún, when the current strikes off to the eastward to the 55th meridian, then to the southward, to the 6th parallel, whence it again curves to the north-eastward, through west, forming a complete whirl. At the northern limit the velocity is about 4 miles per hour, while at its southern extreme it is only about one mile per hour. A very heavy confused sea is created by this whirl. Care should be taken to avoid the strongest portion of the current in making the coast of Africa from the eastward, by keeping well to the southward.

Although the strength of this current along the coast may be less near the close of the south-west monsoon, and at other periods capricious, yet it is occasionally felt strong as far as the parallel of 4° N. up to the first week in December; but as the time of the change of monsoon varies, so at other periods the current may set to the southward a month or more earlier, and thus no dependence can be placed on the exact time of change.

During the north-east monsoon period, this northerly set from cape Delgado meets the southerly set from the Arabian sea and Sokótra, between Lamu and Castle point (lat. $1\frac{1}{2}^{\circ}$ to $2\frac{1}{2}^{\circ}$ S.), the two producing an off-set from the land. In the offing the southerly set continues, gradually curving to the eastward, and forming the easterly set to the Seychelles in the track of the north-west monsoon.

The meeting, however, of the two currents in the vicinity of Castle point (as at cape Delgado) must be accepted with considerable limitation, as it probably varies with the season, extending southward according to the strength of the north-east monsoon, the full force of which is between December and March.

During the month of February 1891, the southerly set of the current along the coast was experienced by several vessels, considerably southward of Lamu. The north-east monsoon was unusually strong.

Although the current in the Arabian sea sets to the south-west from about the middle of October, it does not reach Mogdishu, on the

African coast, until about the second week in December; it is said to begin to run off that place almost invariably with bad weather from the north-east; at a distance from the land it sets to the south-west a month earlier. It is also stated that the south-westerly current does not continue for a longer period than about three months, its strength generally being from one to 2 knots an hour.

PASSAGES FROM THE CAPE OF GOOD HOPE TO AND FROM PORTS IN EAST AFRICA AND INDIA.

GENERAL REMARKS.—There is little difficulty in passing eastward round the Cape of Good Hope at any period of the year, though a greater proportion of gales will be met with in the winter season (April to September).

From the South Atlantic, or from the Cape, vessels are recommended to cross the meridian of 20° E., in from lat. 39° to 40° S. Vessels may make quicker passages by going farther south (lat. 42° to 44° , especially from November to March), but better weather will, as a rule, be found on or about the parallel recommended. Should a south-easterly wind be blowing on leaving Table or Simons bays, stand boldly to the south-westward until the westerlies are reached, or the wind changes to a more favourable direction. In all cases where vessels are making for the 40th parallel south of the Cape, they should steer nothing eastward of South, so as to avoid the area to the south-east of the tail of Agulhas bank, where gales and heavy cross seas prevail. See page 18. The amount of easting required to be made depends on the prevailing monsoon in the Indian ocean, for which, see the passage required.

From October to April easterly winds prevail as far south as the tail of Agulhas bank (about 37° S.), with variable winds, principally westerly, beyond it. In the months of May and September, at the tail of the bank, easterly and westerly winds are in equal proportion, but between these months westerly winds prevail, extending sometimes close into the coast.

June to August, inclusive, are therefore the worst months, and January and February the best months for proceeding westward round the Cape. It should be borne in mind that there is much less sea on the Agulhas bank, in from 60 to 70 fathoms or less, during heavy gales, than there is near its edge and southward of it. If it be found necessary to heave to, the port tack should be chosen, as (with the exception of south-east gales beginning

with south-east winds) the shift of wind is almost invariably against the hands of a watch, and the vessel will come up to the sea. *See* page 19, on south-east gales.

Caution.—Mariners should remember that off all parts of the south coast of Africa, and especially off salient points, sunken wrecks or uncharted dangers may exist close to the coast; and that it is not advisable to approach this surf-beaten shore, even in full-powered steam-vessels, within 3 or 4 miles. Sailing vessels should give cape Agulhas a berth of 7 or 8 miles. When a strong adverse current prevails the temptation to approach the shore is great, but west of Algoa bay there is nothing to be gained by so doing, while a risk is run (in case of a breakdown in the machinery or any temporary error in the course) of total wreck before any efforts can be made to avoid such a catastrophe.

OUTWARD (EASTWARD) ROUTES.—FULL-POWERED STEAM VESSELS.*

Mail steamers and similar full-powered steam vessels leaving the Cape for ports in the Cape Colony or east coast of Africa, take the direct route in-shore, thus avoiding the strength of the Agulhas current, and being sometimes assisted by a counter current, extending from one to 6 miles off-shore, particularly between cape Agulhas and Kowie river; also between Natal and cape St. Lucia, and Kosi river and Delagoa bay, there is, as a rule, no current within 3 miles of the shore. The dangerous set eastward, towards the land, sometimes experienced between capes Hangklip and Agulhas, and also the dangerous set of the northern edge of the Agulhas current, north-westward towards the land, during and after gales, in the vicinity and westward of Algoa bay, must be particularly guarded against. (*See* Caution above). From Algoa bay, if not wishing to hug the shore, a vessel might push 100 miles to the eastward, where the current is weak, thence parallel to the shore until abreast Natal, if bound there. Also north-eastward of Natal, if not desirous of hugging the shore, a vessel might push eastward nearly to the meridian of Europa island, whence probably she will meet with a favourable current and a southerly wind, carrying her past that island, and to the Comoro islands, eastward of the Mozambique current. On account of the uncertain set of the currents in the Mozambique

* *See* Admiralty chart of the World, No. 1,077, showing the tracks followed by full-powered steam vessels, and "Ocean Passages," 1896."

channel, frequent observations for ascertaining the position of the vessel are imperative. Northward of cape Delgado the current is favourable near the coast.

Zanzibar to Aden, during north-east monsoon, the coast should be avoided northward of 2° S., on account of the strong adverse current. Mail steamers steer E.N.E. until about 120 miles from the land, then parallel to it until in lat. 6° N., thence to Ras Asír.

VESSELS WITH SAIL AND AUXILIARY STEAM POWER.*

CAPE to NATAL.—From April to October, inclusive, the prevailing winds are westerly, when all classes of steam vessels may make the passage near the coast, being sometimes favoured by a countercurrent; but guarding against in-draught, as before mentioned, at page 32. *See* caution, p. 37.

From October to April, when the prevailing winds near the coast are easterly, vessels must first make southing from the Cape, crossing the meridian of 20° E. in from 39° to 40° S., depending on the parallel on which a steady fair wind is picked up (in January the permanent westerly winds are not usually northward of 40° S.); thence eastward, crossing the meridian of 30° E. in about 39° S., and the meridian of 36° E. in 36° S., from whence, if the vessel will head N.E. by N with steam and sail, she may do so, striking the parallel of Natal in about 34° E.; thence westward to Natal, making ample allowance for crossing the Agulhas current, which will be found setting south-westward from $1\frac{1}{2}$ to 3 miles an hour. If the vessel will not head N.E. by N. from the position mentioned, more easting should be made before turning towards the port.

CAPE to MOZAMBIQUE and ZANZIBAR.—April to October.—Along the coast as far as Natal, and beyond if the winds remain favourable. Moderate-powered vessels might get up in-shore in the same way as those of full-power, but those under consideration, when they meet with adverse north-easterly winds, and are making but little progress in-shore, should stand away south-eastward, endeavouring to cross lat. 30° S. (the parallel of Natal) in about 42° E.; here they will probably be within the influence of the south-east trade winds; thence the course is nearly due North,

* *See* Admiralty Chart of the World, showing tracks followed by vessels with sail and auxiliary steam power, No. 1,078, and "Ocean Passages," 1896.

with a favourable wind, preserving the long. 42° E., passing between Europa island and the coast of Madagascar, and close westward of Juan de Nova. If bound to Mozambique, it may be steered for when abreast, bearing in mind the strong southerly set, which may be experienced when nearing the land, of from 2 to 4 miles an hour. If bound to Zanzibar, continue on from St. Juan de Nova, passing close westward of Great Comoro, thence direct to Zanzibar, sighting Mafia island to ensure a correct land-fall. Northward of cape Delgado the current will be favourable, and at the rate of 2 to 4 miles per hour. See page 425 for approaching Zanzibar channel.

October to April.—From the Cape, same route as for Natal as far as lat. 36° S., long. 36° E.; thence continue north-eastward, crossing the parallel of 30° S. in about 42° E.; here the vessel will probably meet with the south-east trade, and can then proceed as in the months of May to September, keeping in about long. 42° E., and passing close westward of Juan de Nova. If bound to Mozambique, make the land northward of it, as both wind and current will tend to set the vessel southward on nearing the coast.

If bound to Zanzibar, pass close westward of Great Comoro island; a favourable current will be experienced when northward of cape Delgado, and the fore and aft sails will probably stand. See also page 425.

An alternative route to the Comoro island and Zanzibar, and perhaps a quicker one for a small-powered vessel, is that eastward of Madagascar. Easting should be made in from lat. 39° to 40° S. from off the Cape, to about long. 45° E., thence north-eastward, crossing lat. 30° S. in long. 53° E., thence due North with south-east trade, passing midway between Madagascar and Réunion, thence to sight the north extreme of Madagascar, when the wind and current will be favourable to Comoro and Zanzibar.

CAPE to MAURITIUS.—The route is nearly the same all the year round; make southing from the Cape, cross the meridian of 20° E. in from 39° to 40° S., thence making easting to 50° E., thence north-eastward, crossing the parallel of 30° S. in about 59° E., thence direct to Mauritius with the south-east trade wind.

CAPE to BOMBAY.—April to October.—If bound to Bombay, proceed as for Mozambique; thence the course may be

set direct from the Comoro islands, crossing the equator in 53° E. But considerable advantage would be derived by following the strength of the current northward from Delgado to the equator, crossing it in about 45° E., then parallel to the coast to 4° or 5° N.; thence direct to Bombay, keeping well southward of the heavy sea caused by the whirling current southward of Sokótra, which sometimes extends down to lat. 6° N.

Or the route to Mauritius may be taken, as above, thence westward of Saya da Malha bank, across the equator in 62° E., thence direct to Bombay.

A route midway between these two may also be taken, passing close eastward of the north end of Madagascar.

October to April.—Make southing from the Cape, crossing 20° E. in from 39° to 40° S., keeping between these parallels as far as long. 60° E., thence north-eastward, crossing lat. 30° S. in long. 70° E., and 10° S. in 72° E., passing close eastward of Diego Garcia, and crossing the equator in from 76° to 78° E., thence along the west coast of Hindustán to Bombay. *See* West coast of Hindustán pilot.

CAPE to CALCUTTA.—April to October.—Make southing from the Cape, to 39° or 40° S., thence between these parallels to about 62° E., thence north-eastward, crossing the meridian of 80° E. in 26° S., and 82° E., in 20° S., thence across the equator in about 82° E., skirting Ceylon, thence to Calcutta. *See* Bay of Bengal pilot.

October to April.—Making southing from the Cape, to 39° or 40° S., thence eastward between these parallels as far as St. Paul's, or to about 80° E., thence north-eastwards, keeping in long. 88° E., between the parallels of 30° to 10° S.; thence north-eastward, crossing the equator in 93° to 95° E., thence eastward or westward of the Nicobar and Andaman islands to Calcutta. A vessel will be in a much better position for getting up the bay of Bengal, if, when approaching Acheh head, the wind admits of her passing within 100 miles of it, thence to windward of the islands mentioned.

CAPE to SUNDA STRAIT.—April to October.—Eastward as for Calcutta, in opposite season, to St. Paul's, or to about 80° E., thence to lat. 30° S., long. 100° E., and 20° S. in 105° E., passing close westward of Christmas island with the easterly monsoon, to Java head. *See* China Sea Directory, vol. I.

October to April.—Eastward to St. Paul's as before, thence north-eastward, crossing lat. 30° S. in long. 95° E., 20° S. in 100° E., and 8° S. in 102° E., thence eastward with the westerly monsoon to Sunda strait. If contrary winds are met with after passing St. Paul's, a vessel may steer at once to the northward, into the westerly monsoon, which monsoon will carry her direct to Sunda.

CAPE to AUSTRALIA.—Make southing from the Cape, crossing the meridian of 20° E. in from 39° to 40° S., at all times of the year, and continue on or about that parallel to the eastward. *See Australia Directory, Vol. I.*

CAPE to KERGUELEN, same route as to Australia, but shaping direct course for Bligh's cape, near north extreme of Kerguelen island, from about long. 45° E.

CAPE to CROZETS or PRINCE EDWARD ISLANDS.—Same route as for Australia, but shaping direct course from lat. 40° S., long. 20° E.

NATAL to MAURITIUS.—The route is about the same at all seasons, standing south-eastward from Natal, making a circular track to about 35° S., and again reaching the parallel of Natal in about the meridian of Mauritius, lat. 30° S., long. 58° to 59° E., thence direct in the south-east trade.

MOZAMBIQUE to MAURITIUS.—**April to October.**—The route is southward from Mozambique, near the land, keeping in the strength of the Mozambique current as far as cape Corrientes, or beyond, into the south-west winds, thence make the best way eastward in about the parallel of 30° S., to the meridian of Mauritius, thence direct in the south-east trade.

October to April.—The route is northward from Mozambique, passing close westward of Great Comoro and Aldabra islands, thence making the best way eastward, passing round the Saya da Malha bank, then direct to Mauritius in the south-east trade. The current is about one mile an hour adverse to Saya da Malha bank. The southern route, before mentioned, may also be taken at this season.

ZANZIBAR to MAURITIUS.—**April to October.**—From Zanzibar the route is midway between the Seychelles and the equator, in the south-west monsoon, crossing the meridian of 60° E.

in about 3° S., thence steaming south-eastward into the south-east trade to about lat. 5° S., long. 63° E., whence passing eastward of Saya da Malha bank, Mauritius will be fetched on the port tack. *See* passage to Seychelles, below.

October to April.—Eastward from Zanzibar with north-east and north-west monsoons to Saya da Malha bank, passing north-eastward of it, thence steaming southward into the south-east trade, thence direct to Mauritius on the port tack.

ZANZIBAR to SEYCHELLES.—April to October.—The quickest way is to steam a direct course, taking advantage of any slight shift of wind to assist with fore and aft sails. During the early part of August, when the south-east trade blows strongest and reaches the African coast, and the current is running strong to the northward, the passage is somewhat tedious. A small powered vessel might stand off on the starboard tack (as for Mauritius); should she reach north of the equator, she will, when eastward of the Seychelles have no difficulty in fetching the islands, owing to the favourable current which may be relied on as far south as lat. 4° S., and at times even 6° S.

October to April.—Same route as to Aden, *see* page 44.

ZANZIBAR to ADEN.—April to October.—In this, the south-west monsoon period, all vessels take the direct route, passing through Pemba channel and keeping near the African coast the whole way to Ras Asír, to get the full benefit of the northerly current which runs with a velocity of 60 to 100 miles per day.

Precautions necessary in rounding Ras Asír.—As many large and valuable vessels have from time to time been wrecked with loss of life on the coast to the southward of Ras Asír (cape Guardafui), the seaman should use the utmost caution when bound round this headland from the south or south-eastward, during the south-west monsoon, when the weather is stormy, accompanied by a heavy sea and strong current, and the land is generally obscured by a thick haze.

The similarity between the outlines of the headlands of Ras Jard Hafún and Ras Asír is a fertile source of disaster. Ras Jard Hafún is much the higher (2,900 feet), Ras Asír being about 780 feet, and separated from Ras Jard Hafún by a broad sandy plain of little height compared with the two headlands that bound it. In hazy

weather at night the steep fall of Jard Hafún is dimly seen from the deck of a vessel, and when this bears southward of West, if Ras Asír is not sighted, as is often the case from the haze being thicker in the lower strata, and also from the light colour of the hill rendering it difficult to discern, the navigator fancies he has rounded it already, and steers to the westward into the low bay of Wadi Tuhom. Clouds and haze often hang about the lower part of this coast, and when this occurs the high plateau behind Ras Jard Hafún will generally be the only land visible above them.*

During day-time, a gradual change will probably be seen in the colour of the water from blue to dark green. Attention should also be paid to the alteration in the direction of the swell caused by the promontory of Ras Hafún; the water gets smoother and the swell alters its direction to the eastward of south, when the meridian of that cape is passed.

It has been stated that the temperature of the sea surface decreases considerably as the coast between Ras Hafún and Ras Asír is approached, a sudden rise to a temperature of about 80° taking place only to the northward of Ras Asír, and that this rise in temperature can be safely taken as an indication that the latter is passed, and that the vessel's course can be shaped westward with confidence.

An examination by the Metecrological Office of a large number of observations on temperature show that this is not the case. While it is true that the temperature of the sea north of Ras Asír is invariably high, the temperature to the southward, and especially off Ras Jard Hafún, is not invariably low, and any action founded on the thermometer would, therefore, be most dangerous.

To ensure safety, when the land cannot be clearly seen and recognized, especially at night, the lead, and the lead alone, can be relied on.

As the bank of soundings extends from 10 to 12 miles from the coast, the deep-sea lead should be frequently used, and the vessel's course altered to N. by E. or N. by E. $\frac{1}{2}$ E., or if necessary more to the eastward, immediately soundings are struck, or the land sighted in dark or hazy weather. By steering to the northward as above, and by not standing into less than 35 fathoms water, the vessel's safety will be ensured, and as the water rapidly deepens northward of the parallel

* A full description of the land about Ras Asír will be found at pages 557, 558. From 1876-1882, seven vessels were wrecked and three stranded in the neighbourhood of Ras Asír; in August 1885 the steamer *Dalmatia* was wrecked 15 miles southward of it (5 miles southward of Ras Jard Hafún). See Chart, No. 1,078.

of the cape, the 100-fathoms line of soundings being only $2\frac{1}{2}$ miles from it, there will be no difficulty as to the time when the course should be altered to the westward.

Westward of Ras Asír, the African coast should be kept aboard as far as Burnt island ; thence direct to Aden. *See* Red sea and gulf of Aden Pilot.

October to April.—From Zanzibar to Aden or Seychelles, small-powered steam vessels may proceed through Pemba channel to take advantage of the favourable northerly current, as far as about lat. 3° S., or near Lamu, whence she may gradually steal towards the equator, and on to the Seychelles on the port tack. From Seychelles, the westerly monsoon will take her, with a leading wind, to the equator, which should be crossed in about long. 61° E., thence steaming to the northward, the wind will gradually haul through north to N.E., enabling the vessel with steam and sail, from lat. about 6° N., to fetch Ras Asír, thence with a fair wind to Aden.

ZANZIBAR to BOMBAY.—April to October.—Northward through Pemba channel, when course may be shaped direct ; but advantage may be taken of the strong coast current as far as lat. 4° or 5° N., thence direct to Bombay, keeping well southward of the heavy sea caused by the whirling current southward of Sokótra, which sometimes extends down to 6° N.

October to April.—As for Aden, above, to abreast the Seychelles, passing on either side ; thence with the westerly monsoon, in about the parallel of 5° S., to long. 70° E. ; from thence, north-eastward across the equator in 76° to 78° E., and northward up the west coast of Hindustán to Bombay. *See* West Coast of Hindustán Pilot.

ZANZIBAR to CALCUTTA.—April to October.—Course is direct, passing either southward of the Maldives or through the One and a-half degree channel, past Ceylon, and up the west side of the bay of Bengal.

October to April.—Northward through Pemba channel, to lat. 3° S., or near Lamu, as for Aden, above, thence on the port tack to Seychelles ; thence, with the westerly monsoon ; the parallel of 5° S. should be kept, until in long. 90° E., crossing the equator in 92° to 94° E., thence to Calcutta.

PASSAGES FROM THE PORTS IN EAST AFRICA AND INDIA TO THE CAPE OF GOOD HOPE.—HOMEWARD (WESTWARD) ROUTES.

FULL-POWERED STEAM VESSELS.*

ZANZIBAR, MOZAMBIQUE, or other East African ports, to the Cape of Good Hope.—Full-powered steam vessels take the direct route alongshore at all seasons of the year. From near cape Delgado, or from lat. 10° to 11° S., the coast current is favourable for the whole distance to the Cape, from one to 3 miles per hour; near Natal at times it amounts to 4 miles per hour. Between Algoa bay and Mossel bay the strength of the current lies from 50 to 100 miles off-shore. June to August are the worst months for passing westward round the Cape of Good Hope. *See* caution in general remarks, page 37.

CALCUTTA and SUNDA STRAIT, to the CAPE.—The full-powered steam vessel route is direct to Mauritius, thence about 100 miles southward of Madagascar, making the African coast about 200 miles southward of Natal; thence along shore. *See* preceding paragraph.

BOMBAY to the CAPE.—The route is direct for Mozambique, thence down the African coast with the Mozambique and Agulhas current, as above. During the height of the south-west monsoon, on leaving Bombay, a S.S.W. course should be taken to about 9° N., where the wind becomes lighter and the water smoother, thence across the equator in about 57° E., close westward of the Seychelles to Mozambique, &c.

ADEN to ZANZIBAR.—During the strength of the south-west monsoon, the British India mail steamers make the passage, with the assistance of fore and aft sails. From Ras Asír, they keep nearly close hauled on the starboard tack to about the meridian of 54° E., thence making due South to about 2° N., from whence they fetch Lamu, on the port tack. This route avoids heading the heavy sea southward of Sokótra, and also the strong north-easterly current of 3 to 4 miles an hour, probably found within 50 to 100 miles of the coast. Little or no adverse current will be found on the meridian of 54° E., southward of lat. 8° N.

* *See* chart, No. 1,077.

Bound to Zanzibar, continue the due South course as far as the equator, crossing it in long. 54° E., thence on the port tack; the distance may be shortened under favourable circumstances of wind and weather by crossing the equator farther west.

VESSELS WITH SAIL AND AUXILIARY STEAM POWER.*

EAST AFRICAN PORTS to the CAPE.—As for full-powered steam vessels, p. 45.

CALCUTTA to ZANZIBAR.—April to October.—Due South from Calcutta, crossing the equator in about long. 90° E., thence south-westward across the doldrum space to pick up the south-east trade, to probably 5° or 6° S., thence *viâ* Diego Garcia and the Seychelles with the south-east trade wind to Zanzibar.

During the height of the south-west monsoon, it might be advisable (as in a sailing vessel) to pass eastward of the Andamans and Nicobars, thence westward of Acheh head; the equator will scarcely be crossed westward of long. 95° E., but when well in the south-east trade, steer to the westward past Diego Garcia and Seychelles to Zanzibar.

October to April, the route is direct.

BOMBAY and SEYCHELLES to ZANZIBAR.—April to October.—Stand on the starboard tack with fore and aft sails, about S.S.W. from Bombay; the monsoon will abate and the sea become smoother in about 9° N.; whence stand away free across the equator, crossing in about long. 70° E., or more westward if the wind permits, thence southward across the narrow doldrum space to about lat. 3° S., whence the south-east trade will carry the vessel to Seychelles or Zanzibar, making due allowance for the strong northerly current when approaching the latter island. In May, before the south-west monsoon has set in at Bombay, a vessel will proceed direct until the monsoon is met with, thence on the starboard tack into the south-east trade as before stated. During the height of the south-west monsoon, it is advisable to run down the coast from Bombay, eastward of the Maldivé and Laccadive groups, thence across the doldrums and proceeding as before.

October to April.—From Bombay and Seychelles the route to Zanzibar is direct.

* See chart, No. 1,078.

ADEN to ZANZIBAR.—April to October.—Having passed northward of Sokótra, stand away to the south-eastward, crossing the equator in from 70° to 72° E., thence as from Bombay, p. 46.

October to April.—From Aden, the route is round Ras Asír, thence direct to Zanzibar.

MAURITIUS to ZANZIBAR.—The route is direct at all seasons of the year, passing near the north end of Madagascar, and entering Zanzibar channel from the southward, taking care to make the land about the north point of Mafia to allow for the strong but variable northerly current.

MAURITIUS to MOZAMBIQUE.—The route is direct at all seasons of the year, passing near the north end of Madagascar, guarding against the strong southerly set of the current when approaching the port of Mozambique.

MAURITIUS to NATAL and the CAPE.—The route is nearly direct at all seasons of the year, with a favourable wind and current, passing about 100 miles southward of Madagascar, to Natal. In December and January it is advisable to make more southing when leaving Mauritius, as westerly winds are occasionally found at that time between it and Madagascar, but those are not frequent. If not bound to Natal, the African coast might be made about 200 miles southward of it, thence, in the summer season, keeping in the strength of the Agulhas current, passing about 50 miles off Algoa bay, 100 miles off Mossel bay, and sighting Cape Agulhas light before shaping course for the Cape of Good Hope. In the winter, when strong westerly winds prevail, keep within 40 or 50 miles of the shore westward of Algoa bay, where the sea will be smoother.

KERGUELEN to the CAPE.—From Kerguelen the route is northward going free on the port tack with the prevailing westerly wind into the south-east trade to about 25° S., thence to the westward, passing about 100 miles southward of Madagascar, and making the coast of Africa about 200 miles southward of Natal, proceeding as just before mentioned,

CROZETS and PRINCE EDWARD ISLANDS to the CAPE.—Stand northward as from Kerguelen, thence to the African coast.

SUNDA STRAIT to the CAPE.—May to October, direct, passing southward of Rodriguez, and about 100 miles southward of Madagascar, and making the African coast as from Mauritius, page 47.

October to April.—From Sunda strait on the starboard tack, with the westerly monsoon, passing westward of Christmas island into the south-east trade; thence direct for Madagascar, thence as from Mauritius, page 47. It must not be forgotten that this is the cyclone season, when the barometer and weather signs should be carefully noted.

TORRES STRAITS to the CAPE.—May to October, the route is southward of Keeling islands, and crossing the meridian of 80° E. in lat. 18° S.; thence passing 100 miles south of Madagascar, as from Mauritius, page 47.

SOUTH AUSTRALIA to the CAPE.—December to March, from Cape Leeuwin, the course is north-westward to lat. 20° S., long. 80° E., thence to about 100 miles southward of Madagascar, as from Sunda strait and Mauritius.

This is the route at all times of the year from West Australia.

CALCUTTA to the CAPE.—April to October.—Southward from Calcutta, crossing the equator in 90° E., thence direct to Rodriguez, and passing southward of Madagascar as from Mauritius, page 47.

October to April, eastward of Ceylon and Diego Garcia, thence direct to Mauritius and southward of Madagascar as from Mauritius, page 47.

BOMBAY to MAURITIUS and on to the CAPE.—April to October.—Down the coast, eastward of Maldive islands, crossing the equator in 75° E., thence direct to Mauritius, or 100 miles to windward if not calling there; thence 100 miles southward of Madagascar, making the African coast about 200 miles southward of Natal, thence within 40 or 50 miles of the shore near and westward of Algoa bay, where the sea will be smoother than farther off.

October to April.—From Bombay to the Cape, steer direct to and westward of Comoro islands, thence near the African coast in the strength of the Mozambique and Agulhas currents to the Cape.

The strength of the Agulhas current will be found at about 50 mile off Algoa bay and 100 off Mossel bay; it is advisable to sight Agulhas light before shaping course for the Cape. *See* caution, page 37.

From Mauritius to the Cape the route is similar to that taken in May to September, but a little southing on leaving Mauritius might be made before shaping course for south end of Madagascar.

ADEN to the CAPE.—April to October.—Having passed northward of Sokótra, stand away to the south-eastward, and cross the equator in about 72° E.; thence steaming to the southward through the doldrums and eastward of the Chagos group, whence Mauritius will be fetched on the port tack with the south-east trade; thence to the Cape as from Mauritius, page 47.

October to April.—Direct from Ras Asír, with a favourable wind and current, crossing the equator in 45° E.; thence close westward of Great Comoro and along the African coast in the Mozambique current, as from Zanzibar and Mozambique (*see* below). Little ground would be lost by making the passage *via* Zanzibar.

BOMBAY to the CAPE.—April to October.—The route is *via* Mauritius (*see* page 47).

October to April.—Direct, crossing the equator in 53° E., thence westward of Great Comoro, and down the coast with the Mozambique and Agulhas currents, as from Mozambique; *see* below.

ZANZIBAR, MOZAMBIQUE, and NATAL to the CAPE.—Both seasons.—Down the coast from Zanzibar, through Mafia channel, keeping close in shore until southward of cape Delgado, from which cape, westward of Lazarus bank, the current will be strong and favourable; although somewhat longer than the direct route, there will be less adverse winds and currents, and smoother water in the south-west monsoon period. Vessels bound to the north-west coast of Madagascar should keep the African coast as far as Mozambique port. From Mozambique to Natal and the Cape, keep in the strength of the Mozambique and Agulhas currents to Natal; thence in the summer season, in the strength of the latter current, passing about 50 miles off Algoa bay and 100 miles off Mossel bay; cape Agulhas light should be sighted, whence course may be shaped for the Cape of Good Hope.

In the winter season, keep within 40 or 50 miles of the shore of Algoa bay, and of that to the westward, where the sea will be smoother than out in the strength of the Agulhas current.

OUTWARD (EASTWARD) ROUTES.—SAILING VESSELS.*

CAPE to EAST AFRICAN PORTS.—The routes for sailing vessels from the Cape of Good Hope to East African ports are much the same as those given for vessels with sail and auxiliary steam power, but a little more easting than that recommended for those vessels might profitably be made before leaving the westerly winds. The Mozambique channel, or the passage close eastward of Madagascar, may be taken during the south-west monsoon period (April to October); but in the opposite season, only the latter passage. (*See* page 39.)

CAPE to BOMBAY.—April to October.—Vessels bound from the Cape to the west coast of Hindustán may, during the south-west monsoon period, take either of the routes mentioned at page 39, through Mozambique channel, or eastward of Madagascar, provided they are certain of reaching their port before mid-October, otherwise they should take the route for the north-east monsoon period, herein mentioned. *See* West coast of Hindustán pilot and “Ocean Passages.”

October to April.—During the north-east monsoon period, make easting from the Cape in the westerly winds to long. 65° E., cross lat. 30° S. in 75° E., lat. 10° S. in 70° E., and the equator in 80° E., thence up the coast of Hindustán.

CAPE to CALCUTTA.—April to October.—From the Cape to Calcutta, in south-west monsoon period, make easting from the Cape to long. 62° E., thence north-eastward, crossing the meridian of 80° E. in 26° S., and 82° E. in 20° S., thence across the equator in 82° E., and direct to Ceylon or Calcutta.

October to April.—During north-east monsoon, make easting to St. Paul's, or a little beyond to 80° E., thence north-eastward, keeping in long. 88° E. between the parallels of 30° to 10° S.; thence north-eastward, crossing the equator in 95° or 96° E., thence as near Acheh head as the wind permits, and eastward or westward of

See chart, No. 1,078; and “Ocean Passages,” 1896.

the Nicobar islands ; the former is to be preferred, as the vessel will have a better chance of fetching up the Bay of Bengal. *See* Bay of Bengal pilot.

HOMeward (WESTWARD) ROUTES.—The homeward routes from India, for sailing vessels, during the south-west monsoon period are similar to the routes given for the small-powered steam vessels during the height of that monsoon (*see* page 48), but the equator will probably not be crossed so far to the westward.

During the north-east monsoon the wind is fair and the homeward route is the same as for small-powered steam vessels, as before described.

CHAPTER II.

TABLE BAY TO CAPE AGULHAS.

(Between long. 18° 20' E. and 20° E.)

VARIATION IN 1897.

Table Bay and Cape Agulhas 29½° W.

The **CAPE PENINSULA** is a remarkable promontory, extending about 28 miles, north and south, and from 5 to 8 miles in breadth, with a varying height from 3,550 feet at Table mountain, and 3,200 feet at Constantia berg, to but a few feet above the sea between Fish Hook bay on the east and Chapman bay on the west; which low land, however, is only visible on certain bearings. The neck of land connecting the peninsula on its north-east side with the main, and extending from Table bay to the head of False bay, is low, and about 11 miles across.*

The Cape peninsula is rocky and barren, with a stunted growth of trees here and there; the fertile valleys, however, in the vicinity of Constantia and Wynberg are pleasing exceptions. From the westward, the peninsula appears high and rugged from Table mountain to within 4 miles of the Cape of Good Hope, where the mountain chain terminates at Paulsberg, which stands over the north extreme of Buffals bay, on the east side of the peninsula. From Paulsberg to Cape point the land is elevated and even, with the exception of two peaks at its southern extremity, which at a considerable distance make like a saddle island.

Depths westward of the Cape peninsula.—The offing westward of the Cape peninsula has not been thoroughly sounded; but from what has been done, it appears that at 4 miles from the shore there is no bottom at 40 fathoms, and off the high land north-west of Hout bay there is none at 40 fathoms 1½ miles off shore. From Hout bay to the Cape the water is less deep, the

* See the opening paragraph of Chapter I., and charts, Nos. 2,091 and 2,082.

soundings varying from 24 to 10 fathoms, rocky bottom, at from one to 2 miles off shore. At the distance of 5 miles north of the Cape, and abreast of the south Whittle western beacon, a depth of 10 fathoms, rock, was obtained at $1\frac{1}{4}$ miles off shore, and the sea breaks on this spot in bad weather. The precaution, therefore, of using the lead when approaching the Cape should never be omitted if doubt exists as to the accuracy of the vessel's position.

TABLE BAY* is an indentation on the northern side of the neck of the Cape peninsula, about 4 miles wide at its entrance between Whale rock and Green point, and affords anchorage for a large number of vessels, with fair security in the summer months, October to April. The outer harbour, approaching completion, at Cape Town, and the basin accommodation within, afford shelter for large vessels. For anchorage, *see* page 58.

Table mountain.—The bay derives its name from Table mountain, a remarkable and gigantic mass of quartzose sandstone, rising to an elevation of 3,550 feet at the south part of the bay immediately over Cape Town. The mountain, which rests on a granite base 500 feet above the sea, is level on the top, and falls nearly perpendicularly at the east end, until it joins Devil's peak, which is a rugged peaked mountain, 3,270 feet high, and separated from the former by a gap. On the east side of Table mountain and Devil's peak lies the low sandy isthmus between Table and False bays. The west end of Table mountain is also nearly perpendicular from its summit to a considerable distance, and is then united by an abrupt declivity with the base of a conical mountain called Lion's head, which is about 2,180 feet high, and is in some places so steep, that it can only be ascended by steps cut in the rock.

From the north side of the Lion's head a rounded ridge extends to the north-east, where it reaches an elevation of 1,150 feet, and is known as Lion's rump, upon which is a signal station.

Blaauwberg (Blue hill), a dark, round hill rising to an elevation of 745 feet, may be considered the northern boundary of the approach to Table bay.

Salt river.—Southward of Blaauwberg, the shore for 2 miles is composed of a number of white sand hills from 100 to 200 feet high, at which distance rocks and breakers extend one-third of a mile off shore; it then gradually curves to the south-westward for 8 miles, to the mouth of Salt river. The whole of this space is very deceptive

* *See* plan of Table bay, No. 1,920; and also on chart, No. 2,082.

to vessels standing into the bay at night or in hazy weather, from the close resemblance the sand bears to the water.

The mouth of Salt river is fordable in summer, but dangerous in winter, when it becomes an extensive quicksand. Another winter mouth of the river lies about 2 miles north-eastward; this mouth is fronted by foul ground with depths of 3 to 5 fathoms water, to the distance of three-quarters of a mile from the shore, and on which the sea breaks after heavy north-west gales; with this exception, the water shoals regularly from 8 fathoms, to the sandy beach between Blaauwberg and Salt river. From Salt river the coast sweeps to the westward and northward, fronting Cape Town, and forming Table bay anchorage.

The Tygerberg range, 1,357 feet high, and 6 miles in length, extends 5 miles in a north and south direction, within the eastern shore of Table bay. With the exception of Blaauwberg, these are the only elevations in the neighbourhood of Table bay north of Table mountain.

ROBBEN ISLAND lies about 5 miles northward of Green point, the northern extremity of the Cape peninsula, and, with its light, forms an admirable landmark for the northern approach to Table bay. It is low, flat, nearly 2 miles in length in a north-north-east and opposite direction, with a breadth of one mile. The island is fringed by reefs, which project about one cable off its western side; but rocky ground, with from 5 to 11 fathoms, extends W. by N. one mile from its western extreme, and on which the sea breaks heavily during strong on-shore winds. This rocky ground rises suddenly from depths of 25 and 30 fathoms. *See light, page 57.*

The north-east side of the island is free from danger, but the east and south shores are fronted by rocky ground, with irregular depths of 2 to 4 fathoms, and marked by seaweed to the distance of 3 to 4 cables.

Signal station.—The signal station at Robben island communicates by heliostat with Cape Town.

Landing.—There is a jetty on the south-east side of the island for the convenience of the lunatic establishment, and there is also good landing on the north-east side, in Murray bay.

Whale rock, with a depth of about 6 feet, marked by seaweed, and upon which the sea usually breaks, lies S. by W. $\frac{1}{2}$ W. $1\frac{3}{10}$ miles from the lighthouse on Robben island. Between the rock and Robben island, there is a passage nearly three-quarters of a mile wide, with

depths varying from 4 to 7 fathoms, over rocky ground ; but this channel should never be attempted by sailing vessels, except in case of emergency, as the currents are sometimes strong and uncertain in their direction about the rock.

Robben anchorage.—On the north-east side of Robben island, there is fair anchorage, sheltered from W.S.W to N.W. winds. The best position for a large vessel is with Whale rock breaker open eastward of the south point of the island, bearing S.W., and the north extreme of the island N.W. $\frac{1}{2}$ N., in 8 or 9 fathoms water, sandy bottom. Smaller vessels will find excellent shelter nearer the island, in 5 and 6 fathoms. Closer to the shore than this, the ground is rocky. The channel between Blaauwberg beach and Robben island is nearly 4 miles wide, with depths of 7 to 10 fathoms.

CAPE TOWN, the capital of the colony and the seat of government, stands on the western shore of Table bay, between it and the foot of Table mountain, and is well laid out with numerous public buildings, schools, churches, hospitals, and several good squares. It is connected with the principal places in the Colony by railway and telegraph, *see* page 13, and for population, &c., page 3.

Outer harbour and docks.*—About midway between Mouillé point and Amsterdam battery on the north side of Cape Town are situated the harbour and docks.

The works completed, or in course of construction, are shewn on the plan, and consist of a breakwater 3,640 feet in length, with a quay wall on the inside running parallel to it, with tranverse jetties ; these are the East jetty, 600 feet in length, with a depth of 18 feet alongside ; the coaling jetty, 500 feet in length with 25 feet alongside ; and the Loch jetty, 600 feet in length with 30 feet alongside. The railway is extended to the Loch and coaling jetties.

Another tranverse pier, 850 feet in length, and 500 feet seaward of the Loch jetty, to be called the East pier, is in course of construction.

The South pier, in course of construction, about 1,650 feet southward of and parallel to the breakwater, will be 2,060 feet in length with a transverse arm 600 feet in length to the northward, forming, with the East pier, an entrance 250 feet in width ; the two piers will enclose an area of 64 acres, with depths varying from 35 feet in the entrance to 20 feet as far in as the East jetty.

Several buoys have been placed for the convenience of warping.

* *See* plan of Table bay, breakwater, and docks, No. 123 ; also No. 1,920.

On the completion of these works and other projected jetties, the total length of berthage will be about $2\frac{1}{4}$ miles.

Notwithstanding the severe gales which occur annually, there have been no casualties since the breakwater was practically completed, in 1893.

The **Alfred dock** lies close southward and within the outer harbour. It is 1,000 feet in length, 400 to 450 feet in breadth for two-thirds of its length from the north quay, the remaining portion being 250 feet in breadth ; the width of the entrance is 100 feet with a depth of nearly 21 feet at low water springs. Inside, the dock has a depth of 24 feet over the northern part, decreasing to 19 and 20 feet in the southern. Extensive warehouses and sheds, with cranes, &c., are erected around the basin, and a large smithy and factory are available for engine repairs. The basins are connected by a railway with Cape Town.

Vessels wishing to enter must first communicate with the harbour master, who will supply them with a copy of the dock regulations.*

Dry dock.—The Robinson dry dock lies at the north-west angle of the inner basin ; it is 530 feet long overall, 500 feet on the blocks, 90 feet wide at the coping level, and 68 feet wide at the entrance.

The length of the dock can be increased by $12\frac{1}{4}$ feet, by placing the caisson on the stop, instead of the outer groove. The caisson can also be placed in an inner groove, thus forming a dry dock $274\frac{1}{2}$ feet in length, leaving the outer portion for use as a wet dock.

The available depth for docking at high water ordinary springs, allowing 18 inches as a margin, is $22\frac{1}{2}$ feet over blocks at the upper end, 24 feet middle caisson landing over blocks, and 25 feet at the entrance end over blocks. The depth on the sill of the entrance is $24\frac{1}{2}$ feet, with 2 feet less at high-water neaps.

Vessels above 23 feet draught can lighten at the jetties in the outer harbour.

The **patent slip** at the south end of the Alfred dock is 860 feet in length, cradle 204 feet, with a width of 50 feet and a depth of 22 feet on lower end of cradle at high-water ordinary springs. See repairs, page 58.

See plan of Table bay, No. 1,920 ; also No. 2,082.

* Great care is necessary when entering the Alfred dock, as there is generally a strong run, at times amounting to 4 knots, the direction being reversed perhaps in a few minutes. The coxswain of the Port Captain's boat usually acts as pilot, every assistance being given by the Port Captain from the shore. On a large vessel it is advisable to have the assistance of a tug when unacquainted with the port.

Communication.—By telegraph with all parts. Mails weekly from England by Union and Castle Lines of steamers. See page 15.

LIGHTS.—On Minto hill, the highest and southernmost elevation on Robben island, is a lighthouse 60 feet high, of a cylindrical form, painted white. It exhibits, at an elevation of 154 feet above high water, a *fixed white* light, visible in clear weather from a distance of 19 miles.

Green point.—A lighthouse stands upon Green point, the western extreme of Table bay, at 400 yards from the low water line. It is a rectangular building 52 feet high, from which is exhibited, at an elevation of 65 feet above the sea, a *white flashing* light every *ten seconds*, visible in clear weather from a distance of 13 miles.

Mouillé point.—On Mouillé point, situated about half a mile eastward of Green point, and at 100 yards within low-water mark, is a lighthouse, 30 feet high, painted in alternate red and white bands, from which is exhibited, at an elevation of 44 feet above the sea, a *fixed red* light, visible in clear weather from a distance of 10 miles.

Breakwater.—Near the extremity of the breakwater, on a travelling platform, a *fixed green* light is exhibited at an elevation of 25 feet above high water. Vessels are recommended to pass well to the eastward of the light, as in rough weather it stands further in from the end of the breakwater.

Three *white* lights, triangular, mark the works in progress on the South pier. The jetties are marked by electric lights, about 30 feet within their extremes, except that on the Loch jetty, which is about 70 feet within; a flagstaff is situated between the latter and the extreme of the jetty. There are also electric lights in places on the breakwater.

A small *fixed green* light is exhibited during northerly gales, from a position a little to the southward of the inner part of Prince Alfred wharf (near the castle).

TIME SIGNAL.—A ball is dropped from a staff in the Alfred dock, 36 feet above the ground and 47 feet above high water (by electricity from the Cape observatory), at 1h. 30m. Cape Colony mean time, corresponding to Greenwich mean noon.

A gun is fired from Imhoff battery (by electricity from the Cape observatory), at the same time.

The Cape observatory is situated in lat. $33^{\circ} 56' 3''$ S., long. $18^{\circ} 28' 40''$ E.

Signal station.—There is a signal station on the Lion's rump, west side of Table bay, connected with the telegraph systems of Cape Colony. Port signals, *see* page 61.

SUPPLIES of all sorts can be obtained at Cape town. Water tanks for the convenience of shipping will be brought alongside at a moderate charge. There is a plentiful supply of good water laid on to the quays.

Tugs.—There are three or more tugs available at the port.

Coal is to be obtained in abundance at the coaling jetty, and there is a contract for coaling men-of-war. It is put on board at the rate of 30 to 40 tons an hour. The harbour master or his deputy invariably comes off and berths vessels.

Repairs to engines and boilers of all classes of vessels are undertaken by the various firms of engineers. There are no heavy forging facilities, but shafts of 40 feet in length and 18 inches in diameter can be turned, cylinders of 36 inches diameter bored, and castings of 3 tons made ; there are also several steam-hammers of 15 cwt. and less.

In the outer harbour, within the coaling jetty, there are sheers capable of lifting 50 tons, with a depth of about 25 feet alongside under them. There are two hand cranes in the dock, but none at the slip or elsewhere.

ANCHORAGE.—Between April and September, the winter months, all vessels anchoring in the bay must do so under shelter of the breakwater, southward of the harbour entrance, and as near the western shore as their draught will permit. *See* Port Regulations, a copy of which is given to every vessel on arrival. It is recommended that vessels be kept as snug aloft as possible, and have a good spring in readiness for use in the event of heavy weather. Since the breakwater has been completed there have been no casualties.

Vessels should moor with long scopes of cable. The best ground tackle is required in the winter season when north-west and northerly winds prevail, and during gales, precautions should be taken to prevent surging ahead and slacking the cables between the gusts.

Vessels touching for water and other supplies may ride at single anchor. *See* port signals, page 61.

Tides.—It is high water, full and change, in Table bay at 2h. 40m. ; springs rise 5 feet, neaps $3\frac{1}{2}$ feet. The duration of slack at high water varies considerably, and greatly depends on the prevailing wind ; the water is never stationary more than 30 minutes, and frequently it begins to fall immediately on reaching high water. There is no sensible stream of tide, either in the bay or on the adjacent coast. The time of high water and its rise is nearly the same at Simons bay, and all the bays along the coast from the cape of Good Hope to cape Agulhas.

Current.—A current varying in strength from half a knot to 2 or 3 knots, sets to the northward past Table bay and Robben island, but during the winter months, when north-west winds prevail, a current sets into Table bay from the N.N.W., and impinging on the south-east shore of the bay, about Salt river, divides into two streams, the one setting northward along the coast and out between Robben island and the mainland at Blaauwberg, while the other takes a westerly course as far as Cape Town castle, then northerly, sweeping the south-west shore of the bay, and carrying away loose soil from the south sides of the jetties and projecting rocky points.

During the summer season it has been observed, particularly during south-easters, that a gentle stream sets round Mouillé point south south-eastward into the bay, and out by the Blaauwberg beach, as in the winter. The rocks about the beach from Green point to Amsterdam battery are bare, and always free from sand, but in the depth of the bay, from the Castle to Salt river, vast quantities of sand and sea weed are removed from the beach by the drawback of the rollers, and carried away by the current, leaving the sea-shore a platform of solid rock, which is again covered up to the depth of 2 to 3 feet during the summer months.

DIRECTIONS.—No special directions are required for steam vessels entering or leaving Table bay in the daytime.

Sailing vessels during the Cape summer months should shorten sail before hauling in for Green point, as south-easters blow hard at times on opening the bay.

If it is found to be blowing hard after passing Mouillé point, they may with advantage anchor in 10 or 12 fathoms, where they will be in a good position for dropping into the inner anchorage on the

following morning, as the wind invariably falls light there during the night, although the S.E. wind may continue to blow hard on the east side of the bay.

If compelled by a south-easter to bear up from Green point, in order to seek shelter under Robben island, take care to avoid the Whale rock, and bring up on the north-east side of that island (page 55), under easy sail. With ordinary precaution, there is little probability of losing an anchor in bringing up in this place of shelter; but should she part in trying to bring up during a south-easter, there is an open sea to leeward. Tugs are available.

During daylight vessels may round Green and Mouillé points at half a mile distant, in not less than 10 fathoms water, but this distance must not be judged by the eye, as the points are low and deceptive; thence to the anchorage or the harbour, passing the breakwater at a prudent distance, but giving it a wide berth in bad weather.

Caution.—From neglecting the precaution of using the lead, vessels have sailed on to Green and Mouillé points without seeing land, whilst their masts were seen over a fog from the elevated ground at the foot of Lion's rump. The fogs that obscure the lights are frequently confined to the low ground in the vicinity of Green and Mouillé points, extending upwards only 100 to 150 feet. Under these circumstances it is advisable to send a mast-head man aloft, who will probably see land when it is invisible from the deck.

At night.—Vessels bound for Table bay from the southward should not shut in Cape point light with the land at Slangkop point until the *fixed white* light on Robben island (which will be seen before the *flashing white* light on Green point) bears N.E. $\frac{1}{2}$ E., when they may steer for it; and when Green point light bears East, an E.N.E. course may be followed until the *fixed red* light on Mouillé point bears S.E. by S. (This route will clear Vulcan rock and all dangers between it and Table bay.)

The course may now be altered to S.E. by E. $\frac{1}{2}$ E., which will lead one mile northward of Mouillé point light, and within this distance no stranger should round the point at night. When Mouillé point light bears S.S.W., a course about S.S.E. may be steered, bearing in mind not to approach the green light near the end of the breakwater too close; when past it a vessel may anchor in 6 fathoms water, partly sheltered by the breakwater, or proceed into harbour.

Vessels bound to Table bay from the northward should pass about 2 miles westward of Robben island light, and steer for Green point

light bearing S. by E. (which will lead nearly 2 miles westward of Whale rock) until Robben island light bears N.E., then steer S.E.; and when Mouillé point light bears S.S.W. proceed as before. The channel between Robben island and the main is not recommended for a sailing-vessel on account of the northerly (adverse) current.

Leaving Table bay.—Vessels leaving Table bay and bound to the northward should pass between Robben island and the mainland. An almost continuous current sets to the northward through this channel, and during the summer months a fresh south-easter frequently blows, whilst a few miles to the westward of the island the wind is light and baffling, or fails altogether. Vessels bound to the southward should reverse the directions previously given for entering the bay.

PORT SIGNALS.—The following signals will be shown for the information of vessels in the anchorage, when, from local experience and the indications of the barometer, a severe gale may be expected. There have been no casualties, however, since the completion of the breakwater in 1893.

It is strongly recommended that they may be promptly observed when made from the port office; and any neglect in the observance of them will be reported to the agents for Lloyd's, as also the owners of the vessels disregarding the signals. *See* also page 21, for weather signals.

White pierced blue, over union-jack.—Clear hawse, and prepare to veer cable.

Union-jack over white pierced blue.—Veer to a whole cable, and see the third anchor clear.

Blue, white, blue, horizontal, over union-jack.—Down top-gallant yards and masts, and point yards to the wind, and see everything clear for working the ship as far as practicable.

Union-jack over No. 3, white and red, vertical.—Shorten in cable to same scope as when first moored.

When it is considered necessary to make any of the above signals, it is strongly recommended that all commanders immediately repair on board their respective vessels, and that the above signals may be answered by hoisting the answering pendant, or the ensign at the peak end or any of the mast heads.

The above signals will be repeated from the Lion's rump signal station.

Vessels can make their wishes known to their agents in blowing weather, through the port office, by the International Code of Signals, and any assistance required will be strictly attended to, as far as practicable.

Should vessels part from their anchors during a northerly gale and cannot work out, they are strongly recommended to run for the *green* light, shown on the shore near the castle, and beach close to the southward of the Castle ditch, the crews remaining by their vessels, by which means little or no danger of life is to be apprehended. It is also recommended that, in the case of such vessels taking the ground, any after sail that may have been set in running for the beach should immediately be taken in, keeping the foresail or fore-topsail set, as the case may be, until the vessel is firmly grounded.

The following signals may be made from the most convenient point of the shore to vessels that may be stranded.

In day-time, a number will be shown, white upon a black ground. At night, the number will be shown transparent.

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

No. 2. Send a line on shore by cask, and look out for line from rocket or mortar.

No. 3. Secure the rope ; bend a warp or hawser to it, for us to haul it on shore for the boat, or for us to send you a stout rope, to be made fast to some firm part of the wreck, that we may haul off a boat for bringing you on shore.

No. 4. Lifeboat will communicate at low water, or as soon as practicable.

No. 5. Have good long lines ready for lifeboat, and prepare to leave your vessel ; no baggage will be allowed in the lifeboat.

Answering Signals.—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.

Climate and Rainfall.—See page 27.

WINDS.—During Summer (October to April) the prevailing winds in Table bay are from the south-east ; these, although known

by the name of south-easters, blow at about S. by E., frequently with violence during the summer season, and more or less in every month of the year, generally bringing settled weather.*

Regular sea breezes from south-west and west prevail in the mornings, and continue until noon or longer, succeeded by the south-east winds from the land.

North-westerly gales are experienced here in every month of the year, but as a rule these do not blow home between November and May, during which months the bay is considered safe.

The ordinary indications of a south-easter are well marked—a high barometer, a clear sky, and the cloud cap on Table mountain, known as the “table cloth.” During the hardest south-easters, the Blue Berg and Hottentot mountains are obscured by mist, and often after the “cloth” has disappeared the gale continues until these mountain ranges are clear. In autumn, during south-east gales, the top of Table mountain is sometimes quite clear, such a gale is called a “blind south-easter,” but the Blue Berg and Hottentot Holland ranges are covered in mist 24 hours or more before the breeze springs up, by which sign it may thus be confidently foretold; moreover, the wind does not die away until these mountains are clear.

In autumn, the south-easters blow at times with great fury over Table and Devil mountains, and through the gap between them, driving the white clouds in rolling fleeces like wool over the perpendicular sides of the mountain. On these occasions, vessels not well moored are liable to drive, and bring both anchors ahead. There have been instances of vessels driven from Table bay by these south-easters with all their anchors down, and not regaining the anchorage for five or six days. Sometimes there occurs a fall of the barometer whilst such a gale is blowing, when a change of wind to north may be expected; if this does not come, a black south-easter follows. Sometimes a black south-easter follows a sudden change of wind from the north.

The so-called “black south-easter” is distinguished from the regular south easter by the nimbus or rain tint of the cloud on Table mountain. It is frequently accompanied by light rain and cold weather. Black south-easters are very destructive to the vines, and to young vegetation, their appearance the next day being as if withered by frost.

See plan of Table bay, No. 1,920.

* Extract from report on gales in ocean district adjacent to Cape of Good Hope. Capt. Toynbee, F.R.A.S., 1882. *See also winds off the Cape, pages 16–21.*

During winter (April to October) north-westerly winds prevail, and the bay is not so safe. A mountainous sea is thrown into the bay by some of these gales, and before the breakwater and docks were built there was not the slightest shelter.

Westerly and S.W. winds blow strong, and are often accompanied with fogs, rain, and cloudy weather, and with the south-west wind hail-storms are frequent; but the north-west winds are most violent in those months, often blowing in severe storms from north, or N.N.W. for several days, with a cloudy sky, and sometimes accompanied with rain. These north-west gales are preceded by a gradually falling barometer, with the wind at N.N.E., the temperature increasing to an unusual height 36 hours or more before their advent, and with cirrus clouds in the north-west. Table mountain and the adjacent high land becomes enveloped in clouds. The duration of a north-wester is from 2 to 10 days. North-east winds are less frequent than any other, and never continue for any length of time.

In calm weather low fogs occasionally occur, particularly in autumn and winter, the tops of the mountains and high hills being visible above the fog, which is afterwards dispersed by the heat of the sun.

WEST COAST OF THE CAPE PENINSULA.*—General remarks.—The distance from Green point to the southern extremity of the Cape of Good Hope is about 32 miles, the intervening coast line being rugged and indented, whilst the outline of the country is also broken and irregular. From Green point to Duyker point the distance is about $9\frac{3}{4}$ miles in a south-westerly direction, and along this portion of the coast the water is deep at one mile off shore, but within that distance there are numerous off-lying rocks, and patches of reef. Sailing-vessels navigating in this locality should maintain an offing of 2 or 3 miles, for within these limits the wind is generally light and baffling from the close proximity of the high land.

From the western end of Table mountain, a high serrated ridge of mountains, named the Twelve Apostles, extends in a south-west direction, towards Hout bay. They present a steep precipitous face to seaward, and are terminated by a remarkable conical hill, similar in appearance to the Lion's head, though not so high, and having at its southern slope a very conspicuous white sand patch. To the southward of this, about $1\frac{1}{2}$ miles distant, rises Suther peak, a lofty rugged

* See charts, Nos. 1,920 and 636. For a description of the Peninsula and depths off, see page 52.

hill, which is divided by a saddle ridge from Captain peak, a remarkable hill of considerably less elevation, overhanging, and to the westward of Hout bay.

Lion's Paws.—Between $2\frac{1}{2}$ and 3 miles W.S.W. from Green point lighthouse, and just to the northward of Camps bay are two clusters of rocks, 4 cables apart, known as the North and South Lion's Paws; these rocks are awash, but with 7 and 9 fathoms close-to, and they lie one-half and one-third of a mile off shore, the Lion's head bearing S.E. and E.S.E. from them respectively. Robben island lighthouse bearing N.E. $\frac{1}{4}$ N., leads one mile westward of the outer danger; and Green point lighthouse bearing East, leads half a mile northward of the Paws. Besides the Lion's Paws there are several other straggling rocks along the shore, both north and southward.

Duyker point, is rocky, forming the western extremity of the Cape peninsula. At half a mile north-eastward of Duyker point, is the Oude Schep, a dry ledge of rocks extending about one-third of a mile off shore, with a detached rock outside it. There is no bottom with 40 fathoms, at $1\frac{1}{2}$ miles off shore, and Green point light bearing E. by N. $\frac{3}{4}$ N., clears the point about that distance.

Vulcan rock, the central and highest of a cluster, about 150 yards in extent, is awash at high water, and has from 11 to 20 fathoms from one to two cables distant all-round. It lies nearly three-quarters of a mile off shore, with Duyker point N.N.E. $\frac{3}{4}$ E., distant $1\frac{1}{2}$ miles. A line of breakers extends 3 or 4 cables from Duyker island (a low flat rock close to the shore, abreast Vulcan rock) to a mid-channel position. Vessels should pass outside Vulcan rock.

HOUT BAY is formed by a deep indentation in the high coast line, at $2\frac{1}{2}$ miles south-eastward of Duyker point, and is about one mile in depth. It affords anchorage in from 12 to 5 fathoms, sand, but is open to south-westerly winds.*

This bay is scarcely ever visited, and yet it possesses advantages as a place of shelter, especially for steamers; the only objection to it for sailing-vessels, is one that is applicable to all harbours surrounded by high land, namely, variable winds and strong gusts from the shore.

* See plan of Hout bay, No. 635, and chart, No. 636.

The coast on either side of the entrance is high and rugged, particularly on the eastern side, which is quite inaccessible. Here the hills, rising precipitously from the coast, are broken by a succession of ravines, which renders walking around the shore impracticable. There is no landing on this side.

On the western side of the bay is York point and battery in ruins, with rocks extending about one cable off; within the point there is good landing even in S.W. gales; on the opposite side is Blockhouse point. The head of the bay is low and marshy, with a stream of running water.

Anchorage.—Constantia berg, 3,200 feet high, seen over the high cliffs on the eastern side of the bay, bearing E. $\frac{1}{2}$ S., leads directly into the bay. A line of foam, giving a false appearance of danger, is frequently seen across the entrance. It is advisable to anchor as close in, round York point, as the vessel's draught will admit. It is said that with an inside berth a vessel may lie safely in all weather, and that the port is capable of affording shelter to six or eight vessels of ordinary size in all winds, if properly moored, and on the whole is a better harbour than would appear at first sight. The south-west wind is said not to blow home against the high land.

Supplies.—Fresh water is abundant at Hout bay, but there are no conveniences for getting it on board. Provisions may easily be obtained from Cape Town, and fish of good quality is abundant.

COAST.—**Slang-kop point.**—Above Chapman point, which is common to Hout and Chapman bays, is Chapman peak, of dark appearance and considerable elevation. From Chapman point to Slang-kop point the distance is about $3\frac{1}{2}$ miles in a south-west direction; the intervening shore falling back into the curved sandy beach forming Chapman bay, which is fringed with rocks, and being exposed to north-westerly winds, should not on any account be used as an anchorage. A sunken reef extends about 3 cables off Chapman point.*

Immediately at the back of Slang-kop point the cliffs rise 300 or 400 feet above the sea; but the point itself is low and rocky, with a ledge of sunken reefs fringing the shore, at the distance of one mile. (This coast has not been sounded out.) The sea breaks over this reef in westerly winds when there is usually a heavy swell. From Slang-kop point to the Kromme river, a distance of $5\frac{1}{2}$ miles in a

* See charts, Nos. 636 and 2,082.

southerly direction, the coast becomes higher and rugged; thence to Olifants Bosh point and the Cape of Good Hope it is elevated from 300 to 400 feet above the sea, and is tolerably regular in outline.

Albatross rock, on which the Union Mail steamer *Kafir* probably struck, is 400 yards in length, has less than 6 feet water, with 7 to 13 fathoms around, and 5 fathoms between it and Olifants Bosh point; its outer part lies with Olifants Bosh point bearing East, distant 6 cables.

About one mile northward of Albatross rock, and 4 cables from the shore, a detached rocky patch of small extent, with less than 6 feet water, also exists.

One mile westward of Albatross rock the depths increases to 27 and 30 fathoms, and nearly the same depths are found at the distance of 2 miles in the same direction.

In proceeding northward, keep the Cape light in sight (eastward of S.S.E. $\frac{3}{4}$ E.) until Duyker point is open of Slang-kop point.

A rocky bank, with irregular depths of 10 to 16 fathoms, and one mile in extent north and south, fronts the point situated about 2 miles southward of Olifants Bosh point, to the distance of $2\frac{1}{2}$ miles.

From the shoalest part of the bank the Cape of Good Hope lighthouse bears S.E. $\frac{1}{3}$ S., 6 miles, and the point abreast, E. $\frac{1}{4}$ S., distant $1\frac{1}{2}$ miles.

This rocky bank lies somewhat in the fairway for vessels passing round the coast to and from Table bay, and as in heavy southerly gales a continuous line of breakers has been observed to extend between this ledge and the shore, vessels should not approach this part of the coast in bad weather.

CAPE OF GOOD HOPE.—The southern extremity of the Cape peninsula is a high precipitous cliff, surmounted by two peaks distant from each other 1,800 yards in a north-west and south-east direction. The one to the north-west, 880 feet high, is known as Vasco da Gama peak; and on the other, 800 feet high, near the pitch of the Cape, stands the lighthouse.

LIGHT.—From a lighthouse, 30 feet high and painted white, on Cape point, is exhibited, at an elevation of 816 feet, a *revolving*

white light showing a bright face for the space of *twelve seconds every minute*. It is visible all round, except where cut off by the land between the bearings of S. 22° W. and S. 5° E., and between S. 25° E. and S. 31° E., and in clear weather should be seen from a distance of about 36 miles. Its position is lat. 34° 21¼' S., long. 18° 29½' E.

Caution is necessary when approaching this light, as from its great elevation it is frequently obscured by mist, although at the same time clear round the horizon.

A Lloyd's Signal station, established on Cape point close to the lighthouse, is connected with the telegraph system of Cape Colony; passing vessels showing their number, will be duly reported.

Reefs off the Cape.—South-west reefs, which are generally breaking, appear to be the outer projections of a rocky ledge, extending one mile from cape Maclear. From the outer patches, of 5 fathoms, the lighthouse bears E. ¼ N., 1¾ miles. Under no circumstances should vessels attempt to pass inside these patches, and coming from the northward Slang-kop point should be kept in sight until Cape point bears E. by N.

Bellows rock, from which the lighthouse on Cape point bears N.N.E. ¾ E., distant 2½ miles, is awash at high water, and always breaks. The water is deep close round this rock except on its south-west side, where there are sunken rocks about a cable distant, on which the sea does not always break.

Anvil rock has a depth of 6 feet at low water springs, and lies on the eastern end of a 3 fathoms rocky patch about 2 cables in length and with Cape point bearing N.N.W. ¼ W., distant 1¼ miles. It breaks only at low water with a heavy swell, and the depths to seaward are from 14 to 18 fathoms close-to. Vasco da Gama peak, open northward of the lighthouse, leads northward of Anvil rock, and Constantia berg well in sight leads eastward.

Dias rock, about 8 feet high, is connected with Cape point by a sunken reef. The water is deep at 2 cables seaward of the rock.

Three pinnacle rocks with 4½ and 5 fathoms lie between Dias and Anvil rocks, rendering the passage between them unavailable for vessels of large draught, or even for small vessels in bad weather.

DIRECTIONS.—Making the Cape from the westward.*

—Vessels approaching the Cape of Good Hope from the westward may, if the weather be clear, make Cape point light at the distance of about 36 miles, unless it should happen to bear between S.S.E. $\frac{1}{8}$ E. and S.S.E. $\frac{3}{4}$ E. (or behind Vasco de Gama peak). Caution is therefore necessary not to continue a course between these bearings when making the land at night, or in hazy weather. Should a vessel be near the coast at night, and the land not visible, she should be kept to the south-westward until her position is ascertained.

As the wind seldom, if ever, blows from the east or north-east (*i.e.*, directly off the peninsula), sailing-vessels bound either for Table bay or round the Cape of Good Hope, should ensure a weatherly position to the northward or southward, according to the season of the year. Those for Simons bay have been detained many days by south-easters off the Lion's head and Hout bay, in consequence of their making the land too far to the northward during the summer season. The same winds would have been fair for them had they been 30 miles farther south. On the other hand a vessel bound for Table bay in the winter season will find it difficult to make her port from a position off Cape point, during the continuance of North and N.W. winds, notwithstanding the general prevalence of a N.N.W. current.

Rounding the Cape from the westward.—Vessels rounding the Cape from the westward, and bound into False bay, should pass about half a mile southward of Bellows rock (which is always visible by the breakers), thence steer East until Constantia berg is well in sight, bearing N. $\frac{3}{4}$ E., or Vasco de Gama peak opens eastward of the lighthouse hill, either of which marks lead eastward of Anvil rock.*

Vessels proceeding to the eastward along the coast, having passed the Cape at a prudent distance, should take careful bearings of the Cape of Good Hope light as long as it is in sight, and make every allowance for a possible easterly on-shore set, so as to avoid the dangerous neighbourhood of the Birkenhead rock, page 81. Cape Agulhas light is not visible when bearing southward of S.E. by E

Steam vessels bound into Simons bay often pass inside the Bellows and Anvil rocks, but the discovery of the pinnacle rocks, mentioned in page 68, makes it advisable for large vessels to pass seaward of the Anvil. Vessels taking the inside route, when

* See charts, Nos. 636 and 2,082. Directions for False and Simons bays, see p. 78; Table bay, p. 59. Passages to the Cape of Good Hope, from England, west coast of Africa, &c., will be found in the Africa Pilot, parts I. and II.; and from the Cape to East African ports, &c., at pp. 36-51 of this work. Also "Ocean Passages," 1896.

nearing cape Maclear, must not bring Bellows rock to bear southward of S.E. $\frac{1}{2}$ S., until Dias rock bears E. $\frac{3}{4}$ N. or until cape Maclear is midway between Vasco de Gama peak and a gap which separates the lighthouse from that peak, which will lead clear of South-west reefs; then steer to pass from $1\frac{1}{2}$ to 2 cables southward of Dias rock.

Beaching.—There is a small sandy cove between the lighthouse and cape Maclear, in which vessels in a sinking state may be beached in greater safety than on any other part of the adjacent sea-coast.

Rounding the Cape from the eastward.—When Cape point light is in sight, vessels in standing in towards the land, should be guided by frequent bearings of it and of Danger point light, to avoid the rocks off the latter. When to the westward of Danger point, Cape point light should not be brought to bear more westward than N.W. $\frac{1}{4}$ W., which will clear all danger off Mudge point and cape Hangklip. As cape Hangklip, and the narrow neck of land which connects it to the shore, is very low, great caution is necessary in passing it in hazy weather.

If bound for Table bay from the eastward, vessels, after rounding the Cape of Good Hope* and the coast northward to Slang-kop point, at the distance of about 5 miles, should not shut in Cape point light with Slang-kop point, until Robben island light bears N.E. $\frac{1}{2}$ E., or the light on Green point becomes visible, which will be on an E. by N. $\frac{3}{4}$ N. bearing. This latter bearing leads about three miles westward of Vulcan rock. *See directions at page 59.*

The precaution of using the lead when approaching the Cape of Good Hope should never be omitted.

FALSE BAY.—The entrance to False bay lies between the Cape of Good Hope and cape Hangklip, about 16 miles apart. Within these points, the bay extends to the northward about 18 miles. There are several dangers in it, but the middle and eastern sides are clear, though the bottom is foul and generally unfit for anchorage. The general depth varies from 46 fathoms at its entrance to 20 fathoms about 5 miles from its head, whence it

See charts, Nos. 636 and 2,082.

* The south Whittle beacon (black, with staff and ball) situated on a lower hill about 3 miles northward of Cape lighthouse, is often visible when the lighthouse is enveloped in mist, and is a good mark for recognizing the locality.—ED.

gradually shoals to the breakers, which break in from 4 to 5 fathoms about half a mile off the beach. At the entrance of the bay there is a rocky bank, on which the least water is 13 fathoms, and its north-west end lies with Cape point lighthouse bearing N.N.W. $\frac{1}{3}$ W. distant 5 miles.

Whittle rock, with 7 feet water, is about 6 feet in diameter, and but seldom breaks. It rises on the south side of a rocky patch nearly one mile in circumference, upon which the depths vary from 7 to 10 fathoms. It lies with Cape point lighthouse bearing S.W. by W. $\frac{1}{2}$ W. distant $7\frac{1}{4}$ miles, and the lighthouse on the Roman rocks N.N.W. distant $6\frac{1}{2}$ miles.

Clearing Marks.—Beacons.—A beacon, 35 feet high, and 56 feet above high water, painted white with a red band in the centre, stands on a flat-topped rock, near Oatland point, and 1,700 yards from an inner white beacon, with staff and ball, on the shoulder of the hill beneath Simons berg. From the Whittle rock, these two beacons, as well as a large whitewashed patch on the hill north-west of Simons town, are in line N.W. by N.; as are also the black and white beacons, each with staff and ball, standing on the land over Buffals bay, bearing W. $\frac{3}{4}$ S.; consequently, if these respective beacons are kept open of one another the Whittle rock will be cleared.

Also Chapman peak, well open to the westward of Elsey peak N. by W. $\frac{1}{4}$ W., leads 4 cables westward of the Whittle; and Roman rocks lighthouse, in line with Elsey peak N. $\frac{1}{4}$ W. leads midway between Whittle rock and Miller point.

West shore of False bay.—Buffals bay, on the western shore of False bay, and 2 miles northward of Cape point, is a small indentation in the coast line, marked by a white sand patch. On the ridge of hills behind the bay is a black beacon, which shows out clearly as a mark for the Whittle rock. A white beacon for the same purpose also stands near the sea, just to the northward of the bay. The depth of water is 4 or 5 fathoms near the shore, and in a north-west breeze a vessel may anchor off it in 8 to 20 fathoms, sand, if unable to beat to windward; this is preferable to going to sea, and if a south-easter comes on, a vessel will have room to weigh, cast, and run up to Simons bay, if anchored in the greater depth. There is a fishing establishment and a landing place in the bay.

Between Buffals bay and Smithwinkle bay, $3\frac{1}{4}$ miles northward, the shore is backed by four sharp peaks. Off both points of Smithwinkle bay, rocks, some of which are above water, project one-third of a mile from the shore; Batsata rock, 8 feet high, is the highest of those off the southern point.

Rockland point, situated about $7\frac{1}{2}$ miles northward of Cape point, is the most prominent point between Cape point and Simons bay.

The point slopes off to a ledge of dry rocks; beyond it at 2 cables distance, south-eastward, there is an isolated rock 9 feet high, named Bakkoven, which has 11 fathoms close-to; Castle rock, lying 3 cables southward of Bakkoven, dries only at low water.

At $1\frac{1}{2}$ miles northward of Rockland point, is Oatland point, with a few rocks off it, on one of which is a beacon for the Whittle rock, previously described. Between these points sunken rocks extend from 3 to 5 cables off.

Noah's Ark is a flat-topped rock, in shape resembling a barn, about 100 feet long by 30 feet high, lying 3 cables off shore, and about a mile northward of Oatland point. Beyond the distance of 50 yards, the depths are from 6 to 7 fathoms.

Phœnix shoal.—For a distance of $3\frac{1}{2}$ cables in a north-north-west direction from Noah's Ark, the ground is shallow and foul, terminating with Phœnix shoal, which has but 3 feet over it. A red buoy with staff, and the word *Rock* painted on its flag, lies off the north side of Phœnix shoal. Nimrod rock, with 8 feet water, lies nearly midway between Noah's Ark and Phœnix shoal.

Maidstone rock, with 22 feet at low-water springs, lies S.E. $\frac{1}{2}$ E. 2 cables from the south-west end of Noah's Ark. The base of this rock is about 20 feet in diameter, rising to a sharp peak, the summit of which is so small that it is difficult to keep the lead on it. The marks for it are, the south-west end of Noah's Ark N.W. $\frac{1}{2}$ W., and the Roman rocks a sail's breadth open eastward of the foot of Muizenberg.

There is also a small patch of 29 feet, which is steep-to on all sides, lying one cable S.S.E. $\frac{1}{2}$ E. from the Maidstone rock.

Roman rocks occupy a space of about three-quarters of a cable in extent. The rock on which the lighthouse is built is above water; the rest are awash, and the whole surrounded by foul ground.

LIGHT.—From a light-tower, 48 feet high, painted in red and white horizontal bands, erected on Roman rocks, is exhibited, at an elevation of 54 feet above high water, a *revolving* white light, which shows a bright face for *twelve seconds every half minute*, and visible in clear weather from a distance of 12 miles.

Castor rock, with 15 feet water, is detached from the Roman rocks cluster, and lies N.N.E. $\frac{3}{4}$ E. distant 2 cables from the light tower. A red buoy with staff, and the word *Rock* painted on its flag, is moored one-third of a cable N.E. of the rock. Between the rock and the lighthouse there are patches of 19 and 24 feet.

Seal island is a low rocky islet, 2 cables in length, north and south, and one cable in width. It lies E. $\frac{1}{2}$ S. distant $6\frac{3}{4}$ miles from the Roman rocks lighthouse, and is surrounded by sunken rocks, upon which the sea usually breaks. Landing is difficult except in very smooth water. It is the resort of penguins, whose eggs may be collected in considerable numbers at the proper season.

York shoal, the nearest part of which lies S. $\frac{1}{4}$ E. one mile from Seal island, is a rocky patch with from one to $4\frac{1}{2}$ fathoms, about 4 cables in length and $1\frac{1}{2}$ cables in width. The sea is generally breaking on it.

East shoal has depths of from 4 to 8 fathoms, excepting in one small spot near the middle that nearly dries at low water springs, and on which the sea is always breaking. The shoal is about half a mile in length by one quarter of a mile in breadth, with Seal island bearing N.W. $\frac{1}{2}$ W. distant $3\frac{1}{4}$ miles.

Abreast of Gordons bay, in the north-east corner of False bay, is another shoal patch, about a third of a mile in diameter, with from 6 to 9 fathoms, and on which the sea breaks in heavy gales. The shoalest part lies $3\frac{1}{2}$ miles off shore, and S.E. by E. $\frac{2}{3}$ E. nearly 6 miles from East shoal.

SIMONS BAY, situated about 11 miles northward of Cape point and near the north-west corner of False bay, is accessible all the year round, and affords complete shelter, for with heavy south-easters, the only winds that cause any inconvenience, vessels ride safely; and though the bay is exposed to east and north-east winds, these never blow strong.

Wharf rock, having 9 feet of water, lies 220 yards East of the entrance to the dockyard boat camber; and is marked by a beacon with the word *Rock* on it.

The DOCKYARD, though small, is a complete establishment, and has all the necessaries required for refitting and provisioning Her Majesty's vessels.

Moorings.—Eleven sets of Government moorings are laid down in depths varying from 3 to 8 fathoms of water; four of these are in depths above 5 fathoms; No. 1 is the flagship's moorings.

Position.—The dockyard flagstaff is in latitude $34^{\circ} 11' 32''$ S., longitude $18^{\circ} 25' 52''$ E.

Time signal.—A circular disc, attached to a lever arm working on a mast, is situated close to Simons Town telegraph office. The disc is raised to a right angle with mast at 5 minutes before signal, and falls (by electricity from the Cape observatory) at the moment of 1h. 30m. 0s. p.m. Cape Colony mean time, corresponding to Greenwich mean noon. When signal fails in accuracy, the disc is kept up an hour, then lowered.

Simons Town is situated at the foot of the hills at the head of Simons bay, consists of one long street, and contains a population of about 2,500. It is the head-quarters of H.M. vessels on the Cape station, as above.

Supplies.—The water in Simons Town is excellent; it is brought alongside in a tank. There is a smaller tank for merchant vessels, but the dockyard tank is frequently lent to water merchant ships on application.

Supplies of all kind, if in excess of what Simons Town can supply, are obtained from the interior and from Cape Town, distant by rail about 20 miles. Fish is abundant, and the beaches are good for hauling the seine.

Communication.—Mails weekly from England *via* Cape Town. Telegraph communication with all parts.

Patent slip.—There is a Government patent slip, which at spring tides is capable of taking up vessels of 1,000 tons, that can be lightened to a draught of 14 feet.

There is also a naval hospital, a naval club, and a recreation room.

Repairs.—Moderate repairs to engines, and to boilers of 500-horse power are undertaken in the dockyard. Ten-inch shafts can be turned, cylinders of 40 inches diameter bored, and castings of 5 tons made. There are two steam hammers of 15 and 10 cwt., and the crane on the boat camber pier is capable of lifting $2\frac{1}{2}$ tons.

Coal.—At the Naval depôt there is possibly about 6,000 tons of coal in stock. Coal is delivered alongside in bags from lighters of from 10 to 30 tons each. About 250 tons can be put on board per day, and 500 tons by working day and night. At times, coaling is interrupted by bad weather.

There is usually about 2,000 tons of coal in the hands of private firms. Labour is plentiful.

Caution.—There is a fish in Simons bay commonly called toad-fish, about 6 inches long; back dark, with deep black stripes; belly white, with faint yellow patches; it swims near the surface, and is a constant attendant on lines employed fishing. When taken from the water it puffs out considerably. Should any portion of the fish be eaten, *death* ensues in a few minutes.

Anchorage.—H.M. ships and vessels lie at the moorings assigned to them. A good berth for a large merchant vessel is about half a mile off shore, in about 10 fathoms, with Noah's Ark S.E. $\frac{3}{4}$ S., and the dockyard clock W. by S. $\frac{1}{2}$ S. Vessels should moor north-west and south-east, with the stoutest ground tackle to the north-west from May to September, for this being the winter season, the winds prevail from that quarter, and often blow in strong gusts over the hills. From September to May, south-easterly winds may be expected to predominate; then the best bower should lie to the south-eastward. If an inshore berth is required by a smaller vessel, she should take a position north-north-westward of Blockhouse point.

Compass Adjustment.—Iron and other vessels desirous of testing their compasses, to ascertain the deviation, will find it convenient to use Sharp peak, a conspicuous mountain to the north-east of Hangklip berg, which rises over cape Hangklip, instead of having a person stationed on shore taking simultaneous observations. The true bearing of this peak from the anchorage is S. 71° E.; and as the peak is 24 miles distant, the bearing will not be materially affected by the change of position of the vessel in any part of the anchorage in Simons bay.

Tides.—It is high water, full and change, in Simons bay at 2h. 44m.; springs rise $5\frac{1}{4}$ feet, neaps $3\frac{3}{4}$ feet. There is but little stream perceptible in the bay at any time.

Directions for False and Simons bays will be found on page 78.

Winds.—From October to April, south-easterly winds generally prevail, but do not continue longer than five to eight days at a time, and are succeeded by variable winds. In Simons bay as in False bay, it frequently happens that these winds, after blowing very hard for a day and part of the night, abate towards morning, and are succeeded by a land breeze from the W.N.W.

In the south-east season, these winds blow frequently and with violence from S.S.E., making landing in boats disagreeable and at times almost impracticable.

From April to October, north-westerly winds are most prevalent with frequent gales and rain from that quarter. These gales occur at times all the year round, but they are rare in the south-east season. The wind scarcely ever blows from the north-east, and never with violence. The south-west wind (commonly called the kloof wind) is cold and frequently rainy. During this wind no boats should sail in the bay on account of the violent and variable squalls which come down from the hills.

If the barometer stands at 30·2 to 30·3 inches and falls suddenly to 30·0 or 29·95 inches, in nine cases out of ten it will blow a strong S.S.E. gale. The Muizenberg capped with white cloud is generally the precursor of a south-east wind; and if the Hottentot Holland range on the east side of False bay is also capped, the south-easter will probably be violent and of long continuance. When Simons berg has a misty cloud on its summit, rain may be expected within an hour or two.

Captain Lord Charles Scott, H.M.S. *Bacchante*, 1881, remarks that the Hottentot Holland range are the first to cover on the approach of a south-easter, and that if the Muizenberg does not cover it may not blow home to Simons bay. *See* also p. 16, winds off the Cape, &c.

NORTH AND EAST SHORES OF FALSE BAY.—Northward of Simons bay the land ranges in height from 800 to 1,200 feet as far as Muizenberg mountain, which is 1,651 feet high. There are four remarkable sand patches on this coast—the first on the north-west shore of Simons bay, the second between that and Elsey peak, the third in Elsey bay, and the fourth in Fish-hook bay.

Kalk bay.—In Fish-hook and Kalk bays there are villages. The latter (pronounced Cork) is situated on the Cape Town and Simons Town railway; from a small fishery station a few years ago it has now become a fashionable watering place, and several

hotels have been erected. The only good landing along the north shore is at Kalk bay, where a projecting ledge of rocks makes a little shelter.

Eastward of Kalk bay the shore is a low sandy beach with a continuous line of breakers fronting it, and no landing. This portion is not frequented.

The eastern shore of False bay to the southward of Gordons bay is bold, having no outlying dangers more than one quarter of a mile off. The high land comes close down to the south side of Gordons bay, whence to Hangklip is an unbroken chain of mountains.

The Strand is a fishing station about $2\frac{1}{2}$ miles north of Gordons bay. It has a boat harbour formed by a circle of sunken rocks extending some distance from shore. The entrance is narrow, but when inside it affords good shelter.

Gordons bay is formed on the north-east side of False bay, and affords shelter from south and easterly winds. As it is quite exposed to westerly winds vessels can only lie there in the summer months.

Kogel bay lies about $5\frac{1}{2}$ miles to the southward of Gordons bay ; it is about 3 miles across and falls back to the eastward more than a mile ; but the bottom in many parts being rocky it is not a good anchorage, although shelter may be obtained from south and easterly winds.

Pringle bay or cove, 3 miles north-north-east of cape Hangklip, is open to westerly winds. It affords good shelter in S.E. gales, in depths of 9 to 10 fathoms. H.M.S. *Sidon* rode out a strong S.E. gale here.

Cape Hangklip.—The quoin-shaped hill of this name (sometimes called False cape), 1,448 feet high, is the eastern point of entrance to False bay, and makes as an island in approaching from the southward. Its western face appears to overhang from some points of view (hence its name), and a conspicuous sand patch extends half way up its south-east side. The cape itself, about $1\frac{1}{2}$ miles southward of this hill, is very low, and a heavy sea always breaks upon it ; a sunken rock lies N.W. $\frac{3}{4}$ N. three-quarters of a mile from the cape, at one-third of a mile off shore, and as the sea breaks some distance outside of this rock, it is not advisable to pass within one mile of the cape.

Within Hangklip the land is low, then rises to a sharp peak 2,780 feet high, at the distance of $3\frac{1}{2}$ miles from Hangklip hill. This peak is the commencement of a chain of mountains extending to the eastward.

DIRECTIONS.—False and Simons bays.—Steam vessels or sailing vessels with a fair wind coming from the westward by day, and having opened the clearing marks for Anvil rock (*see* page 68), should, if bound to Simons bay, steer N.N.E. midway between Whittle rock and the shore; and when Elsey peak is in line with Roman rocks lighthouse, bearing N. $\frac{1}{4}$ W., steer for it, altering course when within one mile of the lighthouse, so as to pass midway between it and Noah's Ark. When the blockhouse on Blockhouse point bears W. by S., the vessel will be past Phœnix shoal, and may haul into Simons bay, taking, however, sufficient sweep to have time to choose a berth and room for rounding-to.

Working.—Vessels working in westward of Whittle rock and nearing that danger, will easily avoid it by keeping the beacons erected to show its position well open of each other; or Chapman peak (a dark peak over the southern side of Hout bay) well open westward of Elsey peak, N. by W. $\frac{1}{4}$ W. The Admiral's house open its breadth northward of Noah's Ark, bearing N.W. by W., leads northward of Maidstone rock.

The ordinary channel for vessels entering Simons bay is between Noah's Ark and the Roman rocks, a width of 7 cables; but if the wind be N.W., and the vessels under sail, the passage east and north of the Roman and Castor rocks should be taken, as it affords better working space.

The four sand patches on the hills northward of Simons bay, are usually conspicuous and serve as good landmarks for the bay; the western patch is a streak stretching down from the top of the hill.*

In thick weather, and uncertain of the position of the vessel, it is advisable to anchor when the depths come under 20 fathoms.

At Night.—Care should be taken in rounding the Cape of Good Hope for Simons bay to give it a berth of not less than 3 miles; by not going into less than 45 fathoms until the Cape light bears northward of N. by E. $\frac{1}{2}$ E., a vessel will clear Bellows rock.

* *See* sketch on chart, No. 636.

When eastward of Anvil rock, with Cape point light bearing about N.W. by N., distant 3 miles,* steer N.N.E. until Roman rocks light bears N. $\frac{1}{4}$ W.; then steer for it to within half a mile of the light, when alter course to N.W., which should lead a quarter of a mile northward of Phoenix shoal; then haul gradually into the anchorage.

Unless thoroughly acquainted with the navigation and favoured with moonlight, vessels, at night, should always pass eastward of Roman and Castor rocks. The four large sand patches on the hills northward of Simons bay are visible on bright nights, and in steering for Simons bay they will be ahead or on the starboard bow; bearing this in mind will prevent the Muizenberg being mistaken for the hills southward of Simons bay; these patches, with the exception of that over Buffels bay, are the only sand patches on the west side of False bay.

Passing eastward of Whittle rock.—Running for Simons bay, do not bring the Cape light to the southward of W.S.W. until the Roman rock light is between the bearings of N.N.W. $\frac{1}{2}$ W. and N.W. by W. $\frac{1}{2}$ W., between which bearings a vessel will be clear of the Whittle on the one hand and York shoal on the other. If working in, make short tacks between the above bearings of the Roman rock light, until certain of being within 5 miles of it.

By day, Chapman peak touching the western edge of the sand in Fish-hook bay, leads two-thirds of a mile eastward of Whittle rock. The whitewashed mark on the hill over Simons bay, kept well open northward of the Whittle beacon on Oatland point, also leads north-eastward of Whittle rock.

Running for Simons bay in a south-easter.—In daytime, it is recommended to come in between the Roman rocks and Noah's Ark, shortening sail so as to have all furled when abreast of the latter, and to round-to under the spanker only. The sheet anchor should be ready when entering False bay in a south-easter.

It is not advisable for a sailing-vessel in a strong south-easter to run for Simons bay at night, for the gusts of wind are violent, and there is a risk in bringing up, but should stand off and on the Cape under easy sail till daylight.

The COAST† between cape Hangklip and Danger point, about 27 miles to the south-eastward, forms a bight from 8 to 10 miles in

* The Roman rocks light (also a revolving light) may be seen from near this position, if not from the deck, from the masthead. See chart, No. 636.

† See charts Nos. 2,082 and 2,571

depth. Mudge point lies about midway, with Sandown bay to the westward, and Walker bay to the eastward of it. The remainder of the bight is composed of rocky projecting points, and landing can usually only be effected in certain places, and which are shown on the chart. Palmiet river, 9 miles to the eastward of cape Hangklip, is a rapid stream in the winter season, but its entrance is always blocked up with sand. About three-quarters of a mile eastward of it is a small rocky cove, where a boat may land at high water, in fine weather.

Mudge point is low and rocky, and there are many sunken rocks off it, which, with the masses of kelp about them, form the south side of D'Urban cove, where there is good landing in east and south-east winds. The gig of H.M.S. *Birkenhead* landed after the wreck of that vessel, in a small rocky cove at the south extremity of the sand in Sandown bay, where there is a fishing-station, but the landing at D'Urban cove is the better and safer of the two. A coast range of hills terminates near Mudge point in Onrust berg, a square bluff, 1,575 feet high, which has a pile on it.

WALKER BAY is remarkable for the immense tracts of sands and high sand-hills at its head, which are visible a long distance at sea, and give a distinctive character to the land, which would have been aptly expressed by the name Sandown. About midway along the sand and one mile inland is a sand-hill pyramid 427 feet above the sea. A long heavy swell always rolls into the bay, and the water is deep within one mile of the beach.

Klein river, in the northern bight of Walker bay, is a stream of considerable size inland, but its mouth is choked with sand.

Stanford cove, a small rocky inlet, similar to D'Urban cove, before described, also affords landing in east and south-east winds. It lies in the rocky southern shore of Walker bay, 5 miles north-east of Danger point. There are several rocky patches off it, which, with the heavy swell, renders it less available than Hydra bay. There are some fishermen's huts, and plenty of good water near Stanford cove.

Hydra bay, lying between Stanford cove and Danger point, is the best anchorage under that point, as farther in Walker bay the swell is heavier. It is easily distinguished by a sand patch which marks the face of the hillock over it. In approaching Hydra bay

from the southward, Danger point lighthouse should not be approached nearer than 2 or 3 miles; the bluff hill of Mudge point may be steered for until the sand patch in Hydra bay is well open, when the rocky spit projecting from Danger point will be cleared. Then haul up for the bay, and anchor in 12 or 14 fathoms, about three-quarters of a mile from the shore, taking care to keep the low extreme of Danger point open of the intermediate points, to avoid the 3 fathoms rocky patch in the centre of the bay, upon which the sea does not always break.

Tides.—It is high water, full and change, in this neighbourhood, at 2h. 50m.; springs rise 5 feet. The rise of the tide and the establishment at Simons bay, Dyer island, and Struys bay are very nearly the same, and the stream of tide along the whole coast between cape Hangklip and Struys bay is inconsiderable and uncertain.

DANGER POINT, the south-west extreme of Walker bay, is a tongue of low sandhills covered with bushes and stunted trees, projecting about $4\frac{1}{2}$ miles from the base of Duin Fontein berg, which is 1,130 feet high, and a conspicuous remarkable bluff hill from every point of view at sea. This point affords shelter, in Hydra bay, from the S.E. gales of summer.

The depths are irregular off Danger point. If approaching it at night, do not go into less than 35 or 40 fathoms.

LIGHT.—On Danger point, from an octagonal tower, 87 feet in height, with its sides painted red and white alternately, is exhibited, at an elevation of 150 feet above high water, a *group flashing white* light with a period of 40 seconds, and visible in clear weather from a distance of 18 miles. There are three flashes in quick succession, thus: flash $2\frac{1}{4}$ seconds, eclipse $3\frac{1}{4}$ seconds; flash $2\frac{1}{4}$ seconds, eclipse $3\frac{1}{4}$ seconds; flash $2\frac{1}{4}$ seconds, eclipse $25\frac{3}{4}$ seconds.

Birkenhead rock.—Several detached sunken rocks are met with off this part of the coast, the most dangerous of which lies about one mile from the pitch of Danger point, with 2 fathoms water, and from 10 to 18 fathoms within a short distance. It has acquired a melancholy celebrity as having caused the loss of H.M.S. *Birkenhead* and 436 lives, in February 1852, hence its name. The sea breaks with violence on the rock, but often only at intervals of about a quarter of an hour.

DYER ISLAND, $6\frac{1}{2}$ miles south-eastward of Danger point, is a low rocky islet, visible only at a short distance. It is the abode of rabbits and numerous sea birds. Geysers island is smaller, and formerly the resort, in certain seasons, of seals, for killing which there was a permanent establishment on Dyer island. These islands, together with the numerous rocks, extending nearly $1\frac{1}{2}$ miles to the westward of them, form a natural breakwater, under which vessels may find shelter in south and south-east gales.

Landing is not good, and at times impracticable. The best is near a small shed on Dyer island, the remains of the disused sealing station.

Anchorage.—Directions.—Dyer and Geysers islands, being low and white, are made out with difficulty when seen against the sand-hills on the adjacent coast. In approaching them from the southward, keep Palmiet valley (in the high land near cape Hangklip) open of Danger point until Geysers island is in line with Gunners Quoin to avoid the reef, which does not break in fine weather, extending westward of Dyer and Geysers islands. Then haul up for Duin Fontein berg, and when Gunners Quoin is open northward of Dyer island, steer for it, and anchor in 10 to 12 fathoms, with the extremes of Dyer island bearing about S.S.E. and S. by W., distant about one mile.

The bottom is sand, and the holding ground good, but the reef affords no shelter from south-west winds. There is a narrow channel, with depths of 3 fathoms between the east end of Dyer island and the rock above water inshore, which a small vessel might find practicable under favourable circumstances, but it cannot be recommended; the sea breaks across it in southerly winds. Foul ground, with heavy breakers, extends from the Sandy point abreast, to within one mile of Dyer island.

THE COAST* from Danger point to Quoin point, a distance of nearly 19 miles south-eastward, is low near the sea, and backed by bare rugged hills of moderate elevation, one of which, named False Quoin, from its shape, is 888 feet high, and about half-way between Danger and Quoin points. A long, heavy swell constantly breaks on the shore, which is inaccessible.

At about $5\frac{1}{2}$ miles eastward of Danger point, at the head of a bay, is the mouth of the Uilkraal, a small stream, checked at its junction with the sea by sand.

* See charts, Nos. 2,082 and 2,572.

Patches.—About half-way between Dyer island and Quoin point are two rocky patches, $1\frac{1}{2}$ miles off shore, upon which the least water found was 4 fathoms. The sea breaks upon them when there is any swell.

Gunner's Quoin (Buffel Jagt-Berg) is a conspicuous bluff hill, 997 feet in height, named from its resemblance to a quoin, which, however, it does not bear when viewed from the westward. Quoin point is a square projection of hummocky land, from the base of the Gunner's Quoin, and is 3 miles from it. It is fronted by sunken rocks and heavy breakers to the distance of $1\frac{1}{4}$ miles from the shore, and is distinguished, when seen from the southward, by two sandhills near its extremity.

The Coast from Quoin point to cape Agulhas, 18 miles to the south-eastward, is low and sandy, except abreast of the flat-topped range named Zoet Anys, where it is steep and rocky. The whole is exposed to the full force of the ocean swell, and landing is impracticable.

The depths are shallower along this part of the coast than they are off, and to the westward of the Quoin; and between about 2 and 4 miles eastward of the south-east face of Quoin point and $1\frac{3}{4}$ miles from the shore are several rocky patches, some of which are above water.

Directions.—In standing towards any part of this coast, cape Agulhas light should not be lost sight of, and a vessel should stand off before the light disappears on a S. 57° E. bearing. From the westward, having passed Quoin point at a distance of 7 or 8 miles, a S.E. $\frac{1}{2}$ E. course, made good, will round cape Agulhas at a similar distance. *See caution, p. 85.*

There is tolerable shelter and smooth water, in strong north-west winds, under the lee of the reefs 4 miles eastward of Quoin point, and it is possible that a small vessel might find the same shelter close under the east extreme of Quoin point; the whole of this coast, however, should be given a wide berth, when possible.

See charts, Nos. 2,082 and 2,572.

CHAPTER III.

 CAPE AGULHAS TO CAPE RECIFE, ALGOA BAY.

(Long 20° E. to 25° 40' E.)

 VARIATION IN 1897.

 Cape Agulhas ... 29° 30' W. | Cape Recife ... 29° 10' W.

AGULHAS BANK.—The limits of this extensive bank, southward of cape Agulhas, have been fairly defined. The 100 fathoms line appears to extend from near the shore in the vicinity of Bashee river to the south-westward, passing cape Recife at about 20 miles distant, and the meridan of Mossel bay at 60 miles; here it trends southward, reaching its outer limit in lat. 36° 45' S., long. 20° 45' E., thence it inclines northward, passing the Cape peninsula at a minimum distance of 5 miles. Nowhere does the edge of the bank appear to be very steep; the general depths on it are from 45 to 80 fathoms.

Eastward of cape Agulhas the bottom is generally rocky, or coarse sand, shells, and small stones, whilst to the westward of Agulhas, mud or green sand will be found southward of lat. 35° 15' S., but within 50 fathoms the bottom is rock, sand, or stones, and beyond 90 fathoms generally sandy, with black specks. The quality of the bottom is not, however, sufficiently ascertained to enable seamen to determine their position by it.

There is one marked effect of the Agulhas bank in quieting the heavy seas which roll up to it. A vessel may be exposed to a turbulent and irregular sea while in deep water and outside the bank, endangering spars and threatening to break over her, but the moment soundings of 60 to 70 fathoms are gained the sea becomes comparatively tranquil.

CAPE AGULHAS is a rocky projection, and the most southern part of Africa. The features of the land about cape Agulhas distinguish it from the neighbouring headlands. Viewed from a distance seaward, east or west, the north and south elevations resemble two oblong hummocks. At a distance from the southward the two appear united. The highest part is 455 feet above the sea, and its distance from the extreme of the cape about one mile.

On the first undulation within cape Agulhas is the lighthouse, which is at times somewhat difficult to distinguish from the southward against the higher land behind.

Westward of the cape, the coast trends a north-west direction to Quoin point. Immediately to the eastward of the cape are two small indentations, the first of which is named St. Mungo bay. The whole of the coast about cape Agulhas and thence to Northumberland point consists of rugged sandstone and quartz rocks, or rocky reef, extending out one-third of a mile, and perfectly impracticable for boats to approach.

Exposed to the uninterrupted oscillations of the Southern ocean, the sea breaks heavily all along on this iron-bound shore, particularly during southerly winds. A vessel touching on it has not the slightest chance of escaping destruction.

Reported dangers near.—Caution.—A report was received that the steam-vessel *Mexican* struck, on the 2nd December 1894, some obstruction off cape Agulhas, with the lighthouse bearing N.E. $\frac{3}{4}$ E., distant about $1\frac{1}{4}$ miles.

A former Notice to Mariners, No. 208 of 1892, stated that the steam-vessel *Alcestis* had then struck an obstruction off this cape, but that the particulars given were not sufficient to enable the position to be ascertained with any degree of exactness; it was however assumed to lie about $2\frac{3}{4}$ miles W. $\frac{1}{2}$ N. from cape Agulhas.

Mariners should remember that not only off cape Agulhas, but off all other parts of the south coast of Africa, and especially off salient points, sunken wrecks or uncharted dangers may exist close to the coast; and that it is not advisable to approach this surf-beaten shore, even in full-powered steam-vessels, within at least 2 or 3 miles. When a strong adverse current prevails the temptation is great, but west of Algoa bay there is nothing to be gained by so doing, while a risk is run (in case of a breakdown in the machinery or any

temporary error in the course) of total wreck before any efforts can be made to avoid such a catastrophe. Sailing vessels should keep 7 or 8 miles off shore as recommended in the directions on page 83.

On this coast the water breaks in heavy swells in 10 fathoms. If therefore a rock, with its top near enough the surface to bring up a ship, existed in this position in about that depth, it would, unless a most unusual pinnacle, undoubtedly break long before the whole area is a mass of breakers, which occurs in bad weather. The lighthouse keepers at Agulhas report no such occurrence, and it appears more probable that the obstruction is a wreck.

On the Admiralty charts however "rock hereabouts" has been written at the spot where *Mexican* reports touching.

LIGHT.—The lighthouse on cape Agulhas is a round tower 100 feet high, painted with horizontal red and white bands alternately. From it is exhibited a *fixed white* light at an elevation of 128 feet above the sea, visible from seaward between the bearings of S. 89° W. and S. 57° E., and in clear weather should be seen from a distance of 18 miles. It is frequently invisible at this distance.

Lloyd's Signal station, near the lighthouse, is connected with the telegraph system of Cape Colony.

Northumberland point lies 3 miles eastward of Agulhas lighthouse. It is low and sandy immediately on the beach, but a dangerous ledge of rocks surrounds the point, and shallow water extends in a south-east direction about one mile from the point. A detached rock, which breaks at times, lies S.E. by E. $\frac{1}{4}$ E. distant $1\frac{1}{8}$ miles from the point. Westward of the point the reef extends off about one-third of a mile, and the sea breaks heavily near it with S.E. winds.

A **bank** about one mile in extent, with from 7 to 9 fathoms water, lies with its north edge on the parallel and eastward of the lighthouse, and distant from it $5\frac{1}{4}$ miles. The sea breaks on it in bad weather.

STRUYS BAY, lying between Struys and Northumberland points, affords shelter in West to N.W. winds, but is wholly unsafe in any wind from W.S.W. round southerly to East. From abreast the houses in the west part of the bay the beach is clean sand to within 2 miles of Struys point, where flat jagged rocks

commence ; behind this sandy beach is a line of sandhills about 100 feet in height, some of which are partly covered with scrub ; behind these is a green covered ridge attaining a height of 200 feet. The bank lying between 3 and 4 miles south-eastward of Northumberland point, with depths of 7 fathoms, breaks heavily in bad weather.

Directions.—Anchorage.—The best anchorage is under Northumberland point. Vessels from the westward should round Northumberland point in 9 to 10 fathoms water, at a distance of about 2 miles, to avoid the dangers off it. When the stone house in the bay bears W.N.W., steer to the N.W., and anchor in 5 fathoms, sand, with the house bearing W. $\frac{1}{2}$ S., and the extreme of Northumberland point S.W. by S. Here the bottom is clear, while farther in it is foul. Large vessels should anchor farther out, in 7 fathoms.

Vessels from the eastward will clear the dangers off Struys point by keeping Agulhas light bearing well to the northward of West.

Caution.—With strong onshore winds it is unsafe to venture into Struys bay, as the sea often breaks in 7 and 8 fathoms water. It has been the scene of several wrecks.

As a general rule, sailing vessels seeking temporary shelter in this bay in a north-west gale should put to sea immediately after it subsides, for the wind frequently changes in a few hours from blowing strong at north-west to south-east or south, in which case it is very difficult to work out, in consequence of the heavy sea which then rises.

Landing.—The landing place is a small cove to the north-west of Northumberland point, sheltered by a shelf of shingle projecting from each extremity of the cove, but it is fast filling up with sand ; a wooden jetty at the end of which a vessel drawing 7 or 8 feet formerly secured has been dry for many years.

Water.—There are several wells, but the water is scarce and brackish ; it is procured only by digging in the sand beach above high water mark.

Bredasdorp.—The village of Bredasdorp is 16 miles or three hours journey distant from the landing place in Struys bay, where supplies can be obtained and where there is postal communication with Cape Town.

Honing Nest river discharges into Struys bay near the centre, between bare sandhills; it is the outlet of several streams flowing from the hills northward and westward for many miles, which form lagoons in places in the flat land lying within this coast. These are the Kars, Poorts, and Nieuw-jaar. The Honing Nest is unimportant and usually fordable three-quarters of a mile from the mouth, and often at the mouth, but the latter is dangerous.

Tide and Current.—It is high water in Struys bay, full and change, at 2h. 50m.; springs rise 5 feet. During the examination of this part of the coast, in September 1848, no current was observed in the bay, or within $2\frac{1}{2}$ miles of the shore, but the fishermen stated that a strong current frequently sets to the westward round Northumberland point. A vessel becalmed in the offing, was seen from the anchorage drifting to the eastward more than one mile an hour. On two other occasions, close to the shore, about 2 miles to the westward of cape Agulhas lighthouse, the stream ran through the whole night steadily to the N.W. at $1\frac{1}{4}$ knots per hour. These changes may probably be traced to the effects of the wind.

Several accounts concur in stating that eastward of cape Agulhas the current has been found to set towards the shore; this indraught seems to be stronger between the months of January–April. A large proportion of the wrecks which have occurred between capes Agulhas and Infanta have been attributed to it. *See* pages 32 and 33.

STRUYS POINT is a mass of bare sandhills 200 feet high, sloping southward for nearly one mile to low water mark, where it is rocky.

Beacon.—A stone pyramidal beacon 34 feet high, surmounted by a ball 4 feet in diameter, is erected on Struys point. The beacon is coloured red to seaward, with red and white bands on the east and west sides, and stands on land about 2 feet above high water spring tides.

Outer Blinder rock.—From Struys point a chain of detached patches of rock extend in a S.S.E. direction. On the outer one, named the Outer Blinder, there is a depth of 3 fathoms at low water,

with 4 to 6 fathoms close-to, and 7 to 9 fathoms at a distance of 4 cables. The rock lies with Struys point beacon bearing N.N.W. distant $1\frac{8}{10}$ miles.

At about 3 cables inshore of the Outer Blinder rock is the Bulldog or Saxon reef, with 2 fathoms at low water, 8 fathoms close-to, and about 4 fathoms between it and Outer Blinder rock. Between the reefs lying between Bulldog reef and Struys point, there are boat passages, available in fine weather.

In standing towards these dangers, cape Agulhas light will be lost sight of when bearing S. 89° W., that line of direction passing about 3 cables southward of Outer Blinder rock.

Marcus bay.—From Struys point the coast trends north-eastward for about 5 miles to Hoop point, forming Marcus bay; fishermen live near and beach their boats on one of the sandy beaches in ordinary weather.

The shore for 2 miles eastward of Struys point, is a sandy beach with a fringe of low flat jagged rocks rendering it unapproachable; it is backed by rocky hills covered with sand, 150 feet high; behind these hills is a range of green covered hills which drop to the plain behind at 2 to 3 miles distant from the coast. Marcus bay has rocky patches in it, but it affords shelter in westerly and north-westerly winds equal to that of Struys bay.

Martha point, about 5 miles eastward of Hoop point, is named from a vessel wrecked here: it is the scene of more wrecks than any other part on the south coast of Africa. The coast between Struys and Martha points is fringed with reefs, with depths of 4 to 6 fathoms, and on which the sea breaks in heavy weather.

Atlas reef, eastward of Hoop point, with 3 fathoms least water, named from the Dutch ship *Atlas*, which was wrecked on it, lies $1\frac{4}{10}$ miles from the shore, with Struys point bearing W. $\frac{1}{4}$ S., distant 7 miles, and a triple isolated peak inland N.W. $\frac{1}{4}$ W. The peak on this bearing appears like a cone. Miles Barton rock, with 4 fathoms, lies 6 cables from the Atlas reef, in the direction of Struys point; a patch of 5 fathoms lies 4 cables seaward of Miles Barton; and two patches with the same depth lie one and two miles eastward of Atlas reef.

DIRECTIONS.—Rounding Cape Agulhas and Struys point.—Vessels from the westward (*see* directions, page 83, and reported dangers off, page 85), after rounding cape Agulhas, should keep the light in sight; it is advisable not to bring it to the westward of W. by N., on which bearing a vessel will pass the dangers extending from Struys point at a distance of 3 miles.

From the eastward, Agulhas light must not be depended upon for passing Struys point, as in hazy weather, or from other circumstances, combined with the distance from Struys point (14 miles), the light may be faint or altogether obscured, and the vessel may get within the line of danger. Under such circumstances, the point should not be approached at night to a less depth than 30 fathoms.

The like precautions are required in the day time, particularly in foggy weather; for the high land of Agulhas may be invisible, while the sandhills of Struys bay and the breakers off Northumberland point are distinctly seen. At such times it may be somewhat difficult to determine whether the vessel is eastward or westward of Struys point, because the shore features of Struys bay are very similar to the bay eastward of Struys point, but in the former there is a house and flagstaff near Northumberland point; these, with the beacon on Struys point, should be sufficient to identify the coast.

Whilst to the eastward of cape Agulhas, sailing vessels should not approach the shore nearer than 7 or 8 miles, at which distance the cape should be rounded, for if it falls calm, the heavy swell which constantly rolls towards the shore will carry her with it, and the resource of anchoring would, probably, be of no avail, owing to the swell and the rocky nature of the bottom.

Vessels beating round cape Agulhas in strong north-westerly winds would find it safe and profitable to anchor in St. Sebastian, Marcus, or Struys bays, being prepared to weigh on a shift of wind.

Caution.—In rounding cape Agulhas either way, be careful not to mistake the lights of camp fires for Agulhas light.

COAST.—From Martha point the coast trends northward, and 3 miles beyond it is a large mass of bare sand hills, a broader sand beach, and fewer of the flat jagged rocks fringing it; this continues for about 7 miles; then the coast becomes again rocky, the bare sand hills disappear, and the Driefontein range becomes inclined to the

coast. At 13 or 14 miles from Martha point this range forms the coast line, intersected by deep watercourses, eastward of which the Potteberg range, 1,980 feet high, slopes gradually to cape Infanta.

Hoop Lake.—At $1\frac{1}{2}$ miles from the beach and $4\frac{1}{2}$ miles eastward of Martha point is the south end of Hoop lake, 4 miles in length, into which discharges the Zout river. On its east bank is a farm. This lake is shallow throughout, has no apparent outlet, and varies in depth, according to the season; the water is brackish.

ST. SEBASTIAN BAY.—Cape Infanta, the western extreme of St. Sebastian bay, is a bold cliffy rocky point situated 24 miles eastward of Martha point; a double point with remarkable masses of rock lies about one mile westward of it.

Rock.—A sunken rock, named the Blinder, a name commonly given to sunken rocks on this coast, lies about one mile southward of cape Infanta; its correct position has not been ascertained, and it only breaks during heavy gales.

Landing.—From cape Infanta the coast trends suddenly northward, and at the distance of about one mile is the mouth of a deep ravine, known as Still bay, with a beach of large rounded stones; here fishermen can usually launch and beach their boats. This is the only landing place for many miles along the coast, and it can often be used when it is unsafe to cross the bar of Breede river.

St. Sebastian bluff.—At the distance of 2 miles north-eastward of cape Infanta is St. Sebastian bluff, a bold perpendicular headland, 220 feet in height; a ledge fronts the bluff to the distance of one cable, with a depth of 5 fathoms at the same distance beyond.

Northward of the bluff the cliffs cease and the land around the mouth of Breede river becomes lower, but deeply intersected for three-quarters of a mile from St. Sebastian bluff.

The coast from Breede river trends south-eastward, to cape Barracouta, a distance of 22 miles, and is composed of cliff-faced hills, ranging from 60 to 200 feet high; about $7\frac{1}{2}$ miles eastward of the Breede is the little river Duivenhoks; a conspicuous sand patch on the west marks its entrance, and 4 miles inland is a hill named Wolfskloof, 744 feet high. At 2 and 5 miles north-west of cape

Barracouta there are conspicuous sand patches. Tromps Kop hill, 959 feet high, lies 6 miles northward of the cape. The coast from the cape eastward to Kaffir Kuyl bay is irregular, with several projecting points.

Anchorage.—There is good anchorage in St. Sebastian bay, and the western part affords shelter from all winds except those between East and South. The best position is in 8 fathoms, sand, with St. Sebastian bluff, bearing from S.S.W. to S. by W., and the high flagstaff on the south bank of the Breede river about N.N.W. $\frac{1}{2}$ W.

Breede river falls into the sea in St. Sebastian bay, through a mouth narrowed by sandbanks to 160 yards at low water, and extending off about half a mile from its northern point. It has a depth of 12 feet at high water on its bar, and is the most important navigable river in this colony; a steam vessel drawing 8 feet can ascend to Malagas, 20 miles from its mouth.

Within the mouth, for 3 or 4 miles, its navigable channel is intricate and varying; above that it contracts and flows evenly between steep banks.

For 48 miles from the mouth the general direction of Breede river is north-westerly, but tortuous; at that distance Buffeljagts river, a stream from the mountains 9 or 10 miles distant, flows into it; beyond this confluence the Breede flows from the west, passing close to the town of Swellendam, near which the main postal road crosses the river, which point is 61 miles by the river from its mouth; at 8 miles farther on it is joined by the river Zondereinde.*

Railway.—It is intended to connect Swellendam with the Cape railway system.

Tides.—It is high water, full and change, at the jetty at port Beaufort at 3h. 8m.; springs rise 6 feet.

Directions.—The river should be entered at the last quarter of the flood. A pilot is always ready and should be taken on board in St. Sebastian bay. The following directions apply to the date of the survey:—Having brought the flagstaffs on the sandhills on the south bank of the river in line, steer for them, which will lead over the bar in about 12 feet at high water springs; after deepening the water, open the inner flagstaff a little to the northward of the outer one, passing close to the rocks on the south shore, to abreast the flagstaffs, close to which and on the beach will be seen a house. Still keeping on the same shore, a little farther in the

* See plan of entrance to Breede river, and port Beaufort, on chart, No. 2,983.

narrowest part of the channel will be reached abreast the spit end, when it turns suddenly to the northward: the breadth is here 160 yards at low water, and a vessel may anchor in safety. As the channel thence to the jetty at port Beaufort is varying, no reliable directions can be given.

Port Beaufort is a small trading settlement on the left bank of Breede river; loaded vessels cross the bar drawing 11 feet and lie alongside a jetty. The value of the exports is inconsiderable.

Supplies are readily obtained except water, which has usually to be brought down the river in boats from a distance of 20 miles or less according to the season, though sometimes it is fresh at port Beaufort.

There is postal communication with Cape Town.

KAFFIR KUYL BAY, situated about 6 miles eastward of cape Barracouta, with Leven point midway between, is open to winds from E.S.E. to S. by W., and is therefore unsafe during the season of south-easterly winds; but in winter, when westerly winds prevail, cargoes may be safely landed or shipped.*

The anchorage is sheltered from the south-westerly swell by a reef which projects about half a mile to the southward from Morris point. It appears to be clear, with regularly decreasing depths of from 10 to 4 fathoms, with a bottom of sand and broken shells. The best anchorage is in $6\frac{1}{2}$ fathoms, about one-third of a mile from the shore, with Morris point bearing about S.W. by W.

Kaffir Kuyl river is insignificant, and has a bar which is nearly dry at low water. There is a good landing-place in fine weather in the rocky cove on the south side of the mouth of the river.

COAST.—The shore eastward of Kaffir Kuyl river is a sandy beach for about 2 miles, whence it rises, and trends in a south-east direction for 12 miles to Izervark point; it is skirted with reefs, on which the sea breaks. Izervark point is bold and rocky, with Buffels Kop hill, 740 feet high, about one mile northward of it; Aasvogel berg, a long elevated mountain, 1,620 feet high, lies 11 miles northward from the point, and may serve to identify it.

Between Izervark point and cape Vacca, 10 miles farther eastward, the coast consists of jagged rocks, on which a heavy sea is constantly beating. The land immediately at the back rises to the height of

* See plan of Kaffir Kuyl bay on chart, No. 2,083.

500 to 700 feet, and is covered with vegetation. Bull point, about 3 miles eastward of Izervark point, is not easily distinguished, being only a slight projection; at half a mile westward of it is a sand patch of a reddish colour; and South, three-quarters of a mile from the patch and one-third of a mile off shore, are patches of detached reef which break and uncover at low water.

Gouritz river enters the sea at about one mile westward of cape Vacca. There is a sandy beach on the western side of entrance, but the breakers are generally too high to make it available as a landing place. The sea breaks across the mouth of the river, which at the outer part is half a mile wide, but at half a mile within it is only 10 to 15 yards wide.

Cape Vacca, lying 15 miles west from the lighthouse on cape St. Blaize, is the extreme of a low flat of rock and shingle jutting out from a round hill which rises over the eastern side of entrance to the Gouritz river, $1\frac{1}{3}$ miles westward of the cape. In rough weather the sea breaks half a mile off the cape, at which distance the depth is 9 fathoms. From the discolouration of the water, and the uneasy ground swell in the vicinity, it is more than probable that foul ground exists there.

Care must be taken in rounding this low cape at night, as it is only just within the range of the light on cape St. Blaize. The light is not seen within the bearing N. 81° E., which is a little more than half a mile outside the cape. If the light is not seen, the lead will be the best guide either at night or in thick weather.

Flesh bay lies between cape Vacca and Flesh point, a distance of $2\frac{2}{3}$ miles. The shore of the bay is sandy, save at the extremes, which are rocky. About the middle of the bay there is a bare sandhill, 271 feet high.

Flesh bay affords no shelter, save as a temporary one in north-west gales, and it can only be used as a landing place in tolerably fine weather. Flesh point may be known by a flesh-coloured patch of sand; it is bold-to on the eastern side.

Fish bay is formed between Flesh and Pinnacle points, separated by a distance of 9 miles; the latter is the well-defined commencement of the rocky cliffs, about 250 feet high, extending 4 miles westward from cape St. Blaize. The whole of the shore of the bay is sandy, with occasional patches of rock showing near low water and through the breakers which are generally high. The land at the

back, at the distance of one mile, rises 400 to 500 feet in height, and is covered with vegetation.

Fish bay may be used by vessels seeking shelter from north-west gales. The best anchorage is in the west corner of the bay, in 7 to 8 fathoms, with Flesh point bearing about S. $\frac{1}{2}$ W., distant $1\frac{1}{4}$ miles, and the same distance off shore. It is advisable for vessels to put to sea as soon as the gale subsides, for then a heavy south-west swell sets in and causes a dangerous breaking sea. The best landing is near Flesh point, in a sandy cove between rocks; but in fine weather boats may land in the bight under a farmhouse.

CAPE ST. BLAIZE is a bluff about 250 feet high, upon which, at 500 yards from the sea, is a square white light tower, with buildings at its base for the light keepers; just beneath the bluff is the Logan stone, a remarkable whitewashed rock.*

The extreme of the cape is a tongue of low land, fronted by reef to the distance of $1\frac{1}{2}$ cables. The Blinder or Windvogel, a rock with $2\frac{1}{2}$ fathoms water, and 5 to 7 fathoms around, lies a quarter of a mile off the cape; the sea breaks on the rock at low water and in rough weather.

Vessels proceeding westward from cape St. Blaize should be careful not to shut in the light, nor should they stand into less than 25 fathoms water.

LIGHT.—From the square white light tower, 45 feet high, on cape St. Blaize will be exhibited after September 1897, at an elevation of 240 feet above the sea, a *group flashing white* light showing *two flashes*, each of one-third of a second in duration, *every fifteen seconds*, visible in clear weather from a distance of 15 miles. To the westward, the light is not visible when bearing eastward of N. 81° E., or within half a mile from cape Vacca.

A temporary *fixed white* light will be shown until the new light is exhibited.

MOSSEL BAY,* between cape St. Blaize and little Brak river, is about 6 miles wide; the whole of the western shore is a sandy beach. Between the Hartenbosch river and the little Brak are conspicuous sandhills, which are useful in identifying the bay when coming from the eastward. The mouth of the little Brak river is a dangerous quicksand. At one-third of a mile from the head of the bay, is Seal island, about 15 feet high, with 3 to 5 fathoms between it and the shore.

* See chart, No. 2,083; also plan of Mossel bay, No. 639.

Mossel bay affords excellent shelter to vessels during the winter months, April to September, when heavy north-west gales are of frequent occurrence, and it is far preferable to use it as a place of shelter than to buffet the sea about cape Agulhas. During the strength of these gales the water in the bay is smooth, and vessels ride easily ; but it sometimes happens that a heavy south-west swell sets into the bay if the wind veers to West and W.S.W., rendering the bay unsafe, and landing difficult and at times almost impracticable.

In winter south-easterly winds are unfrequent, moderate, and of short duration. The heaviest gales during the year are from W.N.W. Winter gales commence from N.N.W. with heavy gusts, unsteady both in direction and force, then veering to W.N.W. or West. They blow very hard in continuous gales, with a low barometer (29.6 inches), finally shifting rather suddenly to S.W., when they subside with steady breezes and occasional showers.

During the summer season, September to April, when south-east gales occur, the bay is exposed to the full effect of the open sea, but these gales seldom last longer than 36 hours, and do not blow home. A heavy breaking sea then rolls in, and vessels trading to the port usually ride with a long scope of cable, with a coir or hempen spring to ease the strain ; with this precaution vessels ride safely, and the holding ground is good. As in Algoa bay, there appears to be a strong easterly current or undertow, which assists to ease the strain on the cables. Should a sailing vessel, however, not wish to risk riding out a south-easter, by putting to sea early she will be well able to clear cape St. Blaize by first making a long board to the eastward, in which she will be assisted by the undertow. It has been found that a rise of the barometer usually precedes a south-easter, and that the increase of the wind is gradual at the commencement. Moderate south-west winds even at this season of the year are very common.

Landing jetty.—The south shore of the bay, for 3 miles north-westward of cape St. Blaize, is rocky, with the exception of three sandy coves, the outer two of which are named Vaarkens and Mauro. In Vaarkens cove is a substantially built jetty, protected by a small shelter pier from the east side of the cove ; here landing may generally be effected. The depth alongside the jetty is 11 feet.

Town of Aliwal.—On the rising ground over Vaarkens cove is the town of Aliwal, which consists of numerous houses, the greater

number substantially built, an episcopal chapel and a Dutch church ; various other buildings are in course of erection. The resources of trade and produce in the interior have been opened to this port by the formation of roads *via* Ruyterbosch and Meirings Poort, through a gorge of the Zwartberg range of mountains, and a thriving commerce is the result. There is also a bridge over the Little Brak river.

The population of the town in 1891, date of last census, was 2,061. The civil establishment is composed of a resident magistrate, a collector of customs, a district surgeon, and a small police force.

Trade.—The principal exports are wool, skins, aloes, ostrich feathers, tobacco, cereals, and brandy ; and the imports, general merchandise. The exports in 1895 were valued at £145,302, and the imports at £163,530.

LIGHTS.—A *fixed red* light and a *fixed green* light are exhibited from the extremity of the jetty in Vaarkens cove. The *green* light is not visible until bearing S.W. $\frac{3}{4}$ S., or southward of that bearing.

In bad weather, a *red* light is exhibited on the rising ground at Erme bay, for the purpose of guiding vessels, which may part from their anchors and are not able to beat off, to the best spot for beaching.

Supplies.—**Coal.**—Fresh water is supplied, at the rate of about 30 tons a day, from a pipe at the jetty end in Vaarkens bay. Fresh provisions and vegetables are to be had in any quantity, but coal only in small quantities. There is also a harbour master and an accredited agent for Lloyd's. There are no port charges.

Communication.—Aliwal is in telegraphic and postal communication with the Cape Colony, and the Union line of steamers call here fortnightly. There is other coastal service. The railway is two days' journey distant. Vessels can communicate with the shore by the International Code ; the flagstaff is near the Port office.

Directions.—**Anchorage.**—Approaching Mossel bay from the westward, the lighthouse bluff of cape St. Blaize will be conspicuous, the land at the back being quoin-shaped and somewhat resembling the Bill of Portland. In rounding the cape, keep Pinnacle point

See plan of Mossel bay, No. 639.

open southward of the rock under the cliffs just westward of the lighthouse bluff, until the large patch of sand at Hartenbosch river bears N. $\frac{1}{2}$ E., when the anchorage may be steered for, taking sufficient room for rounding-to, if necessary.

Coming from the eastward, cape St. Blaize may be identified by the lighthouse, which being white shows conspicuously against the dark background, and by the remarkable sand patch at the mouth of the Hartenbosch river.

There is anchorage in Mossel bay abreast the town of Aliwal, in about 6 fathoms, with St. Blaize lighthouse bearing S. by W., and the Magazine W. $\frac{3}{4}$ N. Small vessels may anchor nearer the cove in $3\frac{1}{2}$ to 4 fathoms.

Vessels seeking shelter only, should not go within a depth of 7 fathoms, in either season of the year.

At night, lights are shown from the jetty, as before mentioned. When the *green* light is visible (bearing S.W. $\frac{3}{4}$ S., or inshore of that bearing) anchor with St. Blaize light S. by W., in about 6 fathoms water.

Should a vessel part her cable, with no hope of getting to sea, she should run for the *red* light in Erme bay, bearing W. by S.

Tides.—There is no regular stream of tide in Mossel bay. It is high water, full and change, at 3h. 30m., and the rise 6 to 7 feet.

Weather signals.—The following signals are made from the shore when bad weather is expected, and must be answered and obeyed without delay :—

- Union Jack over flag S. - Prepare for bad weather.
- Union Jack over flag J. - Drop second anchor, have buoy ropes and springs on cables, and be prepared to slip and put to sea.
- Red flag above flag S. - Slip and put to sea at once ; see that buoys and buoy ropes are good.
- Union Jack over flag H. - Shorten in cable to length veered on first anchoring.

COAST.—Great Brak river lies in the north-east portion of Mossel bay, about $8\frac{1}{2}$ miles from cape St. Blaize. It enters the sea from between sandy hillocks, 80 to 150 feet high, and which are mostly covered with scant bush. The beach is sandy, and fringed

with rocks at low water. About 3 miles to the eastward, the sand hillocks disappear, and the coast becomes shelving and cliffy to the mouth of Mal Gat river.

Mal Gat river is a stream entering the sea between high cliffs ; its mouth is frequently closed with sand. The water is good, but of a dark-red colour. A little westward of the mouth, and one mile from the shore, there is a 10-fathoms patch, with deep water around. At $1\frac{1}{4}$ miles eastward of the mouth is a conspicuous cluster of rocks, all within $1\frac{1}{2}$ cables of the shore. The land at the back slopes gradually from a height of 720 feet to the sea, where it presents a rocky unapproachable shore.

Gayang river lies 4 miles eastward of the Mal Gat ; its mouth is often closed. The water is good, and of the same dark colour as the Mal Gat. Great Brak, Mal Gat, and Gayang rivers take their rise in the Outeniqua range of mountains, 4,000 to 5,000 feet high, upwards of 10 miles from the coast ; they have formed deep channels for themselves across the elevated plateau, extending to the sea coast.

Dutton cove, lying close westward of Gayang river, is a slight indentation in the coast, in which lies a rocky islet.

From Gayang river the coast takes an easterly trend for 4 miles to Schaapkop river, next to which is Mill river and Christina bay. The coast thus far continues rocky and unapproachable.

Christina bay is another spot in which an attempt has been made to make it available as a landing-place, from its nearness to George Town, but it is quite impracticable ; it is simply the embouchure of Mill river, which flows between steep, close, wood-covered hills. The beach is covered with large smooth stones.

Victoria bay lies half a mile eastward of Christina bay. It is a broader indentation than the other, but is shallow, with a sandy beach, where landing may at times be effected ; but no craft should attempt to enter it.

George Town is situated on a plain behind the coast hills, at about 5 miles from the Gayang river, and the same distance from Victoria bay.

Cayman river enters the sea at one mile north-eastward of Victoria bay, and, like the others, is of no navigable importance; within a mile from the mouth the waters of Zwarte river join it; here the river is fordable.

The Touw river, a small stream, lies a little more than one mile to the eastward of Cayman river, and its mouth is often closed by sand. It takes its rise in the Outeniqua mountains.

COAST.—From the mouth of Touw river the coast trends south-eastward about 21 miles to Walker point, which is 4 miles westward of Knysna harbour. For nearly 2 miles eastward from the Touw the beach is sandy, with scattered flat rocks appearing at low water, backed by a ridge of irregular sandhills, about 250 feet high. Thence the hillocks are stony, but the sandy beach continues, with fewer rocks above low water, for $4\frac{1}{2}$ miles, when it becomes permanently rocky, and the hills increase in height to 300 feet. Thence to Gericke point, about 2 miles farther, are cliffs of a reddish colour, averaging 500 feet in height; it is not wooded.

Gericke bay is small, with an apparently foul bottom; a rocky islet lies off Gericke point, and rocks outside the islet, but all that uncover lie within half a mile. The rocky coast continues beyond Gericke point for three-quarters of a mile, when the sandy beach again appears for a short space, across which Zwarte Vlei empties itself into the sea at certain seasons.

Lakes.—From the mouth of Touw river to the old mouth of Zwarte Vlei is upwards of 11 miles. Behind this extent of coast, at varying distances to 3 miles, are the three lakes, Lange Vlei, Rond Vlei, and Zwarte Vlei. Wild fowl abound on them all.

The first is composed of two parts, with channels connecting them, and extending 6 miles in all. The water is brackish, and has a maximum depth of 22 feet. The Wolve and the Touw streams are the principal, but not the only feeders of this lake.

Ronde Vlei is almost circular, with an average diameter of half a mile; it communicates with Lange Vlei; its maximum depth is 22 feet, and water brackish, but near the edge of the lake tolerably good water is found by digging a hole.

Zwarte Vlei is the largest in this chain of lakes; it extends upwards of 3 miles in one direction, and is connected with Ruigte Vlei, another and smaller lake. They are fed by the Diep, Wolve,

Zwarte, and Caratera streams. The water is brackish, and 48 feet deep in some places. Its south-east extreme is only about 2 cables distant from the sea, with which it appears to have been at one time connected by a passage known as Zwarte river. The land at the back of the lakes rises to 700 and 800 feet, and is fertile. Though not wooded, there are many conspicuous small clumps scattered about, and it is deeply intersected by the streams, rendering the roads steep and bad.

Groens Vlei, irregularly oval-shaped, upwards of 2 miles in length, and half a mile at its greatest breadth, contains fresh water. There are no streams flowing into it, and it has no visible outlet; its greatest depth is 20 feet.

COAST.—From the mouth of Zwarte Vlei, conspicuous bare white sand extends south-eastwards for one mile, when the beach becomes rocky, and continues so for 5 miles, interspersed with patches of sand. The beach is backed by irregular hillocks from 200 to 300 feet high.

The land behind Groene Vlei rises abruptly, so that at 3 miles from the sea it is 1,110 feet high. It presents a smooth green appearance, with scattered clumps of trees. The valleys are more or less cultivated.

In bad weather, this coast is fronted with heavy detached breakers to the distance of one mile or more.

Goukamma river enters the sea at the east extreme of a sandy beach 2 miles in extent. The river is remarkable for its sudden rising after rains, and the depth of water then attained. At a distance of 4 miles by its course from the sea it is crossed by a causeway on the high road between George Town and the Knysna; this causeway is sometimes dry, and at others covered to the depth of 12 to 20 feet, with a rushing torrent. The river has an average breadth of 100 yards along these 4 miles of its course; its mouth is closed by sand for long intervals during the dry season.

Walker point.—To the eastward of the Goukamma are two dangerous rocky points, including a small rocky and sandy bay one mile across. Off the western point at a quarter and three-quarters of a mile distant, are rocky patches on which the sea

constantly breaks ; but the whole neighbourhood is foul. Walker point, the easternmost of the two, is also rocky and dangerous, and forms the western horn of Buffalo bay. A chain of rocks extend about one-third of a mile from the point, with a sunken rock at about 4 cables distant, but the sea breaks much further out.

The land adjacent, is sparsely covered hillocks backed by undulating ridges, but at a distance of 2 miles inland, the higher green-coloured land is reached, without trees, and rising to upwards of 900 feet.

BUFFALO BAY is included between Walker point and the rocky cliffs westward of the head, at the entrance to Knysna river ; the distance is about 3 miles across. It affords shelter to small vessels during N.W. winds, but it should be remembered that the bay has not been sounded, and that rocks extend about half a mile southward from Walker point.

Anchorage.—Coasters, however, find shelter about midway between Walker point and the bight of the bay, at half a mile off shore, in from 5 to 8 fathoms, clear bottom with blue clay ; nearer to the point the ground is rocky. With the wind anything to the southward of West it is not advisable to remain here, as a heavy breaking sea then sets in.

KNYSNA RIVER and HARBOUR (pronounced Nysna), is situated close to the eastward of Buffalo bay ; the entrance, about 250 yards in width, being formed by two steep and rocky headlands, on the eastern of which there is a flagstaff and a pilot signal station.*

Northward of the Knysna there is a mountain named the Spitzkop, 3,048 feet high, eastward of which are five Paps ; and at 10 miles eastward of the entrance is the Krantz Hoek, 914 feet high, fronted by a bluff 554 feet high, from which the coast slopes away to cape Seal, the western point of Plettenberg bay ; these serve to identify the Knysna from a distance.

Town.—The township of Knysna is situated about 3 miles within the entrance of the river, and on the eastern bank. It is built on the slope of the hill and on its outskirts are several villa residences. There are several English residents, most of whom are connected with the timber trade.

* See plan of Knysna harbour with view, No. 1,224.

Between the town and the river is a strip of land belonging to the Admiralty, which was originally presented to them by the principal land owner of the district.

Jetties.—There is the town jetty near the south-west angle of the town, with a depth of 10 feet alongside, and Paarden jetty, at Paarden island, with a depth of 23 feet alongside at low water; the island is connected to the town by a bridge, and there is a tramway from the pier to the town.

Supplies.—The country around the Knysna abounds in various kinds of game. The river produces quantities of fish, and other provisions are abundant; water is to be obtained by application to the Port Captain. Good timber from the neighbouring forests is abundant, but coal is not obtainable. There are several firms of carpenters and engineers capable of effecting repairs to coasting craft, and vessels can be hove down. The climate is extremely healthy, and especially adapted to Europeans.

Communication.—There is weekly communication with Cape Town by steamer, and good roads to the interior.

Trade.—During 1895, 59 vessels, chiefly steamers, entered the port; aggregate tonnage, 26,165. The chief export is wool and government railway sleepers. Imports in that year were valued at £11,597, and the exports at £8,381. Population of Knysna and suburbs, 1891, date of last census, was 956.

The harbour is by no means easy of access, even to small steam vessels, in consequence of the heavy surf which breaks across the entrance; for sailing vessels it is only practicable with a leading wind. There is a depth of 18 feet in the fairway over the bar at low water springs, and the services of a pilot are not necessary unless proceeding beyond Best cove. Vessels of 14 feet draught can proceed to Knysna, about $1\frac{1}{2}$ miles beyond the cove. Boats can ascend the river to Westerford farm about 9 miles up.

Bar.—Knysna river has two bars, the outer one with 18 feet least water, stretches across the channel from Needles point, on the west side of entrance. The inner bar extends across the mouth just within Emu rock, on the east side of entrance, and has from 16 to

18 feet at low water springs. Both bars are stationary, and are of rock, covered with sand and mud ; no difference in the depth of the water on the bars has been observed for many years.

Beacons.—There are two beacons to guide vessels over the bar—one on Fountain point, just within the entrance on the east side, consisting of a white stone beacon built upon a large rock, and standing 30 feet above high-water mark ; the other on Steenbok island, is a wooden one composed of a long spar with two triangles and painted red ; these lie N.E. $\frac{3}{4}$ N. and S.W. $\frac{3}{4}$ S., 758 yards apart.

Emu rock, with 4 feet water, is on the eastern side of the channel, nearly one cable S.W. of Inner Obelisk point.

The sea does not always break on the rock.

Black rocks are situated one cable southward from the southwestern point of entrance ; the sea always breaks on them. South-East rocks are another cluster, distant $4\frac{1}{2}$ cables S.S.E. of the Mewstone.

Tides.—It is high water, at full and change, at 3h. 30m. ; springs rise from 6 to 7 feet.

The tidal stream runs from 4 to 5 knots through the Narrows during springs. The flood sets strongly from the eastward towards Needles point, and from thence directly through the Narrows. The ebb from abreast Green point sets directly towards Fountain point, and on to the rocks between that point and Inner Obelisk point, and thence it follows the channel to the eastward, except there be a strong westerly current outside, in which case it runs directly to seaward.

With a heavy sea on the bar, at near high and low water, the force of the break drives towards Emu rock large masses of water, which set strongly out again close to the western shore, outside the inner bar. It is therefore advisable, before taking the bar with a breaking sea, that the flood should have made at least two hours, at which time the stream inwards and the break act together, and the drawback is not felt.

Signal station.—**Pilots.**—On the summit of Outer Obelisk point there is a flagstaff, and a pilot house painted white, with which communication can be held by signals, and directions given

for entering the harbour. The house is visible from a considerable distance seaward, and forms a good landmark. There is also a pilot boat for giving assistance to and directing vessels entering or leaving the port. It frequently happens that, although the weather and bar may be favourable for vessels to enter, it may not be safe or possible for the pilot boat to go out.

The pilot signals used are as follows :—

White and blue diagonal.—The pilot boat is coming out.

Red.—Vessel is recommended not to attempt to come in.

White and red horizontal.—Vessel may come in now. If waiting for the tide, a red pendant will be shown over the flag at a proper time for entering.

Yellow.—Pilot boat cannot go out, but is ready to receive the vessel within the bar.

DIRECTIONS.—Anchorages.—In case a sailing vessel has to wait for wind or tide to enter Knysna river, she may, in moderate weather, anchor off the entrance in 12 to 15 fathoms, blue clay, but not when the weather is unsettled, as the sea frequently sets in heavily from south-west with little or no wind. Attention must be paid to any signals made from the pilot station.

The best time to enter Knysna harbour is a little before high water. It is not advisable to go either in or out during the strength of the ebb at spring tides, more especially if there is any break on the bar. Vessels should approach the entrance with the beacons in line, bearing N.E. $\frac{3}{4}$ N., and keeping them so until nearly abreast Inner Obelisk point, thence steer to pass about 50 yards off Fountain point, from abreast which, steer for Green point (the south point of Best cove), keeping close to it to avoid the tongue of sand which projects from the northern end of Steenbock island. The distance of the point of the Spit (11 feet water) from Green point is 100 yards only. Having passed Green point, anchor in Best cove, in 4 fathoms. There is a depth of about 14 feet water close to the shore. There is no danger in grounding in any part of the river, as the bottom is soft.

Vessels proceeding to the anchorage off Knysna should employ a pilot. From Best cove, the western shore should be kept aboard until abreast the stakes marking the edge of the spit extending southward from Paarden islands; thence steer close along to the westward of the stakes and of Paarden jetty. When past the jetty

the anchor should be let go, in about 15 or 16 feet, and when swung to the flood secure the stern to one of the mooring buoys; vessels can also lie afloat alongside Paarden jetty.

Before crossing the bar, under sail, it is necessary to have a boat in readiness with a kedge and hawser, as the wind sometimes dies away between the heads.

In proceeding in, the wind should be at least two points southward of West, and not eastward of S.E.

In leaving the harbour, under sail, the wind should not be to the westward of North nor to the eastward of E.N.E. The best time to get under way is with the last quarter of the flood. With a commanding breeze a vessel may go out with the last quarter ebb, but in getting under way care should be taken not to get too close to the eastern shore, as the ebb sets towards the rocks between Fountain and Inner Obelisk points.

It frequently happens that there is no wind in Best cove when there is a fine breeze blowing out through the entrance. During the summer months, when the winds prevail from S.E., almost the only opportunity for a sailing vessel going out is early in the morning, when there is generally a breeze from the land, which dies away about 9 or 10 a.m. and is succeeded by the sea breeze.

The COAST from the entrance of the Knysna trends eastward for 3 miles to the mouth of the Nútze. It is composed of irregular red cliffs, 200 to 300 feet high, with patches of shingle beach, and points fringed with off-lying rocks, to the distance of half a mile in places. The back land rises steeply to a height of 700 feet, and clusters of trees become more frequent and larger towards the Nútze.

Between the Nútze and cape Seal are many peaked masses of rock, some bare, others clothed with vegetation, which occasionally rise as high as the cliffs, giving a characteristic appearance to this part of the coast.

The coast maintains the same precipitous cliffy character for 3 miles eastward of the Nútze, and rising steeply behind to a height of 900 feet. This portion, and for 3 miles inland, is inaccessible, being completely covered to the cliff heads with dense forest. At 4 miles eastward of the Nútze a deep gorge is reached, beyond which the country facing the sea assumes the usual smooth green appearance, with scattered clusters of trees.

No Landing.—There appears to be no spot on this coast where landing could be effected.

The Nütze is a stream flowing across a small patch of sandy beach into the sea, from between high wooded hills; its mouth is often closed. At a distance of 3 miles from its mouth it is called the Witte Els.

CAPE SEAL is the easternmost point of a tongue of land with rugged sides and overhanging cliffs, clothed with scrubby bush; it is rather more than $1\frac{1}{2}$ miles in length, rising about its centre to the height of 485 feet, and being joined to the mainland by a narrow neck, has from many points of view the appearance of an island. Off its south side is a rocky mass, 123 feet high, about half a mile in length, joined to it by a narrow sandy isthmus.

Whale rock, having a depth of 4 feet, lies S.E. from the pitch of the cape, and $3\frac{3}{4}$ cables from low water mark. A patch of $3\frac{1}{4}$ fathoms lies nearly one cable north-west of the rock, but on the seaward sides it is steep-to. The sea does not always break on Whale rock.

PLETTENBERG BAY*, may be considered to lie between cape Seal and Salt river, distant from each other about 9 miles. Plettenberg bay, from its suitable depths at short distances from the shore, its good anchoring ground, and the shelter afforded, renders it equal to any other bay on the south coast. Vessels seek shelter here when the sea is too high to get into Knysna and Mossel bay.

Like the other bays on this coast, it is exposed to the full force of the south-east gales that blow so violently from September to March; and a vessel should be prepared to leave it on any indication of a south-east gale.

Settlement.—**Landing.**—Pisang river, situated at the head of the bay, is small, and frequently has its mouth closed, but affords a supply of fresh water; at its mouth is a rocky islet, 40 feet high, sparsely covered with bush, the top of which is in latitude $34^{\circ} 3\frac{1}{2}'$ S., longitude $23^{\circ} 22\frac{3}{4}'$ E., and being close to the landing place masters of vessels can readily test their chronometers.

A rocky ledge, covered at high water springs, lies about a quarter of a mile eastward of the islet, affording some shelter to the beach close northward of it, the only landing place, though it is not always

* See plan of Plettenberg bay, No. 385.

practicable. The old residency, the Government store houses, a little church and parsonage, with stores and such moderate supplies as the place yields, are close at hand.

Numerous farms are scattered over the country and in the valley of Pisang river, whence supplies of meat and vegetables can be obtained. Water has generally to be rafted through the surf in casks. There is little or no trade, and there are but few people in the immediate neighbourhood of the port. The nearest town is Knysna, which is some 20 miles distant; communication with the interior is by ox waggons. There is no telegraph.

Directions.—There are no dangers in entering or leaving the bay, except Whale rock, which should be given a berth of about one mile. The channel between it and cape Seal should not be attempted. The south end of the long sandy beach southward of Pisang river, in sight, leads north-eastward of the rock.

Anchorage.—Vessels visiting Plettenberg bay to ship timber usually anchor under shelter of the ledge of rocks off Pisang river. Vessels seeking shelter from westerly gales should anchor more in the southern portion of the bay, with the Gap in the peninsula bearing S.W., and the extreme of the cape S. by E. $\frac{1}{2}$ E., in 8 fathoms, sand. There is generally a heavy surf on the beach which prevents landing.

Tides.—It is high water, full and change, at Plettenberg bay at 3h. 10m., and the rise is 6 feet. There is no regular tidal stream in the bay.

Kourboom river, the most considerable on this part of the coast, rises in the Lange Kloof range, which reaches 5,294 feet in height. It trends between high lands $3\frac{1}{2}$ miles from its mouth, and flows across a plain in a tortuous channel, in many places fordable at low water, and obstructed by sandbanks; for the last $2\frac{1}{2}$ miles its course is parallel with the coast, and separated from the sea by a narrow sand strip. At high water it appears a large river, as much ground covers and uncovers with the tide. It is navigable for boats for about 8 miles, but the bar is only passable under favourable circumstances.

Bitan river is a small stream, moving sluggishly and winding along a broad plain. It joins the Kourboom about 2 miles from the mouth of the latter, and is fordable just above the junction.

The Coast.—From the mouth of Kourboom river, the coast for 5 miles is a sandy beach, backed by sandhills more or less covered with scant bush. Along this beach no landing should be attempted, as the sea always breaks heavily. At the east end of this beach is the Droog river, whence the coast becomes rocky, with intermediate sandy beaches, but the whole fronted by outlying rocks. The Droog, as its name implies, is mostly without water.

Matjies river is one mile eastward of the Droog, and its mouth is often closed. It enters the sea from between high hills, and is bounded between high precipitous and wooded hills for some distance from its mouth.

Komkromma or Salt river lies $3\frac{1}{2}$ miles eastward of Matjies river; the coast between consisting of rocks and sandy beaches. About $1\frac{1}{4}$ miles eastward of the Matjies is the most off-lying cluster of rocks, which are, however, within a quarter of a mile of the shore; close to the eastward of Matjies river are two rocks, 50 feet high; the shore here is usually dangerous to approach. Abreast the rocks, the country is park-like, with wooded patches and gorges, and farther inland, forest.

The Salt river is said to be navigable by boats for one mile above its mouth, but the sea frequently breaks heavily off and about its mouth; directly within it expands to a small lake.

COAST.—Aspect.—Over the eastern point of Groote river, which is about 11 miles eastward of cape Seal, is a double peak. The coast thence south-eastward to Aasvogel point, a distance of 37 miles, is formed of perpendicular cliffs, and rocky hills, 300 to 600 feet high. It is intersected by streams and gorges, with several outlying dangers at a short distance; it should not be approached nearer than 2 miles. In this extent of coast the numerous streams which empty themselves into the sea take their rise in the Outeniqua mountains, but none of them are navigable for vessels.

The Outeniqua mountains, which in this locality back the coast at a distance of 4 to 8 miles, continue eastward to about 7 miles north-east of Zitzikamma point. This mountain chain has several well-defined peaks, which from their appearance are very conspicuous and useful landmarks to seamen. Formosa peak and Thumb peak (so called from its appearance) each about 5,500 feet in height, are the highest and most remarkable.

Nearer the coast, and only 4 miles from it, the Grenadiers Cap, so named from its shape, is also conspicuous and 3,224 feet in height. Eastward 20 miles on the same range is Witte Els berg, a pyramidal peak, 4,098 feet in height; when seen from the eastward and westward it shows a flat top.

Karedow peak, when nearly abreast, shows a saddle-shaped hill, but on other bearings a flat top, 3,009 feet in height. The end of Outeniqua range, north-eastward of Zitzikamma point, is very conspicuous, terminating in a sharp conical hill 1,634 feet in height, which drops suddenly to the plain, and extends to the shores of St. Francis bay.

Elands river range and Van Staden range of mountains north-eastward of cape St. Francis are also conspicuous, and in clear weather mount Cockscomb is a conspicuous object. The Van Staden range, which terminates suddenly, has a remarkable jagged top peak at its south-east extremity named Brak River hill, 1,989 feet in height.

Groote river lies 2 miles eastward of Salt river, and within its mouth expands into a lagoon. A conspicuous hillock marks its eastern bank, from whence the shore is backed by high wooded cliffs, as far as Blue Rock river, which river may be known by the cliffs on the eastern side being bare and perpendicular. There are deep ravines in the land, and several other streams along the wooded coast as far as Storm river.

Storm river.—Wall point, $12\frac{1}{2}$ miles eastward of Groote river, is so named from its perpendicular appearance. Storm river, 4 miles eastward of Wall point, is about 50 yards in breadth, and flows through a gap between cliffs about 600 feet in height. Low shelving rocks on the western side partly shelter the entrance, and under favourable circumstances, landing may be effected in boats, a little inside the eastern point. The point forming the eastern entrance is skirted by rocks awash lying close to the shore.

Eastward of Storm river the forest loses its denseness. A sunken rock lies about $2\frac{1}{2}$ cables off shore at 3 miles eastward of Storm river.

Faure river, a small stream, lies 5 miles eastward of the Storm. A long patch of sunken rocks, on which the sea breaks in bad weather, lies one mile off the entrance.

Elands river, lying about 9 miles eastward of Storm river, may be known by some white rocks a little inside a point on its eastern side of entrance. There are many branches to the river, and its banks a little inland are covered with dense bush. Eastward of Elands river the cliffs are not so thickly wooded.

Robhoek or Seal Corner point lies $2\frac{1}{4}$ miles eastward of Elands river. One mile eastward of Robhoek point, the cliffs are nearly perpendicular, with rocks awash at the distance of one cable. At $2\frac{3}{4}$ miles farther on is the mouth of the little river Witte Els; thence, sand skirted by rocks, extends along shore $1\frac{1}{2}$ miles to a high rock, with a ledge extending nearly one mile in a north-westerly direction; the ledge covers at half tide. Eastward to Aasvogel point there are several dangers awash at a quarter of a mile off. There are farm houses about one mile inland.

Aasvogel or Vulture point may be known by the cliffs forming a hill, 660 feet high, with a strip of sand half a mile at the back of it; a rock awash lies one cable distant from the point.

Clarkson village.—At $2\frac{1}{2}$ miles westward of Karedow peak is a road through the mountain range, and at the same distance, to the south-eastward, is the village of Clarkson with a population of 500, and the Moravian mission.

From Aasvogel point, eastward for 4 miles, the coast is composed of cliffs, and appears clear of outlying dangers. Here, at a small stream, the land is more elevated, and rocks lie about half a mile from the shore; eastward there are sandy beaches as far as the mouth of Zitzikamma river. This shore should not be approached within 2 miles.

ZITZIKAMMA RIVER, the entrance of which is closed, may be identified by some sand cliffs nearly one mile in extent on its western side. At the back of the sand cliffs the land attains an elevation of 729 feet. The eastern side of the river is much lower than the western side.

Thence to Zitzikamma point, the coast is formed by several grassy ridges, fringed with rocks. There are many streams of fresh water in this locality.

Zitzikamma point is low and shelving, with rocks and breakers extending nearly three-quarters of a mile off. Eastward of the point the coast is composed of a succession of bushy hillocks 50 to 120 feet high, from the base of which shelving rocks and breakers extend off about half a mile. The highest of the hills in the vicinity of the point is 596 feet.

Two rocks awash lie close off Wreck point.

Landing.—On the ridge, one mile within Wreck point, there is a conspicuous peak 560 feet high. About half a mile eastward of Wreck point there is a ledge of rocks, the eastern part awash at low water, and forming a cove where at times landing can be effected. Within the cove long shelving rocks and big boulders appear at low water, and on the western part there is a little sandy beach.

Reef, or Klippen point, is a rocky point 30 feet high, with a cluster of rocks projecting two-thirds of a mile, in a S.S.E. direction; the outer rock is nearly awash at low water, and the inner one 13 feet high.

SLANG BAY has on its western side low sand cliffs, 30 to 50 feet high, with patches of bush, and the shore is foul for half a mile north-eastward of Klippen point; in other parts the bay appears free from rocks, but a heavy surf rolls into it. Bare sandhills, from 200 to 300 feet high, fringe the bay for 3 miles, whence it is blown by the strong westerly winds experienced along this coast between two ridges to a distance of 6 miles inland.

Slang river lies at the head of the bay, but its mouth is closed. Another small stream discharges itself into Slang bay three-quarters of a mile to the eastward of Slang river, and at the back of this, the land gradually rises to a grassy ridge 596 feet high; at 3 miles inland some white farmhouses are conspicuous from the westward.

The coast eastward of the second river consists of wooded hills, 200 to 250 feet high, based by rocky cliffs, 10 to 20 feet high.

There is a cove three-quarters of a mile eastward of White point, formed by a rocky ledge, parallel to the coast; it is encumbered with boulders, which cover at high water, when, under favourable circumstances, it is stated a boat may land.

Thys bay.—Thys point forms the western point of Thys bay. It is 50 feet high, with shelving and sunken rocks extending

one-third of a mile off. Thys bay is a sandy bight about one mile in breadth, and apparently free from rocks; low sand hillocks fringe the bay, and at the eastern end there is a sandhill partially topped with bush, 366 feet high; here the sand is blown inland to a distance of 2 miles, forming a conspicuous stripe when seen from seaward.

The shore from Thys bay trends in a south-east direction, and is rocky and rugged, with grassy cliffs from 50 to 110 feet high.

Scholtz Kraal is a cliffy indentation, 2 miles eastward of Thys bay; in it there are several rocks, and at the head a small waterfall. Near the summit of the ridge, about half a mile from the coast, a farmhouse is visible. In the vicinity of Scholtz Kraal, rocks awash extend a quarter of a mile off-shore, and in a rocky bight, $1\frac{1}{4}$ miles south-east of the Kraal, H.M.S. *Osprey* was wrecked in 1867. At this bight the grassy cliffs and hills decrease in elevation, the shore is straight, and fronted with rugged rocks, 10 to 30 feet high.

SEAL POINT is a rocky projection, lying 2 miles westward of cape St. Francis; off the point there are three rocks nearly awash, and at half a mile S.E. by E. from it there is a reef half a mile in extent, on which the sea breaks heavily in bad weather.

Between Seal point and cape St. Francis is a bay about half a mile deep; its shores are rocky, with large boulders, but at its head there is a low sand beach, in front of a ridge of bushy sand hillocks varying from 30 to 70 feet in height.

LIGHT.—At about 250 yards within the extreme of Seal point is a stone light tower, 91 feet in height, painted white, with keeper's dwelling attached. From the tower is exhibited, at an elevation of 118 feet above high water, a *flashing white* light, at intervals of *twenty seconds*, visible in clear weather from a distance of about 16 miles. The light shows *red* between the bearings of S. 30° W. and S. 83° W., over Krom bay, excepting where the hill tops intervene. In consequence of the want of sharpness in the change from red to white, it may appear red near the bearing of West; but this red light will not be seen from a vessel passing a safe distance along the coast, and if seen warns the mariner of his dangerous approach to the shore. The light is named St. Francis.

Telegraph.—There is a flagstaff and signal station near the lighthouse, which is in telegraphic communication with the ports of the colony.

Cape St. Francis is the most prominent point along this coast ; from the eastward and westward it appears as two bushy hummocks with a bare sand ridge between ; the northern hummock is 140 feet high, and the southern 110 feet high. Its position may be known by mount Cockscorn, which bears about N.N.E. from it, and by the extensive plain inshore, on which, at a distance of 10 miles from the cape, may be seen the village of Humausdorp. *See* description of mountains, pp. 109, 110. At the back of this village are two remarkable mountains, the nearest one, Kruisfontein, 2,574 feet high, has a double peak ; the other, named from its appearance, is Sharp peak.

Immediately off the cape are two rocks, 11 feet and 9 feet high, with low water rocks between, terminating in a reef extending about 2 cables in a S.S.E. direction.

Vessels from the westward, rounding cape St. Francis, should give Seal point a berth of 2 miles, and not bring it to bear westward of N.W. by W. $\frac{1}{2}$ W. until the high sandhill in Krom bay, or the western end of beach, is well open eastward of the cape.

KROM BAY is formed between cape St. Francis and Zeekoe point, a distance of 7 miles. It affords good anchorage in 10 fathoms, over a sandy bottom, with cape St. Francis bearing S.W. $\frac{1}{2}$ W. distant about 2 miles, and about the same distance off the mouth of Krom river. Krom bay affords good shelter in westerly gales, but it cannot be considered safe with easterly winds, though it is said to be as safe as Algoa bay. South-west winds are the worst for swell. There is generally a heavy surf along the beach, but with westerly winds landing may be effected at the western end of the beach, or on the rocks forming that extreme of the bay. There are several farmhouses in the neighbourhood of Krom bay.

Landing.—From cape St. Francis the coast for $1\frac{1}{2}$ miles is rocky, irregular, and backed by grassy hills, and with two rocks, 4 feet above high water, about half a cable off shore.

Thence sandhills, 200 feet in height, commence, the base of which is fringed with rocks and boulders for about three-quarters of a mile to the beginning of the sandy beach ; at this point a long ledge of boulders uncover at low water, under which is one of the best places for landing.

The coast between these boulders and Zeekoe point is formed by bushy sand hillocks, and fronted with a sandy beach, which, to the

westward of Krom river, is flat and free from rocks. The highest hillock between Zeekoe point and Krom river is 67 feet, and just behind it is a spring of fresh water.

Tides.—It is high water, full and change, in Krom bay at 3h. 34m.; springs rise about 5 feet. South-east winds reduce the height, and north-west winds cause a corresponding rise. The barometer falls before north-west winds, and rises on the approach of south-east winds.

Krom or Crooked river is not navigable. At low water there is one foot on the bar, and the mouth is contracted to a breadth of about 33 yards, but at high water, the sand being very flat, the river presents an entrance, about 2 cables in width; within the entrance the water is deeper. There is a ford about 2 miles above the mouth, and near it are several farmhouses.

Humansdorp lies north, $7\frac{1}{2}$ miles in a direct line from the mouth of Krom river, on the main road between Cape Town and port Elizabeth, and contains a population of about 2,000; it gives its name to the district, has postal communication with all parts of the colony, and is 56 miles from port Elizabeth, with which and Cape Town it is connected by electric telegraph. Ostrich farming is carried on with marked success. The village is conspicuous from seaward.

Zeekoe river, $4\frac{1}{2}$ miles eastward of Krom river, is broad but generally closed. At three-quarters of a mile from its mouth the river divides into two branches, the western taking its rise near Humansdorp. The water is fresh at about 2 miles from the sea. The hillocks fringing the intervening coast are about 100 feet high, and there are rocky ledges projecting from the sandy beach, all of which nearly cover at high water.

Zeekoe point, 102 feet in height, lies half a mile eastward from Zeekoe river. At $1\frac{1}{2}$ miles northward of the point, in a sandy bight between two ledges, is Jeffrys bight, a fishing establishment. Here is a two-storied building and some cottages.

Landing.—Jeffrys bight is considered one of the best landing places in fine weather.

Noors Kloof point, $1\frac{1}{2}$ miles north-eastward of Jeffrys bight, is formed by a wooded hillock near the termination of a back ridge of hills. The beach northward is comparatively free from rocks.

Kabeljou river, closed at its mouth, lies about 2 miles northward of Noors Kloof point. The frontier road crosses the river about one mile from its mouth, and at this place fresh water may be obtained. The back land for 3 miles to the eastward forms a plain, and nearly midway to Gamtoos river there are some conspicuous farm buildings at one mile from the beach.

Gamtoos river lies at the head of St. Francis bay. Its bar is nearly dry at low water springs, but there is deep water inside, and the tidal influence is felt for about 8 miles up; a ferry from the main road crosses it 3 miles from its entrance. The east point of the river is formed by low sandhills, but on the opposite side the hills form bluffs, which are conspicuous from seaward.

Eastward of Gamtoos river the bare sandhills increase considerably in elevation, forming ridges nearly perpendicular to the coast.

Van Staden river, also closed at its mouth, is 9 miles eastward of Gamtoos river, and may be known by the high sandhills which form a saddle sand peak on its western side.

The abrupt termination of the Van Staden range of hills, and a double peak, Brak river hill, 1,989 feet high, 5 miles inland, are also good marks for identifying this locality.

Maitland river may be identified by the sand extending some distance inland at its western side, forming a conspicuous round hill, and by another high sand patch, about $1\frac{1}{2}$ miles eastward of it; like all the other rivers it is dry at its mouth. There are several farms along the banks, and lead has been found in a mine about 2 miles from its mouth.

The coast eastward to Glassen point is foul in places to a quarter of a mile from the shore.

Glassen point is fronted by a rocky ledge to the distance of half a mile, on which the sea breaks with violence during heavy gales. The cliffs are formed by the termination of bushy hills about 150 feet in height. One and a half miles inland there are two hills;

the western one is wooded, but the top of the eastern one, named Lovemore hill, 690 feet above the sea, is bare, with a conspicuous clump of trees near its western slope.

Coast.—At 4 miles eastward of Lovemore hill, near the eastern extremity of a wooded ridge, is Buffels Fontein or Botha Kop elevated 915 feet above the sea; it has a bluff termination, and near it are several buildings.

Eastward to Chelsea point the coast is composed of cliffy points with sand beaches between, and sunken ledges extending in places about a quarter of a mile off shore.

Foul ground.—From the report of a Court of Inquiry, held at Port Elizabeth in 1890, into the loss of the s.s. *Strathblane*, by striking on a rock near the shore westward of cape Recife, it appears that foul ground may exist about one mile from the shore westward of Chelsea point for a distance of about 5 miles. Further, it is not improbable that the unsounded area fronting the coast between Chelsea point and Glassen point may contain many hidden, and as yet unknown, dangers.

Chelsea point lies about 4 miles westward of cape Recife; the point is shelving, with several conspicuous grassy hillocks, the highest being 103 feet above the sea; at the back are some high sandhills. Off the point there are two rocks above high water, and sunken dangers extending about two-thirds of a mile. The bay between Chelsea point and cape Recife is fringed with sunken ledges.

GENERAL DIRECTIONS.—From cape Seal (page 107) to Zitzikamma point the shore should not be approached within a distance of 2 miles, or at night and in thick weather a vessel should not stand into less than 45 fathoms. Thence to cape St. Francis the same distance should be preserved in daytime, but at night and in thick weather, owing to the irregularity of the depths and the probability of the current setting directly on to the shore, it should not be approached in less depths than 70 fathoms. Between cape St. Francis and cape Recife the same distance must be observed in daytime, and at night until the vicinity of Glassen point is approached, the vessel may go into 45 fathoms, but in thick weather and at night no nearer to cape Recife than a depth of 60 fathoms.

Caution.—A current at times sets directly on to all this part of the coast or in a north-east direction ; seamen should therefore avoid hugging the land at night or in bad weather, when bound either east or west ; more especially as dense fogs occasionally prevail. From cape Agulhas eastward to Buffalo river the current has been known not only to set to the westward along, but towards the coast, more particularly opposite the bays. *See* currents on pages 31 and 32 and caution, page 85.

A weak current runs to the eastward near the shore all along the coast between cape Seal and cape Recife, but in the offing, as a rule, the Agulhas current sets to the westward at a rate of from one to 2 miles an hour ; and off the edge of the bank of soundings as much as $3\frac{1}{2}$ or 4 miles.

See chart, No. 2,085.

CHAPTER IV.

CAPE RECIFE TO CAPE MORGAN.

(Long. 25° 40' E. to long. 28° 20' E.)

VARIATION IN 1897.

Port Elizabeth, Algoa bay	...	...	29° 0' W.
East London, Buffalo river	...	...	28° 20' W.

ALGOA BAY is formed between cape Recife and Woody cape which are 33 miles apart in an east and west direction. In the south-west corner of the bay is Port Elizabeth, off which there is usually safe and convenient anchorage at all times of the year, but like other bays on this coast, it is subject to the full force of the south-east gales that blow so violently at times during the months of October to April.

Cape Recife is low, with a stone lighthouse; to the north-west of it is the hillock of Recife, which is the higher of the two, and is often seen some time before the lighthouse is made out.

In approaching the land from the southward during daylight, cape St. Francis has been mistaken for cape Recife, but they may be distinguished by the hillock above mentioned, which appears at a distance as the termination of the coast line, and by a remarkable strip of bare white sand, immediately to the westward of the hillock, appearing like a beach, also by the differently coloured lighthouses.

Thunderbolt reef, on which H.M.S. *Thunderbolt* was wrecked in 1847, lies about three-quarters of a mile from cape Recife, with the lighthouse bearing N.E. $\frac{1}{2}$ E.; the sea generally breaks heavily upon it, but at high water and in fine weather this may not occur. There is an indraught towards this reef and the cape, and no sailing vessels should attempt to approach either, except with a commanding breeze, within the distance of 2 miles.

* See chart of Algoa bay, including Bird islands, No. 642; and plan of Port Elizabeth, No. 641.

Caution.—As the depths about the cape and reef decrease suddenly from 10 fathoms, vessels should not go into less than 12 fathoms.

LIGHTS.—**Cape Recife.**—From a lighthouse 80 feet high, painted in red and white horizontal bands, on cape Recife, is exhibited, at an elevation of 93 feet above the sea, a *white* light, with *red* sector, *revolving* every *minute*, and visible from seaward in clear weather from a distance of about 15 miles. The light shows *white* except between the bearings of S. 39° W. and S. 11° W., where it shows *red*, to warn vessels of too near an approach to Dispatch rocks.

At **Port Elizabeth**, on a hill at the back of the town, S. $\frac{1}{2}$ E., distant 25 yards from Donkin monument, is a stone colour lighthouse 55 feet in height, from which is exhibited at 225 feet above the sea, a *fixed* light, visible from a distance of 12 miles in clear weather. It shows *white* between the bearings of N. 56° W. and S. 55° W ; *red* between the bearings of N. 45° W. and N. 56° W., and from S. 55° W. to S. 45° W. In consequence of the greater elevation of Port Elizabeth light, in certain conditions of the atmosphere, it may be seen by vessels coming from the eastward, before the light on cape Recife.

At the extremity of the North jetty is a light which shows *green* seaward through an arc of 150°, or between the bearings of N. 46° W. and S. 16° E., and *white* inshore of these bearings.

The light whilst showing green leads clear of the dangers near the shore.

A *red* light is shown at the end of the South jetty, obscured inshore of a South bearing ; boats approaching must not lose sight of this light until close to the outer end of the jetty.

A light is shown during south-east gales, near the beach northward of the town. See port instructions, page 125.

Telegraphic communication exists between cape Recife and cape Francis lighthouses and Port Elizabeth.

Beacons.—A stone beacon, 25 feet high, painted red, is situated about 500 yards N.N.E. of Recife lighthouse. Two other stone beacons are situated about $2\frac{1}{2}$ miles northward of cape Recife, near

Beacon point, E. $\frac{1}{2}$ N. and W. $\frac{1}{2}$ S., 1,200 yards from each other, to mark Dispatch rock. They are each 25 feet high, surmounted by a ball, and painted in alternate bands of red and white.

Shoals.—Dispatch or Roman rock, with a least depth of 8 feet, and steep-to on its eastern side, lies nearly one mile off shore, and 3 miles northward of cape Recife; from the shoalest part, cape Recife red beacon is in line with the lighthouse, and the two beacons on Beacon point are in line bearing W. $\frac{1}{2}$ S.

Riy bank is about one mile in extent, and composed of uneven rocky ground, with depths of from 6 to 14 fathoms; the sea breaks heavily over it during and after bad weather. The shallow spot of 6 fathoms lies with cape Recife lighthouse bearing W. by N. $\frac{1}{4}$ N., distant $8\frac{1}{2}$ miles.

Strutts reef, with $2\frac{1}{2}$ fathoms, is about 50 square yards in extent, and 3 cables off shore, with the magazine bearing W. by S. $\frac{1}{2}$ S., and the lighthouse on South jetty N.W. by W. Port Elizabeth lighthouse in line with the tower of the town hall, bearing N.W. $\frac{1}{2}$ W., or the light showing *white*, leads northward of Strutts reef.

PORT ELIZABETH.—Town.—The town of Port Elizabeth is named after Lady Elizabeth Donkin, to whose memory an obelisk, 210 feet high, is erected on a hill overlooking the town and sea; her husband, Sir Rufane Shaw Donkin, arrived here in April 1820, for the purpose of locating the British settlers. Then there were but a few huts; the town (in 1891) had a population of 23,266. It is the principal seaport of the eastern portion of the Cape Colony, and its geographical position with reference to the other provinces, and as a port of call or refuge for vessels from the eastward, renders it a place of much importance.

The principal buildings are the town hall, library, provincial hospital, the Grey Institute, London and South African and Standard banks, St. Patrick's, Oddfellows', and Good Templars' halls, Masonic temple, the wool and produce market, gasworks, Custom house, and other handsome buildings, together with numerous churches and other places of worship within the town and environs. There are also two parks, one named St. George, the other Prince Alfred. The Baakens river is spanned by an iron bridge, connecting the two portions of the town.

Exports, &c.—The exports consist of wool, hides, ivory, beeswax, sheep and goat skins, ostrich feathers, tallow, angola hair, &c.

In the year 1894, the value of the imports was £5,280,457, and that of the exports £1,908,241.

Jetties.—The north jetty at Port Elizabeth is 384 yards in length by 28 yards in breadth, with a depth of 24 feet at its extreme at low water. The south jetty is about 250 yards in length, with about 14 to 18 feet alongside, and lies about 4 cables south-eastward of the north jetty. For the lights, *see* page 120.

Vessels of not more than 20 feet draught are allowed alongside the north jetty on due notice being given to the Harbour Master. Hydraulic capstans and screw moorings are provided, and arrangements have been made for watering and ballasting from alongside.

Both jetties are equipped with hydraulic cranes ; one of these, on the south jetty, is capable of lifting weights up to 20 tons.

Landing can generally be effected, but not in very heavy weather. A red ball is hoisted at the north jetty when landing is dangerous.

Supplies of all kinds are plentiful, and moderate in price.

Repairs to machinery may be effected, there being two engineering firms here. Shafts of 6 to 8 inches diameter can be turned, castings of 1½ tons made, and cylinders of 36 inches cast and bored. Tugs are available, and steam launches attend on the shipping. No facilities for docking.

Coal.—About 4,000 tons are usually kept in stock. It is shipped by means of lighters of 30 to 90 tons burthen. The jetties are connected by rails with the coaling stores.

Water is obtained from pipes at the end of the pier, and is put alongside vessels in the bay, when required, at a fixed charge.

Communication.—Port Elizabeth is connected with the telegraphic and railway systems of the Colony. Mails weekly from England *via* Cape Town, by Union and Castle Line steamers ; coastal steamers to other ports ; *see* also p. 15.

Time signal.—A black ball is dropped at Port Elizabeth lighthouse on the hill, at 1h. 30m. p.m., Cape Colony mean time, corresponding to mean noon at Greenwich, every day, Sundays and

public holidays excepted. If signal fails in accuracy a red and blue flag will be shown from the upper window of the lighthouse, and the ball will be dropped 5 minutes later.

The position of Lady Donkin's monument (close to the lighthouse) is lat. $33^{\circ} 57' 43''$ S., long. $25^{\circ} 37' 24''$ E.

Anchorage off the town of Port Elizabeth in about 6 fathoms water, sand over clay, may be taken with the lighthouse W. by N. $\frac{1}{2}$ N., and Bird rock at Beacon point S. by E. Anchorage equally good for large vessels may be taken in 8 fathoms, similar bottom, about half a mile east-north-eastward of this position.

At night, anchor with Port Elizabeth light bearing about W. $\frac{1}{2}$ N., in 8 fathoms.

The port captain determines the berths for merchant vessels, and vessels-of-war should take the precaution in the summer season, when East or S.E. gales may be expected, to anchor with plenty of room to veer. The holding ground is good, and with the ordinary ground tackle of vessels-of-war, there is not much danger in riding out these gales.

It is the practice of merchant vessels regularly trading for wool cargoes to moor on arrival, and to strike their top-gallant masts, and unbend sails. They are found with ground tackle superior to ordinary merchant vessels, and usually ride out in safety the summer gales from the S.E. Nevertheless, in S.E. gales of unusual severity, vessels at times break from their anchors and are stranded, with loss of life. See remarks on the weather, page 124, and pars. 5 and 10 of the Port Instructions, pp. 126, 127.

Tides.—It is high water, full and change, at Port Elizabeth at 3h. 10m.; and the rise is 6 feet; the tides are often irregular, being acted upon by the wind. The surface stream is uncertain in direction and inappreciable.

DIRECTIONS.*—Coming from the westward and having rounded cape Recife at the distance of about 2 miles, steer N. by E., taking care to keep the red beacon on cape Recife well open westward of the lighthouse, until northward of the line of the two beacons near Beacon point, or Beacon point bears W. by N., to avoid Dispatch or Roman rock; thence a vessel may steer for the anchorage.

See chart of Algoa bay, No. 642, and plan of Port Elizabeth, No. 641.

There is seldom any advantage in passing between Dispatch rock and the mainland, and no large vessel should attempt it.

A strong indraught will often be felt after passing cape Recife and Thunderbolt reef, and allowance must be made for it in passing Dispatch rock.

At Night.—Cape Recife should be rounded at a distance of 2 to 3 miles, and in not less than 15 fathoms water, bearing in mind the strong set towards the cape and Thunderbolt reef; and when the light bears N.W. steer N. by E., taking care not to enter the ray of *red* light shown from cape Recife lighthouse. When Port Elizabeth principal light is seen, which will first appear *red*, a vessel will be northward of Dispatch rock, but should continue on across the *red* into the *white* light, which will be first seen bearing N. 56° W.; and thence to the road, steering about N.W. $\frac{1}{2}$ N., and anchoring in about 8 fathoms, with Port Elizabeth light bearing about W. $\frac{1}{2}$ N.

In working in, or coming from the eastward, a vessel should keep in the *white* light of port Elizabeth principal light.

Leaving.—Vessels leaving Algoa bay and proceeding eastward, are recommended to take Bird island passage in fine weather; see page 131.

WINDS and WEATHER.—Easterly and S.E. gales, which alone are to be apprehended in Algoa bay, occur in the summer months from October to April; the worst weather usually happening during these two months, that is at the commencement and close of the season. In the winter months the wind seldom blows from these quarters, except in rare instances, when what is called a black south-easter comes on, with rain and thick weather, of which the appearance of the sky and sea gives sufficient warning. The black south-easters are more frequent in spring (October and November); they do not last long but at times are violent.

The approach of the summer gales is to a certain extent foretold by the irregular oscillations of the barometer, which, although constantly high, in comparison to what it would be under similar circumstances in westerly winds, falls before the increase of wind. A damp cold air prevails, and there is a constant hazy appearance about the horizon, the upper parts of the sky remaining clear. When

signals to prepare for foul weather are made from the Port office sailing vessels with doubtful ground tackle should get under way, making their first tack towards St. Croix island.

With the gale at its height a heavy and dangerous breaking sea rolls in ; but it has been observed that vessels with plenty of cable ride easily ; and, from the strong easterly current which prevails near the shore during these gales, it is probable that a powerful undertow assists to relieve the strain. It is also stated that, should the reading of the barometer be 30·5 inches, and cirrus clouds appear, a south-easter will set in before 24 hours have elapsed ; or if the hills to the northward of Port Elizabeth be obscured by haze a gale from south-east may be expected.

Port Instructions.—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 at the north jetty or as close to it as the safety of the vessel and other circumstances will admit. If anchored off, the vessel must then be moored with two bower anchors, with open hawse to the south-east, and special 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 supplies, 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 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 has 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.

5. To prevent injury to the jetties by vessels drifting upon them in south-east gales, no sailing vessel is permitted to lie to the southward of a line from the Hill lighthouse through the north Malay mosque, and should any vessel anchor southward of this line, she must shift her berth to the northward as soon as circumstances will permit. Steam vessels are to anchor southward of a line from the Hill lighthouse through the south Malay mosque. The light on the north jetty, showing *green*, leads clear of all danger for boats landing. It shows *white* inshore. On the south jetty is a *red* light.

Masters of vessels are especially warned of the danger of housing top-gallant masts, instead of sending them on deck, a practice which 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.

6. All vessels lying in this port shall show a light at night, as prescribed in the Board of Trade Regulations for preventing collisions at sea.

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

8. 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 the owners.

9. In a 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, directly in front of the gashouse, at the north end of the sea wall, on the chimney of which, at 45 feet above the sea, a powerful gaslight is shown during S.E. gales, as a guide to vessels that part from their anchors during the night, 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 lifeboat arrives alongside or a communication is established with the shore by means of the life saving apparatus or otherwise.

10. On all occasions when it is considered unsafe to work cargo, a blue light will be hoisted on the flagstaff on the north jetty, and when it is unsafe to land, a red ball will be hoisted. At these times ships' boats should never attempt to land.

Vessels can make their wishes known to their agents in bad weather, through the Port office by the International Code. Vessels not having the code, can make the following signals with their ensigns :—

1. Ensign in the fore-top mast rigging - I am in want of a cable.
2. Ensign in the main-top mast rigging - I am in want of an anchor.
3. Ensign in the fore rigging - - I have parted a bower cable.
4. Ensign in the main rigging - - I am in want of an anchor and cable.
5. Wheft where best seen - - - Send off a boat.

A signal station has been established in front of the harbour lighthouse, which repeats the Port office signals.

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.

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

No. 2. Send a line on shore, by cask, and look out for a line by rocket or mortar.

No. 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.

No. 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.

No. 5. Lifeboat 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 lifeboat.

No. 6. Secure the warp to the lower masthead, 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.

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.

- | | |
|--|--|
| No. 11. Union Jack over S, commercial code, white, pierced blue. | } Prepare for bad weather. |
| No. 12. Union Jack over J, blue, white, blue (horizontal). | } Veer cable. |
| No. 13. Union Jack over black ball with J below. | } Veer to a whole cable. |
| No. 14. Union Jack over H, white and red (vertical). | { Send top-gallant masts on deck, point yards to the wind, and see all clear for working ship. |
| No. 15. Union Jack over M, blue with white cross. | } Strike lower yards and top-masts. |
| No. 16. Union Jack over B, red burgee | { Hoist a light during the night. |
| No. 17. Union Jack over R, red with yellow cross. | { Heave in cables to the same scope as when first moored. |
| No. 18. Union Jack over black ball - - | - Clear hawse. |

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

Zwartkop river, about $5\frac{1}{2}$ miles north-eastward of Port Elizabeth, has a few feet on the bar at low water, but the surf is frequently heavy. The river is navigable for small vessels for 8 or 9 miles from its mouth.

ST. CROIX ISLAND* was so named by Bartholomew Diaz, the first European who landed here. It is about 4 cables in length, by 2 cables in breadth, with a surface of nearly bare rock; its western peak is 195 feet high. Penguins and gulls resort here, and it was formerly used as a temporary stopping place by sealers.

There is fair anchorage at about 3 cables north of St. Croix island, in 10 fathoms, sandy bottom, with its west peak bearing S. by E. In this position the heavy sea caused by East and S.E. gales is considerably broken, but the extent of sheltered anchorage is confined to a small space by the shape of the island.

Brenton rock, $1\frac{1}{10}$ miles south-west of St. Croix, is 50 feet high, about one cable in length and fairly steep-to.

Jahleel island, $1\frac{1}{2}$ cables in length, and 47 feet high, lies 3 miles westward of St. Croix, and about half a mile off Coega river. There is 6 fathoms water between it and the shore.

Coega river (pronounced Cooaha), a little more than 5 miles from the Zwartkop, is barred at the mouth, and the water, which is salt, discharges into a lake.

Sunday river, about $9\frac{1}{2}$ miles eastward of the Coega, enters the sea close to a remarkable rock named Read's monument. (So named by Captain Moresby, in 1820, in remembrance of a midshipman of that name, who perished with three seamen whilst surveying this coast.) The surf beats violently over the bar, which boats can rarely pass.

The Coast from Sunday river eastward to cape Padrone is formed by a monotonous chain of sandhills, which extend inland from one to $1\frac{1}{2}$ miles. Many of these hills rise to the height of 350 to 450 feet above the sea, and are bare. At the back of the sandhills the country attains an elevation of 1,200 feet, covered with grass and forest.

BIRD ISLANDS† are a cluster of low rocky islets, situated about 30 miles eastward of cape Recife, and nearly 5 miles southward of Woody cape. Bird island, the largest, is 33 feet in height, about 800 yards in length, and 630 yards in width. No water is found, save what little is left in the hollows of the rocks after rain. Sea fowl

* See chart of Algoa bay, No. 642.

† See plan of Bird islands and view on chart of Algoa bay, No. 642; also No. 2,085.

eggs are abundant at times, and a palatable vegetable, not unlike spinach to the taste, grows here. The *Doddington*, East Indiaman, was wrecked on Doddington rock in 1755.

LIGHT.—From a light tower on Bird island is exhibited, at an elevation of 100 feet above the sea, a *double flashing white* light, visible in clear weather from a distance of 16 miles. It shows a flash of two seconds, eclipse four seconds, flash two seconds, eclipse twenty-two seconds.

Stag and Seal islets.—At about 2 cables northward of Bird island are Stag and Seal islets, connected at low water. North-eastward of these islets are rocky patches extending east and west over a space of three-quarters of a mile, having 2 to 3 fathoms water; the middle rocks rise above water, and are named North patch. These dangers lie about one mile north-eastward from the lighthouse.

At about three-quarters of a mile westward of Seal islet are five black rocky islets, with a narrow passage between, having a depth of 2 fathoms. It is during very fine weather only that these islets are not surrounded with heavy breakers.

Rocks.—South-westward of Bird island there are three dangers named West rock, Doddington rock, and East reef. The two former are awash, and the latter has $2\frac{3}{4}$ fathoms water, but the sea is seldom so smooth as not to break upon it. West rock lies with Bird island lighthouse E. $\frac{1}{2}$ S. distant $1\frac{1}{2}$ miles nearly. From the Doddington, the lighthouse bears N.E. $\frac{2}{3}$ E. $1\frac{2}{10}$ miles; and from the centre of East reef N.N.E. $\frac{3}{4}$ E. $1\frac{1}{4}$ miles.

Between and around these rocks and islands the depths are irregular, and during bad weather a heavy sea rolls over the whole of this space, breaking in 8 to 10 fathoms water to seaward of the group. In thick weather a vessel should not stand into less than 60 fathoms.

Anchorage.—The Bird island group affords indifferent anchorage on the northern side; the holding ground is not good, and the bottom is uneven.

With south-east winds, the lighthouse seen between Stag and Seal islets, in 10 or 11 fathoms, is a good spot for shelter, but should the wind become strong from the westward, it will be found

necessary to shift berth to the eastward, anchoring with the Black rocks in line with Stag islet, 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.

Landing.—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 lighthouse in line with the first or western rock that shows on the white patch at the east end of Bird island, is the best direction to pull in upon, as it leads between the breakers on the spit and those off the end of Bird island. *See* sketch on chart No. 642.

Tides and Currents.—In the vicinity of the Bird islands no regular tidal stream was found, but the rise is the same as in Algoa bay. At the anchorage northward of the group the current sets generally to the eastward; on one occasion, during a strong westerly gale, it ran east at the rate of $1\frac{1}{2}$ knots. It was, however, upon two other occasions during westerly gales, found setting to the westward.

BIRD ISLAND PASSAGE.—Directions.—If bound from Algoa bay to the eastward, with favourable weather, Bird island passage is recommended. The channel is 3 miles wide and clear of danger; a vessel will carry from 10 to 15 fathoms through, and may run along the land at a distance of 2 to 3 miles the whole way to the Buffalo river. By passing inside Bird islands the strong current to the south-west is avoided.

Vessels passing inside the islands during the night, particularly steam vessels, are recommended to keep nearer to the mainland than the group, as the land is higher and more readily discerned, and the constant roar of the surf more distinctly heard than the breakers on the rocky reefs of the group. The lead with care will indicate a too near approach to the main shore, and 12 to 15 fathoms is a safe depth in passing. A wide berth should be given to cape Padrone, off which foul ground extends about half a mile. *See* directions continued, page 133.

In passing outside the group, no vessel should approach within 3 miles of the lighthouse, as no advantage is gained by it, and the

current, though not generally strong, is uncertain and irregular both in strength and direction in the vicinity of the group.

If proceeding from Algoa bay to Port Natal, steam vessels generally skirt the coast, but sailing vessels should keep about 100 miles from land in order to avoid the strength of the Agulhas current.

THE COAST.—Aspect.—The first break in the sandy feature of the sea coast occurs at Woody cape, abreast Bird islands. At this spot the sandhills are covered with dark bushes; they present to seaward a series of sandstone cliffs, fronted by a beach of rock, which extends along shore for 2 miles, when the sandhills are again met with; these continue as far as cape Padrone.

Fresh water is found at Woody cape, and about cape Padrone, welling out from the base of the sandhills. By digging into the sand above high water mark, fresh water may be had nearly all the way along this portion of the coast.

From cape Padrone to Keiskamma point, a distance of nearly 60 miles, the coast is mostly backed by hills, faced with sand to a height of 100 to 250 feet, with the exception of the first 20 miles, in which space the sand is much lower. The coast is intersected with streams, and the land near the shore presents a fine tract of pasture country with large patches under cultivation.

From the offing in the vicinity of cape Padrone, the most remarkable features are Nanquas peak (985 feet above the sea), and the high sandhills to the westward towards Woody cape. The peak, when seen from the southward, appears flat-topped, but proceeding eastward, it assumes a conical form, and is the most conspicuous object on this part of the coast.

Bokness hill, about $3\frac{1}{4}$ miles eastward of Nanquas peak, is a flat-topped bushy hill; thence to Glendower peak, about 13 miles beyond, the land is lower, uneven, and intersected with many ravines. When near the shore False islet and Bushmen river east head become conspicuous; the former resembling, as its name implies, an islet. Karega and Kasuga rivers are noticeable, and from off the latter several houses may be seen near its mouth.

The castle-like house on the west bank of the Kowie, the Kowie river, the village on the cultivated slope on the east bank, the high head over Riet point, Groenfontein head, together with Nanquas and Glendower peaks, serve to identify this coast.

The hills at Bathurst, and the range of mountains in the vicinity of Grahams town, are also conspicuous. From Riet point to Kleinemond river the hills become again low, as also the land behind ; about midway are the Black rocks or Three Sisters.

Proceeding eastward to Great Fish point sand-faced hills become high, and when within about $1\frac{1}{2}$ miles of the point there is a bare-topped sandhill which may be recognised 10 or 12 miles off shore.

Thence to Great Fish river the coast is comparatively low as well as the land behind, which is a grassy plain intersected with ravines.

Farther on to Stalwart point the sand-faced hills are tolerably high, and about midway 2 or 3 miles inland are two peaked grassy hills, near the village of Maitland, visible from all directions. This, with the dark head over Stalwart point, Fish river head, the Black rocks, and Groenfontein head, serve to identify this neighbourhood.

Farther eastward are the Umtata river sandhills, the Bequa river, with the high bare-topped sandhill westward of it, together with a round topped grassy hill 327 feet high north-westward of Bequa river, named Schietkop. Patos Kop, a square flat-topped grassy hill, 900 feet in height, lies about 9 miles north-westward from Kieskamma point. This with the hill close over the point with the house on its summit, as well as the Bequa and Umtata sandhills, serve to identify this locality.

GENERAL DIRECTIONS.—From cape Padrone (directions p. 131) to Bokness river, and thence to Kieskamma point, the shore should not be approached within 2 miles.

At night or in thick weather do not stand into less than 40 fathoms.

The off-shore depths within the 100-fathoms line are tolerably regular, the bottom being composed of sand and shells, though to the westward it is frequently found with black specks.

The edge of the bank is steep, dropping from 100 to 200 and 300 fathoms, in less than a mile.

During westerly gales the sea is much smoother on than off the bank, the edge of which is thus generally well defined.

Currents.—The Agulhas current off this part of the coast from the Bashee river westward generally sets W. by S., or West, and

varies in strength from one knot near the shore to $3\frac{1}{2}$ or 4 knots an hour near the edge of the bank.

A weak current sets to the eastward near the coast at uncertain times. Close to the shore an eddy current often sets to the eastward, but its rate seldom exceeds half a knot an hour.

In calm weather, and off the edge of the bank southward and eastward of cape Padrone, the current in places has been observed running like a race or overfall.

CAPE PADRONE, situated 8 miles eastward of Woody cape, is formed of sand cliffs, exceeding 100 feet in height. The sandhills extend nearly a mile back from the cape and rise to a ridge of bushy hills 340 feet in height, at the back of which may be seen a few houses.

Off the point, to the distance of 4 cables, are several outlying rocks, some of which show at low water; the sea at times breaks heavily on them.

Patches of foul ground, on which the sea breaks in heavy weather, extend about one mile off the rocky points, situated 3 and 6 miles eastward of cape Padrone, and to less distances on either side of these points.

The shore eastward continues fringed with rocks.

At Bokness river, the mouth of which is closed, the coast ridge attains a height of 100 feet, is covered with bush, and sand extends some distance up its sea face. From Bokness river to False islet the shore is sandy.

FALSE ISLET is a dark looking headland, 85 feet high, extending in an east and west direction half a mile; it is nearly perpendicular on its sea face, and is connected with the main land by sand hillocks. From seaward the head shows out against the white sand, and resembles an islet.

Several rocks which show at low water extend 3 cables from the south-west part of the islet; the point next eastward is foul to the distance of about 4 cables, with rocks awash at low water.

Reef.—A reef upon which the sea breaks heavily, formerly reported by several coasters, was seen from H.M.S. *Flirt*, 1886; it lies from one to 2 miles S. by E. to S.S.E. of False islet.

Bushmen river.—The mouth of Bushmen river is choked with sand and rocks, but at high tide the water runs in. Its southern point is a high cliff with three lumps on it, and connected with the main beach ridge by a neck of sand, against the back ground of which the dark rock shows out conspicuously.

Patches of rocks, some awash at low water, extend from Bushmen river to beyond the mouth of the Karega; the outer one lies with Karega river mouth N.N.W. $\frac{3}{4}$ W. three-quarters of a mile; the sea breaks for a considerable distance outside these patches.

Between Bushmen and Karega rivers the beach ridge is about 180 feet in height, covered with bush and partially faced with sand.

Karega river is generally open at high water; off it are the patches of rock just described.

The shore eastward for 2 miles is fringed with rocks, the coast ridge rising to a height of 225 feet. Sunken rocks extend about 2 cables off.

Kasuga river is closed at its mouth; there are some houses on the banks of the river, visible from seaward. Sunken rocks extend 2 cables off the shore to the eastward.

Ship rock, a black point 50 feet high, lies about 3 miles eastward of Kasuga river; the coast ridge is about 400 feet high, and sand extends up the face of the hills, against which Ship rock shows conspicuously.

From Ship rock to Kowie point the beach is fringed with rocks; at two-thirds of a mile westward of Kowie point and a short distance from the coast are two sunken rocks.

GLENDOWER PEAK.—**Landmark.**—At the back of the beach ridge is Glendower peak, a high grassy head 622 feet above the sea; it is tolerably steep on both sides, its western dropping to a small stream, which having no outlet soaks through the beach ridge.

A stone beacon, 50 feet high, pyramidal in shape, upper part black, lower white, has been erected on Glendower peak, in order to distinguish this monotonous part of the coast.

Salt Vlei bay.—From Kowie point, which is low, the shore trends eastward about $1\frac{1}{2}$ miles to Salt Vlei point, westward of which is Salt Vlei bay ; to about midway the sandy beach is fringed with rocks, at which distance there are several rocks 2 cables from the shore.

In Salt Vlei bay the land is low and grassy ; at a quarter of a mile from the beach is a farmhouse, and on a small hill to seaward of the house is a flagstaff.

Salt Vlei point is low and rocky ; from the sandy point to the eastward rocks extend to the distance of one cable.

The beach ridge of hills extends to Kowie river, to which they drop abruptly ; they vary from 60 to 140 feet in height, are covered with bush, and the highest part is near the river.

KOWIE RIVER* rises near Grahams town, 40 miles from its mouth, and is navigable for small vessels for about 5 miles, and for boats for upwards of 16 miles ; the scenery is exceedingly beautiful and picturesque, the banks wooded to the water's edge, varied in the upper reaches above Mansfield with grassy slopes and high steep cliffs. Game is abundant, and fish may be caught in the river and off the Fountain rocks at the entrance.

The river originally emptied itself into a sandy basin, the water thence forcing its way through a narrow channel on the eastern side into the sea. Its course, however, has been diverted at a point about a mile from the entrance, and now runs close along the western shore between two stone embankments, terminating in piers constructed with concrete blocks, of an average breadth of 70 yards. Vessels of 10 to 11 feet draught can enter the river at high water.

PORT ALFRED is a seaport town situated on both banks of the Kowie river, and connected by railway to Grahams town ; it possesses some advantages as a harbour for coasting and other small vessels. Here are custom and bonding warehouses, and other buildings, with facilities for landing and shipping goods, the railway extending on to the western quay.

This is one of the favourite watering places of the Colony, the warm Agulhas current running down the coast from the southern

* See plan of the entrance to Kowie river (Port Alfred), No. 1,223.

tropic, moderating the cold of winter—frost being almost unknown—and rendering it a genial resort for invalids.

Population.—Trade.—Population in 1891 was 1,092. During the year 1895 three vessels entered of the aggregate tonnage of 601 tons. There is but little trade, owing to the development of rival trade routes and other causes.

LIGHT.—On the western pier, and at an elevation of 40 feet above high water, is a *fixed green* harbour light, visible seaward in clear weather from a distance of about 6 miles.

Beacons.—Eastward of mount Cock house, on the west bank of the river, is a flagstaff painted white, the inner mark for the bar. The outer mark is a beacon S.S.E. $\frac{3}{4}$ E., 176 yards from the flagstaff, on a sand hillock, and formed of two poles with cross bars, above which is a pole with a ball on the top, the whole painted red.

The port office signal staff stands on the west wall at about 350 yards from the outer end.

The bar of Kowie river commences in about 3 fathoms, at the distance of one cable seaward of the extremity of the west pier, and the water gradually shoals to a least depth of 4 to 7 feet at low water springs. The bar is sand over rock, and the passage across it varies considerably in position and depth. Westerly and south-westerly gales send in a heavy swell, which drives quantities of sand into the river, a deposit which the ebb tide does not immediately remove. In fine weather, vessels of 10 to 11 feet draught, with the assistance of a pilot, may cross the bar, but only small coasting craft use the port.

The ROADSTEAD.—Dangers.—There are no shoals beyond the five fathoms line, except Jansen's rock to the eastward of the entrance, within which depth no vessel should go.

Fountain rocks, on the east side of the approach to the river, cover a space of three-quarters of a mile, east and west; some of these rocks are awash at high water, others uncover at half tide, and the sea always breaks on the outer patches.

The south-western of these dangers has $1\frac{1}{2}$ feet water, and lies with the signal staff bearing N.W. $\frac{7}{8}$ W., distant $1\frac{1}{10}$ miles. The south-eastern patch lies $1\frac{1}{2}$ cables eastward of the former, with 3 feet water. There are depths of $5\frac{1}{2}$ to 8 fathoms close to these patches.

Jansen's rock lies E.S.E. $3\frac{1}{2}$ cables from the east dry rock of the Fountain group, and is awash at low water, with 4 to 5 fathoms close northward and eastward and 9 fathoms seaward of it.

Clearing marks.—The quarries on the east bank of Kowie river, bearing N.N.W. $\frac{1}{2}$ W., and kept open westward of the old custom house point, leads westward of Fountain rocks ; and the gap in the cliffs near the outlet of Rufane river, bearing N.N.E. $\frac{1}{2}$ E., leads eastward of the rocks.

Directions.—Vessels approaching Kowie river from the westward may identify its position by the beacon on Glendower peak ; the adjacent country consists of smooth grassy slopes dotted with bush and fronted with a line of sand hillocks. From the eastward. Black rocks or Three Sisters, 7 miles eastward of the river, will, with the houses and flagstuffs at Port Alfred, serve to identify the land-fall.

Having arrived off the river, distant about 2 miles, the anchorage may be steered for on the line of leading beacons for crossing the bar, viz. : Mount Cock's flagstaff in line with red beacon, bearing N.N.W. $\frac{3}{4}$ W., and anchoring in about 15 fathoms, as recommended.

Vessels that can cross the bar, will, by signalling to the Port office obtain all information about the state of the bar, and as soon as it is possible, a pilot will be sent out, but a stranger should not attempt to cross the bar without one. *See signals, page 138.*

Anchorage.—The outer anchorage for large vessels, off Kowie river is in from 15 to 17 fathoms, sandy bottom, with the signal staff from N.N.W. to N.N.W. $\frac{1}{2}$ W. ; westward of this the bottom is rocky. The inner anchorage, in 8 fathoms, lies half mile northward of it, but the sea breaks here in bad weather.

The holding ground is not good, being rocky, with patches of sand. Vessels should veer to 80 or 100 fathoms of cable to ride easily, and be prepared to put to sea at the commencement of a gale (the indications of which are pointed out by signal at the Port office).

In case of putting to sea, masters of vessels should bear in mind that the Agulhas current sets to the westward frequently at the rate of 80 to 90 miles per day, and that moderate shelter may be found under the Bird islands in Algoa bay.

Supplies.—Coal.—Provisions are obtainable, but water is scarce and of indifferent quality. Ballast is obtainable in the river, free of charge. A small quantity of coal is kept for railway purposes. There is a government slip capable of taking a vessel of 100 tons burthen and about 100 feet in length, originally used for taking up sand barges. There is a lifeboat and rocket apparatus.

The Albany hospital at Grahams town receives patients.

Communication.—Port Alfred is connected by rail with the Government railway at Grahams town distant 43 miles; and is in telegraphic communication with the other towns of the Colony. The coastal service steamers call here.

Pilots for the river are always in readiness; there is no charge for their services.

Time signal.—A time ball is dropped from the signal staff, near the inner end of the west pier, by electricity from the Cape Observatory, at 1h. 30m. 0s., Cape Colony mean time, corresponding to Greenwich mean noon. Latitude of signal staff, $33^{\circ} 36' 9''$ S.

Signals.—The international code of signals is used at the Port office with which communication can be kept up. Weather reports are posted up daily.

Port office signals.—A number (indicated by one flag) is given to every vessel upon arrival.

Black ball over union jack - Veer to a whole cable, and see second anchor clear.

Black ball under union jack - Send down top-gallant yards and masts, point yards to the wind, and see all clear for working ship.

Union jack at masthead - Put to sea at once, and get an offing.

Black ball over the ensign - Bar cannot be crossed.

A blue flag will be shown at the west yard-arm of the flagstaff on the flood tide, and a red flag on the ebb.

At night.—A rocket fired across the river - Bar cannot be crossed.

Vessels not having the International code of signals can make the following signals with their ensigns, namely :—

1. Ensign in fore topmast rigging - In want of a cable.
2. Ensign in main topmast rigging - In want of an anchor.
3. Ensign in fore rigging - - Parted a bower cable.
4. Ensign in main rigging - - In want of anchor and cable
5. Wheft where best seen - - Want assistance or a tug.

Tides.—It is high water, full and change, at Kowie river at 3h. 50m. ; springs rise 4 to 5 feet, neaps 3 feet. The tides are influenced by the winds, varying from 6 inches to a foot, being lower with easterly winds and higher with westerly winds. No tidal stream is appreciable in the roadstead, but it is felt some 12 miles up the river.

Current.—With westerly winds and fine weather the current, at about 2 or 3 miles off shore, sets invariably to the eastward ; after a day or two of strong easterly winds it runs to the westward, but only for a short time.

Winds.—The prevailing winds in the summer months are from East to S.E., and in the winter months from West to S.W. Sailing vessels can enter the river with the winds from W.S.W. round by south to E.N.E., but the wind is seldom to the northward of East, except during the summer months in the morning, until 8 or 9 o'clock, when it comes in from the S.E. for the day, and is a smooth-water wind.

COAST.*—From Kowie river the sandy beach extends eastward for 6 miles to Riet point. This coast is low, sandy, and in places fringed with rocks, and the hills at half a mile inland range from 230 to 350 feet in height.

Rufane river lies 2 miles eastward of Kowie river, but its mouth is closed up. The shore is backed by hills about 350 feet high, and faced with sand in places ; at one mile westward of Riet point, behind the coast ridge, is a hill, 486 feet high, and when seen from east or west is conspicuous.

Riet point reef.—Riet point is low and sandy, with sunken rocks extending at least 4 cables off, and for 2 cables at half a mile

* See View on chart, No. 2,085.

westward of it; the sea breaks a considerable distance off the point. Glendower peak beacon, bearing W. by N. $\frac{2}{3}$ N., leads nearly one mile seaward of the charted reef, but as rocks have been more than once vaguely reported to exist some distance beyond, mariners should give the point a berth of at least 3 miles.

Riet river discharges into the bight eastward of the point.

Black rocks or Three Sisters are connected with the shore by a narrow neck of land; they show conspicuously against the white sand behind, and appear like an island. The central one is 50 feet high, and on their sea side they are nearly perpendicular.

Sunken rocks extend from 3 to 4 cables off Black rocks and off the point eastward of them, beyond which the sea breaks for some distance.

Kleinemond rivers lie about about one mile eastward of Black rocks. The sandy mouths of these streams, which are generally closed, are separated by a narrow strip of land; they traverse a low country, covered with grass and patches of bush.

The coast from Kleinemond rivers trends $3\frac{1}{2}$ miles eastward to Great Fish point. The hills near the sea are bushy, faced with sand nearly to their summits, and, at $1\frac{1}{2}$ miles eastward of Kleinemond rivers, attain a height of 350 feet. Three-quarters of a mile eastward is the highest part of the ridge (390 feet).

GREAT FISH POINT is low, sandy, and fringed with rocks. A rock which shows at low water, with a depth of 12 fathoms at 3 cables outside it, lies nearly half a mile off the point. The coast hills rise in a short distance to a height of 260 feet.

At three-quarters of mile eastward of Great Fish point, and about a quarter of a mile off shore, is a half-tide rock, on which the sea breaks. Little Fish point, situated about half a mile westward of the entrance to Great Fish river, is rocky, and shelving; the hill over it is 140 feet about the sea, covered with bush and partially faced with sand.

LIGHT.—A lighthouse is in course of construction at Great Fish point, from which it is intended to exhibit (about March 1898) a *white flash every ten seconds*, thus: *Flash half a second*, *eclipse nine and a half seconds*. The light will be 275 feet above high water, and visible in clear weather from a distance of 20 miles.

GREAT FISH RIVER.—The mouth of Great Fish river is always open, but the depth in the entrance is not stated; probably

it is not permanent, and entering it must be at all times attended with considerable danger, on account of the breakers across the entrance.

At Rocky head, the east point of entrance, are three dark rocks, 25 feet high, outside and around which are several other rocks, showing at low water, and extending to the distance of $1\frac{1}{2}$ cables in places. The sea breaks for some distance outside these rocks.

At 3 cables within the east point is a bushy peak 100 feet high, and near the base of it is the narrowest part of the entrance, which is about 20 yards wide. Here the water appears deep for a breadth of about 10 yards, and the sea does not break successively, having at times an interval of five minutes, when a boat could effect a landing; but when the sea does break it is with treble the violence of the constant rolling surf along the sand before the river's mouth. At particular seasons the river rises considerably, when the current becomes too strong for craft to enter; at other times the river is a mere stream, and the current then is inconsiderable.

The position of Great Fish river may be made out in clear weather by some distant hills of an undulating form, which bear N.N.W. when on with the ravine through which the river flows. The river makes apparently a very perceptible gap in the coast line if near the land.

Current.—The water of Great Fish river is of a red colour, and may be traced after rain for some miles westward of Kowie point, but is seldom seen to the eastward of the river; from this fact it is evident that an easterly current near this part of the coast, though occasionally experienced, is not a constant or frequent current.

Waterloo bay lies between Great Fish river and Stalwart point, about 4 miles to the eastward. There are two streams between which are closed with sand. All vestiges of the establishment that existed here in 1846 and 1847 have disappeared. The coast hills rise steeply from the beach to a height of from 180 to 250 feet faced with sand nearly to their summits, which are covered with dark bush.

About 2 miles eastward of Great Fish river a ledge of rocks projects from the beach about 2 cables; at one cable off its eastern extreme is a sunken rock.

Temporary anchorage.—Vessels should not anchor in a less depth than 9 fathoms, with Great Fish point bearing W. $\frac{3}{4}$ S., and the south-west end of the rocks about half a mile eastward of Great

Fish river, N. by W. $\frac{1}{2}$ W.; it is an exposed anchorage, and the rollers which occasionally set in during calm weather render it unsafe.

Vessels should be ready to slip and put to sea, in the event of a S.E. wind or rollers setting in.

There is better anchorage in 14 fathoms, in which depth the bottom is clean, good holding ground, coarse sand, but this is too inconvenient a distance for landing.

Landing was formerly effected in the bay between the rocks off the east point of Great Fish river and those to the north-east of them, in surf boats, and with them it was difficult. Considerable strain was brought on the surf lines by the westerly current.

Tides.—It is high water, full and change, at Waterloo bay, at 4h. 0m.; springs rise about 6 feet.

STALWART POINT.—From the west part of Stalwart point, the shore eastward is fringed with a series of ledges extending a quarter of a mile from the beach, off which at a short distance are sunken rocks. The sea breaks in bad weather three-quarters of a mile from the shore.

The coast ridge near the west end of Stalwart point is 224 feet high, lower towards its eastern part; on its western slope are two or three farm houses visible from seaward.

Impekquina river, at 2 miles eastward of Stalwart point, is generally closed; a little west of the river is a dark bushy head 144 feet high partially faced with sand, and at the back of which, a quarter of a mile inland, is a house visible from seaward.

Umtata river is generally open. The intervening shore is fringed with ledges extending some distance from the beach, and the sea breaks a long way outside of them.

The hill on the west side of Umtata river is 260 feet high, and that on the east side, is 149 feet high, covered with dark bush, and faced with sand a short distance up. Off this hill a sunken ledge extends a quarter of a mile.

From Umtata river to Golana river, which is closed, a distance of one mile, the beach for about half way is fringed with rocks. A detached rock lies 2 cables off its east point.

Bequa river lies 3 miles eastward of Golana river and is generally closed. The beach between is fringed with ledges, nearly two cables from the shore, with sunken rocks beyond. The coast ridge rises steeply from the beach, and gradually increases in height as Bequa river is approached.

Madagascar reef, about 7 cables in length, dry at low water, and with a depth of 12 fathoms at 2 cables distance, lies half a mile from the shore, and the same distance eastward of Bequa river. The sea always breaks over the reef.

Gosha river, lies about 2 miles eastward of Bequa river and is apparently closed; the shore between is a sandy beach, and midway fringed with rocks.

Eastward to Keiskamma point the beach is sandy and fringed with rocks. The coast ridge is partially faced with sand to a height of 40 to 70 feet; immediately behind the land rises to a height of 300 feet, and about half a mile westward of the point forms a head, on the summit of which is a house visible seaward.

At one mile westward from Keiskamma point, and 3 cables from the shore, is a rock which shows at low-water springs; the sea breaks heavily here in bad weather.

Between Keiskamma point and Buffalo river, the land is covered with grass and bush in patches, and intersected with streams and deep ravines. The shore is backed with an irregular ridge of coast hills, covered with dark bush, and at intervals faced with sand. *See* beacon, p. 146.

At a distance of about 6 miles inland, the land rises to a height of from 600 to 700 feet, and when well off the coast a range of mountains 2,000 to 3,000 feet in height, in the vicinity of King Williams town, may be seen. The range in the vicinity of Grahams town is also visible.

KEISKAMMA POINT is low, sandy, and fringed with rocks; near its extremity is a bushy-topped sandhill, 110 feet high, which when seen from the westward near the coast appears like an islet.

Caution.—Between Keiskamma and Bashee point, vessels should not approach the shore within 2 miles, or at night and in thick weather under 40 fathoms.

Keiskamma river, at its mouth, is about half a cable wide at low water; within, the river opens into a basin about one mile in extent, partially dry at low water; the main stream trends northward from the basin, and many miles into the interior, draining a large tract of country.

Boats have been known in fine weather to enter and leave the river in safety, but such an occurrence is not frequent, and it is always attended with danger, as no dependence can be placed on the bar, the depths on which are constantly altering. The surf in bad weather extends a long half mile from the shore. On the west bank of the river are the two German villages of Hamburg and Bodiam; the former is about one mile, and the latter 5 miles from the entrance.

A quarter of a mile eastward of the entrance, and about one cable off-shore, are some rocks which show at low water.

A 10-fathom patch lies with the mouth of the Keiskamma bearing N.N.W. $\frac{1}{4}$ W. distant $1\frac{1}{2}$ miles.

The coast about the Keiskamma is about 600 feet in height, with patches of sand 80 or 100 feet high, showing against the dark land. Keiskamma river may possibly be identified by a mountain of a conical shape, flattened at the top, standing by itself, and a short distance to the eastward another high mountain which has three slight elevations.

When these mountains bear N.N.W. they are in a line with the entrance of the Keiskamma. *See* beacon, p. 146.

The coast from Keiskamma river trends eastward about 6 miles to Chalumna river; there are several streams between, two of which, like most of the small streams on this coast, are choked with sand; Guanie, the eastern stream, is open at high water.

Chalumna river, 7 miles eastward of Keiskamma point, has a bank extending across its mouth dry at low water; rocks extend about $1\frac{1}{4}$ cables off shore, from a half to one mile eastward of it.

The Coast from Chalumna river eastward is rocky for $1\frac{1}{4}$ miles; thence it is sandy, and fringed with rocks to the Nieca river; at about one mile westward of the river at $3\frac{1}{2}$ cables off shore is a rock which breaks.

Nieca river is open at high water, but a sand spit extends nearly across from the west point at low water. The east point rises to about 150 feet, and is covered with bush.

Another stream empties itself north-eastward of a low point, $2\frac{1}{2}$ miles eastward of Nieca river; at the north east point of its entrance is a bushy peak 185 feet high.

Beacon.—A wooden pyramidal beacon, its top 381 feet above the sea, is situated on the hill $1\frac{1}{2}$ miles due north of the mouth of the Nieca river, for the purpose of identifying the coast when approaching East London from the westward. The beacon, 51 feet in height and painted black, stands on an equilateral base (each side of the base 27 feet) and terminates in a sharp point. It should be visible in clear weather from a distance of about 23 miles.

Nkutu river, 5 miles eastward of the Nieca, is generally open at high water; a sunken rock lies S.E. distant one-third of a mile off it. At one mile inland is a bushy hill, 414 feet high, and near its eastern part half way down the face, is a house visible from seaward.

Gola river, at $2\frac{1}{2}$ miles eastward of Nkutu river, is open at high water; the shore between is fringed with rocks, and the coast hills are covered with bush faced with sand. The hill at the west point of Gola river is about 120 feet high covered with bush, the sand extending up its face some distance.

At Gola point, the land rises precipitously 336 feet to a rounded top covered with grass; and inland two-thirds of a mile is a remarkable peak, 443 feet high, conspicuous from all directions. At $1\frac{3}{4}$ miles eastward of Gola point is a stream, off which at one-third of a mile is a sunken rock.

Cove rock, $2\frac{1}{2}$ miles eastward of Gola point, is a quoin-shaped rock, 86 feet high, with a deep notch in the middle. It is connected with the shore, from which it is about 3 cables distant, by a neck of sand, and hence appears as an island, and a good mark when navigating along shore. Off it and to the westward are some outlying rocks which generally break, at a quarter of a mile off shore.

Landing.—North-eastward of Cove rock on a small sandy beach boats may land even during south-east winds.

The coast from Cove rock eastward assumes a more pleasant aspect: bare sandhills are now only occasionally met with, and they always have such remarkable forms as to make fair landmarks.

From the small stream eastward of Cove rock, the shore trends eastward to Hood point, with several small streams between, and is fringed with rocks, but there are no off-lying dangers.

Hood point, about one mile westward of Buffalo river, is low and rocky, but rises steeply from the beach to a ridge 107 feet high, covered with grass and bush.

LIGHT.—From a cylindrical tower, painted in red and white squares, 62 feet in height, erected on the north-eastern end of the ridge over Hood point, is exhibited at an elevation of 180 feet above high water, a *group flashing white* light, showing *four flashes* in quick succession *every forty seconds*, as follows—the flashes are half second, eclipses between 4 seconds, and the eclipse between each group 25 seconds. The light is visible from a distance of 18 miles in clear weather.

BUFFALO RIVER.—**East London**.—Buffalo harbour, on which is situated the town of East London, is the mouth of the river of that name. Harbour works, upon plans framed by Sir John Coode, have been carried on for some years for the removal of the bar and clearance of the channel, as mentioned below.

The port is the natural outlet for the trade of the border divisions, and of the states and territories beyond the Orange river. In common with all the rivers on this coast, the Buffalo is obstructed by a dangerous sand bar, but by the construction of training walls to confine the river to a width of about 250 feet and the use of steam dredgers, considerable progress has been made in deepening it; the depth, however, will always be subject to great variation from gales of wind. *See* the bar, p. 151.

The Buffalo river is navigable for boats for about 3 miles; its banks are steep, and attain a height in places of 200 feet.

Castle point, the south point of entrance to the Buffalo river, is low and rocky, with rocks extending a distance of nearly 2 cables off it; these rocks probably tend to break the force of the sea on the breakwater which has been built out from the point some 500 yards seaward of the lighthouse.

Within the 5-fathoms line, at $5\frac{1}{2}$ cables southward of the lighthouse, and about 4 cables off shore is a rocky bank $2\frac{1}{2}$ cables in extent, with a depth of $4\frac{1}{2}$ fathoms. The sea breaks heavily over this bank in bad weather.

See plan of Buffalo river, with views, No. 1,843.

Kahoon point.—The coast northward from the north training wall of the river is fringed by a ledge of rocks, with detached low-water rocks extending in places to the distance of one cable, nearly to Inkyanza river, where there is a sandy beach ; thence to Kahoon point, the coast is formed of rugged cliffs from 20 to 50 feet high. There are no sunken dangers beyond a distance of 2 cables, but the sea breaks about 3 cables off, and the coast should be given a wide berth.

The north corner of the barracks on the top of the hill at East London, open of the low part of the bluff over the east point of Buffalo river, bearing West, leads well clear of Kahoon point.

LIGHT.—From a lighthouse 13 feet high, painted in alternate red and white bands, situated near the inner end of the breakwater at Castle point, is exhibited, at an elevation of 45 feet above the sea, a *fixed red* light, visible in clear weather from a distance of 12 miles.

Directions.—For the purpose of identifying the land in the approach to East London from the westward, a beacon has been erected on a hill about $14\frac{1}{2}$ miles to the westward, p. 146 ; and a similar beacon on a hill about 15 miles to the eastward, p. 153. These, with the lighthouse on the hill over Hood point, the flagstuffs, buildings, and the bluff 150 feet in height, on the north bank, on a nearer approach, will afford all the necessary landmarks. From the westward, vessels should not approach within 2 miles of the shore until near the port ; from the eastward, there is no object in hugging the land as the current in the offing is favourable.

Anchorage.—There is good anchorage, with westerly winds, in about 11 fathoms, with the extreme of the breakwater W.N.W., and Kahoon point N.E. by E. $\frac{1}{2}$ E. The same precautions are necessary as mentioned at Port Elizabeth, p. 123. Vessels whose draught will admit will be taken into harbour as soon as possible after arrival in the road. The masters should obtain a copy of the Port regulations.

The holding ground, consisting of stiff mud under a surface of sand, is good, and said to be free from rocks. When ships have gone adrift, it has been from parting, and not from dragging. Lost anchors are rarely recovered, owing to the shifting nature of the bottom in gales. The anchorage, however, is much exposed, and vessels generally lie broadside to the sea, and consequently roll and strain a great deal. Those proposing to risk lying here in bad weather, should on no account be in less than 11 fathoms. The worst wind here is what is called a black south-easter.

Landing.—Steam launches are available for landing and embarking passengers. Ships' boats should never attempt to cross the bar, even in the finest weather, unless accompanied by some one having local knowledge.

Current.—At the anchorage off East London, the current generally runs to the south-westward at a rate of one to $2\frac{1}{2}$ knots an hour. In calm weather, or during strong south-west winds, the surface water is retarded, and it occasionally runs to the eastward at the rate of half a knot, and sometimes stronger.

In shore near the edge of the breakers an eddy current frequently runs to the eastward; this current is variable in its strength, but seldom attains half a knot an hour.

In the offing at about 15 miles from the coast, the regular Agulhas current runs south-westward from 2 to 4 miles an hour.

Winds and weather.—Seven years' observations between 1887 and 1893, show that, of the winds that blow along the land, the winds from the north-eastward and those from south-westward are fairly equal during the winter months; but in summer, or from August to March, the winds from the south-westward exceed those from the north-eastward in the proportion of about 3 to 2. Of those that blow directly landward comparatively few are recorded, whilst those from off the land between North and W.N.W. greatly preponderate during the winter months.

Gales.—The weather off East London presents a marked difference to that of any other part of the coast. When the mercury commences to rise on the wind shifting to the westward, the crisis is accompanied by lightning, thunder, and heavy rain. If the wind shift suddenly in a squall to the south-west, the barometric pressure increases rapidly, a fresh gale may be expected, with fine weather, which will continue until the mercury attains about 30·4 inches. If the barometer remains low and steady, a strong gale may be expected from W.N.W., which will probably continue for several days; but if the wind shifts slowly to S.W., the barometer rises slowly, and a drizzling rain sets in, a strong gale and a high sea may be looked for. These much-dreaded south-west gales occur often after unsettled weather in June, July, and August, preceded by a moderate to fresh easterly breeze, and a gradually diminishing pressure.

The wind begins to blow hard from about West, and shifts slowly until the mercury stands at about 30·0 inches; the sky becomes leaden-looking, and a thick drizzling rain sets in; the mercury

oscillates between 30·00 and 30·10 inches, and the temperature is considerably below the average. These gales blow with much violence, and have been the cause of many disasters to shipping at different times in East London roads.

During the summer, October to April, easterly winds prevail, and S.E. gales may be expected.

Sailing vessels would do well to put to sea when a gale is approaching, standing to the eastward if possible, and heaving-to. Most vessels, however, now enter the river.

Rollers seldom set in during the summer months, but they are frequent during the winter. The rollers generally break in depths of 3 fathoms, and in stormy weather extend out to a depth of 5 fathoms, and at times to 7 or 8 fathoms.

Signals.—Communication can be made with the Port office by means of the Commercial code of signals.

The flagstaff on the hill on the east side is also under the control of the Port office, and is used when the signals from that office are not discernable.

GENERAL PORT OFFICE SIGNALS.

- | | | |
|--|---|--|
| Union Jack over S
(white pierced
blue) | } | Prepare for bad weather. |
| Union Jack over J
(blue, white, blue
horizontal) | | |
| Union Jack over
black ball, J
underneath | } | Veer to whole cable and put spring on. |
| Union Jack over H
(white and red
vertically) | | |
| Ensign over black
ball | } | Slip and put to sea, lee vessels first, to avoid collision, but those that can get away clear do so at once. |
| Black ball at mast head : | | |
| Impossible to cross the bar. (<i>No boat should attempt to cross the bar while this signal is up.</i>) | | |
| Black ball three parts of the way up : Bar dangerous. (<i>Caution to boats working.</i>) | | |

When lighters are working, a red flag with a white centre is hoisted at the Port office flagstaff, but hauled down altogether when the bar is impassable.

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, and also to their owners.

Life-boats.—There are two life-boats near the Port office, and three stations with life-saving apparatus, which are always ready for use at short notice. When the life-boat is under way, the signal J. C. T. is hoisted by day, at the Port office, and two white lights horizontal at night; the signalman at the East bank station repeats these signals.

THE BAR of Buffalo river lies just north-eastward of the extreme of the southern breakwater, and had in 1896 a depth of 17 to 18 feet at high water springs during the winter months, and from 22 to 23 feet during the summer months. The depths also alter considerably with the weather, being decreased generally by a succession of S.E. winds, and increased by westerly winds. The surf on the bar is often very dangerous, and when the swell is coming from the south-westward or southward, heavy breaking seas often render the bar impassable.

Vessels of about 15 feet draught can cross the bar and enter the river at high water springs, in moderate weather. This is sufficient for most of the vessels that visit the port, other than the steamers of the Union and Castle lines, which remain outside, but steam dredgers are at work to increase the depth, as before stated.

The *Clan Graham*, 2,926 tonnage, 330 feet in length, 40 feet beam, and 18 feet 2 inches draught of water crossed the bar under favorable circumstances.

Tides.—It is high water, full and change, at the mouth of Buffalo river at 3h. 47m.; springs rise 5 feet, neaps $3\frac{3}{4}$ feet. The flood stream sets into the river across the bar at the rate of three-quarters of a knot; the ebb sets out at about $1\frac{1}{4}$ knots.

The rise of tide is shown by signal at the Port office for the use of the pilots.

Pilot.—Directions.—There is a Government pilot for the bar, and no vessel should attempt to cross it without local knowledge. All vessels having a pilot on board, in charge, shall display the pilot

flag at the main. In case of emergency, it might be mentioned, that the wind gauge at the harbour works kept in line with the lighthouse, leads over the bar in the best water.

EAST LONDON.—The town of East London stands on the south side of Buffalo river, at about 60 feet above the sea; and with its flagstuffs, churches, &c., may easily be recognised from the offing. It is about 700 miles east of Cape Town, 150 miles by sea from Port Elizabeth, and is the terminus of the line of railway from Queen's Town, a distance of about 180 miles. The population in 1891 was 6,924.

The town of Panmure is situated on the north shore, half a mile above East London; its importance is probably much increased by the extensive wharfage, &c., constructed near it.

The wharves are fitted with steam appliances for loading and discharging vessels that can enter the river. Goods are discharged, from the vessels on to the wharves, and then at once placed in railway trucks, the lines being laid alongside the wharves. Special facilities are afforded for the landing of timber, in which a large trade is done with the Transvaal gold fields.

The wharves abreast Panmure, on the north side of the river, have apparently, depths of 13 to 21 feet near them.

Trade.—The principal exports are wool, ostrich feathers, hides, &c., and the imports are textile fabrics, dress, food, wines, spirits, timber, &c. The value of the exports in 1894 amounted to £791,112, and the imports to £2,234,696.

Supplies.—Water is supplied to the shipping by the Castle Mail Co. at 10s. per ton to vessels in the river, and 20s. per ton to those in the road, brought alongside by the Company's tugs. Provisions are good and plentiful.

Coal.—About 5,000 tons of coal are usually in stock. Vessels coal at the wharves. Coaling in the road is necessarily done by lighters, towed off, and it is often interrupted by bad weather. Since the depth on the bar has admitted vessels of 15 feet entering the surf boats (formerly used for cargo, coaling, &c.) have been discontinued.

Repairs.—Large repairs to machinery and boilers are undertaken by the engineering firms; shafts of 23 inches can be turned, cylinders of 40 inches diameter cast, and castings of $1\frac{1}{2}$ tons made. There is a steam hammer of 20 cwt., and 2 cranes each capable of lifting 10 tons, besides smaller ones.

The patent slip in course of construction will take a vessel of 900 tons dead weight. Probably be ready for use in April 1897.

Time signal.—A ball, shown from an iron frame on Signal hill, is dropped by electricity from the Cape of Good Hope observatory at 1h. 30m. p.m., Cape Colony mean time, corresponding to Greenwich mean noon. Should the signal fail in accuracy, a yellow pennant is hoisted for a short time after the ball is dropped. It cannot be seen from vessels lying alongside the wharves.

Communication—Telegraph.—East London is connected with the railway and telegraph systems of the Colony, Transvaal, &c. Mails weekly from England by Castle and Union lines. *See* also p. 15.

The COAST between East London and Bashee river is everywhere fringed with rocks and a heavy surf; few places offer any chance of successful landing even in the most favourable weather. At Gonubie point, on the south-west side of the bight, landing might apparently be effected.

Aspect.—Beacon.—To distinguish the monotonous coast when approaching East London from the eastward, a wooden pyramidal beacon surmounted by a ball, 368 feet above the sea, has been erected on a hill one mile from the shore, between Reef point and Kintza river, 15 miles eastward of that town. The beacon, 52 feet high, and painted black, stands on a triangular base (each side of the base 29 feet), and should be visible from a distance of 21 miles in clear weather.

Cape Morgan may possibly be identified from the south-west and westward by the high perpendicular cliffs, showing between Ikuko and Sklagha rivers, and from the eastward by the Kei Kop hill and Snag rocks; Mazeppa bay by a somewhat conspicuous sandhill, and the coast southward of Bashee river by the Udweassa cliffs.

Kahoon river, lying about two-thirds of a mile north-eastward of Kahoon point, is generally open at high water, and the tide is appreciable for about 3 miles up. The west point of the river is formed by a bushy peak 80 feet high, and partially faced with sand.

Landing.—About half a mile northward of Kahoon point is a small sandy bight, where it is said landing might be effected, in case of emergency, in westerly gales.

Danger point, 2 miles eastward of Kahoon river, is low, sandy, and fringed with rocks ; between them is a small stream named Gonega river : the highest part of the coast hills, 210 feet above the sea, is behind Danger point, and the sand extends up to its summit.

A reef, which dries one foot, with 11 fathoms at 2 cables distant, lies 4 cables S.W. by S. from Danger point.

Between Danger point and Gonubie point, are the Klakla and the Ganindugs streams.

Gonubie point and river.—From Gonubie point a ledge of rocks extends westward for half a mile, at about 2 cables off shore ; the breakers extend in bad weather 3 cables off, with uneven bottom beyond. Gonubie river is open at high water, the tide running up about 3 miles.

At 2 miles eastward of Gonubie river is a bushy peak, 242 feet high, inclining to the eastward ; from its peculiar shape it is one of the conspicuous objects in the neighbourhood. There is also a dome-shaped peak about 3 miles eastward.

Kwelegha and Bologha rivers.—Kwelegha point is low and rocky, and half a mile to the northward of it is the mouth of Kwelegha river, which is open occasionally ; at one mile eastward is Bologha river, also open at times. On the west bank of the Bologha is a bushy hill, 237 feet high, faced with sand a short way up.

Reef point, $2\frac{1}{2}$ miles north-eastward of Bologha river, has two rocky horns, at the back of which is a sandy beach, with hills rising to a height of 313 feet. At a quarter of a mile off the point is a ledge of rocks, showing at low water ; the sea breaks fully half a mile off the point.

Kintza river and Klefani river, to the north-eastward, are closed. Farther eastward is Kwenugha and Naagh rivers and cape Henderson.

Between Reef point and cape Henderson the coast hills are high and faced with sand some way up ; immediately behind, the land rises to a height of 350 to 400 feet, covered with bush.

The west point of the Naagh river is a bare sandhill 130 feet high, and conspicuous from being the last sandhill of note for nearly 25 miles.

Cape Henderson rises directly from a rocky beach to a height of 485 feet, and is covered with grass; it presents a dark bluff appearance from seaward, which probably gave rise to its being called a cape.

At $1\frac{1}{2}$ miles eastward of the cape is a stream; its west entrance point is a head 410 feet high. Off a point just eastward is a sunken rock on which the sea breaks in bad weather, bearing E. by S. $\frac{1}{2}$ S. $1\frac{3}{4}$ miles from cape Henderson, and a quarter of a mile off shore.

Flat point and the land eastward for nearly a mile is low and grassy, not more than 25 feet above the sea, but about half a mile inland a grassy ridge rises to a height of 356 feet.

At $1\frac{1}{2}$ miles eastward of Flat point are two small streams, the Umtwendwe and Nukwana. Eastward of these the coast is much higher, and trends gradually to Ikuko or Double-mouth river.

Ikuko or Double-mouth river is generally open, and the tidal stream runs up about $1\frac{1}{2}$ miles at high water. At 6 cables eastward of Ikuko river and one cable off-shore are some rocks.

Between Ikuko river and Sklagma river the coast is irregular, and consists of perpendicular cliffs varying from 140 to 220 feet in height; eastward a sandy beach, backed by steep coast hills covered with bush, extends nearly to cape Morgan, with rocks in places at a distance of 3 to 4 cables off-shore.

See chart, No. 2,086.

CHAPTER V.

CAPE MORGAN TO CAPE CORRIENTES.

(Long. 28° 20' E. to 35° 30' E.)

VARIATION IN 1897.

St. John river	-	27° 30' W.	|	Port Natal	-	-	29° 30' W.
Delagoa bay	-	-	-		-	-	23° 30' W.

CAPE MORGAN is a broad low rocky point, rising abruptly a short distance within to a height of 275 feet, and at a distance of half a mile inland to a height of 395 feet; from seaward it shows as a flat-topped hill covered with bush.

North-eastward, three-quarters of a mile, is Ikwili river, the mouth of which is choked; the beach is fringed with ledges extending one cable off, as far as Kei river.

Rocks, some just above water, extend about a third of a mile west of cape Morgan. Seaward of these are two breakers 2 cables apart; the western one lies S.W. by W. $\frac{3}{4}$ W. distant $6\frac{1}{2}$ cables from the cape. The eastern one seldom breaks.

Anchorage.—There is shelter from north-west and westerly winds, from a half to three-quarters of a mile eastward of cape Morgan, and the same distance off shore. Here, under favourable circumstances, landing might be effected.

KEI RIVER lies $1\frac{3}{4}$ miles eastward of cape Morgan. The bar is scarcely ever practicable, but the depth in 1868 was reported to be 6 or 7 feet at low water. Breakers extend about one mile seaward of the entrance.

Inside its entrance, which is about 25 yards wide at low water, Kei river opens to a width of one-third of a mile; about 6 miles up it narrows to about 250 yards, the land on either side being 500 feet high in places.

On the south side at the distance mentioned is a round-topped hill named the Kei Kop, 865 feet in height, which may be seen from most directions, being the highest hill in the neighbourhood. The tidal influence extends about 2 miles above this hill, and here it is shallow enough at times to wade across. The waggon drift is about 20 miles farther up the river.

Snag rocks, one of them 10 feet high, lie from a half to three-quarters of a mile off the mouth of Kei river.

Sunken rocks extend nearly half-a-mile north-eastward of the Snag rock, most of which are visible at low-water springs.

The sea breaks heavily all round the Snag rocks, and in bad weather the breakers extend a quarter of a mile outside them.

Anchorage.—There is temporary anchorage off the river in about 10 to 16 fathoms, eastward of the Snag rocks but it is not recommended.

Tides.—It is high water, full and change, at Kei river at about 4h. 0m.; springs rise about 5 feet. The flood stream sets north-eastward close in shore, and the ebb south-westward.

Current.—At about one mile off the Kei, the current sets south-westward at the rate of $1\frac{1}{2}$ knots.

Bar.—Directions.—In consequence of the channels shifting, and the depths varying after gales or floods, strangers should not attempt to enter Kei river. The channel (Skead, 1858) was close to the ledge of sunken rocks extending from the northern shore. If attempting to enter the river in case of necessity, keep a good look-out on this ledge, over which the sea breaks heavily; and, when a chance offers, pull in, keeping the rocky shore so close as to leave just sufficient room for the oars; probably there is not a less depth than 6 or 7 feet at low water over the bar. The breakers on the bar extend to the rocks only during heavy rollers, when of course the channel is impracticable.

Landing outside.—If landing is decided upon, and the bar prove impassable, it may possibly be effected at a sandy spit, sheltered in some degree by a patch of sunken rocks southward of it; these rocks lie one cable off shore at three-quarters of a mile southward of Kei river; the sea breaks over them.

Care must be taken when attempting to land on the spit, during the flood tide, that while waiting for a smooth the boat be not swept too far to the north-east, for it was found on one occasion, when a whale boat of H.M.S. *Geysler* was swamped in endeavouring to pass through the surf, that the boat was not thrown on the spit by the rollers, but carried to the north-eastward 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 to the south-westward, where the surf is so much heavier and the beach rocky.

Landing in surf boats is sometimes practicable in the sandy bay at $1\frac{1}{2}$ miles eastward of the Kei, and also at the beach near Kologha river.

COAST.—The only sandhills for a hundred miles eastward of the Kei are the sand bluff at Sandy point and a similar one 18 miles farther east. The coast between the Kei and these sandhills is covered with grass and bushes down to the beach.

Koko river lies half a mile eastward of Kei river, and its mouth is generally closed at low water. The beach from Kei river eastward is fringed with rocks, and with the exception of a bushy hill 110 feet high, on the east side of Koko river, the shore is low and grassy.

Kologha river, one third of a mile wide in the entrance, is open at high water, and the channel in is close to the south-west point; a sand spit extends from the north-east point nearly across the entrance. The shore from one mile south-west of Kologha river to 4 miles north-east of it is grassy, and covered with small hillocks about 10 feet above the ground, formed of ant hills over which has grown small bush, and when 4 or 5 miles distant are a conspicuous feature of this part of the coast.

At 4 cables S.S.W. from the west point of Kologha river is a sunken rock, and at one cable west of the rock is the east end of a ledge half a mile in length, which uncovers at low water. Eastward of the sunken rock is another lying S.S.E. $\frac{1}{2}$ E. 2 cables from the west point of Kologha.

The beach is fringed with rocks as far as the Kobinnaba river; at a quarter of a mile south-westward of the river is a sunken rock on which the sea breaks.

Kobinnaba river is always open, and the tide runs up some 3 miles, where there is a ford ; off the extreme of the east point is a rock visible at low water. About three-quarters of a mile eastward of the river is Kobinnaba point, off which are several rocks visible at low water. Within the point is a hill 300 feet in height.

Nxaxa river is generally open ; its west point is low with a reef extending off one cable in an easterly direction, close to which is the narrow channel into the river. The east point of the river is a sandhill covered with bush, with a sand spit extending nearly to the west side.

The coast hills which rise precipitously from the sandy beach form a ridge covered with dark bush, and faced with sand to some height ; these extend from Nxaxa river to about half a mile beyond Sandy point, on which are four distinct peaks ; the third from the westward is the highest, being 280 feet above the sea.

BOWKERS BAY is the bight north-eastward of Sandy point, into which a stream discharges.

Anchorage.—**Landing.**—H.M.S. *Active* (1877) found good anchorage, with shelter from westerly winds, in $10\frac{1}{2}$ fathoms, sandy bottom, one mile off the stream. This appears to be the best anchorage on this part of the coast, and is certainly the safest place for landing. The examination of the bay was made under favourable circumstances. The surf broke in 3 fathoms abreast the landing.

Fronting the stream, landing was effected in a whale boat manned by boatmen from Port Elizabeth.

Umfani river, northward of Bowkers bay, is open at high water. A third of a mile farther eastward is the Istamfoona river, which is also open at high water.

Between these rivers is a rocky point, at the back of which is a bushy peak, 255 feet in height, appearing in some directions as a double peak ; sand extends up its sea face about 40 feet. At 3 cables S.S.E. $\frac{1}{2}$ E. from the mouth of Umfani river is a sunken rock which frequently breaks ; the beach to Stony point is fringed with rocks to the distance of one cable.

COAST.—**Stony point** is low with rocks at one cable off it ; about half a cable from the point is a rock 6 feet high.

Two breaking patches lie S. $\frac{1}{2}$ W. from Stony point, the outer distant half a mile.

Between Stony point and the Manubie river is the Umtilwane, the mouth of which is nearly closed; the shore between is low with a rocky beach, skirted with rocks.

Manubie river is open at high water, and has a spit of sand extending nearly across its mouth, the channel being on its west side. At the west point of entrance the land is 95 feet high, and covered with bush; the east point is low, being the extremity of a ridge of beach hills which rise abruptly.

At 4 cables eastward of the Manubie, are several rocks about one cable from the shore.

About $1\frac{1}{2}$ miles eastward of the Manubie is the mouth of the Kleena, which is open at high water, and farther on is Mazeppa point; the shore between is fringed with rocks.

Mazeppa point may be identified by a grassy peaked islet, 26 feet high, lying about 10 yards off it. There appears to be no dangers off Mazeppa point, but the sea breaks some distance off in bad weather.

Mazeppa bay lies between Mazeppa point and Kogha river; small vessels have landed cargoes here in very fine weather, but with great difficulty; the best place is on the beach just eastward of Nebbelelli river. In bad weather rollers set in right across the bay. A path runs from the western side of this bay up the ridge, through the Manubie forest, and continues up the ridges to the Natal road, about 30 miles from the coast, joining it a few miles east of the Butterworth mission station.

The Nebbelelli river is open at high water; from its rocky east point a ledge dries out a distance of one cable to a patch of rocks. At this point a sandy beach commences, and continues eastward for about a quarter of a mile, when the shore becomes rocky again.

The coast between Mazeppa bay and Bashee river is foul, with a heavy surf.

Signal station.—The United Boating Co. of East London have erected a private signal station and flagstaff on the high ground above Mazeppa bay, in lat. $32^{\circ} 28' S.$, long. $28^{\circ} 39\frac{1}{4}' E.$ The station

is intended to enable vessels in distress to signal for assistance, which will be sent from East London, a scheme of telegraphic communication having been arranged with that port through the town of Butterworth.

Kogha river is always open ; a sand spit extends nearly across its mouth from the west point, the land over which is 150 feet high, and covered with bush. The east point is also bushy, 87 feet high, and from its base a rocky point extends to the south-west, off the extremity of which, distant about half a cable, is a low water rock.

The tide runs up Kogha river 4 or 5 miles, and its banks are high, and in many parts perpendicular. On its right bank, about 3 miles from its mouth, the Manubie forest commences ; it extends about $2\frac{1}{2}$ miles to the north-west, nearly parallel to the river, and is about a mile in width.

At two-thirds of a mile eastward of Kogha river is a low rocky point with a sunken rock $1\frac{1}{4}$ cables off it ; in the bight between are several low water rocks. About 2 cables westward from the point, and $1\frac{1}{4}$ cables off shore is a ledge of rocks 3 feet high.

Juju river lies $1\frac{1}{2}$ miles eastward of the Kogha, and its mouth is generally open ; its west point is low and rocky. On the north-east bank of the river, a short distance from the mouth, is a dark bushy head about 90 feet high, and from its base a sand spit extends nearly across the river, leaving only a narrow channel.

At one mile eastward of the Juju is a stream which is open at high water ; its western point has a green hummock, 15 feet high, on its extremity, with a rock half a cable off.

From this stream the shore trends eastward $1\frac{1}{3}$ miles to Shekleen river, with sandy hillocks, covered with bush. About halfway, and three-quarters of a cable from the shore, are some sunken rocks. The coast rises to a height of 200 feet at half a mile inland.

Shekleen river is generally open, the channel running close to the base of a peak, 120 feet high, which drops perpendicularly on the west side of the river. The east side is low, with a sandy beach. Between the river and Shekleen point is a black headland from which the land rises abruptly to a height of 275 feet.

Shekleen point is about 50 feet high, and connected with the coast ridge by a neck of sand and bush, and when seen from near the coast appears as an islet.

At $1\frac{1}{2}$ miles north-east of the point is Gnabie stream ; and beyond it the Kawka. Between the latter and the Gnabbakka the coast is fringed with rocks.

Gnabbakka river has a wide entrance, and its mouth is common to two streams ; the eastern is the larger, and the tide runs up it about five miles. Thence to Gnabbakka point the coast is rocky, attaining a height of from 200 to 300 feet at a distance of one third of a mile from the beach, and broken by several ravines.

Ingoma stream lies about $1\frac{1}{2}$ miles north-eastward of Gnabbakka point ; half a mile farther eastward is Kabolla river ; between the two is a rocky point, and the coast is about 170 feet high.

From Kabolla river the coast, composed of perpendicular cliffs about 160 feet in height, trends south-eastward to Udwessa point, a dark bluff.

From Udwessa point (half a mile east of which the cliffs cease), the coast trends eastward to Amendu point and Amendu river ; the shore in places is fringed with rocks.

Amendu point is a rocky projection, with several rocks above water near it ; a sunken rock lies about $2\frac{1}{2}$ cables off the point. On the point is a bushy hillock 25 feet high, and on the east side of Amendu river is a hill 115 feet high. The Amendu river forces its way to the sea through a sandy spit, which stretches across from the east point.

Landing might possibly be effected about half a mile eastward of the rocks extending from Amendu point, where also there is reported to be fair anchorage.

Between Amendu point and Bashee river, the coast hills covered with bush are about 60 feet high, backed by land about 180 feet high.

BASHEE RIVER.—The entrance to Bashee river is about one-third of a mile wide, with sand spits extending from both points ; the depth in the channel between (about 50 feet wide) is about 3 feet at low water. The sea breaks for a distance of 2 cables or more outside the entrance.

Within the entrance are sandbanks, which dry at low water; the channel is westward of them close along shore. Above the sandbanks the river expands to an average breadth of $1\frac{1}{2}$ cables.

The west point of entrance is low and grassy, but about a quarter of a mile up the river on the right bank is a grassy hill 270 feet high; the hill on the east side of entrance is high and covered with bush. The banks of the river are steep, and on the west side are generally free from bush, but on the east side, from half a mile within the entrance, are covered with dense bush.

Beacon.—In order to distinguish this part of the coast, a beacon 50 feet in height, painted black, and presenting the shape of a diamond, has been erected on a round-topped, grassy hill, about 150 feet above the sea, at about half a mile north-east of Bashee river entrance. The beacon is in lat. $32^{\circ} 14\frac{1}{4}'$ S., long. $28^{\circ} 54\frac{1}{2}'$ E., and should be seen from a distance of 16 miles in clear weather.

Udwessa forest.—About $1\frac{1}{4}$ miles up the river, and half a mile from the right bank, the dense Udwessa forest commences; it extends in a westerly direction for about 5 miles and is $1\frac{1}{4}$ miles in width.

Anchorage.—H.M.S. *Active* (1877) anchored several times off the mouth of this river. A good berth is in $10\frac{1}{2}$ fathoms, sandy bottom, with Amendu point W. by S. $\frac{1}{2}$ S., and the west head of the river N.W. $\frac{1}{2}$ N. The rollers set in after a strong westerly or south-westerly breeze, occasionally breaking in 6 or 7 fathoms, but generally off the mouth of the river in $3\frac{1}{2}$ or 4 fathoms.

Landing is dangerous. The following is the experience of H.M.S. *Active*.

Landing was first made on the eastern spit in a whale boat, but the attempt to get off proving ineffectual, the boat was carried $1\frac{1}{2}$ miles to the westward to a sandy beach close to a small river, closed by a sand ridge, from which place, with great difficulty, the crew succeeded in returning to the ship. On a second occasion, in attempting to land, the boat was capsized (apparently over rocky ground), one life was lost, the remainder of the crew reached the shore with difficulty. Several attempts were made to return to the ship but without success, and the crew had to go to East London.

Caution.—Before attempting to land on this beach, which is about 200 yards in length, and three-quarters of a mile north of Amendu point, the direction of the current outside the edge of the surf should be ascertained so as to avoid being set over the rocky ground which evidently extends from the shore on either side of the sandy beach. The rollers occasionally without warning break heavily a considerable distance outside the usual line of breakers.

Current.—The Agulhas current off this coast generally sets in the direction of the coast at the rate of one to $3\frac{1}{2}$ knots an hour; it is weak in strength near the coast, and strongest near the edge of the bank of soundings. It almost invariably sets to the westward in all the anchorages between East London and Bashee river, but sometimes, in fine weather, within a distance of about 2 miles from the coast, a weak current may be found setting to the eastward; this easterly set has occasionally been known to extend 7 or 8 miles off the coast.

Bashee point, about one mile eastward of the river, is bushy, with a grass hummock; a rock lies a short distance off it.

THE COAST between the Bashee and Umkomass rivers is fringed with outlying rocks for a distance varying from one to 5 cables.

Hole in the Wall.—At about 17 miles north-eastward of Bashee river are two rocks about 100 feet high. The south-western is flat-topped, has a natural archway, known as Hole in the Wall, and is perforated at the base; the north eastern and higher of the two has a cleft in the summit in the form of a wedge.

Doubtful bank (Whichelo bank).—Abreast of Hole in the Wall, and about 75 miles from land, a bank of soundings of from 42 to 48 fathoms, in lat. about $32^{\circ} 40'$ S., and long. from $30^{\circ} 10'$ E. to $30^{\circ} 45'$ E., is said to have been discovered by Captain Whichelo, in October 1847. This locality was partially examined by H.M.S. *Serpent*, in 1869, but bottom was not reached with from 100 to 200 fathoms of line.

Whale rock point, about 8 miles north-eastward of Hole in the Wall, is 70 feet high, and wooded for about 300 yards inland. The

surrounding country is grass land, with the exception of two patches of trees between it and Umtata river to the westward. Whale rock lies off the point.

Rame head, situated about 15 miles south-westward of St. John river, is a rocky point, sloping gradually, with a small rock at its extremity. At about three-quarters of a mile off shore, a little to the westward of the head, there are depths of 8 to 10 fathoms.

Brazen head, about 5 miles north-east of Rame head, has from the eastward the appearance of two distinct points, densely wooded, steep, and bold. The summit is 809 feet above the sea.

Landmarks.—Between Rame head and Waterfall bluff, about 33 miles to the eastward, the coast is faced with a number of high bluffs, which does not occur on any other part of the coast, eastward or westward, for a long distance. St. John river lies about midway. Between Brazen head and St. John river is a Sugar Loaf rock.

GORDON BAY is an indentation in the coast to the eastward of cape Hermes, and at the mouth of St. John river; it affords fair anchorage, but is exposed from about E. by N. round by south to W. by N.

Cape Hermes,* the south extreme of Gordon bay, is a round, grass-covered hill, 433 feet in height; a rock 8 feet high lies one cable off it; the north extreme of the bay has a similar hill over it, but of less height. The summit of the cape is in lat. $31^{\circ} 38' 6''$ S., long. $29^{\circ} 33' 16''$ E.

Landing.—Just within the cape, at its junction with the sand, is Paul's cove, where sometimes landing may be effected when the bar of the river is impracticable; the boats, if necessary, can thence be dragged along the beach into the river.

Close inshore during flood tide, which runs regularly, a strong stream was found setting southward along the sandy shore inside the breakers, and along the rocky shore in the direction of cape Hermes. This stream 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.

* See plan of St. John or Umzimvubu river, with view, No. 2,566; also view on hart, No. 2,087.

Should a boat be swamped in the surf, it would be almost impossible for the crew to reach the shore, as sharks are numerous both outside and in the river.

The anchorage in 13 fathoms water, with cape Hermes N.W. by W. $\frac{1}{2}$ W., distant three-quarters of a mile, and Porpoise rock N. by W. $\frac{3}{4}$ W., was found to be good : but a berth closer in, about 8 fathoms, would probably be better. No current was experienced at the anchorage.

PORT OF ST. JOHN (Umzimvubu river) is navigable for vessels of 6 or 7 feet draught for about 11 miles, the difficulty being that of crossing the bar. The bottom, above the Gates, is very irregular, with shallow reaches and recurring deep holes, a depth of 56 feet having been found in one place. Below the Gates the river banks are steep so that small craft may lie alongside them.

The appearance of the land from off the mouth of this river is so remarkable that it is easily recognised.* A table mountain, 1,200 feet high, appears to have been cleft to its base, leaving a wedge-shaped gap in the centre, through which the river discharges into the sea. St. John's Gates, the upper part of this table land, is bare stratified sandstone rock, like Table mountain ; but at 200 feet below a dense forest covers the cliffs to the edge of the river. The Gates are $1\frac{3}{4}$ miles from the entrance of the river ; the western Gate, 1,239 feet high, is very steep ; the eastern Gate, 1,163 feet high, has two distinct terraces of table land with grass on it. Beyond the Gates the river becomes more open, and its banks are lined with reeds.

The country is well-watered, and capable of supporting large herds of cattle ; and near the coast the soil is said to be suitable to the growth of cotton, sugar, and coffee ; copper is said to exist in various places.

There is a trading station named White's station at 7 miles up the river, on the right bank, and about 2 miles beyond is a waggon drift, known as Davis' drift, but it is a dangerous crossing. Small craft, drawing 6 feet, can navigate to within half a mile of the drift, and in many places can lie alongside the banks. There is plenty of good timber and limestone in the neighbourhood of the river.

The river is tidal to about one mile above the site of Fort Harrison, dismantled in 1882.

* See plan of St. John or Umzimvubu river, with view, No. 2,566.

The bar lies about a quarter of a mile southward of Porpoise rock, the east point of entrance to the river ; its breadth is about one cable, and the average depth at low water is about 6 feet during the year. On both sides of the channel there are often heavy breakers, and at times the sea breaks across the entrance for four or five successive days, and especially after S.W. gales, when the rollers are unusually high. The bar is of quicksand, constantly shifting ; in December the channel is to the eastward near the Porpoise rock, but as the dry season advances it moves to the westward until June or July. In June, when the bed of the channel is to the westward, the depth on the bar may be reduced to 4 feet at low water, and in the rainy season it may be increased to about 8 feet, but the depth entirely depends on the amount of the rainfall. As much as 20 feet has been found in a freshet. The rainy season prevails from October to April.

Even during the unfavourable part of the year for small craft entering the river, it appears that except during very boisterous weather the bar is always practicable for surf boats. *See* landing, p. 165.

Settlement.—A settlement formed in 1883, and situated on the west bank of the river, contained in 1895, a population of 196. The Resident Magistrate of the territory discharges the functions of Port Officer.

There is a wooden pier with derrick, just within the entrance, alongside which small craft might lie.

Supplies.—Provisions and good water are obtainable, but there are no facilities for repair. Timber and limestone are abundant.

Trade.—The value of the exports in 1895 amounted to £1,627, derived chiefly from hides, maize and gums ; the imports, chiefly dry goods, amounted to £6,482.

Small steamers and other craft trade regularly to Natal, but though the key of a fertile and promising country, its trade is not yet of any importance. 29 vessels of the aggregate tonnage of 2,233 tons entered and cleared in 1895.

A surf boat, with surf warps, communicates with vessels when anchored outside the bar.

Tides.—It is high water, full and change, at St. John river, at about 4h. 8m., and the rise is $5\frac{1}{4}$ feet.

St. John reef.—At about 2 miles eastward of the entrance to St. John river is Bluff point; and the shore between is skirted with rocks in places to the distance of one cable. At 2 cables from the shore on the east side of Bluff point is St. John reef with a depth of 6 feet at low water springs.

The COAST eastward of St. John reef continues high for about 17 miles to Waterfall bluff, intersected by a number of ravines, through which small streams discharge into the sea. The Egosa forest stretches from St. John river to port Grovenor.*

Umzimklava river is situated 9 miles eastward of St. John river. Upon its eastern side is a round hill, with two rocks at its base. The Entafufu river lies about 4 miles south-westward, and the Umzimpanzi and Embotyi rivers at 3 and 4 miles north-eastward of it.

Waterfall bluff is the easternmost of a succession of bluffs. It is about 200 feet high, and from its summit two streams of water precipitate themselves into the sea; the westernmost fall enters the sea at one leap, but the fall of the eastern one is broken at about a third of the distance down.

These falls may be seen 7 or 8 miles off, but in dry weather the volume of water is probably much diminished, if not entirely dried up.

Port Grovenor.—The bight in the coast, known as Port Grovenor, is situated about 6 miles north-eastward of Waterfall bluff; there appears to be little difficulty in landing goods here. Ubazi river enters the head of the bight.

A detached coral patch is reported to lie about 2 cables off the reef fronting the west point of the bay, or about half a mile off shore. The reef is said to extend farther seaward than charted.

The coast.—Aspect.—The coast eastward of Waterfall bluff, is moderately high inland, sloping gently down to the beach. In the wet season this coast appears beautiful, being clothed with bright green grass and clumps of trees and bushes, frequently relieved by streams and small cascades; but a few weeks of drought probably greatly alters the appearance.

* See chart No. 2,087

A bight similar to Port Grovenor is charted about $4\frac{1}{2}$ miles to the eastward, and into which Umtsikaba river discharges. South Sand bluff, on its eastern side, is a round-topped sandhill presenting a sandy bluff to the westward, the top being covered with bush.

A similar sand bluff lies 21 miles farther eastward; midway between them is a red-topped hill, which is in sight from both bluffs.

The Umtentu and Isikota rivers lie between South Sand bluff and the Red hill; and the Umyameni, Umzamba, and Umtamvuna between the Red hill and North Sand bluff, besides smaller streams.

The south point of the Umtentu river is marked by a quoin-shaped hill. On the south side of the Umtamvuna river there is a strip of sand up the side of a wooded hill, which shows like a road; coming from the northward it opens out on a W. by N. bearing.

This river forms the southern boundary of Alfred county, the southernmost county in Natal.

There is a large house on the south bank of the Izotsha river, 2 miles southward of Port Shepstone.

Foul ground.—Within one mile southward of Impenjali river, at half a mile off shore are two sunken rocks. This river is situated about 8 miles north-eastward of the Umtamvuna.

Foul ground is reported to exist from one to 4 miles off the Izotsha and Imbango rivers, south-westward of Port Shepstone.

UMZIMKULU RIVER.*—Port Shepstone.—The estuary of this river, known as Port Shepstone, is easily recognised. On the south side of the entrance there is a long low point, which rises to a height of 300 feet at a distance of 2 miles from the sea. On this ridge the signal station and Port Captain's look-out are situated. Behind it lies the scattered village of Lower Umzimkulu.

The estuary extends about 8 miles inland. At its mouth it is about 200 yards wide, and said to have at times a depth of 15 feet at high water springs. Small craft can go up as far as St. Helen's rock, at the head of the estuary; here the river narrows; lighters can go several miles farther, up to the marble quarries, about 12 miles above the entrance. About £36,000 have been spent by the Natal Government in removing the bar and building a training wall to render the port available for small craft.

* See chart, No. 2,088, with view.

LIGHT.—From a staff, 36 feet in height, on the south side of entrance to Port Shepstone, is exhibited at an elevation of 87 feet above high water, a *fixed green* light, visible from a distance of 4 miles in clear weather.

A **rock** has been reported to exist by the master of the ketch *Norman*, 1895, at three-quarters of a mile off shore, and about 3 miles east-north-eastward of Port Shepstone.

Trade.—Communication.—The trade of port Shepstone is slowly developing; its consists of lime, cement, marble, cattle, grain, fruit and farm produce; sugar and tea plantations and factories have recently been added, and with marked success. Coasting steamers make fortnightly trips to Durban. It is connected with the telegraph system of the Colony.

Red-Topped hill, about 15 miles north-eastward of the Umzimkulu, and 60 miles south-west of cape Natal, has a native kraal in the valley just east of it.

Umtwalume river is conspicuous, somewhat resembling St. John river, and is the only one with high steep banks northward of the Umzimkulu. When the river is open, a remarkable rocky peak is seen in the opening, and high up on the left bank are a few houses.

Besides the streams mentioned between St. John river and Natal, there are many minor ones about which we have no information beyond what is shown on the charts. The navigator will take notice that few soundings have been taken in the locality, and exercise caution accordingly.

Current.—From the mouth of the river Umtwalume in lat. 30° 29' S. to cape Natal, a north-easterly current of about 2 miles an hour has been experienced in the month of May, at from one to 2 miles from the shore; whilst on the coast to the south-west of the river it was exactly the reverse. *See* current, p. 172.

Umzinto river.—The mouth of the Umzinto lies in lat 30° 22' N.

Three miles within the village of Umzinto are the Umzinto Company's sugar estates and several farms.

Umtitchwana or Umzinto bay, about one mile northward of the Umzinto river, and 2 cables southward of Umzimayo river, is now used for landing cargo, brought from Durban.

Bank.—Between the parallels of about $30^{\circ} 22'$ and $30^{\circ} 24\frac{1}{2}'$ S., and $3\frac{1}{2}$ miles off the Umzinto river, there are depths of 10 to 14 fathoms extending in a N.E. by E. direction, over a space of more than 2 miles. From the latter depth no bottom was obtained.

ALIWAL SHOAL.*—This dangerous rocky shoal is within a depth of 5 fathoms, about 7 cables in length, and one cable in breadth; it lies $2\frac{1}{2}$ miles off Green point, and in the track of vessels bound along the coast southward of port Natal. Its north extreme, in lat. $30^{\circ} 15\frac{3}{4}'$ S., long. $30^{\circ} 50'$ E., has a depth of $1\frac{1}{2}$ fathoms, with from 14 to 17 fathoms at 2 cables distant; from this position, the mouth of the Umkomass river bears N. $\frac{1}{2}$ E. distant $3\frac{3}{4}$ miles, Green point beacons are in line, and the mouth of the Umpambinyoni river W. by N. $3\frac{3}{4}$ miles. The depths within the shoal are from 12 to 15 fathoms.

LIGHTS.—From an iron tower 34 feet in height, painted in red and white bands, erected on the headland southward of Umpambinyoni river, is exhibited, at an elevation of 159 feet, a *fixed white and red* light, visible in clear weather from a distance of 10 miles. It shows *white* from S. 55° W. to S. 82° W.; *red* from S. 82° W. to N. 62° W., over Aliwal shoal; and again *white* from N. 62° W. to N. 35° W. Obscured in other directions.

From a tower of same height and colour, erected on the headland north of the Amahlongwana river, is exhibited a *fixed red and white* light, also visible from a distance of 10 miles. It shows *white* from N. 50° W. to N. 30° W.; *red* from N. 30° W. to N. 19° E., over Aliwal shoal; and again *white* from N. 19° E. to N. 39° E. Obscured in other directions.

It will be seen, by referring to the chart, that vessels passing seaward of Aliwal shoal with one red light in sight will be about 6 miles from the shoal, and both red lights can only be seen at once when within that distance; vessels proceeding inside the shoal will pass in nearly mid-channel with one red light only in sight.

Beacons.—A mast beacon, 70 feet high, 228 feet above the sea, and surmounted by a triangle, stands on the hill behind Green point,

* See plan and view on chart, No. 2,088; also views of the coast on No. 643.

about 500 yards distant from a pyramidal beacon 28 feet high, surmounted by a cask, on Green point; these beacons, in line on a N.W. $\frac{1}{2}$ W. bearing, point in the direction of Aliwal shoal. The beacon on the hill has been recognised from a distance of 14 miles. A white house just east of Ifafa river, and one mile inland, is also a useful day mark, when approaching from the south-westward.

In thick weather vessels should not stand into a less depth than 40 fathoms.

Current.—A strong current sets over Aliwal shoal in a south-west direction, but midway between the shoal and Green point it is reduced to one mile or less; at times a counter current sets to the north-eastward. *See* also current, p. 170.

Umpambinyoni river.—**Scottsburg.**—The township of Scottsburg is situated just southward of the mouth of the Umpambinyoni; the landing and shipping of cargo and produce was formerly effected here.

Umkomass river lies 3 miles northward of Green point, and has about 6 feet over the bar at high water; its mouth is a tidal estuary which forms a port suitable for small coasting steamers. The width of the stream at high water at this point is about one hundred yards with comparative deep water; it ranks next to port Shepstone as a harbour.

There are in this district several estates and scattered farms, and a hotel at about 8 miles from the mouth of the river, with good fishing. Higher up the scenery becomes broken and wild, and game is abundant in season. A good road traverses the whole of the country, and a ferry boat crosses the river near the hotel.

False Bluff, 418 feet in height, is situated about 11 miles westward of cape Natal. Two miles eastward of it is the Umlazi river, which drains the Ipisingo flat and sugar plantations. There are several steam mills near the river.

CAPE NATAL is a high wooded tongue of land, terminating in a remarkable bluff 195 feet high, and is easily identified, the coast to the northward falling back and being low for several miles. On the bluff is a light tower painted white, two batteries, a flagstaff and

watch house; on its east side is a rock 20 feet high, and on its north-west side at the foot of the bluff are two white leading marks for the bar. *See* light, below.

There are no outlying dangers in approaching the cape and the water is deep close to the breakers.

Lloyd's signal station.—There is a Lloyd's signal station near the lighthouse.

PORT NATAL is of great commercial importance, as it is the only inlet capable of affording shelter to vessels of moderate draught in the Colony, and which causes it to be the outlet of the produce of an extensive and valuable region.

It consists of a large bay, almost filled with sand and mud banks dry at low water, and sheltered at its entrance by cape Natal. There are no streams of importance falling into the inlet, so that the entrance is only kept open by the scour of the receding tide between the piers constructed for that purpose, and by dredging.

Vessels of 15 to 19 feet draught enter port Natal at high water, depending on the condition of the bar, but the depth and direction of the channel is subject to much variation. *See* Bar, page 175.

LIGHTS.—From a white tower 81 feet in height, erected on cape Natal, is exhibited at an elevation of 282 feet above high water, a *revolving white* light which attains its greatest brilliancy *every minute*, and visible in clear weather from a distance of 24 miles. The light does not open clear of the land until it bears northward of N. 57° E., nor is it visible from Aliwal shoal. Position of lighthouse, lat. 29° 52' 40" S., long. 31° 3' 50" E.

From a purple tower 9 feet in height, near the end of the Innes breakwater, is exhibited at an elevation of 22 feet above high water, a *fixed white* light visible about 3 miles.

A *fixed red* light is shown from the seaward end of the North pier.

Three *fixed white* lights, triangular, are shown from the Rocket house, on the coast about one mile northward of the port entrance.

A *red* light is exhibited at night, under the direction of the harbour master, for the information of the pilots, when the bar is considered dangerous or impracticable.

Anchorage.—The anchorage off port Natal may safely be approached at night by the lead, the decrease in the depths being regular. The best berth is in 10 fathoms, with the lighthouse bearing S.W. by S. distant about $1\frac{1}{2}$ miles, and the Rocket house W. by N. The holding ground is good, but there is no shelter during southerly and easterly winds, and there is nearly always a heavy swell along the coast. In a more southerly position, the outset of the tide is more felt, swinging vessels broadside to the swell, and causing them to roll heavily; the ground is also encumbered with lost anchors and cables.

It is recommended to lie at single anchor with 70 fathoms of chain, and to sight the anchor occasionally. In the event of parting, and not being able to work out, vessels should run for the beach abreast the Rocket house, keeping the head sails set, and remaining by the vessel until communication with the shore is established by the rocket apparatus. Neither the life-boat nor the rocket apparatus were required in the year 1895.

If apprehensive of bad weather on arrival in the road, a sailing vessel should anchor in 16 fathoms, $2\frac{1}{2}$ miles from the lighthouse, from which position she would be able to fetch out on one tack or the other, with the wind from any quarter. *See Winds*, p. 179.

Caution.—When the wind is inclined to freshen from the south-eastward, with a long swell and high barometer, vessels should proceed to sea as soon as possible. The heavy seas from the south-eastward, which at times occur, are generally preceded by an unusually low range of barometer for three or four days before the seas are felt here.

Pilots.—Vessels intending to enter port Natal, and in want of pilots, should anchor in the road. 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 the Commercial Code of signals; *see also* bad weather signals, p. 176. A steam tug may be had. Pilotage is compulsory, but H.M. ships are supplied with pilots free of expense. No vessels are taken in at night.

Directions.—The only danger in the approach is to the southward, namely, the Aliwal shoal, which may be easily avoided by attention to the lights and beacons erected to guard it, p. 171. In thick weather a vessel should not stand into less than 40 fathoms. Southward of port Natal the soundings are coarse gray sand and

stones, whilst to the northward fine black sand will be found. From the southward, having passed Aliwal shoal, cape Natal light kept in sight will lead outside all known dangers while to the southward of Umlazi river; when northward of that river, keep a long mile from the land. When the lighthouse bears W.N.W. steer for the anchorage. *See bar directions, p. 176.*

THE PORT.—The entrance to port Natal lies between Innes breakwater, extending north-eastward of the Bluff, and the North pier, and is about 270 yards in width; these breakwaters, by narrowing the channel, are intended to give greater force to the out-going stream and so clear the sand. Dredging operations are constantly in progress to remove the sand which accumulates, and to permanently increase the depth. The old North pier has been removed to the level of low water ordinary spring tides; its outer end is marked by an iron triangle, surmounted by a circular plate.

A space within Sandy point extending about $3\frac{1}{2}$ miles, east and west, and nearly 2 miles north and south, is almost filled with mud, with boat channels in various directions. On the southern side are some large mangrove islands, and elsewhere around this space are mangroves and mangrove swamps. The part available for a harbour is confined to a channel about a cable in breadth and three-quarters of a mile in length, with depths varying from 12 to 20 feet; this is also being improved by dredging.

The Bar of sand which crosses the mouth of the port is constantly changing both in direction and depth, and should never be attempted by a stranger. There is usually a channel on either side of a central shoal, named the North and South channels; the entrances to which are occasionally marked by a buoy.

From June to September is the time when the bar is usually shallowest. A vessel of 19 feet draught entered in January 1895.

In the year 1896, the average low water depth was about 16 feet, as against 12 feet 1 inch in 1895 and 11 feet 11 inches in 1894. During the months April to September the average low water depth was 17 feet 3 inches, equal to $23\frac{1}{2}$ feet at high water springs and a little over 20 feet at high water neaps. But twice in October the South channel was reduced by exceptionally heavy gales to low water depths of 5 and 6 feet (though the North channel had 17 feet in it); but 48 hours was sufficient time after the sea abated to open

the channel to vessels of 20 feet draught. It is considered that the port can now be kept open for vessels of 17 feet draught at all times of the year, except occasionally for a couple of days or so after exceptionally rough weather.

(See Bad Weather Signals, below, and Lights, page 173.)

In 1895, the least depth on the bar was 10 feet 1 inch, in August, and the greatest (low water) depth 15 feet 1 inch, in January.

In 1894, the depths were a little less than in 1895.

Bad weather signals.—The bar was dangerous for 45 days (of 12 hours) in 1895, denoted by a cone halfway to yardarm of the signal staff; and impassible for 21 days, denoted by cone right up to the yardarm. This was the worst year since 1889. In 1893, the bar was dangerous for 14 days, and impossible for 4 days only.

Directions.—If, through any cause, a vessel whose draught will admit, should be forced to run over the bar without a pilot, steer for the two white leading marks at the foot of the Bluff on the west side, in line; this will lead through the north channel and to the training wall at the foot of the bluff, where, being in smooth water, the vessel will obtain a pilot. On arriving in the road, it will be well to inquire the line of the channel with reference to the Bluff leading marks.

Signals shewn by dredgers.—The undermentioned signals are shewn by the dredgers when at work, or in position for working, on the bar or in the harbour channels :—

By day :—Three red balls, triangular, not less than 10 feet apart.

By night :—Three *red* lights in the place of the balls.

One red ball underneath the triangle at the end of the yard by day, or one *white* light, similarly placed, by night, indicates that the dredger can be passed on that side. When this signal is not shewn, the dredger cannot be passed on either side. The above signals indicate that the dredger is not under command, and therefore cannot get out of the way. The speed of vessel is to be so reduced as to ensure their passing the dredger without causing damage.

Berthing.—Vessels lie in the northern part of the harbour within Sandy point, where are the custom house, port office, wharves, &c., and from whence a railway runs to Durban. The berthing space is

being increased by dredging. Some vessels lie alongside the wharves in low water depths of 13 to 16 feet. The mail steamers generally lie in the Bluff channel. All vessels are compelled to take in or make fast to Government moorings, of which there are several sets.

DURBAN, the town of port Natal, stands about $1\frac{1}{2}$ miles from Sandy point, on a low flat, and is about $5\frac{1}{4}$ miles by road, and 70 by rail, from Maritzburg, the capital of the colony. It is well laid out, with wide streets lined with trees, and a tramway runs to Sandy point. The houses are principally built of wood. Here there is an Episcopalian church and Wesleyan chapel, banks, mechanics' institute, several clubs and societies, a market place, &c. The population in 1886 was about 16,400, half of whom are Europeans. Most of the the wealthy inhabitants dwell on the Berea, a wooded height overlooking the town.

Shipping.—For trade of the colony, *see* page 6.

Communication.—Durban is in telegraphic communication with the towns of Natal and of the Cape Colony, and by submarine cable, *viâ* Delagoa bay and Zanzibar with England, and also *viâ* Cape Town; the cable to Delagoa bay is landed at about 3 miles northward of Durban, near the Umgeni river; there is railway communication from Durban to Pietermaritzburg, the Transvaal, Delagoa bay, &c. *See* also page 13.

Mail steamer from England weekly; mail steamer of the "Deutsche Ost Afrika Linie" every three weeks from Aden *viâ* East Africa ports, and *viâ* the Cape about every two months. Connection with British India Company's steamers at Delagoa bay. The Rennie Company's steamers run every three weeks from Durban to East Africa ports as far north as Kilimán. *See* also page 15.

Supplies.—Water and provisions may be obtained, and are sent off in surf boats or tugs to vessels requiring them in the roads. In the harbour supplies may be obtained at moderate prices.

Repairs.—The railway and other workshops can undertake large repairs to hull and machinery; a large shaft can be turned, cylinders of 96 inches cast and bored, and castings of 10 tons made, there is also a steam hammer of 4 tons. There is a steam crane capable of

See plan of Port Natal, with views, No. 643.

lifting 20 tons, with a depth of 12 feet alongside it at low water. The principal engineering works are the Umgeni, distant 6 miles from Durban and connected by railway.

Hospital.—The Government hospital, situated within one mile of the shipping, admits all classes ; there are no diseases due to climatic causes, nor special quarantine or customs regulations.

Patent Slip.—There is a patent slip capable of taking a vessel of 500 tons burthen.

Coal.—A large quantity of coal is kept in stock ; it is taken off in lighters to vessels requiring it in the road, but the exposed anchorage renders coaling there a tedious proceeding. Vessels drawing 16 feet can coal alongside the wharves in the harbour. The coalfields are situated about 18 miles beyond Ladysmith, 189 miles from Durban, and are connected with the railway. Coal mines are worked in the Newcastle district in the northern part of the Colony ; these are also connected with the Government railway.

Signal Staff.—The port signal staff and semaphore are at the port office at the Point, north side of entrance to port Natal.

Time signal.—A ball is dropped daily, except Sundays, at 1h. 0m., p.m., Natal standard mean time (meridian of 30° E.), equivalent to 23h. 0m. 0s. Greenwich mean time. When signal fails in accuracy, a blue flag with white centre is hoisted at the Time ball staging, about 1h. 5m., p.m., as a notice that the signal cannot be relied on.

The signal is made from a position westward of the Port signal station, at the Point.

Tug.—A **Lifeboat** is kept at Sandy point ; the Rocket house life-saving apparatus is situated on the shore at one mile northward of the harbour entrance. Neither were required during the year 1895. The harbour master has a small steam-tug for the service of the port ; it is sent off to communicate with men-of-war on their arrival.

Tides.—In the port, the time of high water at full and change is 4h. 30m., springs rise 6 feet. The velocity of the ebb at springs is about 3 miles an hour in the Bluff channel and of the flood about 2½ miles.

In the road, outside the bar, the flood stream sets nearly north and the ebb in the opposite direction.

Current.—It is necessary to caution vessels against the strong current which prevails on the coast of Natal beyond a distance of about 3 miles; it generally sets to the south-west at the rate of 2 to 3 miles an hour. Eastward of Natal, within that distance, as far as O'Neill peak, no current is felt; there the Mozambique current will be met, sometimes running as much as 3 knots an hour close in to cape St. Lucia. *See* page 185.

Winds and Weather.—The prevailing winds at Natal are from N.E. to East, and from S.W. to South, and in about equal proportions alternating throughout the year in periods seldom exceeding a few days for either. A digest of the winds in the year 1886, gives 157 days' winds from the former quarter with a maximum force 9, and 145 from the latter with a maximum force 10, the wind on the remaining days of the year, four excepted, were from between South and East; on 4 days winds were registered from W.S.W. to N.E. by N.

From April to June the proportion of N.E. winds to S.W. winds was 37 to 25. November to February 38 to 47.

During the remaining months the winds were about equally divided.

The wet season in Natal is from October to March, but rain occurs occasionally at all times of the year, *see* page 28. After a continuance of rain, the mercury rising all the time, an easterly gale follows, when the weather clears. May, June and July are the finest months, a light breeze coming in from seaward during the day, and a breeze from the land during the night, but strong gales blow both from the eastward and westward even during these months. August September and October are the most boisterous months, when the range of barometer is great, and the gales alternate between east and west. The gales from the eastward blow about south-east at 50 or 100 miles to seaward, but are deflected on reaching the coast to E.N.E. or N.E., and it is the swell set up by the wind at S.E. so far seaward, which, catching the vessels at anchor in Natal road, on the starboard bow, heading to the wind, which causes them to ride so uneasily, and when they part their cables to cant towards the shore (*see* remarks on gales, pages 18–20 and climate, pages 27, 28).

See plan of Port Natal, with views, No. 643.

COAST.—Between cape Natal and the entrance to Tugela river, a distance of about 46 miles, several small streams fall into the sea ; the principal are, the Umgeni, Umhlanga, Umhloti, Tongaati, Umhlali, Umvoti, Nonoti, and the Sinkwassi. The hill 450 feet high, just south of the Umhloti is conspicuous, and has a clump of trees on it. The southern bank of the Umvoti has two sand patches close down to the sea. The south point of the Sinkwassi is a sandhill, with a wooded top. The coast hills range from 250 to 550 feet high, and are backed by dense bush.

At the distance of one mile from the coast, no bottom will be found at 12 fathoms, until close off the Tugela.

Morewood cove, about 23 miles north-eastward of Natal, is said to have a seam of coal in its vicinity. The red cliff southward of the cove is conspicuous.

Landmarks.—The most remarkable landmarks between port Natal and the Tugela river are :—

A red cliff, divided by bushes nearly to the water, is situated just southward of Morewood cove. A red bluff, about a quarter of a mile inland, and $1\frac{1}{2}$ miles southward of the Umvoti river, in lat. $29^{\circ} 25'$ S. Half a mile northward of this bluff is a wooded ravine. Conspicuous red ravines show against the green hills, marking either side of the Sinkwassi river.

TUGELA RIVER, forming the northern boundary of the Colony of Natal, is easily recognized from seaward by its southern head, composed of dark bush, thickly wooded ; and by the red hill on its northern shore, which has a conical nob on its summit, and several patches of red clay to the northward. The river is not navigable.

Its source is in the Drakensberg mountains, whence it leaps over a cliff 1,800 feet sheer, into the Colony. Whilst the Victoria falls in the Zambezi exceed the Tugela falls in volume, the latter are said to be more beautiful. From the foot of the falls, the river winds for 200 miles to its mouth ; at 60 miles from the sea it is joined by the Buffalo, where gold mining is in progress, and rich deposits of gypsum have been located. Coal mines exist in the Newcastle district, near the upper waters of the Buffalo ; this portion of the river, in summer, when flooded, is an endless succession of snow-white rapids, and the same applies to the upper Tugela.

The lower river is also useless for transport in the dry season (winter) when boats ground repeatedly.

The discharge from this river is observed several miles seaward ; the bottom is rocky at the anchorage, but has a thick covering of mud, the deposit from the river.

The bar is impassable, and although with very smooth water a landing might be effected at the northern side of the entrance, it would be attended with considerable danger, as the beach is fringed with rocks.

Anchorage.—At the mouth of the Tugela river the water shallows gradually to 5 fathoms, which depth will be found about 200 yards from the breakers. The anchorage off Tugela river affords no protection during onshore winds. With a strong breeze from that quarter, a vessel should proceed to sea.

The best anchorage is in 9 to 10 fathoms, with the red hill on the north side bearing N.W. $\frac{1}{2}$ N., and the small red-topped hill near the Inyoni river N.N.E. $\frac{1}{4}$ E.

A reef, at about half a mile from the shore, on which the sea breaks heavily, extends for a considerable distance along the coast from the northern point of the river ; a depth of $4\frac{1}{2}$ fathoms was found at 300 yards from the breakers.

THE COAST hills from the Tugela river north-eastward rise gradually from the beach, having grassy and cultivated valleys between, but there is no wood near the sea northward of the river. Several red patches on the hills are noticeable.

Amatikulu river.—At about 9 miles north-east of the Tugela river is a wooded conical hill, 300 feet in height, the most remarkable headland in the neighbourhood ; it forms the south point of Amatikulu river. This river is entirely barred by sand, but the water inside could be seen from aloft. The north side of the river is marked by a red hill similar in appearance and height (280 feet) to the red hill at the Tugela river ; several kraals are seen in the neighbourhood.

The Inyoni river lies about midway between the Tugela and Amatikulu rivers.

This part of the coast should not be approached nearer than $2\frac{1}{2}$ miles, where depths of 9 to 12 fathoms will be obtained.

Umlalaz river.—The coast immediately northward of Amatikulu river presents no features of interest ; the beach hills are faced with sand, but of less elevation (from 200 to 300 feet high, a noticeable difference when north of the Tugela river). Vedette hill, of white sand with a bushy top, situated about 9 miles northward of the Amatikulu, and one mile southward of the entrance to Umlalaz river, is conspicuous from the southward.

The mouth of the Umlalaz was examined by Commander I. W. Brackenbury, R. N., who, with a party of exploration, rode over from the camp at fort Chelmsford on the Inyezane, a distance of about 10 miles. Just within the entrance the river forms a lagoon at the back of the sandhills on the north point ; beyond the lagoon the river has a breadth of about 90 feet, deep enough for large boats, and reported to continue so as far as the first drift.* Two of the party waded across the river at its mouth, and found about 3 feet water (about half ebb), with a stream running out about 2 knots on hour. The water off the mouth of the river was discoloured for a considerable distance, and it was breaking at about 50 yards from the beach.

Glenton reef, lying between Amatikulu and Umlalaz river, is steep-to, and breaks. Its northern extreme lies nearly abreast Vedette hill, and extends about $1\frac{1}{4}$ miles off shore ; thence towards the Amatikulu it gradually merges into the shore breakers. The sea sometimes breaks without warning in 5 fathoms of water in the vicinity of Glenton reef.

Tenedos shoal, lying midway between the Umlalaz river and Durnford bay, extends nearly 2 miles from the shore and is steep-to ; the least water obtained was 9 feet, but there is probably less among the breakers. In calm weather there is often no indication of the shoal. There is a passage between this shoal and the shore, having $2\frac{1}{2}$ to 4 fathoms water, but it is only available in boats, when the water is smooth.

The landing abreast does not seem to be at all improved by Tenedos shoal, as there was far more surf here than at Durnford bay.

See chart, No. 2,088.

* This was in April 1879, or just at the end of the rainy season, when the river was probably swollen ; there was a gentle off-shore breeze : no attempt appears to have been made to land here.

DURNFORD BAY is the slight indentation in the coast near the mouth of the Umhlatuzana, a small river situated about 8 miles westward of Durnford point. The mouth of the river is generally blocked by sand, but it may be recognised by a conical sandhill about a quarter of a mile eastward of it, at the foot of a well-wooded range of hills, and by Grassy hill, one mile westward of the river, with patches of wood near its extremities.

Anchorage may be obtained in Durnford bay in 5 to 6 fathoms, coral, sand, and black mud, about half a mile from the shore, with the entrance of the Umhlatuzana river bearing from N.W. to N.N.E., and Durnford point E. $\frac{1}{2}$ N.

It is a good anchorage in easterly winds, but with those from westward a sea gets up, and heavy rollers set in, necessitating proceeding to sea.

Between Durnford bay and point a fairly even bottom exists, the average depth being 4 to 5 fathoms within half a mile, and 6 to 8 fathoms at about 2 miles from the shore.

Directions.—Approaching from the south-westward, keep Durnford point bearing northward of E. by N. $\frac{1}{2}$ N., until the sandhill on the east point of the Umhlatuzana river bears N. by E., when steer for it to the anchorage.

Landing.—There is occasional landing at the mouth of the Umhlatuzana river.

Commissariat stores were landed here without much difficulty, in July and August 1879, by surf boats brought from Algoa bay, but the landing was not so good as during the months of May and June.

Durnford point is a bluff, in lat. $28^{\circ} 54\frac{1}{2}'$ S., long. $31^{\circ} 59'$ E., and may be recognised by the square-topped hill over the point; it can be seen nearly as far northward as cape St. Lucia.

Shoal.—The bottom around Durnford point for a distance of one to 2 miles is rocky, with depths of $3\frac{1}{2}$ to 4 fathoms; it is advisable to give it a berth of 3 miles.

RICHARD'S BAY, about 4 miles northward of Durnford point, appears to have an even bottom, with a depth of 5 fathoms near to the breakers.

The Umlatuz, the Inseleni and other streams, empty themselves into a lagoon about a mile within Richard's bay, whence they discharge by a common mouth to the sea. This mouth, when observed from the masthead of H.M.S. *Forester* at anchor off it, had a bar extending from a half to one mile off shore, fairly smooth on its southern part, but breaking heavily on its northern part. Landing was impracticable, though perhaps, after calm weather, it might be possible.

A bare sand mound marks the northern point of the entrance. A short distance to the northward of this mound is a well-defined black hill; the beach hills thence to O'Neill peak are of moderate elevation, faced with sand.

Anchorage.—There is good fine weather anchorage in 11 fathoms, with O'Neill peak N.E. by E. $\frac{1}{2}$ E.; and the bare sand mound North.

O'Neill peak, about 400 feet high, and dark, is easily recognised by a cone in the centre of the range, which is more thickly wooded than the surrounding hills; there are no dark hills within 5 miles to the southward of it.

COAST.—The coast northward of O'Neill peak is fringed by a range of hills which become almost destitute of vegetation as cape St. Lucia is approached, again becoming thickly wooded between the cape and St. Lucia river.

Zulu shoal, reported in 1875 in lat. $28^{\circ} 51'$ S., long. $32^{\circ} 6'$ E. $1\frac{1}{2}$ miles off-shore, has been unsuccessfully searched for. It is advisable, however, to give the north-east extreme of Richard's bay a wide berth.

The surf breaks heavily along the whole of this coast.

Cone point, 8 miles south-westward from cape St. Lucia, has a conical hill of bare sand on it, and north-eastward is a round-topped bare sand hill, 380 feet high, appearing as a sharp summit when approaching it from the northward.

CAPE ST. LUCIA is a low rounded point of sand with a hill at the back 550 feet in height. At about 2 miles northward of the cape is a ledge of light brown rocks.

From the eastward the cape makes like a number of islands, which are the summits of the various sandhills comprising it; the most conspicuous is Sharp peak, 630 feet high, about 2 miles northward of the cape.* From Sharp peak the range extends northward, ranging from 400 to 600 feet in height; it is covered with stunted brushwood, and ends abruptly in the bluff hill which marks St. Lucia river.

Current.—Off cape St. Lucia, the Mozambique current sets to the south-westward, in the direction of the coast, at the rate of 2 to 3 knots an hour; at times, it sets close in to the cape. This current is usually found within one mile of the shore as far northward as Kosi river; thence to Delagoa bay, within 3 miles of the shore, the current is seldom felt. Occasionally, in-shore, a counter current of one knot an hour is felt along the whole of this coast. Strong southerly winds raise a considerable sea northward of cape St. Lucia.

Winds.—At times, with a rather low barometer and light easterly winds, strong south-west winds almost amounting to a gale spring up in this neighbourhood with but little warning; the barometer then rises quickly. In August, during one of these blows, it rose to 30·6 inches.

ST. LUCIA BAY, an indentation of the coast 8 miles northward of the cape of the same name, may be recognised by a conspicuous sugar-loaf hill of sand, 200 feet high, about one mile from the south point of entrance to St. Lucia lake. This hill is not seen when approaching from the southward until it bears westward of N.N.W. At $3\frac{1}{2}$ miles northward of the entrance to the lake is a conspicuous square-topped sand hill, 330 feet high.†

Anchorage.—The bay is exposed to winds from S.S.W. through east to N.E.; the bottom is sand, gradually decreasing in depth to the shore, and is good holding ground. A good berth in 10 fathoms, is with Sugar-loaf hill bearing W. $\frac{3}{4}$ S., and a remarkable square-topped hill N.N.E. $\frac{1}{4}$ E. H.M.S. *Sylvia* (1884) rode out a fresh S.W. gale in this berth; but with the wind more to the southward it would be necessary to put to sea. With the Sugar-loaf bearing northward of West the bottom is foul.

* See view on chart, No. 2,089.

† See plan of St. Lucia bay, on chart, No. 2,089.

Landing.—The best place for landing is under the Sugar-loaf ; here, H.M.S. *Goshawk's* boats effected landing, also boats from H.M.S. *Rapid*, March 1886, during exceptionally fine weather and off-shore winds ; the bar of the river was not practicable. After north-easterly or easterly winds, a swell rolls in and causes heavy breakers on the beach, thus rendering landing impracticable in ship's boats. North of the river the breakers extend a long distance seaward. Sharks are numerous and voracious.

St. Lucia river and lake.—In the dry season the entrance to St. Lucia river is completely blocked by a dry sand bar, which is annually swept away by the floods ; but apparently there is never more than a depth of 3 or 4 feet at high water, and with heavy breakers right across it. The bar was not practicable when seen by the *Sylvia* in August and January, though it was open.

Discoloured water from the river extends at times some distance seaward.

St. Lucia river trends north-eastward parallel to the coast, to St. Lucia lake, which is about 40 miles in length, 10 miles average breadth, and with a depth of about 9 feet. The eastern side of the lake is separated from the sea by a strip of land about 3 miles across, with sandhills from 300 to 500 feet high.

COAST.—At about 9 miles northward of the mouth of St. Lucia river and lake is a conspicuous sand-slip, from whence to cape Vidal, a further distance of 9 miles, is a range of dark-coloured steep hills of even height. Detached rocks lie a short distance off the projecting points.

Cape Vidal rises to a peak, 500 feet high, and when bearing W.S.W., shows a long triangular patch of sand, extending to its summit ; when seen from the southward two reddish coloured patches appear on it.

The shore from cape Vidal to Delagoa bay, a distance of about 130 miles, trends north-eastward, in a nearly straight line. The coast, which is moderately high close to the beach, is a continuous line of wooded hills with rounded summits, 500 to 600 feet high, faced with sand to about half their height. There are a few straggling black rocks along the shore.

Towards cape Colatto, near Delagoa bay, the land is well wooded. The interior southward of Delagoa appears to be a low level country,

with knots of trees here and there like park land, but about 10 or 12 miles inland, a few hills apparently 800 or 1,000 feet high are visible.

The **Lubombo mountains** run parallel to the coast at about 40 miles inland.

Leven point, 12 miles northward of cape Vidal, may be known when bearing northward of West, by four sand roads, extending from the sea to the summit of the coast hills, 9 miles north of cape Vidal.

Leadsman shoal, a small patch of coral, about half a mile in length, has $2\frac{3}{4}$ fathoms water, and lies nearly one mile from the shore, and distant 6 miles southward from Leven point.

A coral patch, with 4 fathoms water, lies $3\frac{1}{2}$ miles northward of Leadsman shoal, and about one mile off shore. Vessels should not approach them to a less depth than 20 fathoms.

Havergal hill, at 21 miles north-east of Leven point, is a conical hill, 465 feet high, with a flat top, and a sand road from base to summit.

SORDWANA ROAD.*—Temporary anchorage may be taken by steam-vessels, in the road, in about 7 fathoms at half a mile off shore, with the flagstaff on the point bearing S.W. $\frac{1}{2}$ W. distant about three-quarters of a mile. The holding ground is not good, being partly rock, and is more foul nearer the shore; there is also considerable swell here, and strong on-shore winds would render the anchorage untenable. The anchorage is open to winds from seaward between N.E. and S.W., and is no better than that off other parts of this coast.

Landing.—A reef, about one cable in extent, extends north-eastward from the point of the road affording some slight protection to the landing place, but owing to the heavy surf and rollers usually prevailing, landing is dangerous and impracticable at times even to surf boats.

Position.—The point forming Sordwana road, on which there is or was a hut and flagstaff at about 30 feet above the sea, is in lat. $27^{\circ} 33' 20''$ S., long. $32^{\circ} 43'$ E. The dark bluff 150 feet in height,

* See plan of Sordwana road on chart, No. 2,089. The description of the road is by Commander T. F. Pullen, H.M.S. *Stork*, 1889.

behind the flagstaff is covered with scrub, and conspicuous from seaward ; the coast northward of it is composed of sandhills, ranging from 40 to 200 feet in height.

A small stream enters the sea northward of the point ; its entrance is 20 feet wide, and dries 4 feet at low water springs, rock bottom. This stream carries off the surplus water from two lagoons a short distance inland ; the nearer, half a mile distant from the shore, is about half a mile in extent, covered with grass, and is very shallow. There are but few natives in the neighbourhood, the land being covered with scrub and unsuitable for agriculture.

COAST.—At 8 miles northward of Sordwana road is the point of the same name, raising to a hill 485 feet high.

Lava hill, 15 miles northward, is a grassy hill 300 feet in height with a sharp summit ; it is probably a good landmark.

Boteler point, at 14 miles northward of Lava hill, projects a short distance as a dark rocky cliff, 15 feet high.

Kosi river.—The entrance to Kosi river, in about lat. $26^{\circ} 53' S.$, is conspicuous from the north-eastward. Rollers break across the mouth which appears to be shallow.

At $1\frac{3}{4}$ miles southward of the river, a reef extends half a mile off shore.

The southern boundary of Portugese East Africa is somewhere near Kosi river, *see* page 6.

Oro point, at 3 miles northward of Kosi river, is a low, dark, clifty point. Oro peak, about 390 feet high, is on the coast range behind it. Foul ground extends half a mile northward from Oro point.

Landmarks.—At about 6 miles northward of Oro point are three peaked hills, the highest, named Florence peak, is 400 feet high ; these are conspicuous landmarks from all directions.

At 13 miles northward of Oro point, foul ground 3 miles in length fronts the coast to a distance of $1\frac{1}{2}$ miles.

Steamer rock, 10 miles southward of cape Colatto, resembles the hull of a steam vessel low down on the beach.

Cape Colatto, or Santa Maria, has a round-topped hill 260 feet high, and is the northern extremity of Inyack peninsula, which, with Inyack island and its shoals, form the eastern boundary of Delagoa bay.

The passage between Inyack peninsula and island is blocked by a shallow reef.

INYACK ISLAND,* to the northward of Inyack peninsula, is about 6 miles in length, north-east and south-west, by $3\frac{1}{2}$ miles in breadth. Inyack hill, 385 feet high, 2 miles within cape Inyack, is wooded, and has a dome-shaped summit. The north extreme of Black bluff, on the west side of the island, has a flagstaff and a white barrack with red roof on its summit, partly hidden by the trees; at one mile southward of the barrack is the highest part of the bluff, 117 feet above the sea, with a red streak down its northern face.

Cape Inyack, the north-east extreme of the island, has a steep face, with a lighthouse on the sandhill about 4 cables within it.

LIGHT.—From an iron tower 90 feet in height, erected on the hill within cape Inyack, is exhibited at an elevation of 349 feet above high water, a *fixed white* light, showing a *flash every twenty seconds*, visible from a distance of 22 to 25 miles.

Danae shoal, within a depth of 10 fathoms, is apparently about $1\frac{1}{2}$ miles in extent; there are several coral patches with depths of 3 to 5 fathoms, and one with $2\frac{1}{4}$ fathoms only; from the latter, which is about the centre of the shoal, cape Inyack lighthouse bears S. 63° W., distant $5\frac{2}{10}$ miles.

Five Fathom bank.—Depths of 5 to 8 fathoms are charted from 7 to 10 miles north-eastward of Danae shoal; there is possibly less water, and the locality is better avoided.

DELAGOA BAY, also known as Lorenzo Marques after its discoverer, who was one of the earliest of the Portuguese navigators, is the southernmost port of Portuguese East Africa (*see* p. 6). The entrance is obstructed by shoals, extending for a distance of 20 miles northward of Inyack island, terminating in Cutfield flat,

* *See* plan of Delagoa bay, No. 644, and chart, No. 648.

north-westward of which is the north or main channel to the bay ; the depths between the flats vary from 4 to 7 fathoms in the Cockburn and other navigable channels.

Vessels of above 24 feet draught would have to anchor about 8 miles off the town.

The bay is but imperfectly sounded, and but little reliance can be placed on the charts or on the buoys being in their assigned positions.

Between Elephant island and English river, the bay is 15 miles across, southward of which it extends about 20 miles. Three rivers empty themselves into the bay, viz. :—the King George, the English river, and the Maputa. The great deposit ejected by these streams has caused shallows and flats, which renders the navigation of the bay, particularly in the southern portions, somewhat intricate. The depths in the navigable parts of the bay vary from 6 to 12 fathoms, all good anchorage ground.

Entrance channels.—There are three channels between the shoals fronting Delagoa bay. The northern or main channel is the best for vessels of deep draught. Vessels of moderate draught use the Cockburn and Hope channels ; the Cockburn, which is better sounded, seems preferable. *See Pilots, p. 194.*

SHOALS in the approach.—**Cockburn shoal** is the name of the extensive flat with from one to 3 fathoms, which occupies the whole space lying between the north point of Inyack island and Elephant island, a distance of 5 miles. It is triangular in shape, and its northern point terminates in a 3-fathom patch, with 8 fathoms close beyond it. The shoal may be said to occupy the whole space between these bearings, and there is no known passage through it.

Lighthouse on shoal, *proposed.*

Buoy.—A conical black buoy is moored on the north-west end of Cockburn shoal, with cape Inyack lighthouse bearing S. 22° E., distant $7\frac{3}{10}$ miles, but it is not to be depended on.

Hope shoals, within a depth of 5 fathoms, are about 5 miles in length, in a north and south direction, with patches of $2\frac{1}{2}$ and 3 fathoms in many places, and possibly less.

Buoy.—A conical red buoy, with staff and cone, has been placed near Hope shoals, in $6\frac{1}{2}$ fathoms, with cape Inyack lighthouse bearing S, 4° E., distant $7\frac{3}{4}$ miles, and Gibbon beacon, S. 35° W. It must not be depended on.

Domett shoals, with about the same depth of water, lie northward of the Hope; there are probably some deep water channels between the patches, but the locality has not been fully examined.

Depths of $4\frac{3}{4}$ to 5 fathoms have been obtained at $3\frac{1}{4}$ miles W. $\frac{1}{2}$ N. from the west patch of Domett shoals, over a space about half a mile in extent in a north and south direction; the depths beyond it are also said to be less than are shown on the chart.

Cutfield flat, the northernmost of this chain of shoals, is, within a depth of 3 fathoms, 4 miles in extent in a north and south direction; many patches of 2 fathoms, coral bottom, exist on this flat. Its north extreme lies with cape Inyack lighthouse bearing S. $\frac{1}{2}$ W., distant $19\frac{1}{2}$ miles, and Cutfield hummock, North, distant $6\frac{1}{2}$ miles.

The shoals mentioned break in places during and after strong on-shore winds.

Westward of the fairway of North channel, about 3 miles westward of the north end of Cutfield flat, and one mile from the shore, is the south end of a bank 2 miles in length, with depths of 3 to 5 fathoms.

Patches.—At about 10 miles north-eastward of Cutfield flat, and about 4 miles off shore, is a patch of $3\frac{3}{4}$ fathoms, the southernmost of the patches extending from Lagoa shoal, described on page 204. About midway between this patch and the Cutfield, there is a patch of $5\frac{1}{2}$ fathoms. Tide rips are often seen about here, probably caused by the uneven bottom. H.M.S. *Brisk* in proceeding to sea in 1860, after rounding Cutfield flat and when it was considered that the vessel was well clear of the bay, the soundings shoaled in some places to 6 fathoms rather suddenly, when several miles out to seaward. The bottom appears to be a succession of sand ridges, with 6 and 7 fathoms on them, and from 9 to 11 fathoms between the ridges.

Inner shoals.—**Shefina reef**, on the western side of the main channel, and abreast Hope and Cockburn shoals, is apparently dry at low water, and extends about $4\frac{1}{2}$ miles in an E.S.E. direction from the north end of Shefina island. Discoloured water extends a further distance of $1\frac{1}{2}$ miles south-eastward from the point of Shefina reef.

Fawn shoal, an isolated patch of $2\frac{1}{2}$ fathoms, lies about a quarter of a mile southward of the eastern extreme of this shallow water, with Gibbon point bearing S. $\frac{3}{4}$ E., distant $5\frac{1}{2}$ miles.

Lech reef, with $1\frac{1}{4}$ fathoms water and 7 fathoms close-to, is the termination of the shoal water extending $1\frac{1}{2}$ miles southward of Shefina reef.

Buoy.—A buoy is moored off the southern edge of Lech reef, with cape Inyack lighthouse S. 45° E., distant nearly 10 miles. Vessels should not approach within a quarter of a mile of this buoy, nor place too much dependence on its being in its assigned position.

A shoal, with a depth of $2\frac{1}{4}$ fathoms and 3 fathoms around, was reported, in October 1896, to lie with Shefina island beacon bearing N. 9° E., distant $2\frac{8}{10}$ miles. This lies within the edge of the tongue, with less than 3 fathoms southward of the fairway; a depth of 2 fathoms only is shown on the plan about one mile S.E. by E. of it; other shallow patches possibly exist on this tongue.

A shoal apparently of small extent, with about 3 fathoms water lies in the fairway, with Inyack lighthouse S. 40° E., distant $2\frac{1}{10}$ miles. Patches of 5 fathoms are situated at about three-quarters of a mile southward and south-westward of this shoal.

Clearing mark.—The barrack with red roof on Black bluff, or the bluff itself, on Inyack island in line with Gibbon point, bearing S. 3° E. leads eastward of these dangers. *See* view B. on plan.

A bank, about $1\frac{1}{2}$ miles in extent, within a depth of 5 fathoms, lies in the approach to the anchorage in Delagoa bay. A patch of $2\frac{1}{4}$ fathoms near its centre, lies with Reuben point light bearing W. $\frac{3}{4}$ N. distant about $7\frac{3}{4}$ miles; there are similar depths on the north end of the bank. A projecting horn from the bar of English river, lies about 2 miles S.W. by W. from the centre of this bank, on the south side of the anchorage, with a depth of 2 fathoms near its extreme. This concludes the description of the important shoals bordering the channels from seaward to the anchorage.

Shefina island, between 4 and 5 miles in length east and west, stretches off the west shore of the bay, at the mouth of George

river. It is low, sandy, covered with dense bush; water may be obtained. The lower part of the island is all white sand, and at a distance it is difficult to distinguish the island from the main land. *See* beacon, below.

LIGHT.—From a stone circular tower erected on Reuben point, north side of entrance to English river, is exhibited at an elevation of 134 feet above high water, a *fixed white and red* light, visible from a distance of 15 miles in clear weather. It shows *white* from S. 71° W. to N. 79° W.; *red* from N. 79° W. to N. 73° W.; *white* from N. 73° W. to S. 66° E. *See* harbour lights p. 196.

Landmarks.—Beacons.—A white beacon, with pole, is situated on Timpson point, the southern extreme of Shefina island. A house with a galvanized roof is situated half a cable westward of it, said to be visible in clear weather from a distance of 10 miles.

A beacon has been erected on Reuben point, which, kept in line with the lighthouse, indicates the centre of the *red* sector of Reuben point light.

On Gibbon point, a sand hummock 19 feet high at the west extreme of Elephant island, there is a white beacon, resembling a lighthouse, visible about 10 miles. The buoys and beacons are not to be depended on.

Black bluff (on which is a house), Red streak, and the lighthouse on Inyack island, and Mount Colatto to the southward somewhat resembling a haystack, are also useful landmarks. *See* sketches on plan.

George hill, the summit of the island of that name, may be of use when nearing Shefina reef, but it is not conspicuous, being but little above the land about it.

Cutfield hummock.—From the northward, or for vessels intending to enter by the North channel, Cutfield hummock, 26 miles northward of Inyack island, is rather a conspicuous landmark. It is higher than the surrounding coast hills (210 feet above high water), and there is no higher land behind it. From seaward it appears with a bushy top. Approaching it from the southward, bearing about N. by W., which leads eastward of Cutfield flat, it appears with two peaks, the southern one dark, the other slightly higher, with a streak of sand along the top. It is visible about 16 miles. When westward of Cutfield flat, the hummock appears with a large streak of sand down it.

Tides.—The time of high water, full and change, at port Melville, is 4h. 30m., rise from 14 to 15 feet; and at Lorenzo Marques in English river, 5h. 20m., rise about 12 feet. The age of the tide is about 2 days.

Seaward of the shoals, the flood sets to the northward at the rate of 2 knots, with a strong indraught towards Cockburn channel, across which it sets obliquely. The ebb sets in an opposite direction.

Within the shoals the flood sets to the south-westward through the channel, over Shefina reef and towards English river at the rate of from one to 3 knots. The ebb sets in the opposite direction.

Pilots.—A pilot station has been erected on Elephant island, which is connected by semaphore with Inyack lighthouse. The number of licensed pilots is seven. The pilot boats are painted black, and their distinguishing mark is a white square flag with black square and P in the centre. Pilots, when practicable, will meet vessels outside the shoals or in the channels, but too much confidence must not be placed in them. Pilotage from the 7th November 1896 is compulsory for merchant vessels.

NORTH or MAIN CHANNEL.—Directions.—Anchorage.—North channel lies between the north end of Cutfield flat and the shore, and is about $2\frac{1}{2}$ miles in width, with depths of 6 to 8 fathoms. It is the best channel for vessels of heavy draught.

Vessels from the northward should make the land about the parallel of $25^{\circ} 30'$ S., avoiding Lagoa shoal, and endeavour to identify the remarkable ridge of bare sand hills, with four cones on its summit, 290 feet high, westward of that shoal; and also Cutfield hummock, described on p. 193; thence steering so as to be within 3 miles of the hummock before it bears northward of N.W., to clear Cutfield flats, when proceed as directed below for vessels having rounded the flats from the southward. Inyack lighthouse will, in fine weather, be visible from northward of Cutfield flat.

Vessels from the southward may pass Inyack lighthouse at from one to 2 miles distant, thence steering N. by E. (westward of Danae shoal) about 20 miles, taking care not to bring the lighthouse southward of the bearing S. by W. $\frac{1}{2}$ W., until Cutfield hummock bears N. by W., or more westerly, which will lead clear, and at least one mile eastward of all the shoals. With the hummock on that

bearing, it may be steered for, and there being no other object to assist in determining the distance from it, the approximate distance should be obtained by means of an angle of elevation, (210 feet above high water).

When between 2 and 3 miles from the hummock, the course may be altered to the south-westward to bring it to bear N. by E. $\frac{3}{4}$ E., which bearing should be maintained if it can be seen, until Inyack lighthouse bears S.E. $\frac{1}{2}$ E. and distant about 7 miles; observing that Black bluff on Inyack island on with or just open eastward of Gibbon point (View B) leads eastward of Fawn shoal, and of the 3 fathoms patch charted about one mile southward of it.

Thence to the anchorage off English river, the course is about W. by N. $\frac{1}{4}$ N. for Reuben point lighthouse* (in the red sector of that light after dark) until Shefina beacon or house bears N. by W. $\frac{3}{4}$ W., where anchorage may be taken in about $4\frac{1}{2}$ fathoms. Deep draught vessels should anchor when the beacon bears N.W., in 6 to 8 fathoms.

There is an alternative route, passing half a mile southward of Fawn shoal and Lech reef buoy, avoiding the 3-fathoms patch nearly in that track, thence for Reuben point as requisite, but the above mentioned route seems preferable. These directions must be used with considerable caution.

At night, in favourable weather, vessels may approach Delagoa bay by the lead, if certain of being well to the northward of Inyack island, taking care not to stand into less than 10 or 12 fathoms, when they may anchor or stand off according to circumstances.

Cockburn or South channel has a least depth of 4 fathoms at low water over a breadth of half a mile, and the telegraph ships, drawing 24 feet, made use of this channel. It is not recommended for heavy draught vessels as there is generally a swell, and the tidal stream sets obliquely across, the flood to the westward and the ebb to the eastward. *See Pilots*, p. 194.

Moderate draught vessels, from the southward, having passed cape Inyack at the distance of one mile, should steer N.N.W. $\frac{1}{2}$ W., until the white barrack with red roof on Black bluff is in line with the Red streak on the higher land southward of it, bearing S.W., when the extreme of cape Inyack should be brought to bear S. by E. $\frac{3}{4}$ E. This bearing kept on astern, will lead through the channel (bearing in

* A beacon has recently been erected on Reuben point, which kept in line with the lighthouse will probably be on the same bearing, as it is stated to bisect the arc of red light.

See plan of Delagoa Bay, No. 644; and chart, No. 648.

mind the cross set of the tidal stream), at about half a mile northward of Cockburn shoal buoy, if in its charted position. Thence course should be altered to S.W., observing that the Red streak southward of Black bluff kept in line with Gibbon point beacon, or the beacon bearing S. by W. $\frac{1}{4}$ W. or southward of that bearing, leads westward of Cockburn shoal.

When cape Inyack lighthouse bears S.E. $\frac{1}{4}$ E., distant about 7 miles, proceed as directed for North channel. The white barrack and red streak are not easily discernible, but the bearings of the other objects will serve to identify them.

If bound to the anchorage off English river, follow the directions given for North channel, from view B, p. 195.

Hope channel, one of the passages through Hope shoals, is stated to have a least depth of $5\frac{1}{2}$ fathoms if an angle of 42° to 43° be preserved between cape Inyack and Gibbon point beacon, until cape Inyack bears S. 21° E.; when the Red streak is open of Gibbon point beacon proceed as for Cockburn channel. Hope channel is frequently used.

A pyramidal buoy lies with cape Inyack lighthouse bearing S. 1° W., distant $7\frac{9}{10}$ miles, as before stated, but it is not to be depended on.

ENGLISH RIVER.—The mouth of this river lies in the western portion of Delagoa bay, and forms an excellent land-locked harbour for vessels of moderate draught. See Bar, on next page.

The shores of English river are generally low and wooded. Reuben point, on the north side of entrance, is a bold red bluff about 200 feet high, rising abruptly from the sea, with a light and signal station on it. Mawhone point, on the Catembe shore south side of entrance, has two faces of red earth, which at times show well against the dark foliage adjacent.

LIGHTS.—Reuben point light is described on p. 193. Two lights are shewn from the Custom house landing; the eastern is *fixed red* and the western is *fixed green*.

A *fixed white* light is shown from the inner Catembe beacon, south side of approach, visible over an arc of 12° southward of the line of the beacons.

Beacons.—Two beacons are erected on the Catembe shore within Mawhone point, as a guide over the bar.

The front beacon is an iron pyramidal structure 36 feet in height, painted white and standing on a square white base. The back beacon is cylindrical, painted black, and also standing on a square white base, see light, p. 196. It stands on higher ground than the front beacon, and just behind it is a house of a dullish-red colour.

A conical red buoy, with staff and cage marks the shoal water, extending off Reuben point, but it must not be depended on; a black can buoy with staff and cage marks Catembe shoal. The water is said to be shoaler than charted near it.

Bar.—Directions.*—Anchorage.—The bar of English river had a depth of 24 feet at high water springs over very soft mud (two and three days after full and change) in 1896. H.M.S. *Fox*, early in 1897, of 21 feet draught, crossed the bar in a depth of about 23 feet, on full and change day; a vessel of 23 feet draught crossed during the stay of the *Fox*. The bar has not been surveyed or examined for many years, so possibly better water is to be found; and it is apparently not subject to much change, as the s.s. *Dunbar Castle*, 24½ feet draught, crossed the bar in about the year 1888.

Shallow water extends rather more than halfway across the entrance from Mawhone point, and a sand spit of 1½ fathoms and less extends E. by N., 3 miles from Mawhone point; the southern tail of the bar stretches to a distance of 7 miles eastward of the same point, with depths of 2 to 3 fathoms.

From the anchorage outside the bar, steer for Catembe north beacon (white) bearing N. 86° W., which is stated to lead over the bar in the depth above stated. When Lechmere point bears N. 40° W., steer for it; this will lead southward of the shallow water off Reuben point, and to the anchorage in mid-river near the Custom house, where there are depths of 6 to 8 fathoms, mud, well clear of the mud flats which more than fills the bight eastward of the town. Vessels should moor during spring tides.

At night, steer in with Catembe beacon light N. 86° W., until the red and green lights at the Custom house bear N.N.W., then steer N.W. by N. up the fairway. These directions must be used with considerable caution, and navigation at night is not recommended.

* See plan of English river, No. 646; and plan, No. 644. Vessels of 20 feet draught or upwards should, if their intake valves are near the bottom, consider before crossing whether there is sufficient depth to insure their condensers not being choked by the mud.

LORENZO MARQUES.—The Portuguese town of this name lies on the north bank of English river, about $1\frac{1}{3}$ miles within Reuben point; it is the capital of the southern half of Portuguese East Africa, *see* pp. 6, 7. The town is almost surrounded by a swamp, and is consequently very unhealthy, but some progress has been made of late in filling it up. The town is being gradually improved, streets made and paved, and many new houses and stores have been erected.

The most conspicuous buildings at Lorenzo Marques, are the church, situated on the hill at the back of the town, a large hospital not far from it, and the Government offices, close to the wooden landing pier.

Population in 1835 numbered about 1,700 European inhabitants (about 700 of whom are Portuguese), and possibly 5,000 to 6,000 natives, living within a radius of $1\frac{1}{2}$ miles.

The Eastern Telegraph Company's station is about half a mile west of the lighthouse, where the cables are brought in from Aden and Durban. Their positions in the channels will be seen on the plan. There is communication by land lines with the Transvaal, &c.

Position.—The telegraph station is in long. $32^{\circ} 35' 34''$ E., determined by telegraphic connection with Cape Town, in 1881.

Trade.—The trade of the port may be considered solely as a transit trade to the Transvaal and the British territories north of that country. The railway route to Johannesburg is shorter by 80 miles than that from Durban.

The imports in 1895 amounted in value to £999,130; whereas in 1891 (before the railway) it was only £67,922.

About one-fourth of the imports is timber for mining purposes; other imports are machinery, railway material, and general merchandise. The retail trade at Lorenzo Marques is chiefly in the hands of Banian or Hindu traders.

The value of the exports is not stated.

Shipping.—264 steamers and 39 sailing vessels entered the port in 1895, of the aggregate tonnage of 435,605 tons.; of these 223 were British vessels. In 1896, 397 vessels entered, of which 268 were British.

Piers.—The railway company has constructed two piers with wharfage between; one of these piers is intended to have a depth of 24 feet alongside at low water; the iron pile pier at the Custom house has, at low water, a depth of 12 feet. The boat camber and Custom house piers belong to the Public Works Department.

Supplies.—Poultry, eggs, and fruit are obtainable in moderate quantities; vegetables and bread are obtainable daily from the contractors. Most of the vegetables come from Natal by steamer, a scanty crop only being grown by some Chinese settlers on the ground near the railway.

The best drinking water is still the rain water collected from the roofs of the houses, though a company has laid pipes through the town and supplies water to the houses.

There is a free hospital containing 128 beds, and also several hotels.

Coal.—The best Welsh coal is obtainable in any quantity at about £4 per ton (H.M.S. *Blanche*, 1893). There is said to be large beds of excellent coal near Middleburg, about 150 miles inland, and through which the railway passes.

Railway.—The Portuguese railway to the frontier and its continuation by the Netherlands Company, is open to Pretoria, a distance of 346 miles, thence with Cape Colony. Nelspruit, 129 miles from the port, is 2,416 feet above the sea; and the summit of the whole line, at Bergedaal, 214 miles from the port, is 6,437 feet above the sea. The width of the line is 3 feet 6 inches. The journey to Pretoria takes about 21 hours. A line to Barberton is open, and the journey to the De Kaap goldfields occupies 9 hours.

Repairs.—Machinery for a first-class foundry has arrived at Lorenzo Marques, and will probably be erected as the port and business develops.

Mails.—Mails weekly by rail from Cape Town, about 24 days from England.

The Union and Castle lines of steamers call here fortnightly; the British India mail steamers call here every 4 weeks; and the Deutsche Ost Afrika line every 3 weeks, *viâ* Suez, and every 2 months *viâ* cape of Good Hope. The Messageries Maritime Co. run a vessel monthly

from Diego Suarez (Madagascar) to Delagoa and back, *viâ* Mosambique and Beira, connecting with the Mauritius steamers. There is also a French line *viâ* West African ports. Several other lines call here. *See* also page 15.

Winds.—Seasons.—From October or November to April the weather is mostly fine, although it is the hot and rainy season. At this time the fine weather is accompanied by strong sea breezes, force 4 to 5, succeeded by light land winds at night, but at times the sea breeze only relaxes in strength for two or three nights running. After some days fine weather the sea breeze fails, and rain comes on with southerly or south-westerly winds. South-westerly gales of 36 hours duration are not unfrequent, blowing a gale which draws to the southward, and becoming fine at S.E. The wind then draws round gradually to N.E., and it continues fine for a few days, then undergoes a similar change. Bad weather always comes on with winds from west to south, improving as they draw round to east.

From April to October the sea breeze blows with considerable less force, and calms occur more often; rain occurs only from 2 to 6 days per month, whilst in the opposite season it occurs for about 11 days per month. *See* Meteorological Table, p. 593.

In May and June 1891, H.M.S. *Mohawk* met with exceedingly fine weather at the anchorage, on two days only did any rain fall, that being with an E.S.E. wind, shifting to S.W., the remainder being bright and clear. The temperature ranged from 82° in the daytime to 58° at night, the difference between the wet and dry bulbs being about 8°, but on several days it was as much as 14°.

Climate.—Delagoa bay has acquired the reputation of being very unhealthy for Europeans. At Lorenzo Marques typhoid fever is prevalent, and is responsible for many more deaths than the so-called Delagoa bay fever, which is nothing more than a mild form of malarial attack, not ever likely to claim a healthy European as anything more than a temporary victim; with proper sanitary measures and a good water supply, the statistics of mortality here should not greatly differ from those of other South African communities.

From November to April the hot rainy season is certainly uncomfortable, and under present conditions becomes at times intolerable to any but those of robust constitutions. A change of air and

surroundings, however, generally leads to speedy improvement. (*H.M. Consul*, 1895.)

Mattoll river is the northernmost tributary of English river. It is 320 yards wide, and 16 feet deep, at the junction; at 8 miles above, its width diminishes to 30 yards, and depth to 8 feet, above which boats can ascend but a short distance.

Catembe river, the southernmost of the three tributaries of English river, is broader and deeper than the Mattoll. Including the windings of the river, the boats under Captain Owen's orders (1882) ascended 46 miles, when the river divided into two branches. A short distance up the southern branch, it was found to be about 80 feet broad. Vessels drawing 13 feet can navigate the Catembe for a distance of 19 miles from its mouth. Some of the land is under cultivation, and fresh water is abundant, but the river water is salt.

Dundas river or Lorenzo Marques, lies between the Catembe and the Mattoll; it has the advantage of its water being fresh a few miles up, and is navigable for good-sized cargo boats as far as Bombay, about 10 miles from its entrance, probably near the ford, which boats can only cross at high water. A short distance below the ford the river is 80 yards wide.

Maputa river.—The mouth of this river lies in the south-west part of Delagoa bay, from whence there are two channels through the flats, one of which leads to port Melville, and the other towards English river. The Maputa is said to be navigable for boats for 60 miles, up to June, but later in the dry season they probably would not get beyond the limit of tidal influence, which was found during springs to extend to Moham, 35 miles from its mouth, where a rise of 2 feet was noted; at high water springs, a depth of 3 fathoms may possibly be carried through the channels in the flats to the entrance to Maputa river.*

For about 17 miles up the river, the banks are of low alluvial soil lined with forests of mangroves, after which it is a fine open country with sandy soil, the banks being about 6 feet above high water. Here there are beautiful plains extending about 2 miles back

See chart, No. 2,089, and plan of Delagoa bay, No. 644.

* The *Cockburn* tender, under the orders of Captain Owen, in 1822, appears to have ascended about 20 miles (her draught of water being 8 feet), and the boats explored as far as 40 miles from the mouth of the river, but they did not proceed any farther on account of the fatal fever which attacked the crew; 7 only out of a crew of 20 returned. The mosquitoes at night were intolerable.

on either side of the river, and fine ranges of hills were passed before reaching the foot of the Lubomba mountains. The narrowest part is 60 yards wide, and its greatest breadth at the mouth and fork 300 and 150 yards, respectively.

For the first 20 miles, 18 feet water was carried (April), the next 50 miles an average of 6 feet, the next 30 miles about 4 feet, and the last 30 miles about 2 feet, gradually shoaling to where the river could be forded. The ford is 2 miles beyond the fork up the Umsutu river.

The ebb tide at the entrance runs very strong for about 7 hours, and from $2\frac{1}{2}$ to 5 knots in some of the bends of the river. Great difficulty would be experienced in navigating beyond Moham in boats not having steam power, owing to the narrowness of the channel, and the strong current running down.*

(From recent reports, Upanhlani drift, a few miles below the Umsutu junction, is considered to be the head of navigation.)

King George or Manhica river enters Delagoa bay to the northward of Shefina island. The main stream rises near Leydenburg, in the Lubomba mountains, at about an elevation of 6,000 feet; its chief affluents are the Salibala, on the upper waters of which are the gold fields, the Umgerania, and the Umlamase; the country around them is fine and healthy. The coast lands drained by them are fertile, but too unhealthy for Europeans. The mouth of King George river has a shifting bar of various depths, and the river frequently bursts its banks to find other outlets in the great bay, one apparently passing westward of Shefina island. From its entrance, it trends with numerous windings, parallel to the coast as far as Cutfield hummock, when it turns inland. Captain Owen's expedition carried 22 feet into the river at high water, and ascended nearly 50 miles, then gave up the exploration on account of fever attacking the crew. The current ran down at the rate of $2\frac{1}{2}$ knots, and the water was fresh close to the mouth.†

Mr. Hillard reports having ascended the river from 120 to 140 miles in the trading cutter *Herald*, the depth of water being 12 to 18 feet in the channel, and from 6 to 9 feet near the banks for the whole distance, the cutter frequently brushing the banks with her mainsail, whilst having plenty of water under foot. Only one shallow (6 feet) was found in the whole distance of 120 or 140 miles.

* Commander Cochrane, H.M.S. *Petrel*, March 1869, and Lieutenant H. O'Niell, June 1879, H.M. Consul at Mozambique.

† See chart. No. 648.

On the west side lies a ridge of high land, which approaches the river at a few points, but is frequently separated by a flat marshy tract of country many miles in width, and densely covered with a coarse kind of guinea grass, 5 or 6 feet high.

On the east side there are flats of a similar kind; from the highest point attained by the expedition, these flats were only bounded by the horizon. The banks cannot easily be penetrated where the grass has not been burnt, and it is necessary to be careful in landing, as they are in some places honeycombed with pitfalls for hippopotami and other animals. For some miles from the mouth the banks are more or less covered with bush and mangrove jungles, but for many miles of the upper part of the journey there is no timber, except here and there a straggling fir tree, bent over the river by the force of the S.E. winds. Above the influence of the tide the river becomes narrower and serpentine.

Captain Elton (1870) crossed the river by a ferry near Magud's kraal about 30 miles from its mouth, where he found a magnificent river, with a navigable channel of deep water for almost its entire breadth. Sugar cane, cotton and indigo grow well on the banks of the river.

PORT MELVILLE,* on the eastern side of Delagoa bay, is a good harbour in all winds, being sheltered by Inyack and Elephant islands and Cockburn shoal on the east, and by Gibbon and other shoals on the west, which shoals are discernible by the colour of the water. This is a safe port to come to for refitting, and far better than English river on account of the unhealthiness of the latter. A Portuguese officer with a detachment of soldiers is stationed at Black bluff, but there is no pier. Signals are made from Black bluff to Lorenzo Marques by means of the heliograph.

Elephant island, about one mile northward of Black bluff, is $1\frac{1}{2}$ miles in length, but not being more than 25 feet above high water, is difficult to make out from a distance, when in line with Inyack. It is sandy, with bushes on the top, and uninhabited. Gibbon, the west point of the island, is bold, having depths of 6 to 8 fathoms at the distance of one cable. Gibbon point is considered to be situated in lat. $25^{\circ} 58' 3''$ S., long. $32^{\circ} 54' 11''$ E. *See* Beacon, p. 193.

Supplies.—Small supplies may be obtained from the natives of Inyack, but bullocks are scarce. Water may be obtained with a

* *See* plan of Port Melville, No. 645.

little trouble. Wells should be dug 10 or 12 feet deep, about 70 yards inland on the west and highest part of the island. H.M.S. *Orestes* obtained from 6 to 8 tons a day by sinking casks in the sand. The Portuguese troops have their water brought from English river.

Directions.—Vessels proceeding to port Melville, and having followed the directions given on pp. 194, 195, as far as Fawn shoal, should then steer for the white barrack with red roof, or Black bluff on which it stands, in line with Gibbon point, bearing S. 3° E. (view B. on plan 644); thence passing about one cable westward of Gibbon point, bring it to bear N. by E., astern, and anchor when convenient in about 9 fathoms, sand, bearing in mind that the channel here, with a depth over 5 fathoms, is but a quarter of a mile wide. A large vessel will find more space just eastward of Gibbon shoal, and should, from a position with Gibbon point bearing E.S.E. about 2 cables, steer about S.W. by W., until the south point of Elephant island bears E.S.E., where anchorage will be found in from 8 to 10 fathoms, sand.

COAST.*—North-eastward of Cutfield hummock (page 193) the coast consists of sandhills from 150 to 200 feet high, to latitude $25^{\circ} 23'$ S., a distance of 17 miles, where there is a long bare sand ridge, having four small cones, 290 feet in height, and forming a conspicuous landmark.

The sandhills increase in height between Lagoa and Limpopo rivers to 380 and 430 feet; at the west point of the latter river is a red topped sandhill, whilst at a distance of 17 miles eastward is Salmon cliff, which is red and conspicuous, and backed by cultivated and grassy hills. Thence, and beyond Zavora river, the coast sand ridges are very low, and there is nothing noticeable until the remarkable orange-coloured sandhill 400 feet high, and 16 miles westward of Zavora point is approached; between this hill and the point is a peak 575 feet in height.

Lagoa shoal is a ridge of rock and sand, 5 miles in length and a quarter of a mile in width, lying parallel to, and between 4 and 5 miles distant from the shore, near the northern approach to Delagoa bay. A least depth of $2\frac{1}{4}$ fathoms was found near the centre of the shoal, with Cutfield hummock bearing West, distant about 21 miles.

* See chart, No. 648.

Lagoa lake.—The entrance to Lagoa lake is 27 miles north-eastward of Cutfield hummock; its west point rises to a sandy hill 245 feet high. When near the shore the lake is easily identified by the limestone cliffs or blocks of stone, about 80 feet high, facing the sandhills, extending for some distance on either side of it, and forming a gap about 500 feet in width. It is this break in the cliff which has caused the lake to be mistaken for a river, whereas it extends back only for a distance of about 3 miles, and is but a ravine full of water, separated from the sea by a ridge 30 feet above sea level.

Captain Aldrich, 1884, when surveying in the neighbourhood, states that at half flood a narrow stream of water was visible communicating with the lake, but it was breaking heavily right across the entrance. The sandhills in the neighbourhood are of a red colour, differing from those about Delagoa bay.

LIMPOPO or Innampura river.—The Limpopo takes its rise near Pretoria, in the Transvaal Republic, and is about 1,500 miles in length. The entrance to this river is 300 yards wide, and is situated about 17 miles eastward of Lagoa lake, in about long. $33^{\circ} 31' E$. The east point of entrance is a narrow sandspit about 12 feet high, but its west point has several sandhills 200 feet high, the outer one of which is red, and a conspicuous mark for identifying the river. Within these points there is a large basin with depths of 3 to 4 fathoms.

Depths.—The river has a bar extending and breaking at times to 5 miles from the coast. There is said to be a depth of 3 feet at low water over the bar (with a spring rise of about 11 feet), but it is subject to great change, is difficult to enter, and the ebb stream runs at the rate of 4 knots at times and possibly more.

Two beacons, A and B in line, led over the bar in 1893, in 15 feet at high water springs. These, with beacon C to the eastward of the entrance, would serve to fix the position of the vessel.*

Within the bar the river has a depth of 12 feet for about 40 miles, and is said to be navigable for light draught steamers for about 60 miles to Manjobo's kraal. A steamer of 6 feet draught ascended to this

* See plan of the Limpopo river entrance, with sketches of beacons, on No. 685 and chart No. 648.

place in April 1884, with not less depths than $3\frac{1}{2}$ fathoms. Manjobo's crossing bars the river and is said to have as little as 4 feet at times, but 8 feet was the depth at the time stated.

The first 12 miles of the river is wooded with mangroves, above which the country is low and level, and almost destitute of fuel, to Manjoba's kraal, whence it gradually rises to hills and mountains in the interior, and is well wooded. The Banians have a small inland trade with Manjoba's kraal or village.

Captain F. Elton (1870), when exploring the country inland, states that the Limpopo river is navigable for steam vessels of light draught, even in the dry season, between the tributaries Nuanetzi and Lipalule or Oliphant river, 100 miles apart. The junction of the Lipalule with the Limpopo is at about 120 miles from its mouth.

COAST.*—Innampura shoals, about 5 miles in length and one mile off shore, are charted between the Limpopo and Salmon cliff to the eastward, but we have no other information about them. Off the same coast, the Portuguese gun-vessel *Diu* reported in 1895, that at 3 miles off shore and for a distance of 15 miles, soundings of 8 to 9 fathoms were obtained.

M. Marron, an official formerly in the Limpopo, reported shoal water of $3\frac{1}{2}$ fathoms between the Limpopo and Lagoa lake to the westward, at 2 miles off shore, which may possibly be the correct position of the Innampura shoal, though nothing was seen here by H.M. surveying vessel *Sylvia* in 1884.

Zavora river is charted midway between Limpopo river and Zavoro point, but little is known of it. The coast for many miles on either side consists of low sandhills.

Shoals.—A shoal of $2\frac{1}{4}$ fathoms, on which the S.S. *Courland* was said to have struck, is charted 6 miles southward of Zavora river, in lat. $24^{\circ} 58' S.$, long. $34^{\circ} 22\frac{1}{2}' E.$; the position, amended, is lat. $24^{\circ} 57' S.$, long. $34^{\circ} 25' E.$, but both positions are placed on the charts.

The *Countess of Carnarvon* reports a shoal of $2\frac{1}{4}$ fathoms, on which the sea occasionally breaks, in lat. $24^{\circ} 57' S.$, long. $34^{\circ} 22' E.$ They are possibly identical.

* See chart, No. 648.

The coast between Zavora point and to the westward of the Limpopo river is entirely unsurveyed, and should be given a wide berth.

Zavora point, in lat. $24^{\circ} 23\frac{3}{4}'$ S., long. $35^{\circ} 12\frac{1}{4}'$ E., rises to a ridge of sand hills over the coast, between 200 and 300 feet high. It has no particular distinguishing feature, but at $1\frac{3}{4}$ miles northward of it is a conspicuous sand cliff, nearly half a mile in length.

About 15 miles north-eastward of Zavora point is a remarkable clump of trees, the only ones in the locality. At the same distance south-westward is a remarkable rouge-coloured sandhill, 400 feet in height.

Reef.—At 22 miles north-eastward of Zavora point, a rocky reef extends nearly half a mile from the shore, and heavy breakers were seen along that part of the coast for a distance of 3 miles. A clump of trees near the coast, 15 miles north-eastward of the point is possibly a useful mark.

See chart, No. 648.

CHAPTER VI.

MOZAMBIQUE CHANNEL.

CAPE CORRIENTES TO KILIMÁN, INCLUDING NYASA LAKE.

(Lat. $25^{\circ} 55'$ S. to lat. $18^{\circ} 0'$ S.)

VARIATION IN 1897.

Cape Corrientes, $21^{\circ} 15'$ W.	|	Mouths of the Zambezi, 16° W.
Cape Bazaruto, $19^{\circ} 0'$ W.	|	Lake Nyasa (South end), 15° W.

CAPE CORRIENTES, the south-west extreme of Mozambique channel, is a rounded, sandy point, partially covered with bushes, and rising at the back to a height of 375 feet, while the land on either side of it is somewhat higher. The cape may be recognised by detached black rocks near it, also by an islet 15 feet high situated $2\frac{1}{2}$ miles south-west of it, and connected with the shore by a rocky reef. The islet is situated in lat. $24^{\circ} 5\frac{1}{2}'$ S., long. $35^{\circ} 29\frac{3}{4}'$ E.

The coast about the cape is bold and safe to approach within one mile or less.

Current.—The current nearly always runs to the southward from one to 2 knots an hour.* H.M.S. *Sylvia*, in December 1884, at $1\frac{1}{2}$ miles off cape Corrientes, found the current setting to the southward at the rate of 3 miles an hour; within one mile of the shore at 6 miles to the southward there was no current, whilst at a further distance of 8 miles to the southward and $1\frac{1}{2}$ miles off shore there was a counter set of one mile an hour. The currents were found to be stronger off the cape than on any other portion of the coast, though much influenced by the winds, but they apparently always set direct along the shore, and never on or off.

* See chart of Delagoa bay to Zambezi river. No. 648; also No. 597.

The coast from cape Corrientes to Innambán is composed of sand hills, from 200 to 400 feet high, having at a distance the appearance of chalky cliffs, and visible at a distance of 20 miles or more. Anchorage may be obtained in case of being becalmed, in from 15 to 20 fathoms at nearly one mile off shore, an advantage to sailing vessels proceeding northward on account of the strong southerly current which generally prevails.

Cape Wilberforce, at about 14 miles north-eastward of cape Corrientes, has a grassy summit 200 feet high, and is nearly clear of bush.

INNAMBÁN BAY lies between the Burra, and Algoa point to the north-westward, a distance of 9 miles. A line of breaking reefs, dry in places at low water, extends nearly the whole of this distance from the Burra, almost completely blocking the bay. Innambán river enters the sea westward of this reef, and abreast Algoa point.*

Barrow hill, on the south point of Innambán bay, is 230 feet high, with a sharp summit and a clump of trees on it; from the northward the hill is readily recognised.

Its position is lat. $23^{\circ} 45' 30''$ S., long. $35^{\circ} 31' 41''$ E.

Landmarks.—The Pedestal, a white triangular mark constructed of masonry, on the shore of Linga Linga peninsula, is conspicuous from seaward in the forenoon, and is a leading mark for the bar.

Conspicuous tree, 420 feet above the sea, on the ridge over the West shore of the harbour, is conspicuous only when seen from the northward, or with the Pedestal bearing southward of W. $\frac{1}{2}$ S.

Double bush (consisting of three trees) is situated about half a mile southward of the conspicuous tree.

A beacon, constructed of wood, four sided, and surmounted by a disc, painted white, is situated about 300 yards southward of Double bush.

The **Burra**, on which stands a lighthouse, is about one mile eastward of Barrow hill; a rocky reef extends 4 cables north-eastward of the lighthouse, and other patches lying the same distance off shore, are situated about one mile north-west of it.

* See plan of Innambán river, No. 650.

LIGHT.—From an iron support above a white square tower, erected on the Burra, is exhibited at an elevation of 80 feet above high water, a *fixed white* light, visible in clear weather from a distance of 14 miles.

Pilots.—Signal station.—Near the lighthouse is a flagstaff from which signals are made through another signal station on Ilha dos Porcos, to the town of Innambán.

Vessels passing or anchoring are signalled, and if requiring a pilot, the usual pilot-jack should be hoisted, and the ship anchored off the channel across the bar, or kept underway between the Burra and the river. The pilot boats always come out across the bar, and are in the employ of the Government. Pilots may be obtained here for other places on the coast.

Outer anchorage.—There is good anchorage in about 8 fathoms, half a mile off the bar, with the lighthouse bearing S. $\frac{1}{2}$ W., and the Pedestal W. by S. In strong southerly winds good shelter may be found under the lee of Barrow hill, about three-quarters of a mile from the shore; there is also good anchorage, over sandy bottom, anywhere between these positions at about one mile off the reef. There is nearly always a swell at the outer anchorage.

At night it may be advisable to keep off and on to the northward of the bar, making due allowance for the current which sets strong to the southward.

INNAMBÁN RIVER.—Although the entrance to this river is spacious and forms a good harbour for vessels of light draught, the river is scarcely navigable for a vessel beyond the town, and but a short distance farther for boats. The channel from the bar to the town of Innambán is $14\frac{1}{2}$ miles in length, and in no place is it more than one mile wide; just inside the bar it is $3\frac{1}{2}$ cables, and off the town $2\frac{1}{2}$ cables wide. Many banks dry at low water.

Mafarun islet.—A sand patch 3 feet above high water, on the west extreme of the reef stretching northward from Barrow point, is a small but useful mark when near the middle ground abreast it; formerly it was much larger. About half a mile south of it is a boat channel to Barrow point.

Ilha dos Porcos is low and flat, with cocoa-nut trees about 90 feet high, and lies about $1\frac{1}{2}$ miles southward of Mafarun islet.

On the south-east extreme is the signal station for transmitting signals from Burra lighthouse to Innambán. Ilha dos Ratos is similar in appearance.

Shikoki point, on the west side of the harbour, is a remarkable sand cliff, used as a leading mark to the anchorage off the town. Rather more than one mile south of these cliffs is the village of Obra, with a flagstaff on the beach.

The Bar is about 4 miles from the shore, and a shifting one, moving a little northward or southward according to the wind; there is usually a depth of 10 feet on the bar at low water springs, which gives 17 feet at high water neaps and 21 feet at high water springs.

Buoyage.—A red conical buoy is moored outside the bar in about 9 fathoms, on the line of the leading marks, namely, Double Bush in line with the Pedestal. Within this buoy, black conical buoys mark the starboard hand on entering, and red conical buoys the port hand. These buoys are not to be depended on.

Tides.—It is high water, full and change, at Innambán at 5h. 38m.; springs rise 11 feet, neaps 7 feet. The stream runs strong in the river; off the town it sometimes amounts to 4 knots an hour.

Directions.—Vessels of more than 14 feet draught should employ a pilot, as there is almost always a heavy swell on the bar.

At times the sea breaks right across the river entrance; when such is the case, only steam-vessels of good power and very light draught should attempt to cross the bar.

The leading mark to the Bar buoy and over Innambán river bar (1894), is the Pedestal in line with Double Bush beacon, bearing W. by S $\frac{1}{2}$ S., which mark leads in nearly to the first pair of buoys. Thence keep the black buoys on the starboard hand and red buoys on the port hand, until southward of the buoys abreast Obra; thence with the left tangent of Shikaki cliff in line with Summit, bearing N. $\frac{3}{4}$ E. astern, until near Belau point, when edge a little to the eastward and pass between the two buoys off that point to the anchorage off Innambán.

The holding ground here is good, but it is advisable to moor if intending to remain.

Innambán town is situated on the east entrance point of the river, but being surrounded with cocoa-nut trees is not easily seen until close to. There are no good public buildings to attract attention, and the streets are ill paved.

The small fort, here, has a garrison consisting of native soldiers.

Pier.—There is a wooden pier, but it does not quite reach to low water.

Population. — **Trade.** — There are about 50 Europeans in Innambán, and two American missionaries; native population not known.

The products are ground nuts, gingelly seeds, copal, beeswax, and rubber; occasionally tiger skins and elephant tusks are brought in. Most of the trade is in the hands of the Banians, and the loading is done by native women, who wade off to the lighters with the bags of produce on their heads.

In 1893, the value of the exports amounted to £28,860, and the imports to £38,628.

Climate.—From November to May, fevers are especially to be guarded against; Innambán is considered to be the most healthy of the Portuguese possessions hereabouts.

Communication.—The British India mail steamers call every four weeks. The steamers of the “Deutsche Ost Afrika” line (three-weekly service) when sufficient inducement offers. This company have also a two-monthly service from Hamburg *viâ* Lisbon and cape of Good Hope to Durban, Delagoa bay and Innambán. *See* page 15.

Supplies of cattle, poultry, fruit, and vegetables, are readily obtained at the town, and small supplies of good water may be got by rolling casks up to the wells in the town. Oranges and lemons are in abundance. Firewood is cut and brought in boats from Barrow point by the natives, through the numerous channels in the reef.

Linga-Linga bay is the mouth of the north branch of Innambán river; it forms a fine landlocked harbour for small vessels, having a depth of 2 fathoms or more at low water, and has doubtless been used by slavers to escape the observation of passing cruisers.

COAST.—From Innambán to Burra Falsa (cape Lady Grey), a distance of 50 miles, the coast has no remarkable feature, except Sylvia range, 10 miles southward of Burra Falsa. This range of bare sand of a reddish colour is 330 feet high, and has or had upon its southern end a solitary tree. Between it and Innambán the coast range is from 400 to 600 feet high.

Sylvia shoal is a narrow coral ridge, with $2\frac{1}{2}$ fathoms least water; within the depth of 5 fathoms it is about $4\frac{1}{2}$ miles in length, parallel to the shore and distant $3\frac{1}{2}$ miles from it.

From the north end of the shoal, Burra Falsa bears N.N.E. $\frac{1}{2}$ E., distant $9\frac{3}{4}$ miles.

Current.—A strong southerly current is generally met with off Burra Falsa under one mile distant from it. When bound northward and clear of Zambia shoal, the current is much less inshore in depths of from 7 to 8 fathoms, and at times there is a counter set to the northward.

BURRA FALSA, or cape Lady Grey, in lat. $22^{\circ} 55'$ S., long. $35^{\circ} 37'$ E., is a low point, and rises to two small conical sandhills about 95 feet high. To the southward the land rises to 365 feet above the sea.

There is much sand about the high land over the cape, making it conspicuous from the northward. Good shelter may be obtained under the cape during southerly winds, and landing might be effected at times just north-west of it.

Pumene river, situated $3\frac{1}{2}$ miles north-west of Burra Falsa, was seen from the *Sylvia* at high-water neap tides, when there was apparently a narrow boat channel into it. Within, the river opened to a large expanse of water.

Shivala cliffs, situated 12 miles northward of Burra Falsa, are nearly two miles in length, about 120 feet in height, and red coloured, forming a conspicuous landmark.

Zambia shoal is a coral ridge, rather more than one mile in length by half a mile in width; from the shoalest part, 3 fathoms, Burra Falsa bears S. by W., distant $9\frac{1}{2}$ miles, and the highest part of Shivala cliffs S.W. $\frac{2}{3}$ W. The water deepens rapidly seaward of the shoal.

Foul ground.—At 26 miles northward of Shivala cliffs a depth of 3 fathoms was found one mile off shore, apparently part of a reef extending from the land ; vessels should give this locality a wide berth.

CAPE ST. SEBASTIAN, in lat. $22^{\circ} 5' S.$, long. $35^{\circ} 29' E.$, is a steep bluff 225 feet high ; from the southward, a small white sand patch shows at the upper part of the bluff, while from the northward the face of the cliff shows a considerable amount of red sand from base to summit. The coast hills terminate at 7 miles south of cape St. Sebastian ; here a sandy peninsula begins, partially covered with straggling trees and bushes, and extending in a northerly direction for 6 miles, to nearly abreast the cape.

This peninsula is about half a mile wide, having shallow water westward of it, and bounded by the high land forming the cape.

The **BAZARUTO ISLANDS** extend along the coast for a distance of more than 30 miles northward of cape St. Sebastian. The islands are under the jurisdiction of the Portuguese Governor of Chiluan ; a few troops are stationed upon them, and the small produce is conveyed by boats to Chiluan for shipment. The principal establishment is on Carolina island. The islands are five in number, viz. :—Bazaruto, Benguerua, Xezine, and St. Carolina or Marsha. The route to the anchorage is northward of Bazaruto island. There is a passage between the Bazaruto and Benguerua islands, possibly available for boats with local knowledge.

This is the site of the famous pearl fishery of Sofala ; pearls and mother-of-pearls are met with occasionally, but the trade is insignificant.

Bazaruto island, the northern and largest of the group, is 18 miles in length, and from the southward appears as a hog-back of bare sand about 300 feet in height ; the highest part, 390 feet, is near its north end. There are several villages on the island. *See* light, p. 215.

Cape Bazaruto is the northern extreme of the island ; the pitch of the cape is fronted by a reef to the distance of half a mile, whilst a sand spit, named Punta de Carlos, partly covered at high water, and steep-to, extends about $1\frac{1}{2}$ miles north-westward of its low extreme.

Benguerua island, sandy and partly wooded, lies southward of Bazaruto island, and is 170 feet in height; it is surrounded by sandbanks. There are several small villages on it.

Xezine island lies southward of Benguerua island, and may be recognised by some red cliffs about the southern part, the remainder being wooded down to the water's edge. It is 175 feet in height and being small has but few inhabitants.

Bango island, nearly 4 miles north of cape St. Sebastian, is low and sandy, and has a dark clump of trees near its centre; neither Xezine nor Bango are accessible from seaward.

St. Carolina or Marshā island, in the middle of Bazaruto bay, has a commandant and a small detachment of soldiers, and is the principal establishment of the Portuguese between Innambán and Sofala. Marsha is low, with a sandhill on its north-east side, but well wooded and easily made out. On a vessel's approach, the Portuguese flag is hoisted, near the centre of the island. There are two good wells of water on the island, but none to spare for shipping. There is also good building stone.

Tides.—It is high water at cape Bazaruto, full and change, a 4h. 26m., springs rise 12 feet.

LIGHT.—From a cylindrical iron tower, erected on the north-east extreme of Bazaruto island, is exhibited at an elevation of 98 feet above high water, a *fixed red* light, visible apparently in a north-easterly and north-westerly direction about 9 miles in clear weather; it is said to be visible also over the anchorage. *Reported unreliable.*

Directions.—The depths northward of cape Bazaruto are irregular, and the bottom rocky and uneven, with strong tide rips.

To enter, from a position about 3 miles northward of the light-house, shape course to pass about a mile westward of punta de Carlos spit, then haul to the southward for the anchorage under the north end of Bazaruto; *see* p. 216.

The bearing of the trees on Carolina island, if visible so far, would afford some guide in rounding punta de Carlos spit.

A pilot is obtainable to take a vessel to the settlement at Carol in island, and should be employed as the channel is not buoyed.

Anchorage was obtained by the surveying vessel *Sylvia* on the north-east side of Punta de Carlos spit, sheltered from southerly winds.

According to the plan, there is anchorage in 7 to 8 fathoms within the north end of Bazaruto, with the lighthouse bearing about East, distant 5 miles; also north-east of the settlement on Carolina island in about 3 fathoms.

COAST.—From cape Bazaruto northward to Machanga point, a distance of 39 miles, the coast is little known; but the depths appear to decrease gradually towards it. Northward of Machanga point, to beyond Chilúan, shoals extend to a distance of 10 miles off-shore.

Gouvro river empties itself into Moromone bay, 14 miles southward of Machanga point. It is hardly navigable for boats at its entrance, but is reported to become a fine river in the interior.

Sabi river enters the sea both northward and southward of Machanga point by several shallow mouths. Machanga point is low, with some small sand hillocks just northward of it. Sabi river is said to be one mile broad in the interior, but not navigable.

Mr. A. V. Williams, writing from Chilúan, October 1892, states that he ascended Sabi river to the farthest point where the tide was felt, or about 30 miles from its mouth. He entered by the northern or Makau branch of the Sabi, which had a bar with 5 feet at low water, and was about half a mile wide. He returned to Chilúan by a creek branching off the Makau, navigable by boats.

CHILUÁN APPROACH.—The coast between Machanga point and Ingomaimo point 16 miles to the northward, is fronted by shallow ridges, extending 9 miles seaward, from which distance it is only just visible, so that care and attention to the lead is necessary when approaching this locality.*

Misadjuana shoal, also known as Inverarity shoal, the outermost of these ridges, lies 10 miles E.S.E. from Chilúan island; it is 3 miles in length, and said to be nearly dry in one place at low water. From the shoal no distinguishable landmarks can be seen, but heavy breakers usually mark its position.

CHILUAN.—Chilúan island, situated at, and lying partly in the mouth of Ingomiamo river, is about 6 miles in length, by

* See plan of Chilúan island and approaches, No. 921.

3 miles in breadth ; it is low, and in many places nothing more than a mangrove swamp, intersected by a creek navigable for boats at high water.

The principal village and residence of the governor (Portuguese) is upon the south side, where there is a small fort and a flagstaff.

The northern entrance of the Ingomiamo, named Singune, which leads north and westward of the island, is the one used by vessels visiting Chiluán, and has from 22 to 28 feet at high water as far as the anchorage. The channel southward of the island, named the Inhabacara, has nearly as much water as far as the southern town, but is narrow and intricate.

Supplies.—Goats, fowls, and eggs can be obtained in small quantities, but no vegetables can be bought. There appears to be no regular mail communication, but it is no great distance from Beira, pages 222-224.

Population.—Trade.—The population of Chiluán amounts to about 1,200. The exports, consisting chiefly of india-rubber, ground nuts, and gum, are valued at about £30,000, and the imports, consisting chiefly of cotton goods and hardware, at about £20,000.

Ingomaimo point, $2\frac{1}{2}$ miles south-east of Chiluán island, is low and sandy, with no mangroves, thus differing from other points in the vicinity.

A beacon, consisting of a high pole, surmounted by black and white diamonds, is erected on the point.

Inhaguaia point, the south-east extreme of Chiluán island, shows as a bluff from the north-eastward.

Shoals.—South breakwater bank is an extensive bank fronting the south channel, and lying $3\frac{1}{2}$ miles eastward of Ingomaimo beacon. Anson knoll, near the southern end of the bank, has 9 feet water, and Richardson knoll, near the north end, has $1\frac{1}{2}$ feet over it.

The shoal which fronts Chiluán island to the distance of about $1\frac{1}{2}$ miles, extends $3\frac{3}{4}$ miles from Inhaguaia point, or to within one mile of the south breakwater bank.

North breakwater bank is a similar bank to south breakwater ; it lies $4\frac{1}{2}$ miles E.N.E. from the lighthouse on Singune point, and fronts the north entrance to Chilúan.

LIGHT.—From an iron support over a white tower erected on Singune point is exhibited, at an elevation of 36 feet above high water, a *fixed white* light, said to be visible in clear weather from a distance of 10 miles ; but being an ordinary lantern, is probably not visible more than 5 miles.

Position :—lat. $20^{\circ} 37' 12''$ S., long. $34^{\circ} 53' 33''$ E.

There is a flagstaff near the lighthouse, and also a white house, which is visible for some distance.

Pilot.—A pilot may possibly be obtained, but it is customary to bring a pilot from Innambán.

Tides.—It is high water, full and change, at Chilúan, at 4h. 49m. ; springs rise $18\frac{1}{2}$ feet, neaps 13 feet. The streams run from 3 to 4 knots in the entrances, and in the north entrance set across the vessel's course between North breakwater bank and the island.

Directions.—Anchorage.—From the southward, Chilúan island presents no recognisable features, and is not in sight from Misadjuana shoal, which is steep-to ; this shoal, except at high water in fine weather, will be seen by the breakers.

From the northward, a few cocoa-nut trees may be seen on the north side of the island ; also a large clump of trees eastward of the cocoa-nut trees, but these objects do not appear to be visible much beyond the North breakwater bank. The north entrance is that generally used, but as the banks are liable to shift and the channel is unbuoyed, it is advisable to employ a pilot.

The following directions applied to the north entrance, when surveyed in 1884.

Approach Singune point lighthouse bearing W. $\frac{1}{4}$ N. until Inaguaia point bears S. $\frac{1}{2}$ W., when steer N.W. $\frac{1}{2}$ N. until the lighthouse bears W. by S. (observing that the tidal stream sets across the channel). The course should now be W. by N. $\frac{1}{4}$ N. until the lighthouse bears S.W., after which it may be kept a little on the port bow until the anchorage is reached, when anchor in 4 fathoms, with

the lighthouse bearing about S.E., distant a quarter of a mile. All cargo is shipped and discharged from just within this position. The south entrance should not be used unless buoyed.

The channel between Chiluan and the mainland is navigable for vessels of 14 feet draught at high water, in charge of a pilot; so that vessels can proceed to the town if necessary, near which there is anchorage in 3 fathoms.

COAST.—**Boene** is a small, well-wooded, uninhabited island, about 21 miles northward from Chiluan, and about 12 miles southward of Sofala, at the mouth of the Gorongosi river. It is stated to afford good shelter for small vessels, but this is not borne out by the chart. There is a grove of palm trees on the island.

SOFALA.—The town and dilapidated fort of Sofala are situated on a small sandy peninsula on the north side of the entrance of the river, in about lat. 20° 11' S. It has a population of about 2,000, and is under a Portuguese governor. Water is scarce.

The trade is insignificant, a small quantity of ivory, beeswax, and ground nuts being exported to Mozambique.

Anchorage.—Vessels should approach cautiously by the lead, and little dependence must be placed on the plan.*

The land about Sofala is all low, with scarcely any trees, but in the vicinity of the river the land is a little higher and more irregular, with scattered tall trees; some cocoa-nut trees near the fort, if they still exist, will be distinguished before the fort is sighted.

H.M. Brig *Helena* (1844) anchored in 6¼ fathoms, sand, with the fort bearing N.N.W. 7 or 8 miles. This was the best anchorage for strangers, but in working out to sea the depths were found to be very irregular, shoaling suddenly at times from 10 to 5 fathoms, then immediately deepening; this is suggestive of great caution being required, considering the rise and fall of the tide is about 19 feet.

Sofala river is about 1¼ miles wide at the entrance; the south side is formed by Inhancata isle, separated from the main by a boat channel. The river, although so wide, is almost blocked up by sand-banks dry at low water.

* See chart, with plan of Sofala river, No. 648.

Bar.—The depth on the bar appears by the chart to be about 7 feet at low water, and banks with 3 fathoms and less extend about 7 miles off-shore. There were formerly two channels over the bar, but in 1859 the northern channel was blocked up. This bar should not be attempted by any vessel unless the channel be previously examined and buoyed.

Tides.—It is high water, full and change, at 4h. 0m. ; ordinary springs rise 19 feet.

Sofala bank.—Off Sofala the depths appear to increase very gradually seaward, there being 30 fathoms only at the distance of 70 miles. Within the 100-fathom line this bank, known as Sofala bank, apparently follows the contour of the coast, but its actual limits are not known. Inshore, at the mouths of many of the rivers, the bottom is muddy, but farther off it is fine sand, which becomes coarser as the distance from the land is increased, and is very coarse near the outer edge, where it deepens suddenly.

Coast.—From Sofala the coast takes a northerly direction to the Pungue river ; it should not be approached under 6 fathoms water, or within the distance of 8 miles, as the water is shallow to about that distance ; the land is very low,

PUNGUE RIVER.*—General remarks.—Aspect.—The land about the mouth of the river is very low, and if coming from the southward cannot be seen until close to the outer buoy. To the northward of the river a series of low sand hills covered with scrub extend along the shore, off which the water appears to be very shoal, 6 and 7 fathoms having been obtained at about a distance of 6 miles. On nearing the outer buoy, Massique point shows up well, making as a dark bluff point, caused by the tall straight trees which grow down to the water's edge. The Chirora group of palms to the southward will also be easily recognised for they are the only palms growing in the vicinity ; also the signal and light tower erected near Jea point, southward of the settlement.

After passing the outer buoy, the masts of the shipping will be visible over Beira, and about 3 miles farther in the tower on Chiveve point and the buildings forming the settlement will be visible.

* See plan of river Pungue, No. 1,003 ; also coast sheet, Delagoa bay to river Zambezi, No. 648.

Shoal in the approach.—H.M.S. *Mohawk*, in 1893, passed over a shoal with 4 fathoms water when in approximately lat. $19^{\circ} 50\frac{1}{2}'$ S., long. $35^{\circ} 4\frac{1}{2}'$ E. On nearing the shoal, which is apparently of small extent, the depths gradually decreased from 7 to 4 fathoms and then deepened to $6\frac{1}{2}$ fathoms. (See chart, No. 648).

Depths.—The entrance of the river is obstructed by numerous banks which extend some distance off the land, and partially dry at low water springs. A fairly wide navigable channel (marked by buoys) exists, which has from 3 to 4 fathoms at low water. Abreast Massique point a flat with from 2 to $2\frac{1}{2}$ fathoms water extends nearly across the channel from the banks on the eastern side, between which and Massique spit there is usually a channel with from $3\frac{1}{4}$ to 4 fathoms least water, but this depth is not to be depended on as the channel is subject to considerable change. It is stated that the best water is nearer to Massique point in the rainy season and the converse in the dry season.*

Buoys and beacons.—Black buoys mark the starboard hand of the channel when entering and red buoys the port hand, but they are not to be depended on.

From the latest information, No. 1 buoy, red, conical, with staff and ball, is a fairway buoy in about $5\frac{1}{4}$ fathoms, with point Jea light tower bearing N.W. $\frac{2}{3}$ N. distant $8\frac{6}{10}$ miles; for the others, see the plan.

LIGHTS.—**Signal tower.**—A tower, 80 feet in height, painted in red and white horizontal bands, stands on point Jea, and is visible some distance beyond the outer buoy under favourable circumstances. From the tower is exhibited a *fixed white* light visible in clear weather from a distance of 10 miles. It is also a signal station.

Also at $1\frac{1}{2}$ cables S.S.W. of Chiveve point stands a corrugated tower, of iron, 65 feet in height, similarly painted. The Portuguese flag is hoisted on the flagstaff on its summit (see sketches of towers on plan). A small *fixed red* light is shown from it towards the anchorage, to assist boats coming in at night.

Pilot.—Tug.—There is now a registered pilot in the port, and a tug can be obtained.

* See plan of river Pungue, No. 1,003. There was said to be as little as 11 feet at one period in 1894. In May 1897, the best channel was direct from No. 6 to No. 7 buoy, at which time the depths near Massique point had decreased considerably. Buoy No. 5 was in comparatively shallow water. The sand bank at Jea point continues to increase.—H.M. Consul, Beira.

Directions.—If certain of the vessel's position a course may be shaped for the outer buoy ; otherwise it is advisable to make the sand hills to the northward of the entrance and then steer to the southward, at a distance of 5 to 6 miles from the shore, and keep in not less than 7 fathoms. When the sand hills cease, a good look out should be kept for the outer buoy.

The outer buoy is a fairway buoy, visible about 5 miles, and should be approached between the bearings of N.W. and W.S.W. ; this will keep a vessel clear of the banks which extend for a long distance on either side off the shore.

On nearing the outer buoy, the land will gradually become visible, as before stated, also the tower on point Jea.

Pass the outer buoy close-to ; thence steer to leave the red buoys on the port hand, and the black buoys on the starboard hand : Nos. 2, 3, 4 and 5 are red buoys, and Nos. 6 and 7 are black buoys ; for their positions, *see* the plan. Northward of No. 5 buoy the channel is more subject to change ; it is stated that the best water is nearer Massique point in the rainy season than in the dry.* In keeping towards Massique point, particularly on the flood, care must be taken to avoid the spit extending southward of it, there being nothing to guard it. The bottom is, however, soft, and will probably do no damage. From abreast No. 7 buoy, course may be steered for the anchorage off the town. The stream sets obliquely across the course from about abreast and within No. 6 buoy. Springs run at the rate of 4 to 5 knots and neaps from 2 to 3 knots.

Above Beira the navigable channel is winding, and the banks and crossings are continually changing, thus rendering it inadvisable to attempt ascending without local knowledge. *See* river steamers, p. 226.

BEIRA.—The town of Beira is situated on Chiveve spit, a low sandy point forming the east side of the entrance to the Pungue river. It has become a port of considerable importance as the gateway to the rapidly developing territories being opened up by the railway, and is the capital of the territory of Manica and Sofala, administered under charters from the Portuguese government by the Mozambique Company. The governor resides at Massakessi (Maçaqueço), about 40 miles westward of Chimoio. *See* Railway, p. 224.

* *See* plan of Pungue river, No. 1,003, and footnote, p. 221.

The town is nearly an island at high water, and during springs and freshets is sometimes inundated, and was in danger of being washed away; but the construction of a breakwater on piles has served not only to prevent further encroachments of the river, but also to restore some of the lost ground. A wooden bridge over Chiveve creek connects the Custom house with the railway terminus. At low water the town is surrounded by swamps of black mud. The land about the settlement of Bangue, north-eastward of it, is under water during high river at spring tides.

Population.—The non-native population of the town, in 1896, numbered 778: 192 were British subjects; natives 2,350.

Landing stage.—There is a substantial wooden landing wharf, 293 feet in length by 82 feet in breadth, connected with the Custom house. There is a steam crane and other cranes on the wharf. Rails from the wharf run to the various sheds and are connected with the railway. The water alongside is only deep enough for lighters.

There is also an iron pier 400 feet in length, with a T head 100 feet by 36 feet, with a depth of 24 feet alongside the head at low water. It is connected with the railway.

Anchorage.—The anchorage for men-of-war is just off Chiveve tower in about 5 fathoms; and for merchant vessels, just off the entrance of the creek, above the men-of-war anchorage, in the same depth.

Supplies.—Fresh provisions are procurable in limited quantities; some vegetables and fruit are brought from the Buzi river, where Portuguese colonists have settled and are thriving. *See* p. 226. Canned provisions of all descriptions can be procured, but prices are high. Beira has three hotels, and Fontesville two. There is a hospital at Beira containing 14 beds. There are several steam launches and large lighters available for the discharge of cargo.

Game of all sorts abound on the banks of the river; buffalo, quagga, wild pig, buck, geese, ducks, quail, and the koran or lesser bustard. Alligators and hippopotami are numerous in the river.

Water.—The want of good drinking water has been provided for by the use of a number of large galvanized iron tanks, in which the water is stored during the rains.

Trade.—The principal exports are india-rubber, beeswax, ivory, hides and ground nuts. The country is said to be capable of

producing coffee, cocoa, cotton, wheat, and of carrying quantities of cattle. Coffee is found wild on the banks of the Govuro and near the Zambezi.

The Imports are cotton and dry goods, beer, wine, spirits, furniture, corrugated iron and wood for building purposes. The future of Beira largely depends on the success of the gold mining operations of Massikessi and in those parts of Mashonaland to which the railway has access.

The exports from Beira in 1895, amounted in value to £12,420, and the imports to £142,170, and in 1896 to £17,950 and £302,140, respectively, the latter increase being largely due to the importation of railway materials.

RAILWAY.—Telegraph.—There is railway communication from Beira, *viâ* Fontesville, 35 miles, and Chimoio, 153 miles, to Bandoola, 175 miles; works are in progress to complete it to the border. From the present terminus (1896) goods are conveyed by waggons to Umtali and fort Salisbury. The distance from Bandoola to Umtali is 52 miles; fort Salisbury is about 127 miles. Beira is connected by telegraph with Cape Colony, &c., *viâ* fort Salisbury.

Shipping.—178 vessels, of the aggregate tonnage of 227,986 tons, visited the port in 1896, of these 106 were British. 30,080 tons of cargo were landed.

Mails.—The British India vessels, monthly from Bombay, *viâ* Seychelles to Delagoa bay, &c., call at Beira both going and returning. The Deutsche Ost Afrika vessels, every three weeks from Aden to Natal, call at Beira both going and returning. A branch steamer of this line runs to Chinde and Kilimán; also to Parapat, Mozambique, and Innambán when sufficient inducement offers.

The Messageries Maritime run a steamer monthly from Diego Suarez in Madagascar, to Mozambique, Beira, Delagoa bay and back, connecting with the steamers of the company calling at Mauritius, &c. There is another French line of steamers *viâ* West African ports.

The Rennie Co.'s vessels every three weeks from Natal to Kilimán call here.

The Mozambique Company has organized a tri-monthly service between Beira and Sofala, Chiluan, &c.; and Mashonaland, *viâ* the Beira railway, and Sena on the Zambezi.

Climate.—From April to August fresh S.E. and South winds prevail ; and from October to March N.E. to N.W. winds.

The climate is not worse than other East coast settlements. From October to April there is heat and heavy rain, while during May the country dries up and every one leaves who possibly can ; for the next four months the weather is almost pleasant and health improves. Mosquitos, flies, and other insects make the night miserable during the hot wet season.

The average temperature at Beira in 1895 was 75° ; maximum 94° , minimum 58° ; maximum variation in 24 hours 34° .

The average height of barometer was 30.05 inches ; maximum 30.48 inches, minimum 29.62 inches. The rainfall was 95 inches ; greatest in 24 hours was 9 inches, that of the previous year was but 5 inches. In 1896 the rainfall appears to have been only 34 inches, and the greatest fall in one day 3 inches. See weather table, p. 594.

During the stay of H.M.S. *Brisk*, June to August, the climate was very pleasant, maximum temperature being 80° , minimum 60° . The nights during these months were cold and very damp, heavy mists and fogs hanging over the river, and not clearing away until between 8 and 9 in the morning.

Light Southerly to S.E. breezes prevailed but calms were frequent. The sea breeze blows with a force of 4 at times.

Tides and tidal streams.—It is high water, full and change, at Beira town, at about 5h. 10m., and at the outer buoy about an hour earlier, springs rise about 17 feet.

The tidal streams are very strong, especially when the river is high ; as much as 5 knots at springs have been observed at the junction of the Pungue and Buzi. Considerable caution is necessary when entering on the flood, especially after passing No. 6 buoy, for the stream sets strongly on to the bank off Massique point, and a vessel may be swept on shore before the strength of the stream is recognized. A point and a half on the course has occasionally to be allowed to counteract the effect of this stream and keep the vessel in the centre of the fairway.

At Beira the flood stream was found to run for only four hours during springs, and about five at neaps, and there was no time of slack water between the change of the streams at springs.

See plan of Pungue river, No. 1,003.

At Mapanda, about 43 miles above Beira, it was high water about six hours after Beira, the stream only running up for about one hour each tide ; the rise and fall being about 18 inches at springs and 9 inches at neaps. This was during July, the middle of the dry season.

Height of river.—The rise of the river is similar to that of the Zambezi, page 241 ; it begins in December or January and attains its maximum about March, when it begins to fall, reaching its minimum about the end of August, and remaining so until October or November.

Above Beira the river is navigable for vessels of about 4 feet draught during high river (*see above*) for about 100 miles, and during ordinary low river for about 50 miles ; but at times, during very low river, it is only navigable to Nhamacade point (abreast Naves Ferreira), by canoes, except at near spring tides. Vessels of about 9 feet draught can ascend about 12 miles.

Fontesville, or Fontesvilla, on the western bank, 35 miles above Beira, has a railway station. The line crosses the river by a wooden bridge.

Neves Ferreira, about 9 miles by the river above Fontesville, is a Portuguese military station, and so are also Mapanda and Sarmento. Mapanda is in about lat. 19° 23' S.

Small steam craft ply on the river between Beira and Fontesville.

There are several tugs, many lighters and sailing launches employed in the river trade.

Buzi or Buzio river, which discharges westward of Massique point, west point of entrance to the Pungue, is said to be navigable for vessels of 9 feet draught for a distance of 25 miles. There is a Portuguese military station half a mile above the village of Jobo, about 15 miles above the entrance.

The steam cutter of H.M.S. *Magicienne* in about October 1891 ascended to about 10 miles above Jobo, and could get no further for want of sufficient depth of water.

At 2 miles above the entrance the land is elevated a few feet above the swamp, and is never flooded. Five miles up, the land is cultivated, and there are a number of native villages. The natives are peaceable and industrious, cultivating manioc, rice, and bananas.

Some Portuguese colonists who have settled on the Buzi, have succeeded well with wheat, sugar cane, Ceara rubber and various vegetables. Brick making is a flourishing industry.

COAST.—From the Pungue river to a small river in lat. $19^{\circ} 29' S.$, a distance of 37 miles, the coast is slightly elevated and bounded by a range of low sandhills; these at about midway are somewhat noticeable, there being a number of sharp pointed hills resembling pyramids, about 200 feet in height.

These are or were conspicuous by being almost devoid of vegetation whilst a thick jungle prevails around. From the river mentioned, to the west entrance of the Zambezi the land is lower. Several streams discharge along this coast.

WEST LUABO (Luana) RIVER,* between Kirk and Ord points, is $1\frac{1}{2}$ miles wide. At Ord point, the eastern side of entrance the trees commence and thickly clothe the eastern bank. This river may be known by a range of hummocks on its eastern side, and very low land to the south-westward.

The West Luabo has frequently been taken for one of the mouths of the Zambezi, but it has been ascertained to have no communication with that river, unless it be by small creeks. It pursues a zig-zag, course for about 20 miles with not less than 2 fathoms in the channel, above which it does not appear to have been sounded.

Thornton river runs into the West Luabo from the westward, at about 25 miles from its mouth.

The bar extends more than 2 miles from the shore, and had in 1861, from 3 to 6 feet at low water, and 16 or 17 feet at high water springs; but, like the mouths of the Zambesi, it would be subject to considerable change.

Tides.—It is high water, full and change, at 4h. 30m.; springs rise from 12 to 15 feet. The streams of ebb and flood run regularly in the river from $1\frac{1}{2}$ to 2 knots.

ZAMBEZI AND SHIRÉ RIVERS.

General remarks.—The Zambezi is a river subject to great fluctuations of depth. During the rainy season it floods, the water rises from 15 to 20 feet, sweeping down with great rapidity, and fills all the valley.

* See plan of the mouths of the Zambezi, No. 2,865.

At the height of the dry season the stream is reduced to channels of water winding between dry sandbanks, with here and there shallows, which even a draught of 18 inches can scarcely pass. The channel of one year or at times even of one week becomes a bank the next, and there is no permanence in either direction or depth of the navigable passages.

The river has a large delta, through the several mouths of which it discharges to the sea. This delta may be said to comprise the Milambe, Inhamissengo or Kongoni, East Luabo, Muselo, the Chinde, the Inhamacatiua, entered from the Chinde, and the Inhamhona.

All of these have bars which change in depth from time to time.

The large body of water which runs out of the mouths during the rainy season, combined with the continued heavy ocean swell, so alter the positions of the several bars, and even cause islands to form and wash away, that the entrances are never two seasons alike, and should never be attempted without a pilot, or first sending a boat in to sound.

The bars will probably have a maximum depth from the end of February to early April, when the river is in high flood, and a minimum depth from September to early November, especially the latter portion, the end of the dry season. Details of each bar are given separately.

Navigability.—Vessels of about 10 feet draught can ascend the Delta about 25 miles, as far as Mchenga,* 5 miles above the junction of the Chinde with the main stream, at all times of the year; and vessels of 4 feet draught, except with an exceptionally low river, can ascend to the Dutch house in lat. $17^{\circ} 55'$ S. In February and March (high river), vessels of 5 feet draught, that can steam 10 knots, can go up to Tete, about 300 miles, or to the rapids, 20 miles above it; also up its tributary, the Shiré, to Katungas, also about 300 miles, but not without occasionally getting aground, and there is the possibility of being detained until the next rise of the river. It is not recommended for vessels above that draught to attempt either of these rivers. After March the river falls rapidly.

See chart of the Lower Zambezi and Shiré, No. 1,577.

H.M.S. *Redbreast*, drawing 13 feet, ascended by the Chinde to within a short distance of Mchenga (September 1890) with great difficulty on account of the narrowness and tortuousness of that river. *See plan of Zambezi and Shire rivers, No. 1577.*

Vessels of 18 inches draught only can navigate to the rapids about 20 miles above Tete, or to the Murchison falls on the Shiré, at all seasons of the year ; but with a very low river (November) there may not be sufficient water even for these. *See* Inland Navigation, page 237.

Best mouth.—To within the last few years the Kongoni mouth was considered the most practicable, but attention was in 1888 called by Mr. D. Rankin to the Chinde mouth (p. 233), which, on examination, proves to be the best entrance and is now used by all vessels entering the Zambezi.

In the following pages the entrances will first be described, and then the characteristics and details of the river, and of its important tributary, the Shiré, which falls into the main river at about 110 miles from the sea.

The DELTA.—**Aspect.**—The land forming the mouths of the Zambezi is low, the tops of the trees nowhere exceeding from 50 to 80 feet in height, and the similarity of the appearance of the different mouths renders it somewhat difficult to distinguish them. The East Luabo, the main and straightest entrance, was formerly the most easily distinguished, from its being nearly 2 miles wide, whilst the others are mostly narrow ; it lies also between two comparatively lofty and densely wooded points (*see* view on chart 2,865) ; the bar, however, extends about $3\frac{1}{2}$ miles off-shore.

The Chinde light structures on Mitaone point, the flagstaffs and the houses at the Concession, &c., now easily identify the Chinde entrance.

The Delta, with the exception of the Chinde, is but sparsely inhabited owing to a large portion of it being some feet under water when the river is in flood, especially at or near spring tides. Small villages and clearings exist on the higher grounds, some of the dwellings being on piles ; above the junction of the Chinde the land becomes higher, better populated and cultivated.

Depths in the approach.—The lead is of much assistance when approaching the Delta of the Zambezi, the depths decreasing from 20 fathoms at about 25 miles off, to 7 fathoms at about 4 miles, whence the depths decrease regularly to the bars of the rivers, which are from 2 to $3\frac{1}{2}$ miles off-shore.

Tides.—Current.—The tidal rise in the mouths of the Zambezi is about 12 feet at springs ; this amount is reduced to about 5 feet at Mchenga, situated about 25 miles above the entrances and 5 miles above the junction of the Chinde ; the time of high water at Mchenga is $2\frac{1}{4}$ hours later than at the mouth of the Chinde, or 6h. 50m., full and change.

At about 5 miles above Mchenga there is no rise of tide, but the effect of the flood tide in checking the stream coming down the river is sensibly felt for many miles above, probably as far as Expedition island. Above this there is a constant down stream, varying from $1\frac{1}{2}$ to $3\frac{1}{2}$ knots, according to the season.

MILAMBE MOUTH of the Zambezi lies 6 miles eastward of the West Luabo (which river has not, as far as is known, any connection with the Zambezi), and $3\frac{1}{2}$ miles westward of the Inhamissengo, which it joins about 5 miles above its mouth. Its entrance appears to be choked with sandbanks, but it has not been examined.

INHAMISSENGO (KONGONI) MOUTH* lies midway between the west and east Luabo, and, with the exception of the Chinde, p. 233, is the best known entrance to the Zambezi. All trade now goes by the Chinde, and the buoys have been removed. This mouth extends about 12 miles in a not very winding course to the northward, with depths of from 2 to 5 fathoms ; here it forks.

Madredane, the eastern branch, is only 10 yards wide in places, trending sharply round the north end of Monguni island ; it is about 3 miles in length, at which distance it connects with the Zambezi ; it is said to have a depth of two fathoms at low water, but the channel is tortuous and there are many snags in it. H.M. gunboat *Mosquito* passed through it in 1893, with some difficulty, owing chiefly to the overhanging foliage. It was by this branch that the expedition under Dr. Livingstone entered the Zambezi.

The western branch, named the Doto, is very shallow and but seldom used ; it enters the Zambezi opposite the Chinde.

H.M.S. *Mosquito* ascended this branch for about 5 miles in October 1893 where she anchored. From here, lake Sakasse and the village of Zuere on its west side were visited. The path is across swamps.

* See plan of the mouths of the Zambezi, No. 2,865.

The banks of the lake are high and well wooded, the water clear and good to drink. Fish were plentiful in the lake. It is within a few miles of the west bank of the Zambezi.

There is a boat channel within Inhamissengo bar, named the Inhangurue, which communicates with the East Luabo 3 or 4 miles from its mouth. The *Mosquito* passed through in November 1894 (low river) in not less than 5 feet at low water; it is subject to change.

Bar.—The Inhamissengo is fronted by sandbanks and breakers to the distance of $1\frac{1}{2}$ miles, at which distance they are connected by a narrow sand ridge, with depths of 2 to 5 feet at low water springs, or 14 to 17 feet at high water springs, the greater depth usually being found during the height of the rainy season, about March. A steam vessel drawing 12 feet water has crossed the bar, which at times is possibly available for vessels up to 15 feet draught. In 1893, it was reported that there was a depth of 19 feet at high water springs. It is unbuoyed. See general remarks, p. 227.

The settlements, created in 1881, at the south-east corner of Inhamissengo island, have been abandoned, since the diversion of trade to the Chinde.

Only one house, that of the owner of the Prazo, was standing in 1893 of the settlement of Conceição, 10 miles above Inhamissengo, but the gardens contain quantities of oranges and lemons. Guinea fowl and wart-hog abound, and also small leopards. (Lieut. Carr, H.M.S. *Mosquito*, 1893.)

Outer anchorage.—The most convenient anchorage off the bar is with the gap in the land bearing North, in about $4\frac{1}{2}$ fathoms, sand; but except in fine weather vessels should lie farther out. The current generally sets to the westward, causing vessels at anchor to lie broadside to the usual S.E. wind, and to roll considerably.

Directions.—Vessels proceeding to the anchorage off the Inhamissengo should make the East Luabo first, unless certain of their position, as its entrance is more easily discernable from its much greater breadth. Having made that mouth, steer to the westward along the coast, keeping in 4 or 5 fathoms, until the entrance is identified, whence anchorage should be taken up as above directed. If wishing to enter the river, the bar, which is subject to alteration, must be examined before doing so.

In crossing the bar a probable westerly set must be guarded against. At low water the surf breaks right across the bar, and the channel cannot be distinguished. Within the bar the channel deepens.

Tides.—It is high water, full and change, at 4h. 30m. ; springs rise about 12 feet. The ebb tide at springs runs 4 to $4\frac{1}{2}$ knots in the entrance.

EAST LUABO, known also as the Zambezi, is $1\frac{3}{4}$ miles wide in its entrance, and is the widest outlet of the Zambezi river.

First Bluff point, on the western side of entrance, so called from its high straight trees standing very close together, and Hyde Parker point, on the east side of entrance, which from the view on plan No. 2,865, is a remarkable object, coupled with the wide entrance between them, afford the means of identifying it.

Bar.—The shallow water around the mouth of the East Luabo extends about $3\frac{1}{2}$ miles seaward of the entrance. The sea at low water breaks completely across the passage, at which time a great portion of the banks are uncovered ; it is said to be impracticable during the dry season.

The east bank has a few straggling villages, visited by the *Mosquito* in October 1894, that of Timbue has a considerable population ; cocoa nuts and mangoes were plentiful. The river has considerably altered from that shown on the plan. The vessel apparently did not attempt the bar.

In the rainy season the river frequently overflows its banks at springs, but the waters do not remain up more than three or four days at a time. The water is fresh down to the bar with the ebb tide.

MUSELO MOUTH, about 10 miles eastward of the East Luabo, and between it and the Chinde, has some sandy cliffs on its north-east side, which may assist in identifying it ; about 10 miles from its mouth it joins the East Luabo. The bar is situated about 4 miles offshore, and when examined, some 30 years ago, it was stated to be impracticable for boats even in ordinary weather, there being a heavy surf on the only spot where a channel appeared practicable.

The channel within the bar was examined by the *Mosquito* in October 1894, and was found to have but 3 feet at low water in

one place (dry season). The vessel does not appear to have attempted the bar. The banks are thickly wooded and no villages were seen.

CHINDE RIVER,* now the best entrance to the Zambezi, is about 20 miles in length, between its entrance, and its junction with the Zambezi. Foot point, the south point of the entrance is low, with some trees and scrub on it; here the river is about 7 cables wide. Mitaone, the north point of the entrance, lies $1\frac{1}{2}$ miles eastward of it.

The entrance is fronted by sandbanks over which at times the sea breaks heavily, to the distance of 2 miles; at this distance is the bar which usually has a depth of about 6 feet at low water springs, affording a depth of 15 feet at high water neaps and 18 feet at high water springs, but the depths and direction of the best water are constantly shifting, and therefore not to be depended on. The depth in September, 1896 (towards the end of the dry season and the usual period of least water) was 13 to 14 feet at high water. It is imperatively necessary that the bar should be examined before entering. *See* remarks, p. 227, 228.

Within the bar the depths increase to 3 and 4 fathoms; abreast Foot point and westward past the settlement, the river is at least half a mile wide, gradually reduced to about 4 cables abreast the west end of Mitaone island, 3 miles above.

From thence, to about one mile above Sombo, or 13 miles above the entrance, the river is about one cable wide, with sufficient depth at all times for vessels that can cross the bar. Above this distance the river is much narrower, and the depths are only from 6 to 8 feet at low water in places. At its junction with the Zambezi, the bar there has from 8 to 10 feet at low water.

LIGHTS.—Two *fixed white* lights are shown from iron structures on Mitaone point; the inner or northern one is possibly visible about 10 miles and the outer one 7 miles in clear weather. The inner light structure is an iron framework painted red, with white lantern, and lies North from the outer light structure, which is an iron column with a masonry base.

Beacons.—Buoys.—Two small poles are erected on Mitaone point, westward of the lights; the inner one has a white disc on it.

* *See* plan of river Chinde, with view, No. 1,421.

These poles in line are supposed to lead in the best water when within the black and white buoys.

From latest reports, a red buoy in 15 feet marked the fairway at about half a mile seaward of the bar, with the lights in line. Within the bar, a black buoy marked the edge of the reef on the port hand, and a white buoy that on the starboard hand on entering.

Caution.—The lights, buoys and beacons are not to be depended on.

Pilot.—The services of someone acquainted with the state of the bar may possibly be obtained at the Concession, but too much reliance must not be placed in him.

Directions.—Anchorage.—The land in the neighbourhood of the Chinde mouth is low, and similar to that at the other entrances to the Zambezi, but the structure of the inner light, painted red, with white lantern, was seen from H.M.S. *Barrosa* about 16 miles, and is therefore a good mark; the somewhat conspicuous sandhills, 57 feet high, on the north side of Inhamhona river, $2\frac{1}{2}$ miles north-eastward of the Chinde, as well as the white flagstaff, 86 feet high, at the Concession will be identified on a nearer approach. *See* sketch on plan.

Having identified the entrance, steer in with the light structures in line bearing North, anchoring in about 4 fathoms, about 3 miles off the lights, and three-quarters of a mile outside the outer buoy. From this position, a boat must be sent in to sound the best water into the river, failing to obtain a pilot. (From the latest reports, 1897, the best water over the bar was with the light structures in line bearing North.) The best time to enter is from three-quarter flood to high water.

There seems to be considerable difficulty in establishing signal communication through the flagstaff at the Concession.

There is good anchorage in the fairway between Foot point and Luabo point spit 2 miles above, in depths of $2\frac{1}{2}$ to 4 fathoms, good holding ground. Vessels should moor. Strong easterly winds render the anchorage off the Concession untenable for small craft, but at such times they can shift higher up.

Tides.—It is high water, full and change, in the Chinde entrance at 4h. 30m. ; springs rise 12 feet, neaps 9 feet. These observations were made in July. In September the neap tides were found to be very irregular, with a range of $1\frac{1}{2}$ to 3 feet. The Chinde is tidal throughout, the flood and ebb streams turning about one hour after high and low water at the bar, and running at the rate of $2\frac{1}{2}$ to $3\frac{1}{2}$ knots respectively, at springs.

Occasionally during neaps there is no perceptible flood stream.

Tides in the Zambezi, *see* p. 230.

To enter the Zambezi from the Chinde.—There is depth enough at all states of the tide for a vessel within Chinde bar to reach Sombo, and one mile beyond ; but if proceeding into the Zambezi she should time herself to reach Sombo about an hour or more before high water, as the river above has depths of 6 to 8 feet only in places at low water, and is very narrow. Vessels of about 150 feet in length once committed to the upper part of the Chinde must continue on into the Zambezi, as there is no room to turn. The bar abreast the junction with the Zambezi had, when surveyed, from 8 to 10 feet at low water and not less than 14 feet at high water neaps, with the large tree westward of old Chinde village bearing S.W. Thence the turn into the Zambezi northward was sharp round the spit extending from the north point, the channel between it and the bank in mid-channel of the Zambezi being only about 30 yards wide. The deep water here in the Zambezi was along the eastern bank. The *Redbreast* (September, 1890) anchored just above the junction in 4 fathoms, but had to shorten in when swinging to the tidal stream. These remarks apply to that time.

Inhamacatiua river enters the Chinde between Maria and Fremantle points ; about 5 miles up it is joined by the Inhaombe from the north-westward.

H.M.S. *Mosquito*, in October 1893 (low river), entered the Inhamacatiua, from the Chinde, with a rising tide, and, without difficulty, reached the Zambezi at Juan, about 6 miles above the Chinde junction, thus avoiding Sombo. This route is said to be $1\frac{1}{2}$ hours shorter than by the Chinde, but the depth was as little as $3\frac{1}{2}$ and 4 feet in places.

The Inhaombe was also ascended for some miles, to just above the village of Samakota ; here the stream nearly dries at low water

springs, and the trees overhang the curves, which are very sharp. About 12 miles above it ends in a swamp.

The stream, situated about one mile westward of Fremantle point, was also examined, and up to its junction with the Inhamacatiua was found to be deep and sufficiently broad in all places for the *Mosquito*; by this stream, the flats in the mouth of the Inhamacatiua are avoided.

PORT CHINDE settlements.—The Portuguese settlement of Chinde is established on Foot point, with barracks, flag staff, look-out house, custom house, and a detachment of soldiers, black, under a commandant. With the British Concession it forms now a large European settlement.

Westward, and adjoining the settlement, is the British Concession, with flag staff, buildings, &c. (*see also* p. 9); it has a river frontage of 437 yards, and extends across to the shore of the ocean. Considerable improvement has been effected here since it was made over in 1892; a portion of the marsh has been drained, and groins built to protect the foreshore, and an attempt, unsuccessful as yet, to create a small dry dock. The river shore line at the Concession is said to be continually falling away.

A representative of the Administration resides here, who has under his orders a guard of soldiers. The seaward portion of the Concession is allotted to British trading companies; there were 19 Europeans here in 1895. Goods in transit for Central Africa may be landed and re-shipped here free of Customs duties.

It is comparatively healthy and a short stay here frequently benefits people who have suffered from malarial fever in the interior. This is mainly due to the bracing sea breeze.

Chinde, and Chiromo on the Shiré may be considered the head quarters of H.M. gun vessels *Mosquito* and *Herald*.

The village of Sombo is situated about 12 miles above Foot point, and the old village of Chinde 20 miles above, at the junction with the Zambezi.

Trade.—The trade at the Concession consists in the transport of goods to British Central Africa. There are practically no goods imported into the Protectorate except at port Herald and Chiromo on the Shiré, and Kota Kota on Nyasa. In the year ending March 1896, the value of goods sent to port Herald amounted to £1,970, to

Chiromo £69,300, to Kota Kota £490, and to the Administration £11,000. Total imports £82,760. The value of the exports amounted to £19,668. *See* also p. 9. There are three or more British and one German firms doing steam transport on the Zambezi, with their head quarters at Chinde. At least one steamer leaves Chinde every week for the interior.

The journey from Chinde to Chiromo is against the stream, and occupies about six or seven days ; to Katungas occupies two days more. For river steamers, *see* p. 239.

Supplies.—Dock.—Provisions are fairly abundant. There are two tugs at Chinde. Small repairs to engines up to 60 H.P. are undertaken by the African Lakes Corporation and Sharrer's Zambezi Co. There is a small patent slip at Sombo, where a vessel of 50 tons can be hauled up.

Mails.—The "Deutsche Ost Afrika" branch line from Beira to Kilimán, &c., call here every three weeks ; in connection with their main line service, every three weeks, up and down the coast.

The British India vessels call at Kilimán, both going to and returning from Delagoa bay.

A trading steamer of Messrs. Rennie & Sons, from Natal to Kilimán *viá* other ports, calls every three weeks. *See also* p. 15.

Telegraph.—Chinde is connected with Kilimán *viá* Sombo, where the line crosses the river. The telegraph line from Sombo is led along the left bank of the Chinde and Zambezi, as far as the Leak, there it forks,—one branch following the right bank of the Ziu-Ziu to its mouth at Inyamgona point ; from thence it continues along the left bank of the Zambezi to abreast Tete, thence across to Tete. Also from Inyamgona point across to Sena. Tete will be (about June 1897) connected with Salisbury, &c., in the Chartered Co.'s territory.

The other branch continues along the left bank of the Shiré to Chiromo and thence to Chikwawa. Blantyre, Zomba and Fort Johnston are connected with this telegraph line.

INLAND NAVIGATION.—General Remarks.—The Zambezi is only navigable by steamers of very light draught of water, at all times of the year ; at low river anything over 18 inches draught may ground in places. As stated on p. 228, it is navigable by vessels up to 5 feet draught during high river, or about February and March. For the Shiré, *see* p. 253.

The navigation is blocked by rapids some 200 miles above Tete, or about 320 miles from the sea.

Pilots.—The only pilots on the river are natives who have served on the African Lakes Corporation's steamers. The navigation is entirely by the eye.

Anchorage.—Vessels or boats seeking temporary anchorage are recommended to anchor usually well out in mid-stream in preference to near the banks ; but in early May a good look out must be kept for the large masses of grass, resembling floating islands, which are brought down by the stream, especially in the lower part of the Shiré, as not only are they liable to trip the anchor, should one foul the cable, but there are often snakes among the grass. At this time anchorage should be sought well under the lee of a bend.

Anchors should be sighted about every 10 days when the river is in flood, otherwise they get buried.

Tracking the boats along the river banks is possible for short distances in most places above the Delta during low river.

Natives.—The natives near the banks of the Zambezi are usually friendly and ready to trade, but opposite Tete the country away from the banks is, or was, in an insecure state.

Supplies.—Fowls and game are fairly plentiful ; goats may occasionally be obtained, but fruit and vegetables are scarce. On the Shiré, goats and fowls are to be procured at times, but they are very scarce. The stations of the African Lakes Corporation afford the best supplies. The river water, after being filtered, is always good for drinking ; but it should be first boiled.

Wooding stations.—Firewood is supplied to H.M. gunboats by the British Central African Administration.

Masongwei, the Dutch house, supplies wood for fuel as it is cut on the Shupanga side (Zambezi).

On the Shiré, wood can be supplied at Masanji, just below port Herald, lat. 16° 49' S., and at Chiromo the naval depôt. Above that wood is cut and sent off as required, when the river is navigable.

The African Lakes Corporation have trading stations at the Concession in the Chinde, and at Chiromo and Katungas on the Shiré, whence there is a road *via* Blantyre, to Matope and Mpimbi on the upper Shiré, *see* p. 258.

Steamers on the Zambezi.—The following is from the latest information at hand (*see* p. 264 for steamers on lake Nyasa, &c.) :—

British.—H.M. gunboats *Mosquito* and *Herald* on Zambezi and Lower Shiré—stern wheelers, with a load draught of 2 feet 6 inches ; can lighten to 2 feet.

The African Lakes Corporation has six or more steamers on the Zambezi—viz., *James Stevenson*, a stern wheeler, 90 feet in length with a draught of 3 feet, and 40 tons capacity ; the *Bruce* and the *Scott*, smaller stern wheelers ; *Lady Nyasa*, a paddle ; and the *Princess*, a new stern wheeler of very light draught, sent out in 1896 ; also 23 steel barges.

The Sharrer's Zambezi Traffic Company have for the Zambezi and Shiré, the *Centipede*, stern wheeler of 30 tons ; the *Scorpion*, of 20 tons ; *John Bowie*, paddle steamer, of 20 tons ; 2 screw launches, and 17 steel barges.

The African International Flotilla Company have the *Cameron*, stern wheeler, of 35 tons ; the *Argonaut*, a stern wheeler, of 30 tons ; a screw steam launch, and 5 steel barges.

Mission steamer, the *Henry Henderson*, paddle.

German.—The *Bismarck*, belonging to Deuss, Verten & Co.

Portuguese.—There are five or more Portuguese gunboats on the Zambezi.

In the twelve months ending December 1895, 109 steamers, 360 barges, 169 boats, and 178 large canoes, entered and discharged at Chiromo.

To develop transport by road past the cataracts, and thus connect the river service below with that above, the African Lakes Corporation have sent out with the three new steamers (1896) a powerful traction engine and several goods waggons, pending the construction of a railway alongside the Murchison cataracts on the Shiré.

General directions.—Owing to the constant and rapid changes which occur in the navigable channel of the Zambezi, no permanent directions of any value can be given; islands form and wash away, and channels which have been known to exist at one time, may be found to have disappeared a month later; the navigable channel bears no proportion in the dry season to the width of the river, which varies, below Sena, from a half to over three miles, and is in places studded with islands. The channel crosses and re-crosses from bank to bank, rendering the distances traversed in many places quite double to that shown by the chart. In these crossings the channel is always shallower than where it takes the direction of the banks, but the worst portions are usually pretty clearly defined. In calm weather there is a peculiar boiling up of its water, and when the wind is blowing up the river, as it usually does, the ripples on the shallows are more marked than in the deeper water, and similar ripples or breakers mark the edge of the shallow bank above. These ripples are almost the sole guide of the pilot.

As a general rule, by keeping on the outer side of the bends of the river, and avoiding the points, most of the shallow places will be avoided, as in all river navigation. At a crossing, keep well up towards the upper sand bank, more especially when descending the river; the vessel may ground on this bank with impunity, as the current will wash her off, but should she ground on the lower bank it means hours lost in laying out anchors and heaving her off. In this case her head must be got up stream as soon as possible.

Commander H. J. Keane, late of the *Herald*, remarks:—"The constant change is not confined to the river bed; the banks are continually being fretted away by the combined action of the wind and water, so that huge masses of earth are constantly falling into the stream, to be carried away and deposited in some position that will astonish the navigator, who, steaming with a certain amount of confidence down a channel that he has found to be fairly permanent, suddenly discovers it *blind*, and finds himself aground. On a fine calm day the experienced eye may detect it before too late, but such knowledge is only to be obtained by hard experience of a trying description."

Snags are plentiful in the Chinde, Zambezi, and Shiré, and are a constant source of anxiety, as each year's flood brings down fresh

ones, and to add to the difficulty if they are 2 feet below the surface there is no sign of them. They are more numerous in the Shiré above Chiromo, than below.

High river.—The first rise in the Zambezi, after low river, begins with the lesser rains in November; it attains its maximum about the end of December or the beginning of January; $13\frac{1}{2}$ feet (the maximum) was registered at Tete on 17th January 1889. The river then falls a few feet, until succeeded by the great rise, which takes place after the river has inundated the interior, and is at its highest at Tete in March, amounting usually to about 20 feet above low river. The rise is sudden, and the water is highly discoloured and impure, but still good for drinking purposes, and the current runs down at the rate of 4 to 5 knots, but in a very few days after the first rush, it resumes its usual rate at Tete, of about 2 knots. Lower down, the maximum is $3\frac{1}{2}$ knots. The Zambezi water at other times is almost chemically pure. In April the river is falling. The rise in the Shiré occurs about same time as the Zambezi, but it differs at times, depending on the rains in the districts from which the rivers flow, *see p. 242.*

Low river.—The general character of the waterway during the dry season, after June, is comparatively deep reaches, separated by shallow bars, the position of and depth on which varies from season to season, depending on the lowness of the river and the effect of the previous flood. Thus, while at some seasons a vessel of 3 feet may possibly pass, in another 18 inches is none too little.

More or less permanent shallow places are found in the Zambezi, even nearly down to its junction with the Chinde, where there may not be more than $2\frac{1}{2}$ feet, but more particularly between its junction with the Shiré and Tete. From the month of August to early November, for about 15 miles above the junction, and again in a portion between Sena and the Lupata gorge, the river is hardly navigable for anything drawing over one foot. The flats in the Zambezi above the junction of the Shiré are avoided by ascending the Shiré to the Ziu-ziu, a connecting channel between the two rivers, and re-entering the Zambezi by it.

The Shiré also, particularly in the Elephant marsh northward of the Ruo, is shallow, the depth being not more than 2 feet at the same period. *See pp. 253, 254.*

See chart, No. 1,577.

The early part of the dry season, April and May, naturally affords more water in the channels than during the other months of that season, but these are the most unhealthy.

In the Zambezi the current in the dry season is from $1\frac{1}{2}$ to 2 knots, and in the Lower Shiré from $\frac{3}{4}$ to $1\frac{1}{2}$ knots.

Winds.—The wind blows from the southward, up river, nearly all the year round in the daytime.

Climate and Rainfall.—The valley of the Zambezi is reached by the lesser rains late in October, when the sun is passing southward; these diminish or cease altogether in December, when at times there is a partial drought. The heavy rains usually begin when the sun, returning northward, is in the zenith, about the middle of January, and continue to the end of March or the beginning of April. There are light rains in the months of May and June. The remainder of the year is dry.

The rainfall near Tete is from 33 to 36 inches, though as little as 19 inches was registered in one year.

April and May are probably the most unhealthy months in the Zambesi and Shiré, when, the rain, having ceased, the action of the sun on the decaying vegetation is most active. February and March, the height of the rains, and November, the period of greatest heat, are also unhealthy. The Delta of the Zambezi and the lower valley of the Shiré, particularly in the neighbourhood of the Morambala and Elephant marshes, bear the worst character, and the mosquitos are a terrible plague. The upper valley of the Shiré, above the falls, and lake Nyasa are less unhealthy, but the climate is always trying to Europeans. For these districts, *see* p. 261.

The report from H.M.S. *Herald*, 1891, on the health of the several places is as follows:—"Katungas, a very unhealthy locality. Chiromo, very fair. Vicenti, severe attacks of malarial fever at all seasons. Chinde river, no marked unhealthiness, but chills are dangerous.

The Chinde was healthy and free from fever in September and October 1890; maximum temperature 75° , minimum 68° ."

Temperature.—At Tete, on the Zambezi, the greatest heat is in February, 103° being registered in the shade; it is coldest in July, about 72° , and in November it is about 84° . Between Tete and the

coast, in February, the temperature is about 98° at noon, and 80° at night. On the Shiré, below the Murchison falls, in September it is at times about 100° in the shade, but November is usually the hottest month. For Blantyre, in the highlands, and lake Nyasa, *see* p. 261.

Personal care of health.—Flannel should be worn next the skin by day and night; if other clothes are worn during the day the change to flannel should be made before sunset, as there is a considerable lowering of the temperature during the night, especially about July, the coldest time of the year.

The head and spine should be effectively protected; the former preferably by a well ventilated pith hat; the spine should be protected by an extra thickness of flannel down the back of the shirt; flannel waist belts are recommended.

Sleeping in draughts, opposite a windsail or open port, should be avoided, or a chill may result, followed perhaps by fever. As a rule, sleeping on deck is not recommended, but if indulged in the whole body should be well covered up, and exposure to dew especially avoided. Damp clothes should be removed as soon as possible.

In malarious regions mosquito curtains are a great protection, beside acting as a protection against noxious insects, and they minimise the danger of exposing the body during sleep; moreover sleep is scarcely possible in some portions of the river, more especially near the swamps in the Shiré, without such protection.

The three or four hours before sunrise are those in which precautions are most needed on account of the liability to chills; everyone should be under cover at that time. It is just then, when temperature has reached its minimum, that sleep is most refreshing.

Excess in eating and drinking should be avoided; all meat should be well cooked, and the drinking water filtered before use. The river water both in the Zambezi and Shiré is perfectly good; the water, when the rivers are in flood, is turbid, and if left to stand, throws down a certain amount of deposit, but it is always good when filtered. Water from wells should be avoided, but if used should be boiled. The practice of freely yielding to the sensation of thirst is to be deprecated, as leading to excessive perspiration, which saturates the clothing and predisposes to chill.

Extreme moderation in the use of spirituous liquors is earnestly recommended. Active employment is necessary for everyone employed in malarious rivers, as fever almost invariably attacks first those who lead a sedentary life.

Quinine, in two-grain doses, three or four times in the twenty-four hour, in notoriously malarious districts, is recommended.

These are the most effective measures against fever.

Sir John Kirk remarks :—"The best rule for health for men employed afloat in the Zambezi is to go to bed early, avoid chills at night, have a cup of hot tea, coffee, or cocoa in the morning before exposing themselves on duty on deck in the cold morning mists, which chill you to the bone, and on no account permit spirits to be drunk in the middle of the day. Sunset is the time for the meu's allowance. Remember that mosquitos are in millions on the Shiré; I would always anchor in the stream clear of the shore."

Aspect of river.—Settlements.—(Continued from p. 236)—The banks of the various mouths of the Zambezi for the first 10 or 15 miles are of much the same character, being low and thickly covered with trees, the greater portion of which are mangrove jungle. At about the junction of the Inhamissengo with the main stream the pandanus or screw palm trees begin, many so tall as to resemble steeples. The soil is wonderfully fertile, well adapted to the growth of sugar-cane; rice and many kinds of vegetables are grown; guava and lime trees are also abundant.

Many huts peep out between the bananas and cocoa-palms on the west bank, standing on piles a few feet above the ground, as considerable portions of the land in the rainy season towards spring tides are overflowed for three or four days at a time.

Chinde and Mchenga villages.—On the east bank, at the junction of the Chinde, are the villages of Chinde and Maruga, one mile apart; 5 miles above the latter is Mchenga village.

Above the junction of the Chinde with the Zambezi, the western bank abounds in cocoa-nut palms, and is somewhat higher than the eastern one, which is sandy; the banks of the river continue mostly of sand, with but few trees, until within about 20 miles of Maruro, and it is possible to track boats in most places.

Mazaro (meaning the mouth of creek), in lat. about 18° 4' S., is situated at the mouth of a creek, which, during high river, about

February or March, admits of the passage of boats from the Zambezi to the Kwa Kwa or Kilimán river (*see* Mopea, below) ; during the dry season the bottom of this creek or canal, about 30 yards wide, is about 16 or 17 feet above the level of the Zambezi. The Barabanda, about 5 miles below the mouth of the Shiré, also connects the Kwa Kwa with the Zambezi during the same period.

Abreast Mazaro the Zambezi is about half a mile wide, and the view is a magnificent one ; the river is studded with islands, the sides of which are clothed with grass and shrubs, with many a creeper and convolvulus. On the opposite bank is the Shupanga country, well wooded, and the home of the monster baobabs, many of enormous thickness.

At Maruro, situated just below Mazaro, the bank of the river has washed away considerably of late years. Mopea is considerably nearer the river than formerly, and it is believed that the time is not far distant when it will be on the banks of the Zambezi.

Vicenti is situated about four miles above Mazaro.

Mopea and Marendere.—Mopea is situated nearly 3 miles from the left bank of the Zambezi, on the Kwa Kwa, a branch of the Kilimán river, about 80 miles above Kilimán town, and is in connection with it by telegraph, *viâ* Sombo.

A portion of the Kilimán trade with the Zambezi goes *viâ* Mopea. In the dry season there is just enough water at Mopea for the smallest canoes ; at this time the goods brought up from Kilimán in lighters and canoes have to be unloaded at Marendene, a few miles below Mopea, where there is deeper water in the river. Thence the goods are conveyed by porters to the banks of Zambezi, a distance of about 6 miles, either to Vicenti or to Mazaro, whence they are distributed by river steamers or canoes to the trading stations up river. The transport from Kilimán to the Zambezi occupies from 3 to 5 days.

Shupanga is situated about 8 miles above Mazaro, on the opposite bank of the Zambezi. In the forests at Shupanga the mokunda-kunda tree is found ; it makes good boats' masts, and yields a strong, bitter medicine for fever ; the gunda trees here attain an immense size ; its timber is hard, and the large canoes used on the Zambezi and Kwa Kwa, capable of carrying 3 to 4 tons, are made of its wood

India rubber, calumba root and indigo are plentiful in the district. Wood for fuel is collected here ; the African ebony and lignum vitæ ; the latter of which sometimes four feet in diameter, are the most suitable.

At Shupanga lie the remains of Kirkpatrick, of Owen's surveying expedition of 1826, and of Mrs. Livingstone, who died here in 1862. The immense baobab that formerly shaded the graves has fallen. Some 5 miles inland are the Shupanga hills, from 300 to 400 feet in height. The country abounds with game. For about 2 miles above Shupanga, the west bank is rocky and steep, with a few rocks at a short distance from it. Above this both banks are about the same height as below, and are about 20 feet above the river in July.

The Zambezi above the junction of the Shiré.—General remarks.—Between Shupanga and Sena, the river is exceedingly interesting and picturesque ; it is also considerably wider than below and studded with islands, dividing the river into several channels, all of which are shallow.

That portion of the Zambezi between the mouth of the Shiré and about 20 miles above, is, in the latter part of the dry season, only available for light boats ; the best route then is to proceed up the Shiré a short distance, to the Ziu Ziu, thence by that stream back to the Zambezi and up to Sena.

The Zambezi is also very shallow between the Ziu Ziu and Tete, the river being 3 miles wide in places, consequently the water is spread over a great width of sand bed, with reedy islands between the channels ; from September to early November, one portion of the river between Sena and Lupata is hardly navigable to anything drawing over one foot.

The following information relating to the Zambezi, above the junction with the Shiré, is from Lieut. G. S. Carr, commanding H.M. Gunboat *Mosquito*, 1894. This is supplemented by a few remarks of Dr. Livingstone, where the ground is not covered.

Depths.—Above Senora Maria's (situated about 3 miles below the entrance to the Shiré, on the Zambezi) the channels become somewhat intricate and very winding, but there was plenty of water for H.M. Gunboats on the 26th January when they passed up.

Kaia (lat. 17° 39' S.).—Here there is a substantially-built brick house with corrugated iron roof. The owner does a fair amount of trade in ground nuts and produce generally.

Between Kaia and Casquetis, about 8 miles above, the water shoals considerably, and it is at this part that the river becomes blocked during the dry season.

At Mutaruro (Inyamgoma point), west point of the entrance of the Ziu Ziu, there is a wooding and trading station the owner of which has built a large stone house at the summit of a hill.

Wood can be obtained here, and there are generally a few natives working as goldsmiths, turners, &c. Mutaruro, owing to its greater accessibility takes almost all the trade which formerly passed through Sena.

Sena, one of the principal Portuguese stations, is situated on a low plain on the west bank of the Zambezi, with some detached hills in the background. It is now quite unapproachable except at very high river, and it is preferable to lie at Nyassereri, 6 miles above, and to visit the town from there. Dr. Livingstone (in August) remarks: "being unable to take the launch up the shallow channel in which Sena stands, we anchored at Myaruka, 6 miles below, and walked up."

Sena has greatly fallen away, even since last visited (May 1893). The streets are all overgrown and the whole town gives one the impression of desolation and decay.

The fort is badly in need of repair. Sena is connected with the telegraph system.

Nyassereri.—The road from Nyassereri to Sena is good, except after heavy rain, when about 1½ miles of it is converted into a swamp. The fort at Nyassereri is falling into decay.

Wood can be obtained in small quantities by arrangement with the natives, but as the locality belongs to the Companhia da Moçambique, it is necessary to ask permission from the manager before cutting the wood. From Nyassereri to Inyakarenga, 5 miles above, the river improves there being better water throughout; snags, however, demand attention.

Above Inyakarenga the river rapidly widens, but it is thickly studded with islands and navigation is difficult to about 10 miles

above Guengwe (somewhere above Maria Pia, lat. $16^{\circ} 41\frac{1}{2}'$ S.). In fact this is about the most difficult part of the whole river to pilot through.

The scenery improves. The banks are higher, the hills on each side form a picturesque background and both sides are thickly wooded and abound with game, guinea-fowl, and pigeon. Between Inyacarenga and Guengwe there are some stockaded tax-collecting stations, namely, Shimbwa, lat. $17^{\circ} 12'$ S. ; Shimiara, Nkuesa, and Maria Pia, before mentioned.

These positions, locally known as "*Aringas*" are seemingly used as safe resting places for boats to stop at when the country is in a disturbed state.

Above Maria Pia the river begins to get narrower and deeper as the Lupata gorge is approached.

Shigogo is situated below the gorge.

Lupata gorge.—The gorge is a natural cutting through or between the range of hills on either side, into which the river is compressed into a narrow but deep channel.

The scenery is very fine, having very much the characteristics of the Cumberland lakes. The current was very strong (February) certainly over $4\frac{1}{2}$ knots, and in some places more. H.M. gunboats going at full speed were in some places only barely making headway. This was probably due to a flood as the river had risen 4 feet during the previous night.

Dr. Livingstone remarks : "A strong current sweeps round the little rocky promontories of Chifura and Kangomba, forming whirlpools and eddies dangerous for the clumsy native craft which are tracked past with long ropes ; heavy-laden canoes take two days to track through the gorge. The current above the gorge is stronger than that below, probably running about 2 knots at this season, (August) that below being assumed to be about $1\frac{1}{2}$ knots. In the gorge, the current ran about 3 knots and the launch steamed through with ease."

Sungu.—Immediately above the Lupata gorge on the east bank is the Aringa of Sungu. Here is a small fort with 14 Goanese soldiers. A small stock of coal is kept here for the use of the Portuguese gunboats.

From Sungo to Tete the passage is easy and the channel deep, in some places 30 feet for 2 or 3 miles together.

At Masangano there is a fort constructed of stone and about 200 feet in length on its river face.

Luenya or Shirena river (lat. 16° 25' S.).—An attempt was made to proceed up this river, but about 2 miles above its confluence with the Zambezi it was blocked by large sandbanks, with insufficient water for the gunboat to pass, though every portion was examined. This was all the more provoking as the natives informed me (Lieut. Carr) that a few miles on, the river narrowed and became deep, and from the point where the *Mosquito* grounded the narrows could be seen:

Muarese river.—On the east bank, and about 5 miles below Tete, is the Muarese or Mirarazi stream; coal has been found in the valley through which it discharges into the Zambezi. The country inland here is insecure.

Tete (or what remains of it) stands on a succession of sandstone ridges on the west bank of the Zambezi, which is here about half a mile wide. Shallow ravines, parallel with the river form the streets.

Out of the sixty or so houses constructed of stone and brick, barely a dozen are in a state of repair. The streets are full of grass, the bridges over the little streams have fallen in, there are barely a dozen Europeans in the place, and everything seems to have gone to wreck and ruin. There are three forts, two in the last stage of decay; the military force consisting of a captain of Infantry and from fourteen to twenty soldiers, all Goanese.

Communication.—Tete is connected with the telegraph system, p. 237

Supplies.—Wood is procurable, but rather high in price. There is none kept in stock. (In future one hundred yards will be kept here for H.M. gunboats exclusively.)

The water in this part of the river is very turbid at this season (January and February) and it is advisable to distil sufficient water at

the end of each day's run for the needs of the morrow, as filtration appears quite insufficient, the water being full of suspended matter though doubtless pure otherwise.

The supply of drinking water for Tete is mainly drawn from a well in an island about a mile distant, but it is not clear or pleasant looking.

Livingstone remarks: "The mango tree flourishes here and the fruit is plentiful between November and March."

Revuke or Refubwe river, opposite Tete.—**Coal**.—This river was explored as far as Inyamakaze (Diorite rapids) about 4 miles, where progress was stopped by a reef of rocks and a cataract.

The river is very narrow and the current strong and the bottom soon becomes stony and dangerous to ground upon. There are several large villages on the south bank. Close to Inyamakaze is a large coal mine, and the river being navigable up to that point the coal could be easily transported to Tete in barges for shipment. No attempt is being made to work the mines.

This coal when tried on board H.M. gunboats gave the most unsatisfactory results, no doubt due in a great measure to the form of furnace, but it does not seem to be adapted for steaming purposes. Possibly when coal is obtained some distance from the surface the quality may improve. (The Consular Report on Kilimán, for 1894, states that it is reported to be of fair quality, *see* p. 277.)

Broma.—Above Tete the country begins to be more hilly and the river is narrower and in some places 60 feet deep. At Broma (lat. 16° 2' S.) is the mission of St. José. A large stone house is in process of construction at the summit of a small hill about 150 feet high. Here there are four priests and five sisters of charity. The house is quite the largest in the whole district of Zambezi, its dimensions being 127 by 60 and 50 feet high. At the foot of the Broma hill is the little church and close by it the house appropriated to the sisters and their little girl pupils. Both just above and below Broma there are rocks in mid-channel, but ordinary care is all that is necessary to avoid them.

Sanguru or Panzo as it is generally known has a fairly large Aringa (stockaded station) and stands on the south side of the entrance to the river Mavusi. The entrance is 45 yards wide and about 7 to 10 feet deep (February).

Freshets.—Caution.—While H.M. gunboats were lying here a strange thing occurred, the knowledge of which may prevent future accidents of the same kind.

Both gunboats were lying close to the bank, *Herald* being highest up, a fine though cloudy day and the current in the Mavusi barely running $\frac{1}{2}$ knot. At 5 p.m. without any previous warning the rain commenced, the river began to flood and in less than an hour had risen six feet and with at least a 6 mile current, carrying trunks of large trees and large masses of reeds with it.

At 6:45 the *Herald* parted her cable and was swept out of the river into the Zambezi where she managed to bring up with her other anchor until steam could be got up.

H.M.S. *Mosquito* was driven into a reed bed with a soft bottom and before the current had abated sufficiently to heave her off, the flood subsided even more rapidly than it had risen and left her high and dry. Next day the ship was lightened and preparations made to dig her out. However, at 5 p.m., and in just the same manner, but with far decreased current and force the river rose again and with the united efforts of 150 natives, both anchors, and steam, she floated off safely having been aground 21 hours.

The natives say that such a thing as two floods on two succeeding days is most rare.

The Zambezi was rising at the time and would have floated the *Mosquito* about five days later.

Karuge river.—Above Sanguru there are but few villages. At Karuge river is Matakenya village, and between that point and Kebrabasa rapids only a few scattered huts.

The river Karuge was explored for about one mile when the water shoaled suddenly to 2 feet and further progress was stopped.

Pandua Mokua.*—The country between Tete, and Panda Mokua, about 85 miles above, where the navigation ends, is well wooded and hilly on both banks of the river. Panda Mokua is a hill 2 miles below the rapids, capped with dolomite containing copper ore.

Rapids.*—Above Panda Mokua are the Kebrabasa or Chinaronga rapids. The lower one of these, when seen in November (low river), had a fall of 20 feet in a distance of 30 yards. During high river

* Livingstone. See chart, No. 1,577.

these rapids are said to disappear, and the river is then half a mile wide, but at low river the rapid rushes through a gorge only from 40 to 60 yards wide. These rapids extend nearly to Chiceva, a distance of about 40 miles; in descending one of these Dr. Kirk nearly lost his life. During high river these are said to be smoothed over.

Navigation above the rapids.*—The river is therefore impassable for 40 miles, implying a portage to that extent; above Chiceva the river becomes navigable, and remains so with only one or two rapids that are not of a nature to stop navigation until within 30 or 40 miles of Victoria falls. This upper reach is more navigable than the portion between Sena and Tete, and can be made use of by vessels of 2 to 2½ feet draught. There are two rapids that would require a little study, but with these two exceptions the river is safe.

Lieutenant Carr, February 1894, remarks as follows:—"At Kebra-basa rapids the river suddenly narrows and runs between high rock walls and about 60 yards apart. The current at this time of year (February) being exceedingly strong—so much so that H.M.S. *Mosquito* going full speed could barely make headway. The water literally "boils" over, bursting into large bubbles over a foot high and making it very difficult to distinguish between the rocks and the deep water."

"Above the first reach the river narrows again and bends sharply to the south-westward, with rocks scattered about in every direction. Perhaps a very strongly-built craft with powerful engines might advance above this point, but the chances of her coming down in safety would be very remote. The bottom and sides are rocky and the least error or accident with helm or engine would mean disaster, especially to a vessel whose bottom is of very thin steel only. If the thing be possible the best time to attempt it would be in May when the river has commenced to fall; the diminished current would give a vessel a chance to steer and steam, but a sudden fall in the river, a matter of frequent occurrence, would condemn her to remain above the rapids for a year."

Victoria falls* (about lat. 18° S., long. 26° E.) are separated by an island into two portions, the whole measuring about one mile in width. The river thus divided drops into a deep chasm from a height of 350 feet, causing a vapour to ascend which has caused it to be named by the natives the *Mosi-ao-tanya*, or smoke sounding. The

* Livingstone. See charts, Nos. 1,577 and 597.

streams rush towards one another in the chasm, producing a fearful boiling whirlpool; it thence rushes through a zigzag gorge, apparently not more than 20 or 30 yards wide, situated at right angles to the fissure of the falls, beyond which it expands into the upper reach of the Zambezi, but is not navigable for some 30 or 40 miles below, as before mentioned. See Approximate Distances on river, p. 259.

The SHIRÉ.*—Navigability.—The Shiré enters the Zambezi about 110 miles above its mouth, in about lat. $17^{\circ} 44'$ S., long. $35^{\circ} 23'$ E., at about 5 miles above Saddle hill, which is 655 feet high, and 2 miles above Shimoara village.

The Shiré is navigable for short and handy vessels of 4 to 5 feet draught from about early in March to the end of May; the water is falling from about the middle of April.

Vessels of barely 2 feet draught only can be depended on to pass up the Shiré during the latter months of the dry season, September, October and November, and possibly in February (when the river has fallen after the smaller rains), if the greater rains have not commenced. The flats below port Herald lat. $16^{\circ} 49'$ S., and also between that port and Chiromo, have only about 2 feet over them in those months. The ascent to Katungas can only be made when there is an assured rise of 2 feet there, for, should a vessel get caught above the flats with a falling river, she possibly might not get down again before the next rains.

Height of river.—The tide gauge at Chiromo affords information on the depth in the river in the approach to and above that place. The following remarks applied to the river in 1893–94, which differed but little from the preceding year.

A height of 3 feet 9 inches on the gauge indicated a depth of 2 feet in the approach to Chiromo from below, and 5 feet 9 inches on the gauge a depth of 2 feet to Katungas.

Port Herald is flooded when the gauge shows 10 feet 9 inches, and the northern part of Chiromo when it shows 15 feet. All of Chiromo would be flooded at 17 feet.†

* Information on the Shiré, amended from the remarks of Lieutenants H. J. Keane, H.M.S. *Herald*, Lieutenant A. H. Lyons and Lieutenant G. S. Carr, H.M.S. *Mosquito*, 1891–2–3–5.

† On the 16th January 1895, the banks of the Shiré were flooded; the water rose to 19 feet 10 inches on the gauge, rendering a retreat of the natives to the hills necessary. Chiromo, and Roseberry Park, a station of the Oceana Company, opposite Chiromo, had from 3 to 5 feet of water in the houses, and the country was flooded for miles round; it lasted for 4 days. After the first subsidence, the stench arising caused a great increase of remittent fever.—Lieut. Carr.

On December 1st the water stood at zero, and remained practically so until the 10th, whence it rose rapidly to 3 feet 6 inches on the 13th, falling as suddenly to 1 foot 6 inches, where it remained until 26th, when there was a similar jump to 4 feet, falling again suddenly.

On 1st January the gauge showed 1 foot 9 inches, gradually rising to 4 feet on 3rd February, when a sudden rise set in, the gauge registering 11 feet 9 inches on 8th February. Thence it fell gradually to 4 feet 6 inches on 28th of that month.

A large and abnormal rise then came, caused by the heavy rains in the Blantyre district (and not by water from Nyasa), the gauge showing 15 feet 7 inches on 20th March. Thence it fell to 6 feet 6 inches on 3rd April, and (with the exception of a sudden rise of 3 feet between the 10th and 13th) gradually fell to 4 feet 6 inches on 16th May.

The register was not continued, but the water would stand at about that height for some time, and then gradually fall away to low river, about October.

The mouth of the river is rocky and somewhat dangerous, but for about nine months of the year the main or eastern channel can be avoided by using a channel about 30 yards wide between the islet in the mouth and the west bank which is almost free from danger. During very low river the main channel must be used, avoiding its east side, and giving also the east point, on which the whale-back trees are, a good berth before turning up for the entrance. A rock in mid-river was dry about $2\frac{1}{2}$ feet at low river, 1890; (the channel at this period is apparently between it and the islet).

Dangers.*—Two other places in the Shiré also present difficulties to its navigation, namely the Leak, and Pinda rapid. The former is about 35 miles above the mouth and one mile above the Ziu Ziu with which it connects. It is about 80 feet wide here, and at right angles to the Shiré; in the dry season the water runs through it with considerable velocity, and the channel of the Shiré being very narrow, and running close to the Leak there is considerable danger of being sucked down this narrow rapid, and both anchors should be ready.

H.M. gunboats in the dry season of 1891, found the river blocked below Pinda; they were successful in finding a narrow stream which led into the Ziu Ziu and out near Pinda above the obstruction. The

channel was blocked abreast Pinda island in November 1892, and the gunboats which were being taken up in pieces, had to be transported across Pinda island.

The Pinda rapid is about half a mile above the Leak; the danger here arises from a sharp turn, and an accelerated current caused by the channel being narrowed by a rocky islet. The west channel is the navigable one, keeping near the river bank. The Portuguese telegraph wires lead directly over the island, and seemingly there will be but little space for the funnels of steamers at high river.

The dangers enumerated cause but little anxiety going up against the current, but in not hitting them off successfully going down with the current.

Pinda being passed, there is a clear run through the Morambala marsh to Shuonga; the river is tortuous, particularly at the **S** bends, but there is plenty of water.

Morambala mountain, meaning the lofty watch tower, is about 4,000 feet in height, 7 miles in length, and situated on the east bank of the Shiré, about 20 miles within its mouth; it is visible down the Zambezi at Mazaro, and is a striking object. The summit of Morambala, though nearly always enveloped in mist, is far more healthy than the lower Shiré valley.

S bends.—At the head of the Morambala marsh are the **S** bends, so called from the succession of very sharp and narrow bends in the river; the water is deep, but when the river is in flood the stream is strong, rendering extra care necessary when descending the river.

Above these bends, the river widens and the curves are less sharp; signs of cultivation which have been absent in the marsh again appear, and the country on the right bank is wooded.

At Shuonga, nearly 60 miles above the mouth of the Shiré, a notice board was erected in July 1891, in lat. $17^{\circ} 5\frac{1}{2}'$ S., long. $38^{\circ} 18\frac{1}{2}'$ E., and all the territory to the northward on the right bank, proclaimed as British Territory. Two conspicuous palms, rising from a small clump form a conspicuous object, one mile north of the notice board. The Ruo river, above, is the boundary, on the left bank of the Shiré.

Two flats (only 2 feet over them in the dry season of 1890) have to be passed before reaching Port Herald.

Port Herald or Juan Makanga, the first British settlement on the right bank, is a fairly large village, situated in lat. 16° 50' S. Wood can be supplied by contract here. The run up from Morambala can be made in about 12 hours, so there is no necessity to anchor in the Morambala marsh, which is unhealthy, and where no wood is obtainable.

Above Port Herald the river loses much of its previous monotonous character; numerous islets are dotted about, and trees with heavy creepers overhang the water; on either hand are ranges of hills, and the lofty summit of Chiperone (6,000 feet) commands attention. The channel, however, is very shallow; in September 1891, the river steamers drawing 2 feet 4 inches had some difficulty in descending; and in October, H.M. gunboats lightened to 2 feet had to be constantly assisted across the flats with warps. The same occurred in November and December 1892, when the new gunboats were being taken up.

Ruo river is a tributary of the Shiré, and separates British from Portuguese territory. On the south point of its entrance rest the remains of Bishop Mackenzie, who died here in 1862 from fever caught by severe exposure in the wet season; the grave is marked by an iron cross. The Ruo is 100 yards wide and navigable for canoes for about 12 miles, where the rapids begin. Railway proposed from Kilimán to the Ruo.

Chiromo on the north side of the mouth of the Ruo is a naval depôt and a wooding station of the African Lakes Corporation. Some attempt has been made to lay out building blocks and streets; some Banians are settled here. The waggon road to Zomba and Blantyre, *via* Tuchila river, was expected to be completed in 1896.

Naval Headquarters.—Chiromo and the Concession in the Chinde may be considered the headquarters of H.M. gun vessels *Mosquito* and *Herald*. Chiromo is connected with the telegraph system.

Katungas.—Above Chiromo the river passes through the Elephant marsh and continues shallow; as before stated, vessels of 2 feet draught can only ascend to Katungas on an assured rise of 2 feet at

that place (*see* tide gauge, p. 253), and may have to wait an indefinite period for another rise which may not come until the next wet season.

Elephant marsh, which begins abreast the Ruo, is most unhealthy, and no wood for fuel is obtainable there. Above the marsh there is plenty of wood.

Chikwawa, $1\frac{1}{2}$ miles above Katungas, is a station of the Administration, whence there is a road to Blantyre, &c. It is connected with Chiromo, Blantyre, &c., by telegraph.

Mulilima (Chibisa's) village, lies about 4 miles above Katungas, on the opposite bank, and about 10 miles below the Murchison falls; the *Pioneer* ($5\frac{1}{2}$ feet draught) spent a season here, whilst Livingstone was visiting the Nyasa and Shirwa lakes. At a sharp bend above the village, the channel is barred by rocks during low river; Matiti village is about $1\frac{1}{2}$ miles below the falls, on the western bank; Ramakukan's village is nearly abreast of it.

Murchison falls begin in lat. $15^{\circ} 55' S.$; there are four principal and five minor cataracts, extending over a distance of nearly 40 miles of the river, chiefly in a north and south direction, to within 8 miles of Matope, lat. $15^{\circ} 25' S.$ The lower fall is named Mamvira; Pampatamanga fall, about midway, is 500 feet, and the upper rapid, the Pampaze, is about 1,500 feet above sea level.

UPPER SHIRÉ or Mopango.—Navigability.—Above the rapids the Shiré is again navigable for shallow draught vessels to lake Nyasa, a distance of about 70 miles. Owing to the steady fall for some years of the level of the lake, this upper part of the Shiré carries less water than it formerly had, and in a very dry season in places it is scarcely passable for anything but boats.

One of these places is near fort Sharpe, about 4 miles southward of Liwonde, where a series of gravel banks extend right across the river, with at times only a few inches of water over them. The channel has then to be dug out.

Two miles above fort Sharpe is a dangerous part named the Stones; here the channel is reduced to about 20 yards of navigable water by a reef of boulders which extend from the left bank, and by an islet. The best water is close to the islet. The current runs

through this passage with great force. The channel for about half a mile above the Stones is obstructed by boulders which, in the dry season, stand above water.

Pamalombe or Malombe lake has from 6 inches of water in a very dry season to 6 or 7 feet in the wet season over very soft mud; its northern entrance has at times only one foot water in the dry season. There is a similar bar between fort Johnston and lake Nyasa.

Stations.—**Matope**, a station of the African Lakes Corporation is about 3 miles above Pampaze, the upper rapid. Two new steamers of this company, for service on the lake and the Upper Shiré, were put together here at the end of 1896.

Matope is connected by a good road with Blantyre, a distance of 34 miles, and from here a considerable portion of the goods brought up the Zambezi and Shiré to Chiromo or Katungas are re-shipped for transport to lake Nyasa.

Mpimbi, 6 miles above Matope, is, however, now more used as the commencement of navigation, as it is more healthy, and the difficulty of navigation between those places is avoided. It is connected by road with Zomba, 21 miles, and Blantyre, 42 miles. Here the three British gunboats and a German steamer were put together for service on the lake.

Sharpe and Liwonde are stations of the Administration. Liwonde is about 4 miles above fort Sharpe.

Fort Johnston ($14^{\circ} 27' S.$).—On the east bank of the Upper Shiré, about 2 miles from lake Nyasa, stands fort Johnston, the military headquarters of the Administration, and also of H.M. gunboats. It is connected with the telegraph system, p. 237. On the opposite bank is the large village of Mponda.

The African Lakes Corporation have wooding stations at Matope, Malawi, and Liondi on the Upper Shiré.

Shiré highlands.—**Blantyre.**—In the Shiré highlands is Blantyre, the head mission station of the Established Church of Scotland; it is situated in lat. $15^{\circ} 47' S.$, long. about $35^{\circ} 4' E.$, 3,000 feet above the sea, and 28 miles by road from Katungas on the Shiré. The town is a picturesque little settlement of some 30 European houses in the centre of the coffee-planting district,

surrounded by plantations and beautifully situated beneath the hills in a well wooded country. The climate is remarkably healthy, *see* p. 261.

In the highlands around Blantyre are several sub-mission stations, at Zomba, and elsewhere ; the African Lakes Corporation have established a station at Mandala, close westward of Blantyre, for the development of commerce and agriculture. Buchanan Brothers and others are growing coffee for exportation, *see* products p. 260.

Zomba.—The British Commissioner resides at Zomba, 39 miles northward from Blantyre. It is connected with Chiromo and Blantyre by a road suited for wheeled traffic ; also by good roads with Milanjé and Domasi.

Mails and Telegraph.—Blantyre, Zomba, and fort Johnston are connected by telegraph with Chikwawa, Chiromo, Tete, Chinde, &c., and Kilimán ; they are about to be connected with Cape Colony, &c., *viâ* Tete and fort Salisbury. *See* p. 237.

Mails are conveyed by road to Chiromo, thence by river steamer to Chinde. The southern branch line of the “ Deutsche Ost Afrika Linie ” call at the Chinde every three weeks ; *see also* p. 237.

The distances from the sea are very approximately as follows :—

Mazaro	...	...	...	...	...	75 miles.
Shupanga	...	...	...	...	...	84 „
Junction of the Shiré	...	...	...	...	...	110 „
Katunga's village on the Shiré	...	...	...	...	...	265 „
Murchison falls on the Shiré	..	...	...	...	...	280 „
Sena on the Zambezi	...	...	...	...	...	140 „
Lupata gorge	...	...	...	...	...	235 „
Tete	...	...	...	...	...	280 „
Kebrabasa rapids	...	...	...	...	...	325 „
Zumbo, mouth of Loangwa	..	...	...	...	...	500 „
Victoria falls	...	...	...	...	...	950 „

LAKE NYASA.—**General remarks.***—Nyanyja ya Nyanyesi, or Lake of the Stars, is about 300 miles in length, north and south, from 25 to 35 miles in breadth, about 1,500 feet above sea level, and lying between two high ranges of mountains, is subject to heavy

* *See* chart of lake Nyasa, southern portion No. 1,578, with plans.

gusty winds. Its surplus water is carried off by the Shiré over cataracts to the Zambezi and thence to the sea, over a distance of nearly 300 miles.

The country westward of the lake, southward of a line joining the south end of lake Tanganyika to the north end of lake Nyasa, also the western, southern, and the eastern shore as far northward as Zirambo bay, form part of the British Central Africa Protectorate, for which *see* p. 8.

The headquarters of the Administration is at Zomba, p. 259.

Several mission and trading stations are established on its shores.

There are, of course, at present very few so-called townships in the Protectorate. These are, Chiromo on the Shiré, Blantyre the capital of the Shiré highlands, and fort Johnston; of these Blantyre is the most advanced.

Most of the villages of Nyasaland are perched on rocky heights; they are hedged round with palisades, inside which is a mass of from 50 to 100 huts. A series of good roads are in course of construction. A feeling of security and content is also apparent, and where only a few years ago the timid people were afraid to stir out of their villages for fear of being cast into slavery, they now work the land and evince an ever growing confidence in their protectors, the British.

Products.—The principal product is coffee, of which the Shiré highlands and the Mlanjé district are at present the chief seats, both admirably adapted for colonization, being from 3,000 to 5,000 feet or more in height. The cultivation of the cocoanut palm is capable of great development in Nyasaland. The forests furnish a quantity of durable timber, and ebony is found in several places, and excellent india-rubber is collected. Magnificent cedars grow in the Milanjé district, and rice grows well on the shores of the lake. Orange and lime trees, pine apples, figs, &c., have been introduced with marked success; in fact, the great range of temperature favours the cultivation of nearly all the products of the temperate and tropical regions. A considerable portion of the country is unhealthy for cattle and horses, and there is also a belt in which the tsetse fly is prevalent; fortunately it never appears in the hills or near the rivers.

Communication is *via* Zomba; *see* p. 259.

Climate.—Rainfall.—The advantages of Nyasaland are a rich soil, an abundant water supply and the healthy climate of a large portion of it. Its great value compared with surrounding places lies in the preponderance of high land over low swampy country. The result of this elevation is a far cooler climate than would otherwise be found so near the equator. In the highlands over Blantyre, about 5,000 feet in height, and the beautiful Milanjé district, even in the hot season, the heat is never oppressive, and it is bracingly cold in the cold season.

The average temperature at Blantyre is 50° , the minimum about 40° , but on one exceptional occasion it fell to 30° ; the rainfall is about 56 inches. Fruit and vegetables grow in profusion, and the highlands are used as a sanatorium by those of the mission stations in Nyasa who require a change.

December to March or April are the rainy months, while during the six following months the sun is almost never darkened by a cloud.

The upper Milanjé, about 8,000 feet in height, is very wet, with a rainfall of 75 inches, otherwise the climate is perfection.

In the plains there are unhealthy and malarious districts, but as a rule the nights are cool all the year round, whilst from May, to August they are quite cold, and hoar frost is often seen in the morning. The country as a whole is well watered, only a few of the streams drying up in the hot season. On the lake 85° is about the mid-day temperature for the hottest month (November) of the year, while the average night temperature of the coldest months (May and June) is about 60° ; on rare occasions the temperature has reached 100° and been as low as 54° . The wet bulb reads on an average 10° lower. At Bandawé on the lake, a rainfall of 86 inches is counted a somewhat dryish season. Another authority gives the average temperature on the lake in the hot season, as—maximum 93° , minimum 80° , and in the cool season, maximum 83° , minimum 65° .

The barometer on lake Nyasa ranges from 28.20 inches in November to 28.70 inches in June; the diurnal variation is rarely more than 0.2 of an inch.

Sir H. Johnston, H.M. Commissioner remarks:—May is the unhealthiest month in Nyasaland, and June is not very good. The worst of the rains is over in March, and April is an agreeable month, cool, but not too chilly, bright sunshine with occasional showers and

without high winds. The unhealthiness of the middle and end of May is caused by the strong cold winds from the southward and the drying up of the marshes. The main cause of ill-health in tropical Africa is catching cold. The cold winds of May produce fever by the sudden lowering of the temperature. The rainy season is not an unhealthy season except for people who are travelling through a country without shelter, and constantly soaked through with rain and unable to find a dry habitation.

Sudden and heavy squalls, with rain, thunder and lightning, sometimes come from the south-westward, but they seldom last but an hour or two.

The year 1895-6 was an exceptionally unhealthy year for Europeans (possibly to be attributed to the unusually heavy rainy season). There was an epidemic of malarial fever which equally scourged the East coast of Africa and the Zambezi valley. Those who dwelt continuously on the Highlands did not suffer much, the mortality chiefly occurred on the shores of the lake and in the Zambezi valley. The death rate amongst the Europeans rose from 6·5 to 9·7 per cent.

Winds.—From March to October, the south-west monsoon period, a strong southerly wind blows up the lake, rising at times to half a gale, causing a nasty sea and rendering navigation unpleasant in the small lake steamers. From October to March, the north-east monsoon period, light northerly winds and calms are the rule; occasionally a strong easterly wind will blow for some days from about 3 a.m. to noon, when it dies away.

During June, July and August, heavy damp fogs hang over the river in the morning; these disperse when the sun is well up. They are not often met with on the lake.

Sketch plans of Chisimulu, M'bampa cove, Kaango, Chisanga, Pachia, Sumba, Chikole, Mluluko, Losewa, Chilowelo, and Lusumbwe or Monkey bay, all on the lake, are given on chart No. 1,578; a short account of them is given on the following pages.

Monkey bay is the safest of these anchorages. In most of them the bank shelves steeply, and vessels often drag their anchors with

off-shore winds. The eye is sufficient guide for entering these anchorages.

Missions.—There are six missionary societies at work in Nyasaland ; they are given in this list in the order of the length of their connection with this country.

1. The Universities Mission (founded in 1857-60), which is Anglican (with its head-quarters at Zanzibar), occupies the eastern shore of lake Nyasa, with its principal station at Likoma island. It has also stations on Chisamulu island, and at various points on the shore and in Yao country, and one at the south end of the lake. It possesses the *Charles Janson* steamer.

2. The Livingstonia Free Church Mission, founded in 1875, has its main establishment at Bandawé on the west side of lake Nyasa. They have stations in southern and northern Angoniland (within Bandawé) and in the Konde country, north end of the lake. The Mission has various departments of industrial work.

A great deal of medical work is done by the Free Church Mission.

3. To the Church of Scotland Mission is practically due the founding of the important town of Blantyre. It has two head stations, one at Blantyre, the other at Domasi, on the slopes of mount Zomba. It possesses a small paddle steamer, the *Henry Henderson*, which plies between Chinde, and Katungas on the Lower Shiré.

4. The Dutch Reformed Church Mission, originally a branch of the Livingstonia, has been established for some years past in Central and Southern Angoniland.

5. The Zambezia Industrial Mission is settled near Blantyre and in southern Angoniland ; they principally instruct the natives in agriculture, &c.

6. The Nyasa Baptist Industrial Mission, started in 1892, is at work in the Shiré highlands.

The sphere of the London Missionary Society lies on lake Tanganyika and the plateau south of it.

Steamers on Upper Shiré and lake Nyassa, &c.—The following is from the latest information at hand (*see* steamers on Zambezi, p, 239).

British.—Screw gunboats *Adventure* and *Pioneer*. Small paddle wheel steamer *Dove* on the Upper Shiré.

The African Lakes Corporation have the *Domira*, 80 feet in length, $4\frac{1}{2}$ feet draught; the *Ilala*, 50 feet in length and 4 feet draught (formerly belonging to the Livingstone Free Church Mission, and the first steamer placed on the lake, 1875); the *Monteith*, a new stern wheeler of very light draught, for service between Matope and the lake; the new twin-screw *Queen Victoria*, for service on the lake, 1896, and a number of boats. (The African Lakes Corporation have the *Good News* steamer, and a large sailing boat named the *Dawn*, on Tanganyika. The British South Africa Company have a large iron sailing boat on Tanganyika).

Mission steamer.—The *Charles Janson*.

German.—The steamer *Hermann von Wissman*.

ANCHORAGES.*—General remarks.—The east shore of the southern portion of the lake being high and precipitous, has in most places deep water near it, while the west shore, which is flat, with the hills some distance back, is fronted by shallow water.

The east coast, therefore, is the better for navigating, and there are numerous coves and anchorages where shelter may be obtained. The west coast has shallow water extending from one to 5 miles off in places, and there are numerous rocks and sunken dangers uncharted which render more caution necessary when navigating it; there are also fewer places of shelter.

Northward of Bandawé, where both sides of the lake are fringed with lofty hills, deep water close to the shore is the rule. There is at present no large chart of that portion.

The following remarks are given as a guide to the several places where a craft may anchor, and where wood and water are obtainable; also other points which may be of advantage to those who have to navigate the steamers and boats employed on the lake.

* From Commander C. H. Robinson, 1893-94, late of H.M. gunboat *Adventure*.
See chart of lake Nyasa, southern portion, No. 1,578, with plans.

The latitudes given are simply to afford a clue to the position, and may be many miles in error.

Most of the anchorages mentioned are unsafe with on-shore winds. The chart and plans must be used with considerable caution, being only sketch surveys.

No current.—There is usually a surface drift according to the direction and force of the wind, at times amounting to half a knot an hour.

SOUTH SHORE.—Approach to the Upper Shiré.—As during the greater portion of the year it is impossible to cross the bar to fort Johnstone in anything above a foot draught, and as there is considerable sea off the entrance during a strong northerly breeze, anchorage is recommended off Ndoka's village at about $1\frac{1}{4}$ miles north-west of the entrance; here is well-sheltered anchorage, in about 7 feet, mud bottom. It is proposed to make a road to Mponda's village from Ndoka's.

Lusumbwe or Monkey bay, about 27 miles north-westward of the entrance to the Shiré, and about 9 miles from cape Maclear, is one of the best anchorages on the lake.

There is good anchorage near the beach in about 3 fathoms, sheltered from all but N.E. winds. Craft may approach it on either side of Dimwe island, navigated by the eye. A rock, under water during high lake, lies about 50 feet off the west point of the island.

The two conspicuous houses west of the village belong to the Admiralty and African Lakes Corporation.

Firewood is plentiful; most vegetables thrive well here.

Old Livingstonia lies between the two extremes of Livingstonia peninsula, southward of cape Maclear. It is open to the northward, but fair shelter may be obtained under Mumbo island in from 3 to 5 fathoms.

The anchorage may be approached on either side of Mumbo.

A supply of firewood is not to be depended on. It was formerly the head quarters of the Church of Scotland Mission, since removed to Bandawé. The houses of the mission are in charge of a native teacher.

* See plan of Lusumbwe or Monkey bay, on chart, No. 1,578.

Kasanga, about 6 miles south-westward of Old Livingstonia (not on chart) affords sheltered anchorage from southerly and easterly winds in about 2 fathoms, abreast the village. Fowls, eggs, and goat are generally obtainable.

There are a few villages around the south-west arm, but the water is very shallow so that the shore can seldom be approached within one mile.

WESTERN SHORE.--**Maganga**, on the western shore within the Malere isles is the landing place for the Mvera Mission, 30 miles inland. It is a poor anchorage, in 2 fathoms, about a quarter of a mile off the Mission house, and open to southerly winds, which send in a heavy sea. In case of necessity, berth should be shifted to a cove at the north end of the nearest of the Malere isles, but rocks are numerous and there is but bare swinging room.

Leopard bay, about 12 miles northward of Maganga, is open to all but westerly winds, which seldom prevail. The water is shallow and breaks some distance out. Anchor either in the south or north corners of the bay, according to the wind. In the north corner there is anchorage in 3 fathoms one cable from the beach. Good firewood can be cut here.

Kafura bay, about 10 miles northward of Leopard bay, and just within Rifu sandy spit, affords well sheltered anchorage from southerly winds, but is open to northerly winds. Anchor in $1\frac{1}{4}$ fathoms about a cable from the shore just within the point. No wood obtainable and supplies are scarce.

Benji islands.—Some shelter may be found under Benji island during a southerly gale, in about 4 fathoms, abreast the low neck which connects the two hills forming the island. Great caution is necessary in approaching it as the island is surrounded by numerous rocks, many of which are only just under water.

Kota Kota (lat. $12^{\circ} 56' S.$), on the western shore, is an excellent harbour, but at low lake there is only 4 feet in the channel leading to it; the bottom, however, is very soft mud. In the anchorage there is a depth of 9 to 10 feet, about 120 yards from the landing place. At 100 yards from the shore, in the middle of the anchorage, is a sunken rock with 3 feet over it. Kota Kota island, low and

sandy, and an extensive shallow bank, form the eastern side of approach to the anchorage from the southward. This is the principal place of trade on the lake.

Bua river, about 13 miles northward of Kota Kota, affords no shelter, but wood is sometimes obtainable.

Loangwa promontory is low and sandy and forms the delta of Loangwa river. Shelter can be obtained on either side of it, according to the direction of the wind, but the water is very shallow. About 2 miles inland on the northern side of it is Unaka lagoon, which during the rainy season overflows and turns the whole of the promontory into a mass of swamps and creeks.

Bana, farther northward, is one of the wooding stations of the Administration.

Karali, about 10 miles northward of Bana, may be easily recognised by a small round hill close to the beach, and also by the white rocks which form the point. Open anchorage, in 2 fathoms, will be found at about half a cable off the beach. Firewood is obtainable at times.

Bandawé (lat. $11^{\circ} 53' S.$), on the western shore, is the headquarters of the Free Church of Scotland Mission, formerly at Livingstonia. The mission is situated on the ridge over Bandawé point; it has some 30 schools, with about 80 teachers, in this neighbourhood.

The anchorage is poor and shallow; with any wind, except from the land, a heavy sea sets into the bay, often rendering landing impracticable for many days. In calm weather there is anchorage between the islet and the point, in $1\frac{1}{2}$ fathoms, about a cable from the beach.

The African Lakes Corporation have a station here.

Nkata bay* is a snug little bay, about 22 miles northward of Bandawé, well sheltered from all winds except those from the eastward. There is anchorage close in to the beach. Wood is plentiful here.

About 6 miles northward of Nkata there are villages built on the islands there. It is reported that the approach to them is encumbered with rocks.

* See chart, No. 597. Chart of northern portion of lake Nyasa will be published shortly.

Sisya, some 20 miles northward of Nkata, has rocks, some of which are above water, at $1\frac{1}{2}$ miles off. Ruawe bay, just northward of the north point of Sisya bay, affords good shelter off the southern village, in 5 fathoms, at 60 yards from the beach. If the wind is northerly, a berth can be taken at the north end of the bay. Firewood can be procured here.

Between Ruarwe and Deep bay, a distance of about 40 miles, there are no sheltered anchorages.

Nkanga or Deep bay.—There are several rocks in the approach to Deep bay, some of which are nearly covered at high lake. The coast is rocky. There is anchorage in 4 fathoms, 150 yards off shore, sheltered from southerly winds only. This is a station of the Administration, and wood is obtainable.

Karonga, about 35 miles northward of Deep bay, is on the north-west shore of the lake. It is the scene of the North end war with the Arabs in 1888–93; now it is a station of the Administration, and has a strong, well-built wall, enclosing the houses and compounds. From here all the goods are despatched for Tanganyika and inland stations.

The anchorage, however, is exposed, with bad holding ground, and should not be used longer than necessary. It is a Government wooding station.

It is preferable to proceed round to Kambwe lagoon, where shelter can be obtained from all winds, and it is only an hour's walk into Karonga.

Kumbwe lagoon, formed by a sandspit extending off one of the outlets of the Rukuru, is an excellent place to shelter in, but the great drawback is the want of water. The bottom is, however, soft, and a vessel can steam in and make fast alongside the sandspit in about 5 feet, low lake.

From Kumbwe lagoon, round the north shore of the lake, there are no sheltered anchorages. In calms, vessels can anchor anywhere near the shore; there are many shallow patches to be avoided, and the lead should be kept going when near the shore.

EASTERN SHORE.—**Langenberg**, the head-quarters of the German administration in Nyasaland, is situated on a sand spit at the mouth of Rumbira river, on the north-east side of the lake, and at the base of Livingstone mountains, which rise to a height of 5,000 feet

* See plan on chart, No. 597. Chart of northern portion of lake Nyasa will be published shortly.

close behind the station. The anchorage is on the northern side of the spit, which affords good shelter from southerly winds. The water is deep, so that the anchor should be lowered down with about 20 fathoms of chain, and the vessel backed in until it catches the bottom ; then secure the stern to the beach. The German Commissioner's two-storied house is a conspicuous landmark.

Amelia bay lies about 60 miles southward of Langenberg, and is the place from which the ferry used to run to Deep bay on the opposite shore. There is anchorage in 4 fathoms, at about 100 yards off the village. Kaiser bay is about 20 miles northward of it.

New Heligoland or Papayi island (about lat. $11^{\circ} 4' S.$), named from the number of papayi trees growing on it, is a small island covered with the huts of the Wampoto people, who were afraid to live on the mainland on account of the former raids. There is sheltered anchorage inside the island, in 5 fathoms, about 60 yards off the firewood station. A good supply of firewood is obtainable here.

Between Papayi island and Mpbampa bay numerous rocks and islets lie close inshore, most of which have been used as places of refuge by the Wampoto people ; their huts in many places appear to be only accessible by goats.

Mbampa bay (about lat. $11^{\circ} 16' S.$), 16 miles southward of Papayi island, affords good shelter from all winds, in 4 fathoms, at 50 yards off the beach.

Likomo island.—**Mbampa cove** (lat $12^{\circ} 4' S.$)*—Good anchorage may be obtained in Mbampa cove, east side of Likoma island, in about 3 fathoms, off the stone pier. There are rocks, easily seen, southward of this position. Likoma is the head-quarters of the Universities Mission on the lake, but it is very unhealthy.

Chisumulu island.*—There is anchorage in the south corner of a bay on the east side of Chisumulu, in about 4 fathoms, but open to easterly winds ; there is a boat harbour in the north corner of the bay. It is a station of the Universities Mission.

A **rock** is reported by the natives to exist about midway between Chisumulu and Bandawé.

* See plan on chart, No. 1,578.

Kaango* is situated on the eastern shore south-eastward of Likoma island ; wood may be obtained here, but it is exposed to the northward and westward. There is a depth of 2 fathoms at $1\frac{1}{2}$ cables off, according to the plan.

Ferry.—There is a ferry between Utonga, near Kaango, and Bandawé on the western shore, *viâ* Likoma and Chisumululu.

Rye bay.—A spit of sand extending northward from the southern shore of Rye bay, affords good shelter within it from southerly winds ; there is water enough close in here for the lake craft ; wood is obtainable at times.

Chisanga*, just southward of Rye bay, affords anchorage in $1\frac{1}{2}$ fathoms at 3 cables off shore, open to southerly and westerly winds.

Pachia, 5 miles southward of Chisanga, has a depth of one fathom within a cable of the beach and 2 fathoms at 2 cables, according to the plan. Wood and water are obtainable, but no shelter from south and west winds. It is a wooding station of the African Lakes Corporation.

Sumba* or Msumba, 6 miles southward of Pachia, has a depth of 2 fathoms at $1\frac{1}{2}$ cables northward of the south point of the bay, according to the plan ; it affords no shelter from the prevailing wind ; wood is obtainable.

Luchilunji or **Mtangula**, is a fine sheltered bay a little open to south-west winds, with the village of Mtangula at its head. It has depths of 5 to 10 fathoms, and affords anchorage in 6 fathoms near its head. The bank is steep, rendering a vessel liable to drag with strong off-shore winds. It was formerly an Arab station. In approaching from the northward, a patch with from 4 to 8 feet water, situated about half a mile north-west from Mtangula point, should be avoided.

Mluluka* affords fair anchorage in about 5 fathoms, mud, off the village. This anchorage is protected on the west and south by Danger rocks.

Losewa,* 4 miles southward of Mluluka, affords anchorage in 2 fathoms, at about 2 cables off-shore, according to the plan, but is open to the southward and westward.

Mpanji cove, situated at South point, about 14 miles southward of Losewa, affords shelter from southerly winds. The *Adventure*

* See plan on chart, No. 1,578.

moored here, broadside to beach, with hawser ahead to rocks and anchor out on quarter.

Chilowelo* has deep water close in, there being a depth of 5 fathoms at about half a cable off shore; it is open from south-west to north-west.

Fort Maguire (lat. $13^{\circ} 40'$ S.) is a military station of the Administration. It affords good shelter from southerly winds, under the lee of a bank, in 4 fathoms, at 150 yards from the shore. There is no landing during northerly winds.

THE COAST.

(Continued from page 227.†)

General remarks.—From the Chinde mouth of the Zambezi the coast trends north-eastward about 40 miles to Kilimán river, in which space there are several streams. This coast is very low, being scarcely ever seen from the deck beyond 7 miles; it is a little higher about 8 or 10 miles south-west of Linde river, and again at Linde river, at which place it shows in clumps of trees. A little to the southward of this river there are some sand cliffs separated from the beach by a long lagoon; these cliffs are conspicuous with the morning sun shining on them. The current along this coast is generally S.W. one knot an hour.

Close north-eastward of the Chinde, and separated from it by Mitaone island, is the mouth of the Inhamhona, and other mouths, which possibly connect with the Zambezi, but we have no information on them.

The general depths along this part of the coast are 4 fathoms at low water at 3 miles from the shore, and from 6 to 9 fathoms at 5 or 6 miles from the shore, except off the entrance of the rivers. As the soundings are but few it is not advisable to hug the shore when bound up or down the coast.

LINDE (Indian) RIVER.—The mouth of this river lies about 30 miles south-west from that of Kilimán, in about $18^{\circ} 13'$ S.

The entrance is about 2 miles wide between Linde or Sampanguira, its north-east point, and Dehéa, the south-west point. Linde point is marked by cocoa-nut palms, whilst the vegetation on Dehéa point is low, with sand southward of it.

* See plan on chart, No. 1,578.

† See chart;—River Zambezi to Mozambique harbour, No. 1,810.

Shallow water extends a considerable distance off the entrance points. The bar is very short and has a least depth of 6 feet at low water springs (1895), but is subject to change.

A triangular beacon on Linde point, painted white, bearing N. 8° W., and in line with an isolated palm southward of the others on the point, leads over the bar between the breakers, in the best water. There is a large estuary within the bar, with several islands.

Under Dehéa point there is anchorage in 4 fathoms. Here a pilot is obtainable for up river; there are depths of 2 to 10 fathoms for about 50 miles.

H.M. brig *Singapore*, in 1822, ascended the river about 16 miles, and the least water obtained was 2 fathoms. The Olinda, a stream on the north side of the estuary, apparently was examined by the boats of H.M.S. *Grecian* for a distance of 12 miles; the depths ranged from 10 to 5 fathoms.

The coast between Linde river and Kilimán is covered with vegetation, and there are several low sand hills and reddish looking patches; at about 2½ miles north-east of Linde river there is a low but remarkable bluff. The depths decrease regularly towards the shore, but this neighbourhood has not been closely examined.

KILIMÁN (Quilimane) RIVER* lies between Tangalane and Olinda (Hippopotamus) points, one mile apart; there was a depth on the bar of 11 feet at low water springs, and 23 feet at high water spring tides, in July, 1895, but it is not to be depended on; the depths increase within the bar, and there is not less water up to the town.

There are three channels to the town, within the bar, namely, the Olinda, Militáo, and East channel; the Militáo, the one generally used, is buoyed. East channel has about 20 feet at high water; Olinda channel was the one most frequently used previous to the survey of 1885; it was found to be obstructed with shoals, and its use has been discontinued.

Aspect.—The land on both sides of the entrance is low, sandy, and covered with trees or jungle, the south-west side being rather the higher. The light structure, and the flagstaff and beacon on Tangalane point, are visible some time before the land, which may be safely skirted at a distance of 5 or 6 miles, the outline of the

* See plan of Kilimán river, with view, No. 650. It does not, however, now correctly represent the entrance,

coast being then clearly distinguishable, but as the current is strong and uncertain in the neighbourhood, caution is necessary. The entrance of the river is conspicuous when open on a N.N.W. bearing, the river being wide and nearly straight for 10 or 12 miles; when abreast of it no land will be visible from the deck between the points of entrance; but from aloft, Pequena island, which is about 4 miles within the entrance, will be seen.*

LIGHT.—From an iron quadrangular pyramid, with a white lantern, 80 feet in height, erected on Tangalane point, is exhibited, at an elevation of 105 feet above high water, a *fixed white light*, visible in clear weather from a distance of 16 miles.

Signals.—The lightkeeper has the International code of signals, but his interpretation of the signals cannot be depended on. If a message is required to be sent, it is better to land and see him, when it will be forwarded by telegraph to the town.

Outer anchorage.—A good temporary position is in 5 fathoms, with the lighthouse bearing N. $\frac{1}{2}$ E., distant 5 miles. For a stay, however, it would be better to anchor south-eastward of Tangalane bank, as there is said to be less sea and tidal stream and current than directly off the bar.

Pilot and steam tug.—A pilot is obtainable for the river between the lighthouse and the town, but not for the bar. A small steamer is sometimes available for towing sailing vessels.

Pilotage dues are compulsory, men-of-war excepted.

THE BAR is about 4 miles seaward of Tangalane point light; it varies in different seasons, and especially after south-west gales; it should never be attempted without the assistance of a pilot. At high water it is generally smooth.

The bar had a fairway depth of 23 feet at high water springs in July, 1895. At about one mile within it, between Cavallos Marinhas and the spit extending westward from Tangalane bank, the channel is about half a mile wide, widening and deepening within. Abreast Tangalane point it is reduced to about 4 cables, but the water is deep. Tangalane bank, a portion of which dries at low water, has extended south-westward, but its limit is not definitely known.

* See plan of Kilimán river, with view, No. 650. It does not, however, now correctly represent the entrance.

Beacons. — Buoys. — Two beacons on Tangalane point are intended to mark the best water over the bar. The outer one is a post surmounted by a disc and situated about $2\frac{1}{2}$ cables westward of the lighthouse. The inner one, an iron pyramid, lies about half a mile N. 11° E. of the preceding.

At about one mile northward of the lighthouse are two beacons to mark the fairway through Militáo channel ; they are about 260 feet apart in a N. 76° W. and opposite direction, the west beacon being 23 feet high and the east beacon 30 feet.

A fairway and about half a dozen other buoys mark the entrance to Kilimán river and Militáo channel. Red buoys mark the star-board side of the channel on entering, and black buoys the port side.

No. 1, a fairway buoy, spherical, with staff and globe, painted black and white in horizontal stripes, lies in 19 feet, outside the bar, with Tangalane light N. by E., distant $4\frac{4}{10}$ miles.

No. 2 buoy, a red bell buoy, surmounted by a staff with double cone, marks the western edge of Tangalane bank spit.

For the remainder, *see* the plan.

Caution.—The buoyage, independent of changes in the channel, is not at all reliable. The rush of the tide is apt to shift them, and they are left so long unattended to that they are often misleading, and the distinctive colours quite washed off.

Tides.—It is high water, full and change, at about 4h. 20m. ; springs rise $12\frac{1}{4}$ feet, neaps $7\frac{1}{2}$ feet ; the tides are said to be irregular and to extend 50 miles up the river.

The streams run about 3 knots an hour in the river ; after crossing the bar and nearing Tangalane light, the flood sets directly on to the banks off Olinda point, rendering great care necessary.

Current.—Outside, the current generally sets from one to 2 miles an hour to the south-westward, causing vessels at anchor off the bar to lie broadside to the swell and roll considerably.

Directions.—It is not advisable for a vessel drawing over 10 feet to cross the bar without a boat ahead sounding. The best time is with the last of the flood. A pilot will be found within the bar, to take a vessel to the town.

See plan of Kilimán river, with view, No. 650. It does not, however, now correctly represent the entrance.

Entering Kilimán river—from a little westward of the fairway buoy, Tangalane point beacons will be in line N. 11° E., which mark will lead over the bar; when the water deepens edge to the westward to keep the bell buoy on the starboard hand; thence between the red and black buoys. With a strong flood, the black buoy at the north-east extreme of Militao bank should be rounded pretty close to avoid being swept to the northward. Thence with the beacons in line astern, bearing S. 76° E., proceed through Militáo channel northward of the next black buoy, and southward and westward of the remaining red buoys. Thence to the anchorage off the town, the deepest water on the way up will be found at the distance of about one cable from the western bank of the river. In Militáo channel the streams set across both ends, and should be guarded against. It sets fair, however, through its middle portion.

Sailing vessels have no difficulty in entering on account of the wind, but leaving without towage is a difficult matter; as a rule they have to wait until one of the coastal steamers is leaving.

Caution.—It must not be assumed that these directions will remain available for any length of time, as the banks are constantly changing. The breakers are said to be a better guide than the chart, but much precaution is necessary, especially in boats crossing, as the breakers are so treacherous, that a solitary wave at times comes in and breaks heavily when the water on the bar appeared smooth immediately before. Many lives have been lost, amongst others a native pilot of experience and all his crew perished.

Anchorage.—There is very good anchorage about one mile north-westward of the lighthouse, northward of the creek, in about 5 fathoms; the tidal stream runs about 3 knots an hour.

Pequena island, situated in mid-river, is low and covered with dense jungle; extensive banks extend both north and south of this island, leaving a channel to the town close along both shores. Pequena bank has extended southward into Militáo channel since the survey of 1885, as now charted.

Militáo bank separates Olinda and Militáo channels; it dries for a distance of 2 miles in a north-west and south-east direction,

See plan of Kilimán river, with view, No. 650. It does not, however, now correctly represent the entrance.

and about one mile north and south, and is subject to change. Mangroves are growing on the high part of its north-west side, affording a guide to the best water, which is about 2 cables northward of them.

KILIMÁN is situated on the eastern or left bank of the river, at 10 miles above Tangalane point at the entrance. It was, until the opening up of the Chinde route, the head-quarters of the Zambezi trade. The church and barracks are conspicuous buildings, and the town is surrounded by cocoa-nut trees.

There is a landing jetty available at all times, close to the custom-house and government offices.

Moorings are laid for two government steam vessels off the landing place, over a bottom of very soft mud.

Trade.—The district of Portuguese Zambezia, of which Kilimán is the chief town, extends along the coast from the Zambezi mouths to Angoche. The whole district is traversed by streams connected by natural canals, affording easy means of transit.

The exports consist of oil seeds, such as ground-nuts and sesame seed, copra, india rubber, beeswax, ivory, gold dust, sugar, and locally native tobacco.

Imports consist of blue and white cotton, printed goods, beads, brass wire, implements, provisions, wines, coarse sugar from Natal, besides many other articles. Cargo is shipped and discharged in open lighters, work being very slow.

Some portion of the Zambezi trade passes through Kilimán, as already mentioned; it is conveyed in canoes or lighters up the Kilimán or Kwa Kwa river to Marendene, or Mopea, just beyond it, depending on the amount of water in the river, a distance of about 80 miles, whence it is carried across to the banks of the Zambezi and re-shipped. Steamers of 6 feet draught go up as far as the junction of the Mutu with the Kilimán. The remainder of the trade is *viá* the Chinde.

The value of the exports in 1895 amounted to £76,344, and the imports to £94,537, a considerable falling off since 1892, when both were about 50 per cent. larger.

The population (1895) consists of a Portuguese military commandant, government officials, and other Portuguese, amounting to 190 ; about 50 other Europeans, and 120 half-caste soldiers. The population of the province is estimated at one million. The British Indians number 350, most of whom are in the Chinde.

Shipping.—127 vessels entered in the year 1895, of the aggregate tonnage of 43,430 tons ; of these 41 were British steamers, of 19,105 tons.

Supplies.—Fresh provisions, beef, poultry, vegetables, and fruit can be obtained in small quantities ; the water, obtained from wells in the sand, is scarce and bad. Except beef, provisions may be obtained cheaper by anchoring on the west shore 6 or 7 miles below the town, where the natives bring supplies down. The only coal mines in the district, p. 250, near Tete, are in the hands of the Companhia da Zambezi ; it is said to be of fair quality for steaming purposes, but much, probably, depends on the character of the furnace.

Slight repairs to vessels, such as carpenters', blacksmiths' and caulkers' work, can be effected at reasonable rates.

There is a general hospital, and one for infectious diseases outside the town, attended by a Government doctor and a staff of European and native assistants.

Telegraph.—Railway.—Kilimán is connected with the principal places on the Zambezi by telegraph, thence *viâ* Tete the line is being extended to Salisbury (probably completed in June 1897,) which is connected with Cape Colony, &c. A railway is projected from Kilimán to the Zoa falls on the Ruo river, *see* p. 14.

The Deutsche Ost Afrika mail steamers, three-weekly branch service from Beira, call at Kilimán, both going southward, and on the return voyage northward. The same Company's vessels from Bombay and Zanzibar, &c., call about every six weeks. Messrs. Rennie's trading steamers from Durban visit the ports as far northward as Kilimán every three weeks.

Winds.—The prevailing wind off Kilimán is from S.E. to South during the greater part of the year. From January to March probably it is westward of South. Whilst lying off Kilimán, in

October, the winds varied from S.S.E. to E.S.E., and blew throughout the night, only lulling in the morning; but this is unusual, a land wind generally setting off at night. Off the town, in July, the sea breeze from about S.S.E. was observed to set in at noon with a force of one to three; during the night it was usually calm, with the land breeze in the morning.

Climate.—The climate is unhealthy, and said to be unfit for Europeans, but the general health for the year 1895 was good. Temperature in the early morning (July) has been noted as low as 62°. The heaviest rains occur in January and February, accompanied by much lightning. There are light rains in November, and also in May and June.

See plan of Kilimán river, No. 650.

CHAPTER VII.

MOZAMBIQUE CHANNEL—KILIMÁN TO CAPE DELGADO.

(Lat. 18° S. to lat. 10° 40' S.)

VARIATION IN 1897.

Mozambique	-	12° 45' W.	|	Ibo island	- -	11° 45' W.
Pomba bay	- -	12° 0' W.	|	Ras Pekawi	- -	11° 30' W.

COAST.—About 14 miles north-eastward of Kilimán river is the first patch of casuarina trees, the lofty trees on the intervening space being all palms or cocoa-nut. The coast is low and sandy, with jungle in the background, as far as cape Fitzwilliam, nearly 90 miles from Kilimán.

Natives.—The inhabitants of the whole coast, from Kilimán to Tunghi bay, cape Delgado, are chiefly of the Makua tribe. (Consul O'Neill, 1882.)

Brisk bank.—The depths along this coast decrease regularly on approaching the land, but there is a rocky bank in about lat. 17° 55' S., long. 37° 17' E., at about 12 miles from the shore. H.M.S. *Brisk* passed over this bank, obtaining 7 fathoms; there may be less water.

Rivers.—There are eight rivers between Kilimán and cape Fitzwilliam, namely, the Macuse, Mumwodo, Likugu, Mwabala, Raraka, Mraizi (Mazemba), and Moniga (Kizungu). The Macuse and Moniga are accessible to light draught vessels.*

Macuse river is about 22 miles north-eastward of Kilimán. A patch of casuarina trees forms its western point of entrance, and a rather bluff point the eastern one.

See chart, river Zambezi to Mozambique, No. 1810.

* Consul O'Neill, in proceedings of Royal Geographical Society, 1882, page 599.

The Bar.—Directions.—The bar is about 4 miles off shore, and connects the banks which break heavily at times, to about the same distance off both points of the entrance.

The following remarks apply to the year 1882; like other rivers on this coast, it is subject to change:—The bar had a depth of 7 feet at low water, and 21 at high water springs on the leading mark; namely, the three conspicuous palm trees (situated on its north bank 5 miles N.N.W of the eastern point of entrance) in line with Regis point bearing N. $\frac{1}{4}$ W.; this mark being steered for until the east point of entrance bore N.N.E. $\frac{3}{4}$ E.; thence a course to pass half a mile westward of that point. From abreast the point, the course was towards the eastern shore, to abreast the village between the three palms and Regis point, which point is situated at the mouth of a creek on the eastern shore almost midway between the entrance point and the palms.

There is anchorage off the village in about 2 fathoms.

There is apparently not less than 10 feet at low water as far as Muxixine, a small fort, about $3\frac{1}{2}$ miles up, by following the bends of the river. Villa Candida is situated one mile up a creek just eastward of Muxixine. Maquival, another small fort, is about 16 miles above the entrance, and the village of Chico about 9 miles up.

Guard against the tide in entering; the flood sets to the westward, the ebb to the eastward. No pilots are available. Fresh water and fruit may be obtained, but no other supplies.

It is high water, full and change, at Macuse river at 4h. 0m.; springs rise 14 feet, neaps 12 feet.

The **Likugu**, rising in the hills south-eastward of lake Shirwa, is one of the largest of the eight rivers mentioned on p. 279, but its bar was not passable in former times; we have no further information concerning it. Within the bar it is said to be navigable for boats for 8 or 10 days' journey.

Mazemba (Mriazi) river is about 10 miles south-westward of cape Fitzwilliam, and is, or was, tolerably safe for entering in a boat. The boats of H.M.S. *Persian*, in 1845, found a depth of 3 fathoms on the bar at high water, and from 6 to 4 fathoms for a distance of 30 miles up the river. It is probably barred in the dry season.

There is a channel from the Mazemba to the Moniga, with about 2 fathoms at low water, northward of the island which separates the

two rivers. Several streams flow into the Mazemba, with entrances so wide that it is not easy to distinguish which is the main river. The river abounds with hippopotami.

Supplies may be obtained by barter from the natives at the entrance of the river.

Moniga (Tejungo) or Kizungu river enters the sea on the eastern side of Kizungu island, at about 5 miles westward of cape Fitzwilliam, and is connected with the Mazemba by a channel leading northward of Kizungu island.

Consul O'Neill, 1882, states that "the Tejungo (Moniga) is the only port worthy of the name between Kilimán and Angoche, to both of which it is in many respects superior." Notwithstanding, the bar is probably subject to great changes, as it was not passable by the boats of the *Persian* in 1845 on account of the surf, whilst the bar of the Mazemba had 3 fathoms over it. Between the Mazemba and Kizungu the land is rather high, and of a hummocky appearance. The entrance of the Kizungu is more perceptible than that of the Mazemba; a low point covered with trees forms its south-west point, and cape Fitzwilliam stands out boldly to the eastward of it. Shallow water extends a considerable distance off the river, there being but 5 fathoms at about 5 miles off shore.

The town of Moniga is about 7 miles up the river.

Capt. Thos. Le H. Ward, H.M.S. *Thetis*, Aug. 1875, writes.—The Tejungo (Moniga) has a fine deep entrance running nearly north and south between two lines of breakers about half a mile in length and a quarter of a mile in breadth; 3 fathoms was the least water obtained on the bar, which did not break as it was crossed, it being then nearly low water. Inside the bar there is a land-locked anchorage with depths of 8 or 9 fathoms. The river, however, very soon becomes shallow, being navigable for some 20 miles from its mouth for dhows and boats only. The river, like the rest on this coast, is lined with mangrove bushes near its mouth, but in proceeding up there is a fine open country with numerous indications of large game.

CAPE FITZWILLIAM, about 5 miles eastward of the Moniga, is a remarkable bluff composed of yellow earth cliffs, with a few rocks around them on the beach. This cape and cape Edward are the most remarkable points along this part of the coast.

Cape Edward is a remarkable bluff formed of red earth cliffs, with a sandy beach and a few rocks at the base of the cliffs. This cape is 6 miles eastward of cape Fitzwilliam, the land between being very low, with Mlai creek about midway.

COAST.—From cape Edward, eastward to Macalonga point (Ras Nelide), distant about 46 miles, the coast is nearly straight. Between these points are the Namanwe and Mlela streams entering the sea on either side of Yusi island, the Maravoni (Mwebazi), Molugwi, Mwalaka, the Blanche, and the Eredni. Between the Eredni and Macalonga point, the coast is composed of low sandhills with scattered trees. On the north side of the Eridni, within its mouth, is a red cliff which may serve to distinguish it. Nothing is known of these streams. This coast is but sparsely sounded.

PRIMEIRA ISLANDS and SHOALS.—The Primeira and Angoche islands and shoals are on the outer edge of a coral bank fronting the shore to a distance varying from 5 to 25 miles. The channels between them and the main have from 7 to 11 fathoms, the deepest water being towards the islands.

Pantaloon shoal, the westernmost of these groups, is in lat. $17^{\circ} 42\frac{1}{2}'$ S., long. about $38^{\circ} 2'$ E., being about 2 miles in extent, with a least depth of $3\frac{1}{2}$ fathoms. There are several knolls with from $4\frac{1}{2}$ to 5 fathoms on them. A patch of 6 fathoms lies 5 miles E. $\frac{1}{2}$ S. of Pantaloon shoal; these shoals are steep-to.

Acorn patch, in lat. $17^{\circ} 36'$ S., long. about $38^{\circ} 13'$ E., has not been closely examined, and should be avoided. H.M.S. *Acorn*, 1840, touched lightly on it. H.M.S. *Dart*, 1852, found $5\frac{1}{2}$ fathoms, and the sea was observed breaking at a short distance from it. At a mile distance, all round, there are depths of from 20 to 40 fathoms.

David shoals consist of two rocky patches about midway between Acorn patch and Silva island. The north-eastern one of $3\frac{1}{2}$ fathoms lies with Silva island, bearing E.N.E. distant about 18 miles. The western patch of 8 fathoms lies about $3\frac{1}{2}$ miles from the eastern one.

Silva (Mahiazo) island, in lat. $17^{\circ} 18'$ S., long. $38^{\circ} 49'$ E., is the westernmost of the Primeira islands, and about 13 miles from the coast. It is composed of bare sand, about 10 feet high, and

surrounded by reefs which extend about three-quarters of a mile. There is a depth of 14 to 15 fathoms between Silva and Fogo.

Fogo (Malibono) island, 5 miles north-eastward of Silva island, is surrounded by a reef which extends about one mile, except on the north side, which is bolder. It has a few trees on its north end; the other part is covered with shrubs.*

A vessel may anchor in 10 fathoms, at 3 or 4 cables from the beach, with the centre of the island bearing from S. by E. to S. by W.

When standing from the mainland towards the anchorage, the soundings suddenly deepen from 10 to 20 fathoms, and then quickly shoal to 10 fathoms again, at about 5 cables from the island. There is no fresh water on the island.

Crown island, 20 feet high, is about 4 miles north-eastward of Fogo, and 8 miles westward of the Casuarina island reefs. It is composed of sand, with a few grasses on it, and surrounded by a reef to the distance of half a mile.* The channels between Fogo and Crown island, and between the latter and Casuarina, are clear, with a depth of 10 to 12 fathoms.

Shoal.—The British India steam-vessel *Sokotra*, 1880, when in lat. 17° 16' S., long. 39° 00' E., passed over the edge of shoal ground in 8 fathoms; breakers at the time being observed at a quarter of a mile distant to the westward.

Casuarina (Tanibi) island lies nearly 10 miles north-eastward of Crown island; it is covered with Casuarina trees, which are high (tops about 80 feet above the sea), particularly on its north-east end. The reef surrounding the island, extends from 2 to 3 miles north-east, south, and south-west, with a clear passage about one mile wide between it and the reefs off Epidendron. There is no water on this island. The timber, although heavy when first cut, makes strong spars, but the trees are not permitted to be cut for firewood. See the remarks on the trees on Mafamede island, p. 286.

Casuarina road, between the island and the mainland, forms the best anchorage along this coast. If going in from the northward, keep Casuarina open northward of Epidendron, to pass north-west of Barraco reef and the reef to the eastward of it: the depths are regular. A vessel may anchor in 8½ fathoms, with Casuarina

S.S.E. $\frac{1}{2}$ E. and Epidendron E. by S. $\frac{1}{2}$ S., but the best anchorage, to be out of the swell, is in 9 or 10 fathoms, about equidistant from the two islands. Shallow water is said to extend about $4\frac{1}{2}$ miles S.S.E. of Macalonga point.

Tides.—It is high water, full and change, at Casuarina island, at 4 h. 15 m. The current or stream runs generally south-westward, but occasionally there is a set north-eastward.

Epidendron (Maloa) island, the easternmost of the Primeira group, lies about 6 miles from Macalonga point.* The northern part of the island has casuarina trees on it about 80 feet high, but the southern part is or was covered with short shrubs only. Similar to Casuarina island it has an extensive reef on all sides except the north-west.

There is good anchorage off its west side in 12 fathoms. (Blanche 1892). Epidendron island dips from a vessel's deck at a distance of about 15 miles.

Barraco reef lies about E. by N. distant 3 miles from Epidendron. There is another rocky patch, on which the sea breaks, 2 miles farther in the same direction. These dangers do not appear to have been examined.

COAST.—Rivers.—North-eastward of Macalonga point, between it and Angoche, are the Ligonya, Moma, Mwaladi, Laridi, Namakuti, and Natiti rivers; the last mentioned is the southern mouth of the Angoche. The Moma is the most important of these rivers, as it possesses an anchorage within, but the bar is bad.

Mount Cockburn (Mlungugi), in lat. about $16^{\circ} 29' S.$, long. $38^{\circ} 55' E.$, and the only mountain seen on this part of the coast, is a remarkable cone of considerable elevation.

Moma river, in lat. $16^{\circ} 45' S.$ —H.M.S. *Thetis*, 1875, anchored off Moma river, with mount Cockburn bearing N.W. $\frac{3}{4}$ N., and Caldeira point N.E. by E. $\frac{3}{4}$ E., in 9 fathoms, sand and mud, good holding ground. The ship rolled heavily, being kept broadside to the swell by the prevailing current which at this season (August) always sets along the coast to the south-westward, with more or less strength. The heavy rolling sea from the southward, at times had more the character of rollers on a bar than that which might be expected in an open roadstead.

* Vidal 1823. It is probable that the vegetation on these islands has somewhat altered in appearance since these remarks were made. See chart, No. 1,810.

The bar at the entrance of the Moma river is a long and heavy one; the best time for crossing is said to be the early morning, if the tide suits. The boats of the *Thetis* crossed soon after daylight without difficulty. In coming out in the afternoon most of the boats were in tow of a Portuguese gunboat, but the galley and steam cutter which went out separately encountered two or three heavy rollers which nearly filled the former; the latter was protected by a canopy.

Trade.—There is a little trade with Parapat.

Caldeira point, about 15 miles eastward of the Moma, is rather higher than the adjoining coast. It is fronted by a ledge of flat rocks, dry at low water, and a large black rock lies about half a mile north-eastward of the point.

Angoche point (pronounced Angosha), at about 25 miles north-eastward of Caldeira point, is low, and appears like a number of small sand hillocks. It is bordered by a dry sandbank in the form of a crescent at the distance of about half a mile. Southward of Angoche point are several inlets, which probably communicate with Angoche river.

ANGOCHE ISLANDS—**Moma island** (Fungu Koru), lying 8 miles southward of Caldeira point, is a sand island from 15 to 20 feet high, surrounded by a reef which extends southward more than half a mile from it.

A bank with 5 fathoms, bearing S.W. by W., 9 miles from Moma island, was reported by Captain Wyvill, of H.M.S. *Cleopatra* in 1843.

Another small bank appears on the chart about $2\frac{1}{2}$ miles S.W. by W. of Moma island.

Caution.—The soundings between Moma and Caldeira islands are irregular, and with Caldeira and Hurd island in line, the water shoals in one place to 7 fathoms and the bottom is plainly visible; less water may exist.

Caldeira (Kirubi) island, in lat. $16^{\circ} 38' S.$, long. $39^{\circ} 44' E.$, lies 12 miles eastward of Caldeira point. It is a small sandy island with a few casuarina trees, and surrounded by reefs extending off about one mile, except on its northern side.

Hurd island, lying nearly 6 miles north-eastward of Caldeira island, is low, sandy, and covered with trees. On its east-north-east, south, and west-south-west sides the reef extends off about $1\frac{1}{2}$ miles.

Michael reef (Fungu Namakuti), lies 5 miles north-eastward of Hurd island, and about the same distance from the main. It is a dangerous reef of rocks uncovered at low water, and $1\frac{1}{2}$ miles in extent. It should be given a wide berth.

Walker island (Puge Puge), lies about 5 miles north-eastward of Michael reef, and $2\frac{1}{2}$ miles off Angoche point. At high water, Walker island shows only as a small sand cay 6 or 8 feet above the sea. It is surrounded with reefs which extend on its east, south, and south-west sides, in some places, $1\frac{3}{4}$ miles.

Mafamede island (Kisiwa Sultani Hassan), lying about $8\frac{1}{2}$ miles north-eastward of Walker island, and nearly abreast the mouth of Angoche river, is a low sandy island, about a third of a mile in length, covered with tall casuarina trees, and may be seen from 12 to 15 miles distant. A coral reef extends from $1\frac{1}{2}$ to 2 miles north-eastward, south, and south-westward. On the north-west side of the island the shore is fairly steep and the landing good.

H.M.S. *Brisk* anchored in 10 fathoms, with the centre of the island, S.E. by S. distant 9 cables, and the extremes of reef (dry at low water) bearing E. by S., and South nearly. This is a good safe anchorage, but not over smooth; a berth nearer the island may be chosen if desired. There is no water on Mafamede; it is not desirable that the trees should be cut down for firewood on this and similar islands, because they are so useful in showing their position.

A sand patch, half a cable in extent, with a least depth of $3\frac{1}{2}$ fathoms, lies N.W. distant $1\frac{1}{2}$ miles from the centre of Mafamede. Another patch with 5 fathoms water, lies 3 cables east of it.

ANGOICHE (Mluli) RIVER (pronounced Angosha).—This river is about 3 miles in width at the entrance, in which there are three islands, and there was said to be a depth of 20 feet over the bar at high water springs; it is possibly subject to change. Vessels of 14 feet draught have crossed the bar. The Angoche is wide and

deep for 20 miles, and is said to be navigable for small craft for about 150 miles. Considerable trade is carried on by coasters with Mozambique.

The land to the northward of the river is a low sandy cliff, topped with trees. Southward of the river the land is lower, with some large trees on the south point, between which and another clump 3 miles farther south, is a village.

Anchorage.—There is anchorage outside in 4 fathoms, with Nepatulah point (east point of river) bearing N. by W., and the north-east point of Busio island N.W. by W., not far from the edge of the bank. Large vessels should anchor farther to the south-eastward in about 7 fathoms.

Bar.—The lower reach of the river trends in an easterly direction in a straight line for 10 or 12 miles, nearly one mile in width; the main body of water passes between Busio (Monkey) island and the north shore, after which it is deflected southward to the bar by the north-eastern shoals. The bar lies about 2 miles from the north shore, the same distance from Monkey island, and has a reported depth of 20 feet at high water springs, as before mentioned.

Directions.—To approach the bar, bring Nepatulah, the east point of entrance, to bear N. by W., or Mafamede island S. by E., and keep them so, taking care to allow for the usual set to the south-westward. These bearings formerly led across the bar, but the eye is the only guide for taking the deepest water, as the bar is liable to shift, and there are no marks on shore. When within the bar keep along the north shore, and anchor abreast Parapat settlement in 6 or 7 fathoms.

With a moderate swell only, the entrance will be marked by the breakers on each side; if not so marked the bar should not be attempted. At last quarter flood it is generally smooth all over.

When outside the bar keep a good look out for any appearance of breakers, for there are some patches of shoal ground, which breaks nearly one mile outside the regular bar. These may usually be seen at a distance and avoided.

There is a boat channel westward of Busio (Monkey), and which may be used with advantage when leaving the river in moderate weather, as the channel is winding and protected by the breakers on each side, but it would be difficult to find when entering the river.

Busio, or Monkey island, and two or three others lie within the bar and to the southward of the entrance. An extensive sand spit runs off from the east-north-east end of Monkey island.

The inner end of Monkey island is well adapted for a stopping place for boats, being sheltered, with smooth water, and there is a depth of 3 fathoms alongside a steep sandy beach. Good water may be found in the midst of a clump of casuarina trees on the west end, by digging down a couple of feet.

Parapat or Antonio-Ennes is now the chief Portuguese settlement in Angoche river, Angoche being found very unhealthy. The military commandant resides here. It is situated on the northern bank of the river, within the north point of entrance.

Trade.—Communication.—Large quantities of india-rubber, ivory, ebony, seeds, gum copal, cocoa-nut oil, coir, and ground nuts are collected here.

The exports in 1893 were valued at £16,666, and the imports at £685. Three European firms are represented here.

The steamers of the Deutsche Ost Afrika line, from Bombay *via* Zanzibar and Mozambique, call here about every six weeks, and the branch steamers every three weeks, from Beira to neighbouring ports, call here when sufficient inducement offers.

Angoche is situated on a sandy plain near a creek, some 20 miles up the river on the south bank. The creek leading from the river to the town is not accessible to boats before half flood. The town has been abandoned as a station as above stated.

Winds.—The usual sea breeze varies according to the monsoon from E.N.E. to S.W. In November it was found to blow fresh at E.N.E., falling light at night, and hauling to the N.N.E. in the early morning. At this time of year strong south-westerly winds with a heavy swell, and rainy weather occasionally occur, this being the commencement of the rainy season.

Tides.—It is high water, full and change, at the mouth of the Angoche at 4h. 0m. ; springs rise 10 or 12 feet.

COAST.—From the Angoche northward, the coast is composed of sandhills, which increase in height until reaching the south side of

Antonio river, where they are said to be 300 or 400 feet high, and to have several patches of bright red sand. The land in the vicinity of Antonio river is remarkable, the northern side of the river being a low sandy point, whilst the high sandhills on the south side, partly covered with vegetation, form a striking contrast to two rocky points 4 or 5 miles to the southward of the river.

Nanduma hills, from 2,000 to 3,000 feet high, are charted about 15 miles within the coast, and should be conspicuous objects from seaward.

Antonio (Veve or Jamaguva) bank is a coral bank, about $2\frac{1}{4}$ miles in length, north-east and south-west, by $1\frac{1}{4}$ miles in width; it has some dry sand patches on its south-west end, which are steep-to.

Its dry portion is charted in lat. $16^{\circ} 9' S.$, long. $40^{\circ} 10' E.$, or with Buzio island, Angoche river, bearing W. by S., distant 13 miles, but its position is not correctly known.

About midway between Antonio bank and the shore is a shoal of 3 fathoms or less.

About 5 or 6 miles off the coast, abreast Antonio river, are several patches of 5 fathoms, with the bottom distinctly visible.

Caution.—At night it is advisable not to stand into less than 20 fathoms between Angoche and Mozambique, as the banks are mostly steep-to, and the coast is but imperfectly known.

ANTONIO RIVER lies about 22 miles northward of Angoche. Its south point is in lat. $15^{\circ} 57' S.$, long. $40^{\circ} 9' E.$ *

Its entrance is fronted by a bar apparently about one mile in breadth, with a depth of about 3 feet at low water, or about 16 feet at high water springs; probably subject to change. Within the entrance the river turns sharply to the southward, with depths of from 2 to 4 fathoms at low water.

Settlement.—About 3 miles within the entrance, on the southern shore, is the settlement of Shangaji, which carries on some trade in small craft with Mozambique, similar, though of less extent, to that from the Angoche river.

Directions.—The tamarisk trees on the north point of entrance, bearing W.N.W., led in the best water over the bar (1865).

* See plan of Antonio river on chart No. 1810.

COAST.—Huddart shoal, the centre of which is in lat. $15^{\circ} 46\frac{1}{2}'$ S., long. $40^{\circ} 26'$ E., is about 7 miles off shore, and 20 miles north-eastward of Antonio river. Captain Vidal passed over this shoal in $3\frac{1}{4}$ fathoms; he considered there was less water in places, as the sea sometimes broke over it.

Namalungo point, at 26 miles north-eastward of Antonio river, is a high sandy bluff, well wooded; a reef of rocks and sandbank fringes it to the distance of about half a mile. From abreast the point, the distant land behind is rather high, and that close to the beach low and sandy, with casuarina trees upon it.

MOGINKWALE RIVER, about 5 miles northward of Namalungo point, had (1887) a depth of $2\frac{1}{2}$ fathoms over the bar at high water springs, but there were often heavy rollers on the bar without any apparent cause.

The entrance is about 4 cables wide between Funco and Marano points, but sandbanks front both, reducing the navigable channel to the width of about one cable.*

The Portuguese have a military station here.

Chataputa or Moginkwale shoals lie off the Moginkwale river, about $4\frac{1}{2}$ miles from the line of coast. They consist of several rocky patches, on which the sea generally breaks. Their extent is not known.

COAST.—Barracouta point, about 4 miles north-eastward of Moginkwale entrance, is low, and forms the northern point of Barawa or Mananitya river, which appears barred.

A horse-shoe reef extends nearly 2 miles from the point. On some parts of the reef there is but a depth of 7 or 8 feet, whilst within the horse-shoe, which opens to the north-west, there is 5 fathoms.

Bajone shoal lies about 8 miles north-eastward of Barracouta point, and about 5 miles off shore, in lat. $15^{\circ} 28\frac{1}{2}'$ S., long. $40^{\circ} 39'$ E. It is a patch of rocks of unknown extent having 5 fathoms water, or less, with 14 fathoms close-to.

Naquil shoal.—In January, 1875, H.M.S. *Thetis* anchored about 7 miles off Barracouta point in 15 fathoms, hard sandy bottom, with

* See plan of Moginkwale entrance on chart No. 1810.

Bajone shoal North, about 4 miles; a shoal (now charted as Naquil shoal, but of unknown extent) was observed about one mile west of this anchorage; the bottom generally in this locality is foul. The *Thetis* swung regularly with the tide, the ebb running northward and the flood southward.

MUITÉ RIVER.—The Infussé bar is the chief entrance to Muité river, and, from its being the most important one, it sometimes gives its name to the lagoon system within. It is said to have a depth of 16 feet on the bar at high water springs.*

The Muité and other streams within the bar are usually navigable for dhows at high water, though crossing the bar is attended with some anxiety. These streams are intersected by creeks lined with mangrove bushes, and divided by large tracts of low land, partly inundated, on which are several villages surrounded by cultivated land. Mokolivolane, on one of the southern streams, is apparently the principal village.

NAKIBU SHOAL.—From about 2 miles northward of Infussé bar, the coast is fronted by foul ground, with patches of one fathom, or less, for a distance of 10 miles, at which distance it extends about 4 miles off shore. Here at its north-eastern extremity is a cluster of rocks, named Nakibu shoal, $1\frac{1}{2}$ cables in extent, in parts uncovered at low water, and generally breaking heavily; it lies with Mamarrema river bearing W. by N., distant 5 or 6 miles. Bajone point bearing N.W. by N. apparently leads well eastward of it.

Bajone point or Ras Mtende is low, sandy, and covered with trees to the beach. It should be given a wide berth. The coast from Bajone point to Mudge point, Mokambo bay, is foul and apparently shallow.

MOKAMBO BAY, formed between Bajone and Sancoul points, 9 miles apart, is deep and unfit for anchoring, but there is a spacious basin, named port Mokambo at its head. Peel bank, extends about $1\frac{1}{2}$ miles southward of some remarkable looking rocks on the beach westward of Sancoul point, and is steep to. The south shore, also, as before mentioned, is apparently foul.†

* See plan of Infussé bar on chart No. 1810. Information from Foreign Office letter, September, 1886.

† See plans—Conducia, Mozambique, and Mokambo point, No. 653.

Mudge reef, which is steep-to, extends about $1\frac{1}{2}$ miles north-eastward from the north-east extreme of an island at the south point of entrance to port Mokambo. It lies much in the fairway of the entrance and should be passed with caution.

PORT MOKAMBO, or Kivolani bay, is a port 4 miles in diameter, comparatively free from shoals, and with depths in most places of from 10 to 15 fathoms.

The entrance to the port, $1\frac{1}{2}$ miles in width, is between Mokambo point or Ras Fugu, and Mudge point or Ras Kisarahondo.

Reefs.—The eastern and northern sides of the port are fringed by reefs to the distance of about half a mile, and the western shore to about one mile in places. There are three known shoals in the anchorage; the outermost, a detached reef with about 3 feet at low water, lies about one mile N.W. $\frac{1}{4}$ N. of Pangage point; for the others *see* the plan.

Tides.—It is high water, full and change, at port Mokambo, at 4h. 20m., springs rise 14 feet.

Directions.—To enter port Mokambo, bring Mokambo peak, 135 feet high, on the north shore of the port, to bear W. by N. $\frac{1}{2}$ N., and then steer for it. This line will lead southward of Peel bank and northward of Mudge reef. When Pangage point bears S.W. by W., keep in mid-channel.

If proceeding to the north side of the port, pass midway between Mokambo point and the shoal in the fairway. A sand flat, steep-to, fronts the bay westward of Mokambo point; by keeping the point bearing eastward of S.E. by E., it will be avoided; anchorage may be taken in about 9 fathoms, when the mouth of Lungo river bears N. by E., and Mokambo point S.E. by E. $\frac{1}{2}$ E.

If proceeding to the southern side of the port: from mid-channel between Ras Fugu and Ras Kisarahondo, steer midway between the reef extending off Pangage point and the shoal in the fairway; when westward of these dangers, a vessel may anchor in depths of 5 to 15 fathoms; the bottom is apparently very irregular in places.

Supplies.—There are many villages around the bay, of which Lungo on the north side and Kivolani on the south side appear to be the largest. Poultry, vegetables and water are obtainable at Lungo, and probably at the others.

* See plans: Conducia, Mozambique and Mokambo ports, No. 653.

Mundomonho or Tumonia river lies in the south-west corner of port Mokambo ; it has a depth of about 3 feet at low water in its entrance.

MOZAMBIQUE HARBOUR.*—Mozambique is the head quarters of the northern half of Portuguese East Africa. The harbour is a portion of Mossoril bay, which is an inlet $5\frac{1}{2}$ miles in length, and the same in breadth, receiving the waters of three small streams at its head. In the approach are the islands of St. George and St. Jago, and farther in the island of Mozambique, which, together with reefs and shoals, render the harbour perfectly safe (except perhaps during a cyclone) for vessels of moderate draught ; but too much dependence must not be placed on the chart, as the depths in places are stated to have shoaled since the original survey. The North channel is buoyed and lighted, and should be always taken by large vessels. Vessels of deep draught should use the outer anchorage.

Landmarks.—The land is all low about Mozambique harbour, and for about 10 miles north and south of it, but St. George island and lighthouse, fort St. Sebastian, with its high flagstaff and Portuguese flag, and the tall white spire of the church to the westward of it on Mozambique island, are conspicuous objects from seaward. A broad white stripe has been painted on fort St. Sebastian to make it more conspicuous.

Pao mountain, situated about 23 miles west-north-westward, and Table mountain, about 19 miles northward of Mozambique island, are remarkable in clear weather ; Pao (Matipa) resembles a small round-topped hill on top of a larger one ; it is, however, not often visible. Table (Meza) mountain, 1,095 feet above the sea, in lat. $14^{\circ} 42\frac{3}{4}'$ S., long. $40^{\circ} 38\frac{1}{2}'$ E., appears as a long flat hill on top of a longer ridge of land, also flat-topped. When seen at a distance, only the upper part of the mountain is visible, and it then makes like a flat island.

When approaching Mozambique, frequent observations should be made for latitude if a bearing of these mountains cannot be taken, as the currents are uncertain.

Currents.—A current generally runs to the southward off Mozambique, varying from 2 to 4 knots, which extends from near the outer reefs of Mozambique to 50 or 80 miles from the land, being at its

* See plan of Mozambique harbour, No. 652, and sheet of plans, No. 653.

maximum during the strength of the north-east monsoon, and *vice versa*. In July and August, the southerly monsoon period, on some occasions, no current has been experienced; also close in-shore a counter current has been met with: therefore, the prevailing monsoon should be considered when attempting to allow for the current. *See page 33.*

ISLANDS AND REEFS IN THE APPROACHES.—**Sancoul point**, the south-west point of Mozambique inlet, has a few huts on it. All the land between Mokambo, Sancoul, and Calombo, at the head of the inlet, is low.

Sancoul sands, which dry at the last quarter ebb, and extend from Sancoul point to Kisumbo point, are in places distant one mile from the shore.

Mozambique flat is a great coral bank which fills the whole space between Sancoul and Kisumbo points on the coast, and the islands of St. Jago and Mozambique. This flat has in most places from 7 to 9 feet at low water spring tides, but the sea generally breaks heavily on the south edge between Sancoul point and St. Jago island.

St. George (Goa) island, lying immediately in the approach to Mozambique harbour, is a flat coral island, without trees, about half a-mile in diameter, and $2\frac{1}{2}$ miles south-eastward of fort St. Sebastian. The island is encircled by a reef except near its north-west extreme. This reef extends a quarter of a mile off the north-east point, and rather more from the north-west point, in a south-west direction. There is a square lighthouse on the eastern side, and a white conical beacon on the north extreme of the island. In the North channel the flood stream sets towards St. George island. *See light, page 295.*

St. Jago island is about the same size and description as St. George island, but is wooded. It lies about $1\frac{1}{2}$ miles south-westward of St. George, with South channel between, which is about one mile in width, with depths of 7 to 10 fathoms. The island is surrounded by a reef which, in places, extends to a distance of 3 cables.

Coral knolls.—There are three coral knolls, named A, B, and C, in the outer bay of Mozambique, within St. George island, with depths of $2\frac{1}{4}$ to $2\frac{3}{4}$ fathoms; and a patch of $4\frac{1}{4}$ fathoms, at 3 cables

northward of C, close northward of which is the fairway of North channel. B and C knolls lie near the fairway of South channel. Others may exist.

Cape Cabeceira, forming the north side of Mozambique approach is a low bluff cliff with trees; a submerged coral flat surrounds the cape and the coast northward and westward, extending in places nearly 2 miles from the shore, embracing the Tree islands, and it is scarcely anywhere less than one mile off as far as Conducia bar. The coast gradually rises to cape Conducia, with a sandy beach the whole way.

Tree island, or Sete Paus, is the northernmost and largest of three islands, situated on a sandbank 2 miles in length in a north and south direction, and just covered at high water, at $1\frac{1}{4}$ miles eastward of cape Cabeceira, and about one-third of a mile within the edge of the coral flat above mentioned. It has some trees growing on it.

Harpshell spit is the south-west extreme of the foul ground which surrounds cape Cabeceira, the north point of entrance to the harbour, the shallow water extending about a mile from the point. At low water it shows plainly, and can be traced at times by the eye even at high water, but in the absence of the buoys it would be dangerous to approach it. The harbour authorities state that the spit extends farther to seaward during continued southerly winds.

St. Sebastian spit projects a quarter of a mile eastward of the fort. At low water this spit is clearly visible and often dry.

Leven bank, in Mozambique harbour, is possibly over a mile in length, its limit to the westward not having been defined; the charted portion is 5 cables in width, and with a least depth of $1\frac{1}{2}$ fathoms. It forms the north side of the harbour, and reduces the anchorage limits for vessels of moderate draught to the width of about one cable.

LIGHTS.—From a building resembling a church, with a square yellow tower, on St. George island is exhibited, at an elevation of 85 feet above high water, a *fixed white* light, visible in clear weather from a distance of 15 miles.

Attached to the flagstaff of fort St. Sebastian is an iron scaffolding, from which, at an elevation of 42 feet above high water, is exhibited

a *fixed green* light, visible in the direction of the bar from a distance of 4 miles. At the distance of 200 yards N. 63° W., from the light at the flagstaff, on the west side of the fort, is a similar *fixed green* light, elevated 69 feet, and visible 4 miles. These lights in line lead through North channel.

At Cabeceira Grande, from an iron support in front of a yellow house with turret, is exhibited, at an elevation of 35 feet above high water, a *fixed red* light, visible 5 miles. A *fixed red* light is exhibited from the red and white beacon on Harpshell sands, at an elevation of 11 feet above high water, and is visible in the direction of the bar about 5 miles. It is situated S. 13° E., distant $1\frac{8}{10}$ miles from Cabeceira Grande light. These *red* lights in line, bearing N. 13° W., lead between Sebastian and Harpshell spits.

Two *fixed green* lights, 19 feet above high water, are shown from the custom house pier.

Buoys and Beacons.—Red buoys mark the extreme of the north-east spit of St. George island, the north-east spit of St. Jago and the north extremity of St. Sebastian spit. Black buoys mark the west spit of St. George island, the two Harpshell spits (within the edge), and the south-eastern edges of Leven bank. A red and white beacon (*see* lights) stands on the Harpshell sands.

On entering Mozambique harbour, the black buoys should be left on the starboard hand, and the red buoys on the port hand.

Too much reliance must not be placed upon the buoys maintaining the colours or the positions shown on the charts.

Pilots.—When proceeding into Mozambique, a pilot may probably board the vessel some distance inside St. George island, but by attention to the directions the pilot's services may be dispensed with.

Tides.—It is high water, full and change, at Mozambique, at 4h. 15m.; springs rise 12 feet. The streams run strong in the harbour—the flood to the westward, the ebb to the eastward—and with sufficient strength at springs to turn a vessel against a strong sea breeze.

DIRECTIONS.—On account of the strong current off Mozambique, which usually (though not always) sets to the southward from 2 to 4 knots an hour, vessels should make the land well to the northward, especially during the northerly monsoon; and in the event of

a sailing vessel being swept to the southward of her port, she should at once stand to the eastward for 60 miles or more, and regain her northing beyond the influence of the southerly current.

Vessels of heavy draught should use the North channel only.

North channel.—If approaching from the northward, keep the south-east side of St. Jago open eastward of St. George island, to avoid the reefs off cape Cabeceira and Tree island; and when the broad white stripe on fort St. Sebastian or the flagstaff bears N. 63° W., steer for it, passing about a quarter of a mile northward of the red buoy on St. George spit. Alter course in time to bring the yellow house with turret on its western end, at Cabeceira Grande (or the light structure of it can be seen) in line with the red and white beacon on Harpsell spit, bearing N. 13° W., and steer in on that mark until the custom house pier comes in sight. Then the course should be gradually altered to the westward, steering for the outer end of the custom house pier bearing W. by S. $\frac{1}{2}$ S., until abreast of fort Sebastian; thence about West a short distance, anchoring as convenient. In going through the narrows abreast the fort, be quick with the helm, and make due allowance for the tidal stream, which runs strong. The flood sets towards Leven bank.

A sailing vessel becalmed may anchor in North channel in depths of 6 to 12 fathoms, coral bottom; but there are many deep holes within one mile of fort St. Sebastian.

At night, when about one mile seaward of St. George island light, bring the two *green* lights on fort Sebastian in line, bearing N. 63° W., and steer for them until Cabeceira and Harpsell *red* lights are coming on, when haul up for the latter. These red lights in line, N. 13° W., will lead between Sebastian and Harpsell spits; and when the *green* lights on the end of Custom house pier come in sight, gradually haul to the westward, steering for them when bearing W. by S. $\frac{1}{2}$ S. until abreast the fort, when anchor as convenient.

South channel is only suitable for light draught vessels, unless buoyed. When approaching from the southward, avoid the indraught on the flood into Mokambo bay; thence keep Tree island open eastward of St. George island, until the white stripe on fort St. Sebastian

or the flagstaff bears N.W. by N., when steer for it until the yellow house at Cabeceira is on with Harpsshell beacon ; then proceed as for North channel.

Anchorage.—The outer anchorage is in 7 or 8 fathoms, with the flagstaff on fort St. Sebastian bearing N.W., distant about three-quarters of a mile, and Tree island just open of cape Cabeceira. Here a vessel will be out of the strength of the stream, which runs with considerable force through the narrows and North channel. There are several deep holes in the outer anchorage, which has not been accurately sounded, and care is necessary when bringing up.

Considerable alteration is said to have been caused by the rapid tidal streams which run in Mozambique harbour, and there is supposed to be about 3 feet less water than is shown on the chart. The inner anchorage is not recommended for vessels of heavy draught.

In taking up a berth in the harbour, keep near Mozambique island, to avoid Leven bank, the nearest part of which is but 3 cables from the island.

A good position, in about 5 fathoms, and 2 cables from the shore, is with the outer end of the Customs house pier S.W. $\frac{1}{2}$ W., and fort St. Sebastian flagstaff S.E. $\frac{1}{2}$ E.

MOZAMBIQUE ISLAND AND CITY. — Mozambique island, on which stands the city, is formed of coral, is low and narrow, about $1\frac{1}{2}$ miles in length, in a north-east and south-west direction, and about 400 yards in breadth. It lies directly in the entrance to Mossoril bay, and the ship channel is northward of it.

Mozambique island is covered with stone buildings ; the streets are fairly wide and well kept. The Governor General's palace is an extensive building, and in front of it there is a wharf.

The population of Mozambique may be about 8,000, including the garrison about 200, Arabs, Banians, and negroes. There are but few Portuguese except those holding official positions, and no British merchants. The natives live outside the town proper ; their houses are well built, thatched and numbered.

Forts.—St. Sebastian fort is the most prominent feature on the island. It was built in 1508–11 by the Portuguese, and is of a quadrangular form, nearly 70 feet high. Lorenzo fort, now a powder

.See plan of Mozambique harbour, No. 652, and sheet of plans, No. 653.

magazine, is built on a small isolated rock off the south-west extremity of the island, to which at low water it is joined by a coral flat.

Position.—St. Sebastian fort flagstaff is in lat. $15^{\circ} 0' 45''$ S., long. $40^{\circ} 44' 45''$ E.

Telegraph.—Mozambique is connected with Cape Colony by submarine cable, *via* Natal, with Aden *via* Zanzibar, and with Mojanga in Madagascar.

Mails.—The British India Company's vessels call monthly when proceeding southward, from Aden to Delagoa bay, and also on the return voyage. The Deutsche Ost Afrika vessels, from Aden *via* the coast ports to Natal, &c., call every three weeks when proceeding southward, and also on the return voyage. Their steamer from Bombay *via* Seychelles and Zanzibar calls here every six weeks *en route* to Kilimán, and also on returning. There is a monthly steamer of the Messageries Maritime from Diego Suarez to Mozambique, Beira and Delagoa bay; also another French line, the "Chargeurs Reunis of Havre," *via* West Africa ports, Capetown, &c. See also page 15.

Landing may be effected in boats at the pier in front of the Governor General's, except at near low water springs. There is a small jetty in front of the Custom house, with still less water. The construction of a deep water wharf was commenced and 120 feet of it accomplished, when work was suspended. An addition of 300 feet is necessary to render it of more utility than the present pier.

Supplies.—Fresh beef, vegetables, and bread are procurable in moderate quantities. Fowls, oranges and other fruits are plentiful. There is a good general hospital.

Water.—There is a Government water tank, with pump, which can be borrowed by applying to the guardship. A water tank to hold about 6,000 tons was built in 1893; the water is probably now available for the shipping. Water is brought alongside for about two dollars a ton.

Coal.—From 800 to 1,000 tons of coal are usually in stock at Mozambique. Coal is brought alongside in lighters; labour is

plentiful, but delay may be caused in loading the lighters, as they cannot lie at the pier at near low water. The assistance of a steam cutter to tow the lighters will expedite coaling.

Repairs.—Coasting craft of small burthen are built here; there is a Government factory for repair of machinery, but only those of the smallest kind can be executed. There are no docks.

Trade.—The articles exported are:—Ivory, calomba root, oil seeds, india-rubber, wax, gold in small quantities, ambergris, amber and grain. The imports are principally cattle, rice, cotton goods of all descriptions. The value of the exports in 1893 amounted to £72,000, and the imports to £134,000. 109 vessels entered the port, of the aggregate tonnage of 105,884; 103 were steam vessels. About 40 British India dhows are engaged in the coasting trade, aggregating about 2,000 tons. These dhows sail to Bombay and Kutch in September and return in February or March.

Climate.—The climate of Mozambique is unhealthy. Fevers, malarious and bilious, are prevalent, against which the best precautions are temperate living and abstinence from alcoholic stimulants.

Rain.—The rainy season is from November to March; *see* page 28.

Winds.—The prevailing winds on the coast about Mozambique are northerly from October to April, and southerly during the rest of the year. At Mozambique, land and sea breezes prevail; the latter coming in about 10h. or 11h. a.m. from S.E. to South, shifting towards east in the afternoon. At daylight, the land wind blows right out of the harbour.

Cyclones are experienced occasionally, but at rare intervals. About the latter end of January of the years 1841–2–3, Mozambique was visited by cyclones. At one of these periods the vessels drove from their anchors and were stranded. From the description of those who witnessed them, the bottom of the sea was agitated to such a degree as to heave and loosen the sand, rendering it impossible for the anchors to hold. Black impenetrable clouds overhead produced a darkness as during an eclipse. Previous to those visitations, cyclones had been unknown for 40 years.

Another cyclone occurred on April 1st and 2nd, 1858, on which occasion the barometer fell to 28·7 inches, and seven out of ten vessels at that time in the port were driven on shore ; much damage was done on the island of Mozambique and surrounding country. *See cyclones*, pages 23, 24.

Mossoril bay is a large harbour, within and north-westward of Mozambique island ; it is about $2\frac{1}{4}$ miles in length by $1\frac{1}{4}$ miles in width, with depths of from 4 to 7 fathoms, and capable of containing a large fleet ; but it has only been partially sounded.

The north-west part of Mossoril bay branches off into three creeks. The northern one, Mossoril creek, extends to the isthmus of Empassa, which only separates it from port Conducia by the distance of half a mile. There is a road of communication for the convenience of vessels lying in Conducia.

The western creek branches into two, Calombo on the west, and Lombu on the south. The shores of all these creeks are covered with mangrove.

CONDUCIA BAY and the port at its head are separated from Mozambique harbour, by the peninsula of Cabeceira. The entrance of the bay is 6 miles wide between Kitangonia and Tree islands, with deep water between. The inner part of the bay, has a navigable channel about $1\frac{1}{2}$ miles wide between Sombrero islet and cape Conducia, 3 miles apart, from whence it extends about 6 miles westward to Bar point, with irregular depths of from 20 to 5 fathoms. The depths are more regular towards the head of the bay, decreasing from 11 to 5 fathoms within half a mile from the north shore.

Coral flats extend about one mile off the south side of the bay and off Kissangula islet on the north side, and about half that distance off the shore within the islet. A patch, of $3\frac{1}{2}$ fathoms, lies near mid-channel, with cape Conducia S. $\frac{3}{4}$ E. about 2 miles.

Cape Conducia, is clifty, and about 200 feet high ; the coast on either side is low and sandy.

Kitangonia island, the northern limit of Conducia bay, is about two miles in length, north-east and south-west, by one mile in width ; there are apparently no dangers on its seaward side beyond a short distance.

Kissangula or **Sombrero** is a rocky islet with trees situated within Kitangonia island.

Port Conducia, at the head of the bay of the same name, is a land-locked harbour, one mile in length by half a mile in width, within Bar point, with about 4 fathoms of water near its centre. Bar point is a dry narrow spit of sand with some shrubs on it.

Conducia river, of which the port is the estuary, has its source in Table mountain, and is navigable for boats almost to the foot of the mountain.

Directions.—Having made the land to the northward of Kitangonia, on account of the probable southerly set of the current, coast as close as convenient and haul round the south point of Kitangonia at the distance of three-quarters of a mile; thence steer for cape Conducia. When the two little rocky points between Chicoma and Nifuku bear N. by W. $\frac{3}{4}$ W., and Table mountain is open to the westward of them, a vessel will be westward of Kissangula spit, and may steer N.W. $\frac{1}{2}$ N., coasting the northern shore if wishing to go farther in. Kissangula island on with Kitangonia point, astern, appears a good mark for running up the bay, until Arab islet on the south shore bears about S. by E.

If proceeding into the port without a pilot, proceed carefully along the northern shore, with the boats ahead sounding, until near Bar point; here the channel is tortuous, but there is supposed to be not less than 4 fathoms in mid-channel.

In entering Conducia bay from the southward, round Tree island at about half a mile distant, and steer for Table mountain just open to the westward of the two little rocky points on the northern shore bearing N. by W. $\frac{3}{4}$ W.; then proceed as before.

Anchorage.—There is anchorage in the entrance, in about 11 fathoms, irregular bottom, with cape Conducia S. by W. and Kissangula island E.N.E.; and also farther up the bay, in 5 fathoms, mud, with Sombrero islet bearing East, and cape Conducia S.E. by E. $\frac{1}{4}$ E.

Fowls, eggs, and oysters, will probably be obtained from the natives. Near Bar point there are salt works from whence the salt is shipped to various places.

Tides.—It is high water, full and change, at port Conducia at 4h. 15m. ; springs rise 12 feet.

Port Velhaco, within the point of that name, is protected to the southward by Kitangonia island, and affords better shelter for small coasting craft than Conducia bay from the strong north-west winds, which blow in the latter end of the northerly monsoon. The port has not been surveyed, but there is a depth of about 4 fathoms in the entrance, and from 1 to 2 fathoms within, over dark coral patches interspersed with sand ; there is apparently less water in places.

COAST.—**Kroosi** is a large village situated between the peninsulas of Kroosi and Napenja. Coasters find perfect shelter within the outlying reef (which must be crossed at high water), abreast the town, lying aground on the sand.

The coast from Kroosi village takes a northerly direction for about 14 miles to Kisima-Julu harbour, backed by ranges of hills at 2 miles distant. Janga village, on the point of the same name, lies about midway.

Kisima-Julu harbour.—About 18 miles southward of Fernando Veloso bay is Kisima-Julu harbour. It is visited by coasters engaged in the timber trade, which constitutes the chief wealth of the adjacent district. From the entrance it extends in a west and south-west direction about 5 miles. The entrance channel between the reefs is about 200 yards wide, with a depth of from 3 to 4 fathoms ; in the harbour, which is about one mile wide, the depths are from 4 to 8 fathoms. As this harbour has not been surveyed, caution is necessary when entering. A reef extends apparently nearly a mile southward of the north point.

Cape Melamo (Kulumlomu), the southern headland of Fernando Veloso bay, is low and rocky. About 2 miles southward of the cape the cliff terminates near some conspicuous casuarina trees, thence the coast, about 200 feet high, is fronted by a high sandy beach, nearly to the entrance of Kisima-Julu river. Off this beach, shoal water appears to extend about 3 cables.

FERNANDO VELOSO (Mazazima) BAY is a spacious bay, about 40 miles northward of Mozambique, with port Nakala at its

south-west, and Belmore harbour at its north-west corner. The bay is about 6 miles across, between capes Mocuo and Melamo, and about 8 miles in length.

Foul ground, reported by H.M.S. *Vulture*, 1874, is charted for about 3 miles off cape Mocuo, the northern point; on the southern side, a ledge, which dries in places at low water, extends about half a mile from shore, with from 7 to 8 fathoms at a short distance; it is foul, apparently, nearly a mile off shore eastward of Nahareni point. The centre and head of the bay has no bottom at from 20 to 40 fathoms. It is advisable to keep the southern shore aboard when entering or leaving the bay.

The land at the head of the bay is moderately high, with some hummocky hills, and north-westward of the bay are some remarkable saddle hills and a sugar-loaf peak.

On the northern side of the entrance, within cape Mocuo, there is a remarkable hill, about 300 feet in height, with a rather flat top, rising abruptly from the land around, which is level, and of moderate elevation. When seen from the northward at a distance of about 15 miles, this hill resembles a vessel under sail, but, on a nearer approach and different bearing, it changes its form.

Anchorage.—There is anchorage in 8 fathoms about 4 miles within cape Melamo, and one mile off the southern shore, abreast of a small stream.

Water.—H.M.S. *Mutine* watered with her own boats from the stream abreast of this anchorage, obtaining 12 tons per day, but with some difficulty.

Supplies.—Fowls, goats, ducks, and vegetables are to be obtained; also guinea fowls, venison, and a species of hare. Wood is plentiful, and easily obtained in any part of the bay.

Tides.—The probable time of high water, full and change, is about 4h.; rise about 15 feet.

Port Nakala.—The result of an exploration of the south-west corner of Fernando Velosa bay, formerly known as Fernando Velosa river, by Lieut. H. O'Neill, whilst H.B.M. Consul at Mozambique, has been the discovery of a capacious and landlocked harbour, named port Nakala. From Nahareni, the eastern point of entrance, it extends a

distance of about 9 miles in a S.W. by S. direction, with an average breadth of $1\frac{1}{2}$ miles. The entrance is about half a mile in width, with deep water on the eastern side, but a shoal extends nearly half way across from the western point.

Its eastern shore rises in steep but well-wooded slopes to 100 or 200 feet, with bold promontories, suitable for settlements, catching every prevailing breeze over a clear sweep of several miles of water, without a trace of mangrove swamps. There are some remains of the fortress of Don Miguel, on Nahareni point, erected early in this century.

Off Namuhashi point, on the western side of the port, 10 miles within the entrance, are the Shihubidi rocks, covered at high water springs, and connected to the shore by a reef. The water shoals gradually as the head of the port is approached, and foul ground extends a considerable distance off Namusu point. There appears to be no difficulty in entering this port.

This used to be a great rendezvous for slavers, vessels being able to lie perfectly unseen from seaward, either here or in Belmore harbour to the westward.

Belmore (Nihegehe) harbour, at the north-west corner of Fernando Veloso bay, is about 4 miles in length, by one mile in breadth throughout; the entrance channel is apparently reduced by reefs fringing the points, to a breadth of 2 or 3 cables, with no bottom at 20 fathoms. The tidal stream runs strong in the entrance, and in the rainy season the water is discoloured at times, rendering the reefs difficult to be seen. Within the entrance, the depths decrease gradually from about 16 fathoms, towards the head of the harbour.

The east shore of the harbour is mostly rocky, with sandy patches, until northward of West cove, whence it is mangrove swamp to the head. The west side is mangrove swamp, with the exception of a sandy bight just within the entrance, which is a good place for hauling the seine.

H.M.S. *Vulture* anchored off West cove in 7 fathoms, not quite half a mile from the west shore. Directly opposite this cove is a village, where a small supply of vegetables and fowls were obtained.

There is no trade in Belmore harbour, and the locality does not seem to be healthy.

See plan of Fernando Veloso bay (which includes Belmore harbour) on chart No. 1,809.

COAST.—Pinda shoal.—From Fernando Veloso bay to cape Loguno, little is known of the coast, as it is generally given a wide berth, on account of Pinda shoal, which extends 5 miles from it; the sea generally breaks on most parts of the shoal, but we have no definite information as to its extent north and south.

Cape Loguno (Ras Mwamba Koma) is the southern headland of Memba bay. It is of moderate height, about 80 feet near the sea, level at the top, with perpendicular cliffs. It appears to be bold to on the north side, but bordered eastward by Pinda shoal.

MEMBA BAY (Mwendazi) is about 6 miles wide, between capes Loguno and Tapamanda (Ras Umlulu), and perhaps 7 or 8 miles deep, with no bottom at 50 fathoms, in its outer part; its north-western arm is said to afford good and sheltered anchorage, but it has not been examined. The little we know of Memba bay is principally from H.M.S. *Nerbudda*, which vessel touched slightly on a coral reef at high water, going from 60 fathoms suddenly into $2\frac{1}{2}$ fathoms, but no further particulars are given. This reef extends from the north side of the bay apparently $1\frac{1}{4}$ miles, and as the account mentions that it was high water, it is probable that at times the reef is nearly awash.

The *Nerbudda* appears to have anchored in 12 fathoms, at about one mile from the north shore, and one mile or more westward of the reef she touched on. From this anchorage to the head of the bay, sand flats border the shore, extending a considerable distance in some places.

Bocage harbour is an inlet about 3 miles in length, by one mile in width, on the south side of Memba bay. Near the entrance there is no bottom at 60 fathoms; the depths in the harbour are said to be convenient for large vessels.

Marenje is a port and village of some importance to the coasting trade, situated about 3 miles northward of Memba bay.

COAST.—**Landmarks.**—From Memba bay to Sorisa point, a distance of about 37 miles, the land is more striking than other parts of the coast. It is mostly level and of moderate elevation, about 200 feet, decreasing towards the coast where it is low. From the level land, several craggy peaks, known as the Sorisa range, and which Owen justly compares to the ruins of some giant city, rise

abruptly to a height of 2,000 or 3,000 feet; these peaks assume every variety of form of sugar-loaf, cone, and round or square-topped pillars, in some cases appearing to overhang their bases.

Sangone (Simuku) bay, about 10 miles northward of Memba bay, in about lat. $13^{\circ} 58'$ S., is about one mile in extent, with an entrance half a mile wide, apparently free from reefs; but though considered a good port by coasters, a number of reefs are exposed at low water, greatly limiting the anchorage space, and rendering it probably unsuitable for larger vessels.

The village of Simiku is scattered over a space 2 miles in extent. Some trade is carried on here by Banians, in amendoim, columba, wax and rubber. The port is the principal outlet for the trade of the district.

ALMEIDA BAY lies within Mancabale and Indujo reefs, which render it a safe anchorage, with from 4 to 7 fathoms water. The main channel to Almeida bay is southward of Indujo reef, between which and the coast, the depths vary from 8 to 10 fathoms. There is also a passage a quarter of a mile wide, between Indujo and Mancabale reefs, with a depth of 11 fathoms in the centre, decreasing gradually towards the anchorage. Two remarkable peaks bearing $W. \frac{3}{4} N.$, and just open southward of the sandy hill on the western shore, lead through.

Mancabale reef, dry in places at low water spring tides, projects 5 miles southward of Sorisa point. At half a mile seaward of the reef, a depth of 14 fathoms was found.

Indujo reef, about one mile in extent, and awash at low water springs, lies one mile southward of Mancabale reef.

Minsangegi river lies in the southern part of Almeida bay. The hill just southward of the river is a conspicuous bluff, and a useful mark for the bay.

LURIO BAY, between Sorisa and Pando points, a distance of about 8 miles, has from 5 to 15 fathoms water. It affords sheltered anchorage under Sorisa point during the south-west monsoon period, but none during the north-east monsoon; there is an easy overland route from Almeida. The land is all low near the sea, with thick jungle, but there are high craggy peaks in the interior.

See plan of Almeida bay, on chart, No. 1,809.

Lurio river is in the southern part of the bay: the sea at times is discoloured by its water for some miles. Lurio is the principal settlement between Mozambique and Ibo.*

COAST.—Northward of Lurio bay the land is of moderate height and continues so from Badgley point to Maunhane point, a distance of about 25 miles.

This part of the coast is fronted in places by a quicksand beach, and a reef, mostly steep-to, which extends off the northern portion about $1\frac{1}{2}$ miles. Northward of Ushanga there is temporary anchorage in about 11 fathoms, sand over coral, not good holding ground.

Mkufi.—The bar of the river and port of Mkufi, 10 miles northward of Lurio bay, may be crossed at half tide by craft drawing from 5 to 6 feet; close under the southern shore there is anchorage for such craft in from 2 to 3 fathoms. The village is clean and healthily situated on elevated ground on the right bank, and provisions and good water are obtainable.

Ushanga is a village situated about 6 miles southward of Maunhane point; abreast it is Xanga Mrebwi, a gap in the reef with a deep water channel. The land about Ushanga is low, with trees almost to the water's edge.

Maunhane point is rather bluff, but terminating in a low rocky point, from which the reef extends eastward two-thirds of a mile. The sea breaks upon this reef, and it is also visible from the discolouration of the water.

Imbo bank, with depths of 9 to 10 fathoms, lies about $2\frac{1}{2}$ miles north-eastward of Maunhane point; it is said to afford good anchorage, with Sid-Ali point bearing W. by N. $\frac{1}{4}$ N. H.M.S. *Raleigh*, in 1890, obtained soundings of 7 to 8 fathoms at $1\frac{1}{2}$ miles northward of Maunhane point; less water may exist.

POMBA BAY (Mwambi).—The entrance to Pomba bay, about 5 miles to the westward of Maunhane point, is about $1\frac{1}{4}$ miles wide between North and Herbert points. The basin inside these points is one of the finest harbours on this coast, being about 8 miles in length, north and south, by 5 miles in breadth, with sufficient water in most

* Consul O'Neill's Report, 1880. See charts, Nos. 1,809 and 2,762.

parts for heavy draught vessels, and shelter from all winds.* The country around is composed of fertile plains and woods, and the climate is said to be good in comparison with other places on this coast. See climate at Ibo, page 314. The land wind generally blows out of the bay till 7h. or 8h. a.m. There is good fishing with the seine.

North or Sid-Ali point is a moderately high bluff, covered with trees and jungle, and steep-to, there being a depth of 18 fathoms within half a cable.

Herbert or Miranembo point, the southern point of entrance runs off low, but with a high hill at the back ; it may be approached within a quarter of a mile. There was formerly a fort and flagstaff on the point.

Off Mpira point, shoal water extends about 4 cables.

Dangers.—The shores of Pomba bay have several rocky ledges projecting to the distance of $1\frac{1}{2}$ miles in places ; it has not been fully examined, but the principal known dangers are as follows :—

Mutine patch, of coral, one cable in extent, with 3 feet least water, and from 12 to 14 fathoms around, lies with North point bearing E. $\frac{1}{2}$ S., and Herbert point S.E. by E.

A coral patch, one cable in extent, with 6 feet water, also discovered by H.M.S. *Mutine*, lies about one mile southward of Mutine patch. Other shoals are charted about $1\frac{1}{2}$ miles off shore, south-westward of this patch.

Penguin shoal, a patch of coral, with 4 fathoms at low-water springs, lies about midway between the patches.

Pantaloon patch, of 5 fathoms, lies in the northern anchorage, as charted. Two detached patches, with about 6 feet water, lie half a mile off-shore, eastward of Pantaloon patch.

Directions.—Anchorages.—Outside Pomba bay there is no anchorage, except on Imbo bank in about 9 fathoms. Between the points of entrance the depths are from 30 to 40 fathoms, and not less than 20 fathoms until 2 miles within the points.

To proceed to an anchorage in the northern part of the bay, and being abreast of Sid-Ali or North point, distant half a mile ; steer to pass midway between Pantaloon patch and the shoals one mile

* See plan of Pomba bay, on chart, No. 1,809.

eastward of it, and anchor in 9 or 10 fathoms, black mud and good holding ground, with Mpira point S. $\frac{1}{2}$ W., and Mwambi village W.N.W.; the latter mark leads northward of Pantaloon patch, with which bearing a vessel may go nearer the village.

If proceeding to an anchorage in the southern part of the bay, give Mpira point a berth of three-quarters of a mile when bearing about E.S.E., to avoid the reef extending from it. There is anchorage in about 12 fathoms, with Mpira point bearing N.E. distant $1\frac{1}{2}$ miles; southward of this the plan states that the ground is reported foul.

Supplies.—Small bullocks, poultry, vegetables, and wood are obtainable. Deer and other game are found in the vicinity. The village of Mwambi lies in the north-west part of the bay, and that of Nyamazezi in the southern.

Water appears to be obtainable in small quantities. There are, however, two inconsiderable streams in the north-east part of the bay, barely navigable for boats, and a larger one named the Nihegi, in the south part of the bay.

Tides.—It is high water, full and change, at Pomba bay at 4h. 15m.; springs rise 15 feet; neaps rise 11 feet.

The COAST.—Aspect.—The coast from Pomba bay northward continues moderately high for about 15 miles, when it becomes low and thickly covered with trees for 8 miles to Kiziva island; there is, however, high land in the interior of Arimba, which may be seen in clear weather from a distance of about 40 miles.

Dedema bay, about one mile in extent, with a depth of 3 feet only between its entrance points, is situated in about lat. $12^{\circ} 43'$ S. Mugarumo river lies in its north-west corner.

Arimba head, about 4 miles northward of Dedema bay, is a peninsula forming the north-east side of Kipáo bay, and when seen from the north-eastward is conspicuous, having six or seven hillocks on it.

Kipáo bay is about 2 miles in extent, with depths of from 3 to 5 fathoms over a small portion of it. Kipaco island, on the north side of the entrance, is connected to Arimba head by a reef.

The channel to the anchorage appears to be nearer to the island than to the main, the reef extending some distance from Sito point ; a detached patch of three fathoms lies about three-quarters of a mile eastward of the point.

Port Arimba, on the north side of Arimba head, is protected by Kiziva island and reef. Between the island and Arimba head there is a depth of from 5 to 3 fathoms in the channel leading to the anchorage.

Port Arimba appears to be a secure harbour for small vessels. It is one of the Portuguese settlements, with about 400 inhabitants, who export grain, vegetables, fruit, and timber.

KERIMBA ISLANDS.—**General remarks.**—The Kerimba islands extend from Arimba head to Cape Delgado, a distance of 117 miles.

In this space the outer reefs and islands extend in some places as much as 13 miles from the mainland, and in most parts more than 10 miles, but to the southward of lat. 12° S. they nowhere exceed 8 miles.

The Kerimba islands are generally low, well wooded and easily seen from seaward ; some have a diversified surface of hill and dale, whilst many are mere coral islets.

The main land abreast Kerimba islands is also generally low, and will rarely be seen when coasting outside the reefs ; this, and the fact that the sea faces of the reefs are steep-to, necessitates caution in approaching this part of the coast, even in the daytime.

There are eighteen or nineteen openings between the outer islands and reefs into a still greater number of secure ports or convenient anchorages for small craft.

Fumo island, situated about 6 miles northward of Arimba head, is connected with Kiziva by a coral reef ; the passage between it and the main is only a boat channel. Fumo is one of the islands which the Portuguese inhabit ; it has a population of about 100.

Penguin island, to the northward of Fumo, is small, wooded, and fronted by a reef to the distance of half a mile. There appears to be temporary anchorage off Penguin island reef, in 13 fathoms,

coral bottom, with the south point of the island bearing N.W. by N. distant three-quarters of a mile. Samucan island reef is steep-to.

Montepes bay, contained between Fumo island and Kisanga point, has been but partially examined. There is apparently a deep water channel between the reefs of Fumo and Penguin islands, but a rock lies near midway with a depth of 33 fathoms close-to.

At the head of the bay is the Portuguese settlement of Montepes, at the mouth of the river of that name. The village consists of miserable huts, with a population of about 600.

Kerimba island is about 3 miles in length north and south by $1\frac{1}{2}$ miles in width; it is low, wooded, has good well water, and is the most fertile of the Archipelago. Kerimba was formerly the capital of the district, now at Kisanga. Population about 200.

Kisanga point is a projection of the main land towards Ibo island, from which it is separated by a channel scarcely navigable for canoes at low water. Kisanga is one of the Portuguese settlements, with about 2,000 inhabitants.

IBO HARBOUR.—The main channel to the anchorage, southward of St. Gonsalo shoal, is about one mile wide between the buoys, with depths of 6 to 8 fathoms. The channel northward of St. Gonsalo, between it and Matemo reef, is about half a mile wide, with depths of from 12 to 24 fathoms. There is ample depth for all vessels in the harbour, but it is only imperfectly surveyed.

Ibo island is about 5 miles in length in a north-east and south-west direction, and nearly divided into two by a deep inlet. The town and fort of St. João are on the north-eastern side of the inlet and near the northern part of the island. The south-western half of Ibo island is named Kirambo.

Aspect.—**Ibo bluff**, the north-east extreme of the island, is moderately high, with a lighthouse, and may be seen from a distance of 14 or 15 miles in clear weather. Ibo may also be distinguished from the others of this chain of low islands by its white fort, which when bearing about S.W. shows a long front. The cocoa-nut trees in the town are easily distinguished at a distance of several miles.

LIGHT.—From a light tower 20 feet in height on Ibo bluff is exhibited, at an elevation of 51 feet above high water, a *fixed white* light, visible in clear weather between the bearings of N. 4° E. and S. 34° E. from a distance of 12 miles. Exhibition uncertain.

Buoys.—Mujaca shoal, bordering the north side of Ibo island, extends northward about $1\frac{1}{2}$ miles, and is occasionally marked by two buoys; one on the extreme north of the lighthouse, the other on the extreme north of fort St. João. Buoys occasionally mark the east and south extremes of St. Gonsalo shoal; there is a mooring buoy in the anchorage. These buoys are not to be depended on.

St. Gonsalo shoal, or Corea de San Gonsalo, lies in the fairway of the entrance to Ibo harbour. It is about $2\frac{1}{2}$ miles in length, in an east and west direction, and at low water shows as a dry sand-bank. It may generally be seen either by the discolouration of the water or by the sea breaking.

Discoloured water has been reported to extend from abreast St. Gonsalo shoal to a position East (true) 3 miles from Manoel da Silva island.

Tides.—It is high water, full and change, at Ibo at 4h. 15m.; springs rise 11 feet. The tides run strong through the channel between Mujaca and Gonsalo shoals, the ebb setting rather towards the Mujaca side, and the flood inclining to the northward.

Pilotage is compulsory except for vessels-of-war.

Directions.—Anchorage.—The channel southward of St. Gonsalo shoal is the usual one for proceeding to Ibo road, between the buoys, marking that danger and those marking Mujaca shoal, should they be in position. Anchor in about 5 fathoms, with the fort, or the point on which it is situated, bearing from S. $\frac{1}{2}$ W. to S. $\frac{1}{2}$ E., distant about $2\frac{1}{2}$ miles. Deeper water will be found at 2 or 3 cables farther northward. The anchorage is good, but partly exposed to easterly winds, and the tidal streams run strong.

When entering Ibo, it is well to be guided by the eye, as the reefs show well after half ebb, particularly the St. Gonsalo; borrowing a little on this shoal will therefore ensure safety from Mujaca shoal.

The **Town** of Ibo consists of stone houses and huts, and is one of the principal Portuguese ports. The population (1887), composed of Portuguese, Arabs, Banians, and natives, was between 3,000 and 4,000, including the garrison.

Fort St. João, star-shaped and constructed of stone, is garrisoned by a company of infantry. The defence of the town is completed by two other small forts, St. José and St. Antonio, both also of stone.

The **inlet** which runs up to the town forms a harbour for small craft, having depths of from $1\frac{1}{2}$ to 2 fathoms; but on the bar, which is about a mile from the shore, there is only three-quarters of a fathom at low water. The upper part of the inlet, for a mile or more in extent, is shallow.

Climate.—The sickly season is from the middle of January to the middle of March, during which time there is much rain, with thunder and lightning. The fever at that time of year is often fatal, and the negroes are not exempt from it.

Supplies of fresh provisions are obtainable in small quantities; water is difficult to obtain, and of indifferent quality. There are no facilities for repairs.

Communication.—The branch steamer of the Deutsche Ost Afrika Co. from Tanga *viâ* other ports, to as far southward as Mikandani, calls here also every three weeks if sufficient inducement offers. *See* also page 15.

Trade.—The exports are oilseeds, india-rubber, ivory and wax, the value in 1893 being £60,823. Imports: guns, powder, beads, cloths, of the value of £66,600. About 10 or 12 vessels enter yearly besides the mail steamers and coasters.

Cramacoma river enters the sea westward of Ibo harbour. Lumbo, a Portuguese settlement, with a population of about 600, is situated at the mouth of this river.

THE COAST from abreast Ibo island to Kirinuzi point is moderately high, and higher still from the latter to Pangane point. Inland is a range of hills, visible 20 miles from the coast; the south

end of the range is bluff, with a conical hill just to the southward. Thence northward to cape Delgado the mainland is seldom seen from outside the islands and reefs.

Matemo island, next northward of Ibo, is about $4\frac{1}{2}$ miles in length, north and south, by $2\frac{1}{2}$ miles in breadth, and has a population of about 100 persons. It is not fertile, and has no water. This island is low, with straggling trees along its whole length, and has a white sand beach on its south-east side.

The mainland will be seen before Matemo when standing in from seaward.

Das Rolas, a small island about $2\frac{1}{2}$ miles northward of Matemo, is low, and covered with brushwood. A reef extends about one mile north-eastward, and half a mile south-eastward of it. The north-west point is sandy, and affords the best landing.

Anchorage.—Matemo island is a convenient rendezvous when cruising in the vicinity, on account of there being anchorage under it sheltered from either monsoon, and easy of access ; the tidal streams, however, run strong. Between Matemo and Envie shoal, which fronts the coast to a distance of 4 miles, there is a channel half a mile broad, with depths of 3 to 5 fathoms.

There is sheltered anchorage under Das Rolas, in from 7 to 9 fathoms, with that islet bearing N.E. by N., distant half a mile ; there is generally a land breeze in the morning.

Directions.—To proceed to this anchorage, steer for the north-east point of Das Rolas when bearing W. by N., until about half a mile from it, when head to the south-westward. The water will gradually shoal to about 4 fathoms when in a line between the north-east points of Das Rolas and Matemo, after passing which the water gradually deepens again to 8 and 9 fathoms.

Do not haul up to anchor under the lee of Das Rolas, until Sangane point comes well open to the westward of it, in order to avoid Das Rolas reef.

Wood is obtainable on Das Rolas, but no water, nor are there any inhabitants. Stock can be procured from the river Kirinuzi on the main.

Sangane point is a low white sandy point, with a reef extending nearly 2 miles off. In about the latitude of Sangane point, and between 4 and 7 miles from land, is Sangane reef, 3 miles in length by one mile in breadth.

For Lazarus bank, 50 to 80 miles eastward of Sangane point and reef, *see* pp. 562, 563.

Pangane point.—A reef, in the middle of which is the small island of Inhate, extends $1\frac{1}{2}$ miles from Pangane point, nearly joining the south-west end of Mahato island reef. The passage between Mahato island reef and the reef from the main, is only adapted for dhows, having but one fathom at low water. The Portuguese have a settlement at Pangane point, with a population of about 300 persons. Kifula and Molandulo islands lie between Sangane and Pangane points.

Mahato island, lying off Pangane point, has an extensive reef all round it, except on the west side, where there is a smooth anchorage for dhows.

Pantaloon reef, about 4 miles northward of Mahato island, and in lat. $11^{\circ} 54'$ S., long. $40^{\circ} 36'$ E., is one mile in extent east and west, with a least depth of $2\frac{1}{2}$ fathoms, coral.

A sandbank awash at high water springs, but generally visible, lies about $1\frac{1}{2}$ miles west-south-westward of Pantaloon reef. This bank is steep-to on its west side, but a coral reef, with 6 to 8 feet water, extends from the bank about three quarters of a mile in all other directions.

A patch, with one fathom water, lies W. by N. $\frac{1}{2}$ N., about $3\frac{3}{4}$ miles from Pantaloon reef.

Northward of Pantaloon reef there is good anchorage.

RAS PEKAWI, in lat. $11^{\circ} 51'$ S., long. $40^{\circ} 31'$ E., is a low sandy point, with a clump of firs on its extremity 70 feet high; half a mile off, and connected with the point by a reef, is a bushy islet, 17 feet high.

Caution.—As there is no trade on this part of the coast, nothing is gained by approaching the shore by the passages between the inner reefs northward of Ras Pekawi; if obliged to do so, the most

favourable time is at low water with the sun astern of the vessel ; the lead should be kept constantly going.

No Water.—Fresh water cannot be obtained from any of the islands between Ras Pekawi and cape Delgado ; and it is for this reason that the islands remain uninhabited.

Coast.—From Ras Pekawi to Ras Nenumba, the coast for the first 4 miles consists of a sandy beach, with numerous villages, but the remainder is mangroves, intersected by creeks. The shore reef extends about 2 miles off those points.

A wooded range of hills, from 250 to 280 feet high, extends parallel to the coast, from 2 to 3 miles inland.

Supplies.—A few fowls may be bought in the villages north of Ras Pekawi.

Kisanga islet, 20 feet high, is sandy, covered with brushwood, and situated $3\frac{1}{2}$ miles eastward of Ras Pekawi, and on the western edge of a reef.

Mjumbi (Mattos) island is low, thickly wooded, and about half a mile in length. It is surrounded by a reef extending 3 miles north-east, $1\frac{1}{2}$ miles east, and one mile in a southerly direction, with patches of sand which dry in places.

Anchorage.—The anchorage west of Kisanga may be approached with safety either from the north or south, care being taken if entering by Mjumbi pass to avoid Gray rock. A good anchorage may be obtained in 8 fathoms, sand and shells, half a mile from the reef, with Mjumbi tall trees in line with Kisanga islet.

The coast from Ras Nenumba to Ras Yamkumbi is low and swampy, fringed with mangrove, with numerous creeks ; the sudden break in the hills at the back forms the most conspicuous feature of the coast.

Mto Marari.—Boats drawing 2 feet can enter at low water, and there is deeper water inside. A large village probably exists on its banks, as a number of dhows were seen to enter and leave the creek.

Mud and sand flats extend from half a mile to $1\frac{1}{2}$ miles off-shore, with boulders scattered over them.

The coast from Ras Yamkumbi to Ras Ulu, about $12\frac{1}{2}$ miles to the northward, is covered with mangrove trees, and seldom seen from outside the islands. The coast reef borders the shore from three-quarters to 2 miles distant.

Seli-Seli rocks.—At 2 miles eastward of Ras Yamkumbi, and connected with it by a reef, are three flat-topped coral rocks, 10 feet high.

Crawford reefs are several patches of coral which dry at half-ebb, lying 3 miles off this coast, with depths of one to 2 fathoms between them and the coast reef.

The mouths of the creeks on this portion of the coast are dry at low water.

MJUMBI PASS.—The opening between Mjumbi reef and Mwamba Wadiazi, is 4 miles wide and perfectly clear, the heavy surf on the edges of the reefs marking the channel; the mainland will show very indistinctly, but Mjumbi island will be clearly visible.

Gray rock, having $1\frac{1}{2}$ feet at low-water springs, is steep-to, and lies in the fairway to the anchorage off Kisanga islet, with Kisanga summit bearing S.W. by S., and Mjumbi high trees S. by E.

Mwamba Mcholi, a coral reef, dry at low water, is about 4 cables in extent. From its centre Kero Nyuni bears N.E. $\frac{3}{4}$ E. $5\frac{1}{2}$ miles.

Mwamba Wadiazi is a square-shaped reef, extending $5\frac{1}{2}$ miles to the eastward, and 4 miles to the southward of Kero Nyuni. It is composed of coral with many sand cays on it, the rocks uncovering in parts at low water, and the cays at half ebb; its northern, eastern, and southern faces are steep-to, but its western side is broken into a series of gullies with detached masses of coral, with shallow water between them.

Anchorage.—The sheet of water enclosed between Mjumbi and Kero Nyuni islands, and the mainland, with the exception of the dangers mentioned, has anchorage all over it, in from 5 to 15 fathoms.

The water shoals in the northern part over a bar with from $1\frac{1}{2}$ to 3 fathoms water on it, connecting Seli-Seli rocks with Mwamba Wadiazi. The bottom off the entrances of the various creeks is mud over coral, but in the outer anchorages it is sand and coral.

KERO NYUNI PASS is $3\frac{1}{2}$ miles wide between the reefs Wadiazi and Wanuni; it is deep and clear, with the exception of Mwamba Kizingiti, near the western end of the pass; a channel exists both northward and southward of this danger.

Kero Nyuni or Zanga, an islet, 20 feet high, covered with bushes, lies on the north-western extreme of Mwamba Wadiazi, south side of Kero Nyuni pass.

Mwamba Kizingiti, a patch of coral dry at low-water springs, near the centre of the pass, may be generally seen by the sea breaking on it. From it, Kero Nyuni and Seli-Seli rocks are plainly visible, and distant from 3 to $3\frac{1}{2}$ miles.

Mwamba Wanuni is 3 miles in length in an east and west direction, and one mile in breadth; a small shoal lies off its western edge; Wanuni is mostly steep-to and dries in parts at half ebb, showing a sandbank.

A good anchorage during the southerly monsoon is in 6 fathoms, sand and coral, one mile north of Kero Nyuni; and for a small vessel during the northerly monsoon, half a mile S.W. by W. of the same islet.

Tides and current.—It is high water at Kero Nyuni, full and change, at 4h. 15m.; springs rise 13 feet. The tidal streams within the islands are weak and irregular, being greatly influenced by the winds; but the usual southerly current is experienced at a distance of 10 miles outside the reefs.

NAMEGUO PASS to the northward of Mwamba Wanuni is $1\frac{3}{4}$ miles wide between the reefs, and clear of danger. It is the best pass for a stranger to enter by; the reefs show plainly, and the bottom is even, with fair anchoring ground over the whole of it.

Fungu Nameguo is a coral reef, 4 miles in length and 2 miles in breadth, on the north side of the pass, with several sand cays;

the northernmost one is covered at high-water springs. but the sea breaks heavily on it. Its north-west edge lies $9\frac{1}{2}$ miles off Ras Ulu.

Its seaward edges are steep-to, and when there is any wind a cross sea is generally experienced off it. There is good anchorage off the western side of this reef, in 7 to 10 fathoms.

Mwamba Majiwe Kubwa lies $1\frac{1}{2}$ miles north-westward of Mwamba Wanuni, with a 5-fathom channel between them. On the north-west portion of the reef is a sand cay, which dries 11 feet.

Fungu Lamkunama, a coral reef, with a sand cay on its western end, uncovers at low-water springs; a 2-fathom patch lies half a mile westward of the cay.

There is a narrow but clear channel, with 6 to 9 fathoms water, between Fungu Lamkunama and Mwamba Majiwe Kubwa.

Chapman reef, $1\frac{1}{2}$ miles northward of Fungu Lamkunama, is a coral reef, three-quarters of a mile in length; it dries at low-water springs, and has deep water all around.

Ras Ulu or Vela, the southern extreme of Mazimbwa bay, is a mangrove point, 80 feet high. It makes as a series of flat ridges.

A reef extends upwards of 5 miles south-eastward of this point, with several detached patches on its southern side; rocks and shoal water extend one mile from its north-eastern edge into Myonji pass.

Myonji island.—At $2\frac{1}{2}$ miles eastward of Ras Ulu, is Myonji island, one mile in length, thickly wooded, and 66 feet in height.

At one mile south-eastward on the reef are several mangrove trees.

Water.—Myonji island is much used by fishermen, who obtain their drinking water from wells some distance within Ras Ulu.

Anchorage.—Within the outer reefs there is excellent shelter in from 5 to 12 fathoms, the bottom being sand over coral.

The best position depends on the monsoon; the prevailing strong winds being from N.E. and S.E.

Tides.—The tidal streams within the outer reefs are irregular; the flood is stronger than the ebb, and enters by the various openings between the reefs.

TAMBUZI PASS, between the reefs of Tambuzi island and Fungu Nameguo, is 3 miles wide, with Bower shoal in the fairway.

Bower shoal consists of patches of coral, the shoalest water, 9 feet, being near its eastern edge.

To avoid this shoal, do not bring the south extreme of Myonji between the bearings of W. $\frac{1}{2}$ N. and W. by N. $\frac{3}{4}$ N.

Tambuzi island is $1\frac{1}{2}$ miles in length, east and west, and may be distinguished by being higher than the surrounding islands, and by groups of tall fir trees near its extremes. The reef on which this island stands extends for 2 miles on all sides, with the exception of the western.

Anchorage.—There is good anchorage three-quarters of a mile west of Tambuzi, in 9 fathoms, sand and coral, with Myonji summit bearing S.W. by W. $\frac{1}{2}$ W.

Masasari rock is 3 feet high, with a sand cay which uncovers at a quarter ebb, at one cable to the north-westward of it.

Mshanga island, 54 feet high, is of coral, wooded, and with a reef extending one mile eastward and southward.

Myonji pass, between Mshanga and Myonji reefs, is $1\frac{3}{4}$ miles wide, but narrowed to one mile by the rocks and shallow water extending northward from the reefs surrounding Myonji and Ras Ulu; it is the only ship channel to Mazimbwa bay, and carries from 13 to 30 fathoms water.

MAZIMBWA BAY, situated to the northward of Ras Ulu, is a capacious and well-sheltered anchorage, with depths of 5 to 9 fathoms.

The southern shore of the bay is covered with mangroves, backed by a wooded range 200 feet high. From Ras Niguro, on the northern side of the bay, a range of wooded hills extends northward to cape Delgado. Ras Niguro, at the entrance to Mazimbwa river, is a bold cliffy point, the highest on this part of the coast; the cliffs continue along the northern shore of the bay for 2 miles, thence the coast to Ras Msangi is low and sandy, occasionally fringed with mangroves.

Mud flats extend one mile off the south shore of Mazimbwa bay.

See charts, Nos. 658 and 2,762.

Mwamba Msaro.—At one mile off these mud flats is Mwamba Msaro, a narrow coral reef 2 miles in length, extending parallel to the shore, with shallow water between it and the shore reef. It dries at low-water springs.

Mwamba Kisocho may be considered the northern limit of Mazimbwa bay; this reef projects $2\frac{3}{4}$ miles from the mainland, with several detached shoals to the southward, and shallow water reaching $3\frac{3}{4}$ miles from the shore.

Ras Niguro bearing W. by N. $\frac{1}{2}$ N. leads clear of the southern limit of the shallow water; and Ras Msangi tall trees bearing N.N.E. leads eastward of it.

Directions.—To proceed to Mazimbwa bay, having entered by Tambuzi pass, and observed the clearing mark for Bower shoal (page 321), vessels should then pass southward of Masasari rock (3 feet high) at a half to three-quarters of a mile distant, and bring it to bear E. by S. $\frac{1}{2}$ S.; this bearing on astern, and steering W. by N. $\frac{1}{2}$ N., will lead through Myonji pass. When the western extreme of Mshanga bears N.E. $\frac{1}{4}$ E., steer N.W. $\frac{1}{2}$ N., avoiding the spit extending from Mwamba Msaro, until Ras Niguro, the north point of Mazimbwa river, bears W.N.W., when it can be steered for on that bearing, anchoring as convenient in Mazimbwa bay. There is an intricate and almost impracticable channel from the northward along the shore.

Anchorage.—When within Myonji pass, a vessel can always anchor, the depths varying from 5 to 10 fathoms, muddy bottom. A good berth is in 8 fathoms, with Ras Niguro bearing W. by N. $\frac{3}{4}$ N., and Ras Ulu S.S.E.; a small vessel may proceed nearer the river and anchor in about 4 fathoms.

Tides.—The flood sets to the westward, and is scarcely felt, but the ebb sets to the eastward at the rate of from 2 to 3 knots an hour at springs.

Mazimbwa creek trends in a north-west direction for 4 miles, and is then lost in a mangrove swamp. Boats can only ascend it on a rising tide; extensive mud and sand banks reduce the channel to a few yards in width.

Within the entrance there is a general depth of $1\frac{1}{2}$ fathoms. Holes of 6 and 3 fathoms exist, but are surrounded by shallow water. The narrow and circuitous passage, with $1\frac{1}{2}$ fathoms water, is southward of Lupululu island, which lies in the entrance.

The town of Mazimbwa, on the north side of the creek, has a population of about 400, under Portuguese jurisdiction. The fort is a ruin overgrown with weeds and not distinguishable from seaward.

On the western side is Mtamba village, consisting of about 100 huts.

Supplies.—Trade.—Fowls, goats, sweet potatoes, &c., are obtainable.

Several Banians reside at Mazimbwa, exporting india-rubber in a raw state, and importing American cloth, arms, &c. A dhow runs monthly to Ibo.

SUNA PASS, between Tambuzi island reef and Mwamba Tambula, is $2\frac{1}{4}$ miles wide and clear of danger. Vessels from the northward may approach Mazimbwa bay by this pass, on either side of Masasari rock, and thence as before directed (p. 322); the shoalest water known is $5\frac{1}{2}$ fathoms nearly in mid-channel.

Suna island is small and of coral formation, with its summit crowned with trees 58 feet above the sea; it is free from danger on its western side, but a reef extends about one mile in an east and south direction.

Congo island, 35 feet high, is situated on the reef about 4 miles north-westward of Suna. Coral flats extend in all directions from it.

Mwamba Kisanga Mungu embraces the whole of the numerous coral patches and rocks lying between Mshanga and Congo islands; it consists of extensive coral reefs, with several sand cays and detached rocks, with one and 2 fathoms water between them. These coral patches and shallow water extend north and south over a space of about 10 miles.

Luwinza rock, 6 feet high, stands on this flat at about $1\frac{1}{2}$ miles north-eastward of Mshanga.

See charts, Nos. 658 and 2,762.

RAS MSANGI, the northern extreme of Mazimbwa bay, is a well marked point 47 feet high ; it may be recognized by a clump of casuarina trees, 94 feet high, on its northern side, the most conspicuous object on this part of the mainland.

The coast reef extends $1\frac{1}{2}$ miles eastward of Ras Msangi, and shallow water borders the point to a distance of $2\frac{3}{4}$ miles, and thence the coast to the south-westward to Mwamba Kisocha.

Channel.—A 3-fathom channel to Mazimbwa bay exists southward between the shallow ground extending from the shore of Ras Msangi, and the shallow ground to the north and west of Congo island, but it is so circuitous and narrow, with no leading marks, that it is impracticable for vessels.

Jeffreys rock, a pinnacle having less than 6 feet water, with 4 to 6 fathoms around, is the southern danger in this channel ; it lies with Msangi high clump bearing N.E. $\frac{3}{4}$ N. $4\frac{1}{2}$ miles.

NYUNI PASS, between Mwamba Tambula and the reefs extending southward from Kifuki and Mtundo islands, is $3\frac{1}{2}$ miles wide at the entrance, but reduced to three-quarters of a mile by Gray patches and a 3-fathoms shoal off the south side of Kifuki island.

Mwamba Tambula, forming the south side of Nyuni pass, is 4 miles in length, with sand cays and boulders drying from 5 to 9 feet. It is steep to on the northern and eastern faces, and the surf plainly marks the edge of the reef.

Nyuni island, 17 feet high, at the north-west extreme of the reef, is small, flat, and covered with short grass.

Gray patches extend $2\frac{1}{2}$ miles north-north-westward from Nyuni island ; they consist of patches of $2\frac{1}{2}$ to 3 fathoms, with 4 and 5 fathoms water between them.

Kifuki and Mtundo islands are on one reef ; both are about 80 feet high and thickly wooded. A reef extends northward, eastward, and southward of these islands, to the distance of $1\frac{1}{2}$ miles in places. On the reef, at the north-east end of Mtundo, is Sandcay islet, 23 feet high, and Makunga islet, 8 feet high.

Directions.—To enter Nyuni pass, steer for Nyuni island, bearing W.S.W., until the clump of trees on Ras Msangi (probably the only

portion of the mainland visible) bears N. W. by W. $\frac{1}{4}$ W., when the trees can be steered for; this course will lead a vessel in mid-channel, with not less than 10 fathoms, to Kifuki pass.

Kifuki pass, between Ras Msangi and Kifuki island, has a coral shoal of $4\frac{1}{4}$ fathoms, and 3 cables in extent, in mid-channel. The western point of Kifuki may be rounded at a distance of 4 cables, but a flat with depths of $1\frac{3}{4}$ fathoms and less, extends 2 miles eastward of Ras Msangi.

Anchorage.—Good anchorage will be found in 5 and 6 fathoms, sand and coral, three-quarters of a mile north or south of the west point of Kifuki, according to the monsoon.

Tides.—It is high water, full and change, in Kifuki pass at 4h. 10m.; springs rise 14 feet, and neaps 9 feet. The flood sets north-westward from 2 to 3 knots at springs, but is scarcely perceptible at neaps.

MTUNDO PASS is the opening between the reefs of Mtundo and Wamizi islands; there is a deep channel $3\frac{1}{2}$ miles wide between Fungu Makunga and Wamizi reef. The best channel to the inner anchorage is the one northward of Penguin shoal.

Aspect.—Wamizi island is the highest of the islands in this district, being nearly 100 feet in height, and is visible from a distance of about 15 miles; on a near approach the reef will be seen breaking heavily with a white sandy beach at the back. The wooded islet Mkunga, 30 feet high, stands on the reef at the north end of Wamizi.

Shoals.—Fungu Makunga are detached shoals of $2\frac{3}{4}$ and 3 fathoms on the bank which extends about $3\frac{1}{2}$ miles from the north-east point of Mtundo. There is generally a swell in Mtundo pass, causing the sea to break on these patches at low water.

Mwamba Mtundo are coral and sand patches, drying at three-quarters ebb, situated 2 miles northward of Mtundo.

Gulnare reef lies one mile west-north-west of Mwamba Mtundo, with 4 to 6 fathoms water around it. Small craft should not use the channel on either side of Gulnare reef, except at low water, when the reefs show plainly; the eye and lead are the best guides.

Penguin shoal, one mile northward of Gulnare reef, is $1\frac{1}{2}$ miles in extent, with a least depth of 6 feet.

Vumba and Kisingura islands are wooded, and 64 and 44 feet high, respectively.

At $1\frac{1}{2}$ miles north-eastward of Vumba island is a mushroom-shaped coral islet 4 feet above high water, in the centre of a coral flat.

Directions.—Anchorage.—Entering Mtundo pass, by keeping Vumba island bearing between W. by S. and S.W. by W. $\frac{3}{4}$ W., the dangers on either side will be avoided. The main channel is northward of Penguin shoal, and is 8 cables wide, with depths of 8 to 10 fathoms.

To proceed by this channel to an anchorage within the islets; from abreast Fungu Makungu, bring Ras Nondo to bear N.W. by W., and steer for it until the west extreme of Vumba bears S.W. $\frac{1}{2}$ W.; thence steer about West, until the west extreme of Vumba bears S.W. $\frac{3}{4}$ S., when it may be steered for.

A good position is in 7 fathoms, sand, with Ras Nondo bearing about N.W. by N. The passage westward of Vumba is only 3 cables wide, with a depth of 4 fathoms, and only practicable for vessels of light draught.

The channel southward of Penguin shoal has depths of 4 to 6 fathoms between the various reefs, but the water shoals to $3\frac{3}{4}$ fathoms between Vumba and Kisingura islands with several patches of from 2 to 3 fathoms.

COAST.—**Ras Nondo** may be easily recognised from the southward by a group of casuarina trees about 80 feet high. The land around is low and wooded, and there are villages consisting of a few huts on the coast, from the inhabitants of which a few fowls may be obtained; these villages will be found in the cocoa-nut groves. There is a boat passage between the flats and Wamizi island.

Sand flats, dry at low water, extend off shore southward about 2 miles in places, and bordered by shallow water, rendering landing impracticable except at high water.

WAMIZI PASS, between the reefs of Rongwi and Wamizi islands, is $5\frac{1}{2}$ miles wide, and between the reefs of Keramimbi and Wamizi $3\frac{3}{4}$ miles; it is deep and clear, with the exception of Mwamba Mpanga-panga.

Wamizi island is nearly 8 miles in length, east and west, and rather less than one mile in breadth ; it is 63 feet high at its west end, 92 feet high at its east end, and wooded. The island is fringed by a reef to a distance of $1\frac{1}{2}$ miles in places.

The Portuguese formerly had an establishment here, but the scarcity of water caused its removal.

Mwamba Mpanga-panga.—The south end of this danger lies about $2\frac{1}{4}$ miles north-east of the west extreme of Wamizi ; the reef is $1\frac{1}{2}$ miles in extent, composed of coral and sand, dry in places at low water springs, and steep-to on all sides ; it usually breaks after half ebb.

Keramimbi island, 40 feet high, on the northern side of Wamizi pass is nearly one mile in length, and thickly wooded. A coral reef, dry at low water, surrounds it to a distance of $1\frac{1}{2}$ miles to the southward and eastward ; the whole space within the island as far northward as Ras Afunji, is shallow.

Pollard shoal, half a mile in extent, with $1\frac{1}{2}$ fathoms water, and steep-to, lies S. by E. $\frac{1}{2}$ E., distant $2\frac{3}{4}$ miles from the east extreme of Rongwi island.

Maiyapa bay.—The shores of this bay, between Ras Nondo and Ras Afunji, 12 miles apart, are bordered with extensive sand flats, which, with Mwamba Mpanga-panga, Keramimbi and its surrounding reefs, together with numerous deep holes of 30 and 20 fathoms, limit any anchoring ground to a comparative small area.

The western part of the bay near Mluri is mangrove, but the north and south portions are sand. The only prominent features in Maiyapa bay are three casuarina trees, the centre and largest lying $2\frac{1}{2}$ miles north-west of Ras Nondo. In the south-west part of the bay are the rivers Mluri and Maiyapa.

Marongo.—The principal village in the bay is that of Marongo, consisting of about 70 huts ; a few fowls, goats, and sweet potatoes may be obtained. Several villages are situated in the cocoa-nut groves.

Directions.—The approach to Maiyapa bay is by Wamizi pass. Mkunga islet off the north end of Wamizi should be passed at the distance of 2 to 3 miles ; when that islet bears S.E. by E., it will then

show clear of the island, and if kept on this bearing astern, will lead to an anchorage in 10 fathoms, sand and shells, with the east point of Keramimbi bearing N.N.E.

If seeking a more sheltered anchorage, from the position just given, steer for the large tree (70 feet) bearing W.S.W., until the west end of Wamizi bears South; then alter course to N. by W. $\frac{3}{4}$ W., and anchor as convenient in from 6 to 10 fathoms, sand and coral.

Anchorage may also be taken under the west edge of Mpangapanga reef, for which *see* the chart.

H.M.S. *Nassau* rode out a strong south-easterly gale in smooth water, 5 cables south-west of this reef in 6 fathoms, sand and coral.

Tides.—In Maiyapa bay, the flood sets north-westward, and the ebb south-eastward at the rate of 2 to 4 knots at springs.

Port Mluri.—A tongue of sand, dry at half ebb, projects 2 miles northward from the southern shore of Maiyapa bay, and shallow water extends for a further distance of 2 miles, westward of which is the channel to port Mluri. This channel is narrow, with a 9-foot shoal partly blocking the fairway; the anchoring ground in the port has depths of 7 to 10 fathoms, mud, but is adapted for small vessels only. The Portuguese have a settlement here.

COAST.—Ras Afunji, 15 feet high, the southern point of Tunghi bay, is fronted by a sandbank dry at low water to the distance of a mile. The channel between it and Rongwi island is one mile wide, but obstructed by reefs.

Dhows trading to Kiuya, however, frequently pass through at high-water springs.

Rongwi and Tekomaji islands stand on one continuous coral reef, upwards of 9 miles in length in a north and south direction, the seaward face of which is steep-to. The reef skirts the islands generally at a distance of one mile, and on the south-east part, where it extends farther off, there are several detached black rocks uncovering at half ebb.

Rongwi island is 2 miles from Ras Afunji, and $1\frac{1}{2}$ miles from Tekomaji; off its north-west point is the wooded islet of Kamesi,

40 feet high. Tekomaji island is of a triangular shape, 2 miles long, and as its name implies, there is no water on it.

When approaching these islands from seaward, the only distinguishing features are two rounded clumps of trees, 94 feet high, on the eastern part of Rongwi, and when within 6 miles, three casuarina trees on the eastern shore of Tekomaji may be seen ; there is also one or more casuarina trees on the north-western point of Tekomaji. Both islands are low and flat, but densely wooded ; the outer coast of Tekomaji is rocky, but that of Rongwi is principally sandy beach.

TUNGHI BAY.—**Aspect.**—Tunghi bay, between Delgado and Ras Afunji, is about 8 miles wide, with a sandy beach around its shores with the exception of the portion between Kiuya or Tunghi village and cape Delgado, which is rocky. The land between cape Delgado and the head of the bay is from 80 to 200 feet high, thence to Ras Afunji it is low and flat. On the wooded ridge west of Mto Mngani is a single baobab tree, also a compact group, 250 and 228 feet high respectively ; the former is the highest ground in the vicinity of cape Delgado. There is also a conspicuous single palm tree 75 feet high, half a mile from cape Delgado, which shows distinctly all over Tunghi bay.

From Ras Afunji round the head of the bay to Kiuya village are sand and coral flats stretching one mile off shore ; shallow water extends a considerable distance beyond.

The entrance to Tunghi bay between the reefs of cape Delgado and Tekomaji is $2\frac{1}{2}$ miles wide. The reef extending $1\frac{1}{4}$ miles off the northern and north-eastern ends of Tekomaji, is steep-to with no off-lying patches ; the reef off cape Delgado projects one mile south-eastward and is similar in character to Tekomaji reef ; the surf usually marks the edges of these dangers.

Mto Mngani, in the western part of Tunghi bay, is 3 cables wide at the entrance, but banks, dry at low water, narrow it to less than one cable ; canoes can only ascend $1\frac{1}{2}$ miles from the mouth. The village of the same name is situated on the western bank.

Kiuya village, or Tunghi, is concealed from view by a belt of thick mangrove bushes which front the shore, but the position of the village may be readily identified by a thick grove of cocoa-nut trees. The old fort is a small square building in a dilapidated state.

Dhows trading to this place anchor off the village until high water, when they proceed into narrow lanes cut in the mangroves; with their masts down they are completely hidden from view of a boat passing immediately outside.

Supplies.—A few fowls, eggs, &c., are usually obtainable.

Firewood may be cut on any part of the coast between Ras Pekawi and cape Delgado; it is generally ill adapted for steaming purposes, but by a careful selection of trees, many of them might advantageously be used with coal.

Directions.—The lighthouse on cape Delgado (page 332), and the group of baobabs on the hills at the head of the bay, will serve to identify Tunghi bay. The best time to enter is in the morning, as the group of baobab trees bearing W. $\frac{1}{2}$ N. leads in mid-channel; soundings will not be obtained with the hand lead until Ras Afunji is well open westward of Tekomaji. When that point bears S. $\frac{1}{2}$ W., a vessel of deep draught should either anchor, or haul down for it on that bearing, and anchoring under Tekomaji, with its west extreme bearing S.E. by E. or E.S.E. This is a sheltered anchorage.

Vessels of light draught could, if necessary, go farther on the above bearing of the baobabs, until Ras Afunji bears S.S.E. $\frac{1}{2}$ E., anchoring in 6 to 9 fathoms, mud. There is considerable swell here at times.

Tides.—It is high water, full and change, in Tunghi bay, at 4h. 5m.; springs rise 14 feet and neaps 9 feet.

Climate.—The fever months here are coincident with the principal rainy ones, viz., February to May.

Winds.—The general experience gained in H.M.S. *Nassau*, whilst surveying the coast, was as follows: north-easterly winds from December to March, getting lighter as the season progresses, varied occasionally by heavy squalls of wind and rain from N.W., accompanied by vivid lightnings and heavy thunder.

The change of monsoons occurs in April, heavy squalls then frequently occur from South and S.W. By the beginning of May the steady southerly monsoon has set in, generally freshening in the

afternoon to a strong breeze ; from this month the force gradually lessens, and the wind veers to the eastward ; by October very light easterly winds prevail, the change to N.E. taking place in the early part of November in a gradual manner with a few light showers.

Between the islands and the main, land and sea breezes prevail, the latter during the months of May and June blow very fresh.

Currents.—As previously stated at page 30, the separation of the equatorial current takes place between the parallels of about lat. 10° to $11^{\circ} 0'$ S., or in the vicinity of cape Delgado. During the height of the north-east monsoon, the separation is at its maximum northern limit, and *vice versâ*.

See charts, Nos. 658 and 2,762.

CHAPTER VIII.

 CAPE DELGADO TO RAS KIMBIJI, APPROACH TO ZANZIBAR CHANNEL.
(Lat. $10^{\circ} 40'$ S. to lat. 7° S.)

 VARIATION IN 1897.

Cape Delgado	-	-	-	-	$10^{\circ} 45'$ W.
Kilwa Kisiwani	-	-	-	-	$10^{\circ} 30'$ W.
Mafia island, north end	-	-	-	-	$9^{\circ} 30'$ W.

CAPE DELGADO, known by the natives as Ras Kongo, is low, covered with trees, and not easily distinguished from the other low land and islands when coming from the southward, but from the northward it makes like an island. A lighthouse is erected on it, and there is, or was, a palm tree, 75 feet high, on its south side, half a mile from its extreme. A coral flat, dry at half tide, fringes the cape, extending in places to the distance of one mile.

Boundary.—The coast northward (from $10^{\circ} 40'$ S.) of cape Delgado is German territory ; *see* page 9.

LIGHT.—From a wooden lighthouse, painted black, erected on cape Delgado, is exhibited, at an elevation of 59 feet above high water, a *fixed white* light, visible seaward between the bearings of N. 25° E. and S. 25° E., from a distance of 10 miles in clear weather.

COAST.—From cape Delgado the coast is low and thickly wooded as far as cape Rovúma or Swafo, a distance of 14 miles ; between are the bays of Mbwezi and Keonga, which are separated

See plan, cape Delgado to Mikindani bay, with views, No. 690 ; chart of cape Delgado to Kilwa, No. 1,808 ; and No 2,762.

by Ras Nasunga. The shore for the whole distance is skirted by reefs. The long ocean swell generally breaks heavily on these reefs, which are visible some distance off.

Mbwezi bay, between cape Delgado and Ras Nasunga, is about $5\frac{1}{2}$ miles wide, with a long white sandy beach in its north-western part. There is, however, no anchorage in this bay, the reefs which skirt the coast being steep-to, and as there are no creeks, landing is seldom practicable.

Mbwezi village stands at the head of the bay, near the south end of the sandy beach, in a groove of cocoa-nut trees.

Ras Nasunga is low, and may be recognised by the number of detached rocks off it. A reef, with boulders on its outer edge, extends in a south-east direction $1\frac{1}{2}$ miles from the point, diminishing to about three-quarters of a mile near the village of Mbwezi, and thence round cape Delgado. The sea generally breaks on the outer edge, while within it may be comparatively smooth, but southward of the latter point it is reduced by the reefs extending from either side to but little more than half a mile wide, with depths of 3 fathoms and less for a distance of $1\frac{1}{4}$ miles off shore.

KEONGA or KIONGA BAY is 4 miles wide between Ras Nasunga and Ras Samadudu. There are a number of sandbanks that dry at low water springs near its head.

The water deepens rapidly outside the 5-fathoms line, affording but little anchorage space, and the bottom is rocky in places. Within that depth there are shallow heads of coral, one or more of which dries.

Mwamba Ricoma is the southern termination of the coast reef which extends off Ras Samadudu for a distance of $1\frac{1}{2}$ miles, forming the northern boundary of Keonga bay. It dries in places at low water.

The Keonga, Letonda, and the Mpambi, at the head of Keonga bay, are arms of the sea ; the water from Mto Mpambi is said to join Mto Decomba to the north-west at spring tides, when it is available for canoes.

Buoyage.—The best water from the bay to Mto Letonda is marked by three buoys, marked K 1, K 2, and K 3. The outer buoy, K 1, in 11 fathoms, at nearly 2 miles from the mouth of the

Letonda, is a fairway buoy, painted in red and black vertical stripes, and surmounted by a St. Andrew's cross; the two inner buoys are red. The mouth of the Letonda is easily distinguished by the tall casuarina trees on its north shore.

Directions.—Anchorage.—The best anchorage is off Ras Nasunga, in $7\frac{1}{2}$ fathoms, sand, with the extreme north point seen, bearing N.N.W., Mto Keonga south point W. by N. $\frac{1}{4}$ N., and Ras Nasunga S.S.W.

To pick up this anchorage, steer for Ras Nasunga, on the bearing given, until in 10 fathoms water, when the anchor should be immediately let go. Small craft can enter the Letonda, but local assistance should be obtained. The course is from buoy to buoy, leaving the red buoys on the starboard hand, but they should not be depended on. Entering the Letonda the south shore must be kept.

Settlements.—Keonga, a village about 2 miles up on the south side of the creek of that name, stands in a groove of cocoa-nut trees, on a small ridge 70 feet high, and is the resort of many of the dhows trading on the coast. It comprises about 1,000 huts, and its population was estimated at 4,000 in 1895. There is a well of good water in a spring before the village, but other supplies are not obtainable.

The channel leading to Keonga is shallow and tortuous; boats should only ascend it with a rising tide.

ROVÚMA BAY is contained between Ras Swafo and Ras Matunda, the distance between being about 9 miles; the depth of the bay to the river entrance is about 4 miles.

Ras Swafo (Cape Rovúma), the south-east point of Rovúma bay, is low and thickly wooded, with a small conical hill, 77 feet high, at a quarter of a mile from the coast; this hill is conspicuous when near the land. The coast of Swafo from Ras Samadudu is low and thickly wooded, and fronted by a reef to the distance of $1\frac{1}{2}$ miles.

Northward of Ras Swafo the reef dries in patches at low water springs, nearly three-quarters of a mile from the shore, with depths of one to 2 fathoms, at the distance of $1\frac{1}{2}$ miles. The edge of this bank is steep-to, and the tidal streams are strong, rendering it necessary to give it a wide berth.

From Ras Swafo, round the head of the bay to Mto Letokoto, the land is covered with mangrove trees, and is nearly all swamp at high water springs. About 2 miles northward of the Rovúma, on the coast, is a conspicuous square clump of trees, and at $1\frac{1}{4}$ miles farther north is a group of three tall trees, which from seaward form one of the most prominent features in Rovúma bay.

Hills.—Kilima Mundo is a rather sharp well-wooded peak, 350 feet high, on the south side of Rovúma river, and the highest land in the vicinity.

Kilima Macheriuka, north of Rovúma river, is the south-east shoulder of a flat range extending to the north-westward. From seaward this shoulder may be readily identified by three large baobab trees near the summit of its eastern face, one of which is about 340 feet above the sea.

Mto Decomba is a creek three-quarters of a mile westward of Ras Swafo, with a bar on which the sea generally breaks heavily, but it is at times possible for a boat to get in at half flood. Within the bar depths of 2 to 3 fathoms water can be carried for one mile to the south westward. This creek is reported to be navigable at high water springs for canoes to Keonga bay.

Mto Mquango is a small creek eastward of Rovúma river into which boats can enter at high water springs, but some little distance up it is almost impassable for canoes. The sea generally breaks heavily off the entrance of this creek.

Mto Letokoto, a creek north of Rovúma river, is about three-quarters of a mile wide at the entrance, and reported to be navigable by canoes for a distance of 15 miles, where it joins the Rovúma river, but it dries across the mouth.

Ras Matunda, the north point of Rovúma bay, may be recognized by a series of white sandhills, about 80 feet high, and one mile in extent, near the coast; there is a single tall tree on their eastern extreme, which is conspicuous from the northward or southward.

The coast reef dries nearly one mile off Ras Matunda, whence it trends south-westward to the remarkable trees southward of Mto Letokoto, where its distance decreases to $1\frac{1}{2}$ cables, but with shallow water some distance beyond.

Anchorage.—There is good anchorage on the south side of Rovúma bay in 7 fathoms, mud, with Ras Matunda bearing N. by W.; Kilima Mundo, S.W. by W.; and the extreme of Ras Swafo, S.E. Less swell is experienced here than in other parts of the bay.

Good anchorage may also be obtained on the north side of the bay, in 10 fathoms, mud, with Ras Matunda bearing N. by E.; and the remarkable trees, W. $\frac{3}{4}$ N.

There is no anchorage immediately off the river entrance, as the bank is very steep, and the depth decreases from 90 fathoms to 5 fathoms within a distance of 2 cables.

Landing.—Westward of Mto Decomba is a long flat sandy beach, on which it is possible to land occasionally, but between Rovúma river and Ras Matunda it is seldom possible to effect a landing, the bay being open to the ocean swell, and heavy rollers are at all times breaking.

Tides.—It is high water in Rovúma bay, full and change, at 4h. 10m.; springs rise 12 feet; the ebb running to the northward and flood to the south-eastward. When the river is high the current runs out without ceasing, overcoming the flood tide.

ROVÚMA RIVER,* between the trees on either side of its mouth, is about 8 cables wide, but at low water this is reduced by a sandbank that dries from the west shore, to less than 4 cables. From thence, the direction of the river is south-west, but at about 2 miles within the entrance the channel is obstructed by sandbanks, in places nearly dry at low water springs. (This was in September, during the dry season, when the river was very low.)

Although there is no bar, the great depth of water immediately outside the mouth of the river, changing suddenly to 3 fathoms, causes dangerous overfalls, especially when the wind is blowing from the eastward, rendering it at such times unsafe for a boat to attempt to enter, the sea breaking right across. The ebb runs stronger near the mouth of the river than a row boat could stem.

The entrance is not easily made out until abreast of it, and there are several smaller openings, both north and south. The muddy water from the river extends into deep water, and the clearly defined line where it meets the blue water is very noticeable.

* See plan, Cape Delgado to Mikindani bay, No. 690, and charts 597 and 1,808.

Inland Navigation.—About 2 miles within the mouth of the river sandbanks commence, which render the navigation intricate, the channel being narrow, with a depth of only a few feet in places, and here and there running abruptly from one side of the river to the other. The navigation of the Rovúma depends much upon the season, it being highest in March and lowest in about October. Mr. May ascended the river 30 miles in H.M.S. *Pioneer* in March 1861; the water subsided in the middle of the month, but rose again nearly to its former height at its end. Mr. May's examination of the river was made between these periods, and at his turning point there appeared to be no impediment to further progress, but the water beginning to fall rapidly induced him to return to the entrance, in doing which a depth of 5 feet only was carried in places. The stream ran 3 knots.

Dr. Livingstone ascended the river in boats 156 miles, in September 1862, and proceeded to just below Nyamatolo island, lat. $11^{\circ} 53' S.$, long. $38^{\circ} 36' E.$, about 114 miles as the crow flies from the coast. The river was unusually low, entailing frequent dragging of the boats at the shallow parts. The ascent of the river occupied 15 days, and its descent 10 days.

The bed of the river is about three-quarters of a mile wide, flanked by well-wooded table land, apparently ranges of hills 500 feet high; sometimes the spurs of the hills come close to the river, but there is generally about one mile of alluvial soil between the high land and the bank.

About 60 miles up the river the table land recedes, and there is an immense plain with detached granite rocks and hills dotted about it; here some rocks appear in the river. At Nyamatolo island, the farthest point reached by the expedition, the bed of the river is all rocky, the water rushing through numerous channels between rocky masses 4 or 5 feet out of water. Canoes go through these channels with ease, and the expedition might have taken their boats up, but they were informed that the channels were much narrower farther up, and that it was likely they would get them smashed in coming down.

The distance from Ngomano, 30 miles above Nyamatolo island, to lake Nyasa, was said to be 12 days' journey. The Liendi enters the Rovúma at Ngomano; it rises in the mountains on the east side of lake Nyasa. The great slave route to Kilwa Kivinje was along the banks of this stream, which is only ankle deep in the dry season.

See chart, No. 597.

Natives.—There are but few people near the mouth of the river, but farther up there are numerous villages, some on sand islets in the river.

The Tsetse fly is met with along the Rovúma, and the people in consequence have no cattle.

Supplies.—Only a scanty supply of provisions is to be obtained from the natives. The water of the river affects people at first. Wood for steamers may be procured.

MSIMBATI CHANNEL.*—From Ras Matunda the coast and reef take a north-north-west direction for 4 miles to Ras Ruvura; the reef, which is steep-to, extends from one-half to three-quarters of a mile from the shore. Msimbati channel, about three-quarters of a mile wide, is the break in the reef at Ras Ruvura, with depths of about 30 fathoms, and leading into Mnazi bay.

From the west side of entrance to this channel, a reef nearly 2 miles in width protects Mnazi bay, extending 10 miles to the north-westward, where it turns westward to Mikindani bay.

There are two islands on this reef. Mongo, the larger of the two, is low, thickly wooded, and has a number of tall trees near its north-west extreme that show well from the northward. An island named Nakitumbi is connected to it by a bank of sand which dries at first quarter ebb. Mana Hawanja, the eastern islet, is also low and covered with trees.

MNAZI BAY* is a large sheet of water within the coral reef which surrounds the islands of Mana Hawanja and Mongo. This bay is about 8 miles long in a south-east and north-west direction, and about 5 miles wide from the entrance to Mnazi village; its extremes are shallow but the middle is clear, with depths of from 7 to 16 fathoms, sand and coral. The entrance is by Msimbati channel, which is deep.

A bank of sand and coral, extending from a half to $1\frac{1}{2}$ miles off shore, fringes the whole of the bay from Ras Msimbati to Ras Sangamku, which makes landing difficult, unless at high water, when it is practicable at Mnazi village.

Reefs.—Fungu Achumbu is a coral reef, $1\frac{1}{4}$ miles in length, dry in patches at low water, and situated about one mile from the conspicuous tree on Ras Msimbati. At 3 cables eastward of the north

* See enlarged plan of channel and anchorage of Msimbati, on No. 690.

end of Achumbu is a patch, awash at low water, with deep water between. A coral patch, dry at low water, lies nearly one mile N.W. of the conspicuous tree; this patch is on a bank of sand and coral, 8 cables in extent, nearly in mid-channel, and upon which the depths vary from 2 to 5 fathoms.

For other shoals, *see* the plan.

Directions.—From abreast the entrance, steer in between the reefs, with Ras Msimbati bearing S.S.W. $\frac{1}{2}$ W., until the south extreme of Mana Hawanja island bears N.W.; then steer S.W. $\frac{1}{4}$ W. (to avoid the coral flat of 2 to 3 fathoms, which extends off shore, northward of Ras Msimbati); when that point bears South it can be steered for, anchoring as convenient in from 10 to 15 fathoms, sand.

Should the wind be blowing fresh from the northward, a better anchorage will be found southward of Mana Hawanja island; to reach this anchorage steer in as before for Ras Msimbati until the south-west point of Mana Hawanja island bears N.N.W., then steer N.W., and anchor in from 10 to 13 fathoms as convenient.

Tides.—It is high water, full and change, in Mnazi bay, at 4h. 0m.; springs rise 11 feet. The stream in Msimbati channel runs from 4 to 5 knots at springs, with heavy overfalls off the point of the reef extending south-eastward of Mana Hawanja island.

There is very little tidal stream felt in Mnazi bay; outside however, the stream takes the direction of the coast, the ebb running to the north-westward and the flood south-eastward, with a velocity of from 2 to 3 knots an hour at springs, and strongest near the reefs.

Mnazi is a small village in the south-west bight; the population is about 300.

Supplies.—A few fowls, eggs, and goats are to be obtained from the villages between cape Delgado and Kiswere harbour.

Mangrove wood for steaming purposes can be procured on any part of the coast, but if native labour cannot be obtained, it is as well, if possible, to shun the fever breeding swamps in which the mangrove generally thrives.

Water for boats employed cruising may be obtained from a well near the coast about a quarter of a mile northward of Ras Msimbati, but there is no place between cape Delgado and Mikindani bay where a vessel could obtain water with facility.

MIKINDANI BAY lies between Ras Sangamku and cape Paman, and is about $4\frac{1}{2}$ miles wide between the reefs. The shores of the bay are fronted by coral flats, which extend from a half to $1\frac{1}{4}$ miles off, and dry in patches at low water springs. Abreast Ras Sangamku, the eastern point of the bay, the flat extends off $1\frac{3}{4}$ miles. The only anchorage is on the east side, between Shangani shoal and the coast reef. Mikindani bay may be readily identified from seaward by Mlima Mjoho, a remarkable conical hill 617 feet high, covered with trees, and also, if within 7 miles of the entrance, by Hull rocks, 62 feet high, at the north point, a mass of conglomerate coral, covered with brushwood. Both sides of the bay are low, and thickly wooded, while at the head, over Mikindani harbour, the hills rise to a height of from 400 to 550 feet.*

Shangani shoal is a patch of coral and sand, lying in the fairway of the entrance to Mto Mtwara, with deep water all round it; from the shoalest part, 3 fathoms, Ras Richemerero bears S. $\frac{1}{2}$ W. distant 2 miles nearly.

MTO MTWARA.—This spacious and well sheltered-harbour, situated on the south-east side of Mikindani bay, is $3\frac{1}{2}$ miles in length, by $1\frac{1}{2}$ miles in breadth, and affords good anchorage in from 6 to 14 fathoms nearly all over it. The entrance is deep, and from one to 2 cables wide, between Mwamba Ribunda and Mwamba Shangani, the coral flats fronting the coast on either side.

Messemo sand spit on the east side of the channel, and about $1\frac{1}{2}$ miles within the edge of the reefs, is steep-to. Patches of 2 to 3 fathoms are situated near the middle of the harbour, as shown on the plan. On the south side of the harbour is Mto Pwazie, a creek extending about 2 miles to the southward, when it becomes lost in the mangrove.

Directions.—To enter Mto Mtwara, keep Hull high rock (62 feet), bearing N.W. $\frac{3}{4}$ N. astern, or Ras Richimerero the west point of the entrance, bearing eastward of South, ahead, until Ras Sangamku bears E. by N., to avoid Shangani shoal. Then edge to the eastward until

* See plan of Mto Mtwara and Mikindani harbours, with views, No. 684.

the Finger tree (from which the lower branches were cut off in 1874), bears S. by E. and steer for it on that bearing, between the reefs. When Messemo sand spit bears S.S.W. $\frac{1}{4}$ W., or the shoulder of Mjoho hill is in line with Button rock (*see* view on plan), steer for Messemo village, borrowing a little on the eastern shore; thence as requisite round the spit to the anchorage.

When past Ras Richemerero, if entering on the flood tide, keep well over on the eastern side, and if with the ebb running out, keep towards Mtwara village to allow for turning, as the stream runs sharply round Messemo sand spit from $2\frac{1}{2}$ to 3 knots an hour.

With a good look out aloft there is no difficulty in entering the harbour with the sun astern, the eye and colour of the water being the best guides, as the marks given are none of the best, and probably by this time the trees mentioned may be hidden or unrecognisable.

Anchorage.—The best temporary berth is near Messemo spit, in 14 fathoms, sand, with the end of the spit bearing N.W. by W. $\frac{1}{2}$ W., and the small cliff S.W. If intending to make any stay, there is better anchorage under the northern shore farther up the harbour, in from 7 to 10 fathoms, mud.

Tides.—It is high water, full and change, at Mto Mtwara harbour, at 3h. 45m.; springs rise 12 feet; the tides run strong at the western anchorage, and also in the channel.

Supplies.—There are three villages on the shores of the harbour, where small supplies are obtainable.

Misete creek lies between Mto Mtwara and Mikindani harbour; its entrance is about $1\frac{1}{2}$ cables in breadth between Mwamba Dadi and Mwamba Shangani, with a depth of about 4 fathoms.

Within the entrance, the creek expands into a basin nearly half a mile across, with depths of $1\frac{3}{4}$ to $2\frac{3}{4}$ fathoms, sand and pebbles. A small vessel would be well sheltered here, but with the harbours of Mikindani and Mto Mtwara so near, there would be no object in pushing into such a confined space.

MIKANDANI HARBOUR, generally known as Pimlea harbour, lies at the head of Mikindani bay; it affords secure anchorage in from 6 to 8 fathoms, mud, with a least depth of $5\frac{3}{4}$ fathoms in

the entrance channel, which is only $1\frac{1}{2}$ cables wide in one place between the coral flats on either side. The observation spot on the south shore of the harbour is in lat. $10^{\circ} 16' 31''$ S., long. $40^{\circ} 7' 33''$ E.*

Rocks.—At $2\frac{3}{4}$ cables S.W. by W. $\frac{1}{2}$ W. from Pemba point is a rock with less than 6 feet water; in the south part of the harbour, 3 cables N.N.E. of the custom house, are two rocks awash at low water, marked by a white beacon; a third rock lies nearly 2 cables from the custom house on the same bearing.

The shores of the bay are foul to the distance of 4 to 7 cables.

Buoyage.—Red spar buoys with white topmarks mark the starboard side of the channel on entering, and black conical buoys the port hand; for positions, *see* the plan; they are not to be depended on.

Directions.—Anchorage.—To enter Mikindani harbour from the northward, after passing Hull rocks at the distance of half mile, a S. by W. $\frac{1}{2}$ W. course leads up to about one mile east of Ras Managumba, a sharp rocky point with two villages northward of it, on the west side of the bay. Thence steer S.W. until the clump of large trees on the east point is in line with the high trees on a conical peak inside the harbour, bearing S.W. $\frac{3}{4}$ S., southerly, passing between the red spar buoy on the starboard hand and the black conical buoy on the port hand, at the entrance, and on the same side of similar buoys farther in. When within the entrance points, steer for the custom house, bearing S.W. by S., anchoring when the fort bears W. $\frac{1}{2}$ S., in about $6\frac{1}{2}$ fathoms, mud.

The channel is so narrow that a vessel is more easily conned by eye when the sun is in a favourable position; the reefs on either side show at low water.

Tides.—It is high water, full and change, in Mikindani harbour at 3h. 50m.; springs rise 12 feet. The tidal stream in the harbour is scarcely perceptible.

Supplies.—The usual small supplies of poultry and eggs are obtainable at the settlements near the custom house, but the water is bad. There is a spring in the neighbourhood, however, which affords good water.

* *See* plan of Mto Mtware and Mikindani harbours, with views No. 684.

Communication.—The branch steamer from Tanga, of the Deutsche Ost Afrika line, calls here every six weeks, *viâ* other coast ports. It occasionally goes as far as Ibo, in which case it calls also on return, about three days later.

Trade.—The principal products of the neighbourhood are gum-copal, ivory, seeds, and rice, and are exchanged for European commodities, through the Banians.

COAST.—From cape Paman, the north-west extreme of Mikindani bay, the coast to Mgau Mwanja, 10 miles to the north-westward, is low and bordered by a reef extending from three-quarters to $1\frac{1}{2}$ miles off; the only remarkable feature is a black clump of trees, 80 feet high, $3\frac{1}{2}$ miles beyond cape Paman. When off Mgau Mwanja, Mlima Mjoho, 617 feet high, will show as the southern extreme of the hilly range.

From Mgau Mwanja to Lindi river, about 16 miles farther to the north-west, the coast continues low, with a reef extending from a half to $1\frac{1}{2}$ miles off.

The coast from Ras Kera, 8 miles northward of Lindi, to Machinga bay, is low, with a few off-lying mangrove islets on the reef, which extends about one mile off, but the land at the back is bold near Ras Kera. A similar reef fronts the coast southward of Ras Kera.

The coast from Mchinga to Mzungu is also low, with numerous off-lying mangrove islets on the reef. Inland, 2 or 3 miles distant, a wooded range 400 feet high extends parallel to the coast. From Mzungu to Kiswere harbour the coast is rocky.

MGAU MWANIA* (Mungulho river).—The entrance to this river may be easily distinguished by the break in the land, when the river comes open on a south-westerly bearing, and also by the Madjovi or Mushroom rocks.

The entrance channel is about 2 cables wide, with depths of $5\frac{3}{4}$ to 8 fathoms in the fairway, and the same inside. During the southerly monsoon season, in the afternoon, when the wind is from about E.S.E., and also when the northern monsoon is strong, the entrance at times appears to break nearly across.

Position.—Madjovi high rock, on the west side of entrance, is in lat. $10^{\circ} 6' 43''$ S., long. $39^{\circ} 59' 14''$ E.

* See plan of Mgau Mwanja, with views, No. 681.

Reefs.—Nymphe shoal, about half a mile in extent, with a least depth of $2\frac{1}{2}$ fathoms, lies in the fairway of the river, with Madjovi rock bearing S.W. $\frac{1}{2}$ W., distant $1\frac{3}{4}$ miles.

Off the eastern side of the entrance to Mgau Mwanja, Fungu Chosan extends $1\frac{6}{10}$ miles. Off the western side of the entrance, Fungu Gomani extends $1\frac{1}{4}$ miles, and dries in patches at low water. Madjovi rocks, 15 feet high, stand on this reef at 2 cables within its edge and 4 cables off shore.

The sand spit at Ras Swa-Swa extends about 2 cables off the actual point of the land, with shallow water beyond, and there are isolated patches in Mto Sudi, the harbour, which dry at 2 to 3 cables off the southern shore.

Anchorage.—Temporary anchorage may be had in 9 fathoms, sand and coral, within Nymphe shoal, with Madjovi rocks bearing S.W. $\frac{1}{4}$ W., and the south-west extreme of Mkiya village S. by W. $\frac{1}{2}$ W.

There is good anchorage off the south end of Mwanja village, about mid-river, in 9 fathoms, mud; and also at a quarter of a mile S.S.W. of Ras Swa-Swa, in 6 fathoms, mud.

Directions.—Proceeding for the river, do not close the coast within $2\frac{1}{2}$ miles until the new white custom house at Sudi is well open. This custom house in line with a gap in the distant hills (*see* view on plan), bearing S.W. by S., leads westward of Nymphe shoal and nearly up to the entrance to the river. When Madjovi high rock bears S.W. $\frac{1}{2}$ W., edge to the eastward until the old custom house is about its own width open of the sand spit extending from Ras Swa-Swa, which mark will lead in mid-channel to the anchorage off Mwanja.

If bound to the anchorage within Ras Swa-Swa, keep as nearly as possible in mid-channel, to avoid the spit which extends nearly a quarter of a mile from that point, and also the coral patch lying on the opposite side of the channel.

Tides.—It is high water, full and change, at Mgau Mwanja at 3h. 45m.; springs rise 12 feet; off the entrance the flood runs to the northward, and the ebb to the south-eastward, with a force of from 2 to 3 knots, the flood being the stronger during the south-west monsoon.

Villages.—There are several villages on the banks of Mgau Mwanja; on the east point of entrance is Mkiya, and about a third of a mile farther in is the larger village of Mwanja. Sudi, the principal village, is situated on the west bank of the river, within Ras Swa-Swa, or about 3 miles from the entrance. A new custom house, white, and about twice the height of the old one, has been built at the west extreme of the beach at Sudi.

Supplies are scarce; Sudi is the only village with good water.

LINDI BAY* lies between Ras Shuka and Ras Banura, $3\frac{1}{2}$ miles apart. Lindi river lies in its south-west corner. The depths in the outer part of the bay vary from 50 to 250 fathoms, the coast reefs being steep-to, while westward of a line drawn between Ras Ekapapa and Ras Rungi the water shoals rapidly.

Aspect.—Approaching from the eastward, the land about Lindi bay cannot be mistaken, as it is the highest on the coast between Zanzibar and Mikindani; the hills over the western shore, rising to a height of 976 feet, are well wooded, and cultivated in patches. Mlima Mdemba, 947 feet high, has a grove of cocoa-nut trees on its summit.

Approaching from the northward or southward the great indentation in the coast, together with the high hills over the western shore, is sufficient to indicate its position.

Reefs.—On the north side of the bay the coast reef in places extends a quarter of a mile, and at Ras Shuka, on the south side, it extends nearly half a mile, but thence westward to Ras Rungi it does not exceed 3 cables from the shore.

The outer edge of Fungu Myangi, north of Ras Shuka, is composed of dead coral and boulders, forming a ridge, the top of which is covered at three-quarters flood, and on it the sea at times breaks heavily.

Umtamar shoal, the outer extremity of the shallow water extending northward of the approach to Lindi river, lies N. by W. $\frac{1}{2}$ W., $1\frac{1}{8}$ miles from Ras Rungi, with a least depth of $1\frac{1}{2}$ fathoms at low-water springs.

Anchorage.—Fair anchorage may be had on the north side of Lindi bay during the north-east monsoon between Ras Ekapapa and

* See plan of Lindi river, with view, No. 681.

Ras Mungu, in 8 fathoms, mud, with the south extreme of the land to the eastward bearing E. $\frac{3}{4}$ N., and Ras Rungi, S.S.W. $\frac{3}{4}$ W. There is temporary anchorage in 5 fathoms, mud, off Ras Rungi, with the centre of Mwentengi village bearing S.S.E. $\frac{1}{2}$ E., and Ras Rungi S.S.W.

The best anchorage, however, as regards holding ground, shelter and convenience for vessels of moderate draught visiting Lindi, is off the town, within the bar. *See* page 347.

Tides.—It is high water, full and change, in Lindi river, at 4h. 5m.; springs rise 11 feet. The tidal streams in the bay, outside the bank of soundings are not strong, but within Ras Rungi they run from 2 to 3 knots, the ebb being very strong during the rainy season, when a vessel seldom swings to the flood.

Directions.—Bound to Lindi bay from the northward, the coast should be given a berth of one mile, until abreast of Ras Banura, a cliffy point 25 feet high, the north-east point of the bay. From this position, the north end of Lindi town, situated on the west point of entrance to Lindi river, will be seen. *See* view on plan.

If not about to enter the river, and in the northerly monsoon season, anchorage may be taken on the north shore as above described. Or, to anchor temporarily, nearer the town, gradually bring the fort flagstaff to bear S.W. $\frac{1}{2}$ W., anchoring as soon as the centre of Mwentengi village bears S.S.E. $\frac{1}{2}$ E., as before mentioned. The water will shoal suddenly as the latter bearing is approached, and the depth is but 3 fathoms at $1\frac{1}{2}$ cables farther in, requiring caution when approaching.

Winds and Weather.—*See* Meteorological Table, p. 595.

LINDI RIVER.—The entrance to the river is nearly half a mile wide between its banks, but the navigable channel, with depths of 7 to 10 fathoms, is reduced to a width of 2 cables. Abreast Ras Rungi, $1\frac{1}{2}$ miles north-eastward of the town, is a short bar, with a depth of 16 to 18 feet at low-water springs, or 27 to 29 feet at high-water springs, in 1894. It is not recommended for vessels above 20 feet draught, without first examining the bar or obtaining a pilot from the town.

From Gala island, on which there is a village, 3 miles above the entrance, the river takes a south-westerly direction for about 3 miles, where there are several branches. M'tali, the principal one,

is navigable for vessels of 6 to 8 feet draught from half flood to half ebb for about 10 miles. At 13 miles up it apparently ends in a swamp, as boats could not proceed beyond.

Banks.—Off Ras Nando, the west point of entrance, is a sand-bank which dries 4 feet at low water, extending $4\frac{1}{2}$ cables from the point.

Fungu Mbachiwonaki is a bank of coral and sand 5 cables in length, on the western side of the river, dry at half ebb. There is a channel for dhows to the westward of the bank.

Kisiwa Nunyi is a mangrove island half a mile in length, on the west side of the river; between it and the west bank is a boat channel three-quarters of cable wide. Shallow water, 3 fathoms and less, extends about 3 cables from its east side, and mud spits extend some distance from its north-east and south-west extremes.

Buoys.—Three red spar buoys, with white topmarks, A, B and C, mark the starboard side of the channel on entering; the outer buoy with topmark A is placed in 3 fathoms on the south-east edge of the spit forming the north side of the entrance, with Ras Rungi bearing S. by W. about 2 cables; they must not be depended on.

Directions.—Anchorage.—To enter the river, steer in from seaward with the fort well open of Ras Rungi, bearing S. 59° W., which leads northward of the reef off Mwentengi village and in the fairway between Ras Rungi and the outer buoy with topmark A, at three-quarters of a cable off the point. From abreast Ras Rungi steer W. $\frac{1}{2}$ S. for red spar buoy B, allowing for tide, until Ras Rungu, the eastern entrance point of the river, bears S.S.W. $\frac{1}{2}$ W.; then steer S.W. by S. (with Mlima Atu, 699 feet high, ahead), midway between spar buoy C and the eastern shore, anchoring when convenient in from 7 to 10 fathoms, sand and mud.

If wishing to proceed farther up, Ras Rungu may be rounded at one cable distance, and keeping on the east side of the river, a vessel may anchor a little northward of the watering place, but the holding ground is not good.

Lindi.—The town of Lindi is built under a grove of cocoa-nut trees. The new fort and a building of the Administration lies near the shore. There is a pier just southward of the fort. Lindi has a garrison, and is the seat of a District Controller.

The Population of Lindi amounted to about 4,000 in 1895.

Observation spot.—The German observation pillar, on the shore northward of the town, is in lat. $9^{\circ} 59' 26''$ S., long. $39^{\circ} 43' 38''$ E.

Trade.—European goods, hardware, &c., are imported, and sent into the interior; the exports are ivory, brought to the coast by caravans, copal, caoutchouc, corn, rice, maize and sesame. Nearly all trade is conducted by the Banians, who are to be found at most of the places on the coast. For some miles round Lindi the country is well cultivated, rice, mtama seed, manioc, &c., being grown in abundance.

Communication.—The branch steamer from Tanga, *via* coast ports, calls here every six weeks on her way southward and on returning. A telegraph line overland to Kilwa Kivinje is contemplated.

Supplies.—Fowls, eggs, and goats, are to be obtained in small quantities; vegetables are scarce; the Banians have a few oxen, not for sale. There are several wells in Lindi, but the water is brackish. Good water is obtainable from a spring which passes under a turreted stone house on the east side of the river, just inside the mangroves; at high water boats could go up the creek.

THE COAST.*—**Mto Mbanja** is situated 3 miles northward of Lindi bay, and may be known by a large gap in the hills; within the mouth, the water shoals to 3 feet. Dhows can enter the river at all times of tide. There is no anchorage off the river.

Ras Kibungwe, at 2 miles northward of Mbanja, is a wooded point 50 feet high; at half a mile to the northward of the point is an islet closely resembling it.

Mto Kera is a small river immediately south of the point of that name. Between the reefs at the entrance there is a depth of 4 fathoms, but the mouth is so narrow that the swell caused by the surf on either side, rolls in and makes it dangerous even for boats to enter. Ras Kera is a bold looking mangrove point.

MCHINGA BAY† (port Nungwa), lying between Ras Mzinga and Ras Rokumbi is about one mile wide, with depths near its head of from 3 to 8 fathoms; it may be known by the gap shown by the

* See chart :—Cape Delgado to Kilwa, No. 1,808.

† See plan of Mchinga bay, with view, No. 677.

Mto Namgaru, at its head, and the mangrove islets, from 12 to 15 feet high, on the coast reefs extending from the two points of entrance. These reefs surround the points and both the north and south sides of the bay, to the distance of a half to three-quarters of a mile.

Mchinga town is situated in the north-west corner of the bay, in a cocoa-nut grove. Mchinga village lies on the south shore.

Position.—The observation spot, north-west of Mchinga village, is in lat. $9^{\circ} 44' 22''$ S., long. $39^{\circ} 44' 7''$ E.

Mto Namgaru.—The entrance to this stream, at the head of Mchinga bay, is blocked by the Fungu Namtamwa, and is only passable by boats at high water. It was not explored, but the chief stated that its waters were salt, and that a canoe could ascend it a three-days' journey.

Anchorage.—There is anchorage on the southern side of Mchinga bay, in 3 fathoms, sand, with Ras Mzinga S.E. $\frac{1}{2}$ E., and Ras Rokumbi N.E. $\frac{1}{4}$ N.; in this position a vessel is partly sheltered by the Mwamba Mahazamu, from the swell which is thrown into the bay at all seasons. There is deeper water north-eastward of this position.

Directions.—In entering Mchinga bay, keep the entrance of the Namgaru, bearing West; no soundings will be obtained with the hand lead, until the tall mangroves on the south shore bear S. by W., when the depth suddenly decreases from 50 to 10 fathoms, after which, anchor as convenient.

Tides.—It is high water, full and change, in Mchinga bay, at 4h. 0m.; springs rise 12 feet.

THE COAST.—Nondo and Ruvu bays are both shallow indentations of the coast. There is no anchorage in these bays, as the water is deep close to the reef which borders the coast at a distance of 3 or 4 cables. There are no dangers outside the reef.*

Mzungu bay does not afford much shelter. Fair anchorage may be obtained in the southern part of Mzungu bay in 9 fathoms, sand and coral, with Ras Bwamkuro bearing N. by W. $\frac{3}{4}$ W., and the centre of the village S.W. $\frac{1}{2}$ S.

* See chart :—Cape Delgado to Kilwa, No. 1,808.

Mto Bwamkuro discharges itself in the north part of Mzungu bay ; during the rainy season the water is discoloured one mile seaward. A sandbank bars the entrance of the river to boats at low water, and on a rising tide there are heavy overfalls.

KISWERE HARBOUR* lies between Ras Berikiti and Ras Bobare, about three-quarters of a mile apart ; the channel is reduced to about half a mile in width by the coral reefs, dry at half ebb, extending from these points.

The depths decrease rapidly from 30 fathoms to 10 fathoms, but within that depth it shoals gradually towards the head of the harbour. The bar of the inlet extends nearly a mile into the harbour on its north-west side.

Position.—The observation spot at Rushungi village, is in lat. $9^{\circ} 25' 36''$ S., long. $39^{\circ} 36' 31''$ E.

Directions.—Anchorage.—The approach is between Ras Fughio, 29 feet high, and Ras Bwamkuro, 20 feet high and $4\frac{1}{2}$ miles apart. The most conspicuous feature is Mlima Mamba, a conical hill 419 feet high, $1\frac{1}{2}$ miles inland ; and, on a nearer approach, Pandawi, a square cliff, on the coast at the head of the harbour.

At a short distance from the coast the hills are of moderate elevation, the table land to the northward rising to a height of from 200 to 350 feet.

There are no dangers beyond the coral reefs fronting the shore.

When approaching Kiswere harbour, if towards low water, the sea will probably be observed breaking on the bank inside, and on the coral reef off Ras Berikiti, which, when recognised, may be rounded as close as convenient. A mark for entering is a distant peak, in line with the red cliff (difficult to make out) on the south side of the harbour, bearing S. 74° W. (*see* view on plan) until Mlima Ruhaha, a remarkable hill, 412 feet high, to the north-westward, is seen between the entrance points of the inlet, or the small sandy beach on the north shore bears N. by E., when a vessel may anchor in 4 fathoms, stiff mud. The holding ground here is good, and this would probably be the best anchorage in either monsoon. Heavy draughts must anchor farther out in about 12 fathoms, more exposed.

Pandawi cliff (*see* view on plan), bearing N. 85° W., also leads through the fairway of the harbour and entrance.

* *See plan of Kiswere harbour, with view, No. 687.*

Supplies.—In the south-west corner of the harbour is a small fresh water stream, up which a boat can go at half flood to the large village of Kiswere, where supplies, such as goats, fowls, eggs, &c., may be obtained. There is a branch custom house here.

Water.—There are wells of water at the village of Mtumbo, in the inlet, but it is brackish and unfit for use.

Tides.—It is high water, full and change, in Kiswere harbour, at 4h. 25m. ; springs rise 12 feet.

The inlet.—From the western point of the inlet (within the bar), situated in the north-west corner of Kiswere harbour, a depth of 3 fathoms water may be carried nearly up to the fork, a distance of $4\frac{1}{2}$ miles, but above it the inlet becomes insignificant, and there is a patch of rocks in mid-channel a mile below the fork. The banks are mostly mangrove swamps, with higher, well wooded, and partially cultivated land in the background to the eastward.

The anchorage, in about 4 fathoms, off the village of Mtumbo is only accessible to light draught vessels, as the bar across the entrance of the inlet has only a depth of 6 feet at low water springs. There is a nasty sea on the bar at times.

A bank about 2 cables in extent, awash at low water springs, lies on the eastern part of the bar.

A good mark for entering, is Mlima Ruhaha in line with the west point of the inlet, until Pandawi cliff bears S.W. by W. $\frac{1}{2}$ W., then edge to the eastward, which is the deeper side, and anchor as convenient off the village.

COAST.—From Ras Fughio, 29 feet high, on the north point of approach to Kiswere, the coast trends nearly in a straight line for 9 miles, with sandy beaches and small off-lying mangrove islets on the reef, to Ras Mombi, the southern point of Roango bay.*

Roango bay is a shallow indentation of the coast, not distinguishable above 3 miles off. There is no anchorage for vessels, but a narrow boat channel, having 3 feet at low water, leads through the reef to a creek in the centre of the bay, which creek affords shelter to dhows. There is a village on the beach, near the head of the bay, unapproachable by boats except at high water.

See plan of Kiswere harbour, No. 687.

* *See plan of Kilwa Kisiwani, No. 661.*

The coast from Roango bay is rocky, with sandy bights to Ras Ngumbe Sukani, the highest point on this part of the coast ; it may be known by being close southward of two islets, 20 feet in height, and if approached during the morning a white patch will be seen on its upper part. From this point to Mto Pawi, the coast consists of a mangrove swamp with several creeks, the mouths of which are not distinguishable from seaward. The reef between Kiswere harbour and Mto Pawi is steep-to, bordering the coast at a distance of 3 to 4 cables.

Mto Pawi, a boat channel available only at high tide with smooth water, separates the south end of Songa Manara island from the main, and opens into Pawi creek the southern arm of Sangarungu harbour. It is not distinguishable from seaward, being overhung with mangroves, but the south point of Songa Manara may be known by a remarkable break in one of the projecting cliffs, which, when seen from the southward, appears like an island. The sea, when there is much swell, breaks through this cleft with great violence, throwing the spray to a considerable height, and giving the appearance of white smoke rising from the land.

Songa Manara island about 6 miles in length, is low, with an indented rocky coast on its seaward side. There are many groves of cocoa-nut trees on the island, and a particularly tall clump on Ras Kivurugu, its eastern extreme, assists in recognising it. The island is skirted by a reef which off Ras Kivurugu extends for nearly one mile, and the edge is everywhere steep-to.

There are several villages on Songa Manara island, of which Sanji-ya-Majoma is the principal ; also the remains of stone houses and towers.

Kivurugu islets are three low bushy islets, situated on the reef off Ras Kivurugu.

SANGARUNGU HARBOUR lies within Songa Manara island. Its southern portion is about 3 miles in length by half a mile in breadth with depths of 17 to 25 fathoms, somewhat inconvenient for anchorage.

Port Nisus is the name of the south-west portion of it. Port Pactolus is the northern arm and more exposed to the sea. The entrance, common to both, is between Songa Manara and Kilwa Kisiwa, and is nearly one mile wide between the reefs extending from either side.

Ras Sangarungu, the northern point of Songa Manara, on the south side of the entrance, is sandy, crowned with high cocoa-nut trees and faced with mangroves. Ras Mchangamra on the opposite side of the channel is low, and composed of mangroves.

Sangurungu harbour is surrounded by mangroves, and encumbered by islets and reefs, with strong tidal streams, and the swell reaches far in, so that a vessel would have to go some distance in for a secure berth. It has no proper rivers discharging into it, though many ramifications in the shape of mangrove creeks are used by the natives for local trade; but, Kilwa being so near, any trade from a distance finds an exit there.

Caution.—The water in Sangarungu harbour is very thick and muddy, and the dangers cannot be seen.

Port Nisus.—Sanji-ya-Kati, with a village on it, is a mangrove island nearly in the centre of the southern branch of Sangurungu harbour, with an extensive reef stretching northward from it. Southward of Sanji-ya-Kati is (Owen's) port Nisus, with anchorage in 4 to 10 fathoms.

Port Pactolus.—The portion of the harbour northward of Sanji-ya-Kati reef is (Owen's) port Pactolus; its entrance is scarcely a cable wide between the reef extending from Kilwa Kisiwa and the sand spit with 3 fathoms water, extending northward from Sanji-ya-Kati reef. Within the entrance is good anchorage in 8 to 12 fathoms mud, but exposed to the swell that rolls in through the wide open entrance to Sangurungu.

From this harbour there is boat communication at all times with Kilwa harbour by Mlango Mugongo, the wide passage westward of Kilwa Kisiwa. A narrow channel up this passage apparently terminates without effecting a junction with Kilwa harbour, but it has not been closely examined.

KILWA KISIWA, the island which separates the harbours of Sangarungu and Kilwa Kisiwani, has a sea face of 4 miles in a north and south direction. Kilwa is low and covered with trees; the northern part is a coral plateau elevated 45 feet above the sea and has many huge baobab trees on it. The reef dries off to distances varying from 2 cables to one mile, following the line of coast, and is steep-to.

KILWA KISIWANI HARBOUR is the eastern portion of an estuary, which extends inland for about 15 miles in a general westerly direction, where the Mavudyi river discharges into it. The entrance is about 4 cables wide between the reefs which are steep-to bordering the shore, expanding to 6 or 8 cables inside near the town.

Kilwa Kisiwani is an admirable harbour for steam vessels of all classes, and much more adapted for shipping goods than Kilwa Kivinje, where a vessel must lie $1\frac{3}{4}$ miles from the shore, and at times exposed to a swell.

That portion of the estuary above Kilwa Kisiwani town is known as port Beaver; it is shallow a few miles up, and dotted with islands where it begins to contract to the river Mavudyi, which is said to be navigable for canoes some distance.

North shore.—**Ras Matuso** or **cape Kilwa**, the northern point of the entrance, is low, sandy, and dotted with trees. To the westward the coast is composed of sand and cliff for $1\frac{3}{4}$ miles to **Ras Mso**, which is cliffy, and about 10 feet high.

Mwamba Rukyira is a tongue of reef stretching off **Ras Matuso** in an easterly and northerly direction for $5\frac{1}{2}$ miles, terminating in **Rukyira** spit. Southward and westward of the point it extends from 3 to 4 cables off shore. It is all dry at low water springs, and there are mangrove bushes and sand banks on its eastern part, some above high water. The reef is steep-to on its eastern sides, and the sea always breaks on it.

Mso bay.—Between **Ras Mso** and **Ras Rongozi** is **Mso bay**, which is shallow; the shore of the bay is sand, terminating abruptly to the southward in low, rocky cliffs, showing in one part a yellow face. Southward of these cliffs the shore is fringed with mangroves to **Ras Rongozi** and round into the harbour. A sand and mud bank, dry at low water, extends $1\frac{1}{2}$ cables south-westward of **Ras Rongozi**, with many tide whirls off it.

The base of the **Mpara** hill, a flat-topped eminence 460 feet high, skirts the northern bend of the harbour; the hill is partially cultivated but mostly covered with jungle.

South shore.—**Ras Kipakoni**, the southern point of the entrance, is fronted by **Kipakoni** and **Balozi** spits, which extend about three-quarters of a mile off, and are steep-to. On the edge of

the reef, eastward of Ras Kipakoni, is an islet, 12 feet above high water. Balozi spit is rather higher than the part of the reef just eastward of it, but from being protected by the Kipakoni spit, only breaks when the water is low.

Ras Kipakoni is low, with mangrove bushes on its western part and extending along the western ridge of Balozi spit. From the west extreme of the point to the town, the coast is of a cliffy nature, bordered by a narrow belt of mangroves, and a narrow reef which is steep-to.

Castle islet is a mass of mangrove near the edge of the reef off the castle, from which it is distant 2 cables.

The channel separating Kilwa island from the main is at its northern end very shallow, and at low tides fordable; here is a ferry communicating with the island. There is another ferry from the village to a break in the mangroves north of Ras Rongozi.

Outer anchorage.—There is temporary anchorage in the northerly monsoon period in the mouth of the harbour, in about 10 fathoms, sand, abreast the large mangrove bush lying southward of Ras Matuso, at about 2 cables from the reef; the farther eastward the better, to be out of the rush of the tide.

Anchorage.—The harbour of Kilwa Kisiwani has depths of 20 to 30 fathoms, but off the castle there is ample anchorage for many vessels in from 9 to 15 fathoms; it is open to the sea breeze, but completely protected by the projecting points of reef from the heavy swell that almost invariably beats on the outer shore.

A good berth is in 12 fathoms, with Castle islet bearing W. by S. $\frac{3}{4}$ S., the castle S.S.W. $\frac{3}{4}$ W., and Ras Kipakoni W. by S. The reef dries off abreast nearly 2 cables. The tidal streams are strong, and at this anchorage a vessel is often in an eddy, but as the bottom is a tenacious mud, a short scope of cable can be used and the anchor kept clear.

Tides.—It is high water, full and change, at Kilwa Kisiwani at 3h. 45m.; springs rise 12 feet, neaps $7\frac{1}{2}$ feet.

Directions.—In making Kilwa Kisiwani from any direction, the Mpara hill, will be seen in clear weather from a distance of 20 miles. It is flat-topped and in no way remarkable, except being near Singino hill to the northward and the only eminence in the immediate

See plan of Kilwa Kisiwani, No. 661, with enlarged plan of the harbour.

vicinity. To the southward of Songa Manara island are other hills rather similar in appearance, but they are continuous, whereas south of Mpara is a low plain forming a break of 20 miles. In very clear weather the Machinga range, 1,200 feet above the sea, 20 miles inland, will also be seen, but the summits are not well marked. Ras Matuso is tolerably conspicuous, either from northward or southward; Mwamba Rukyira, the reef off it, will be seen from a distance of 3 miles off, either dry or breaking.

At low water, no other guide but the eye is necessary for entering the harbour, but at high water only the outermost parts break, and the Balozi spit does not show its existence even by a ripple, rendering a leading mark necessary. A stranger should, if possible, avoid entering with the strength of the flood, with the sun ahead, as the tidal streams run with considerable velocity. On the ebb, the rush of water sometimes raises a sea between the outermost points of the reefs, which at springs is dangerous for boats, and makes it difficult to realise that there is over 30 fathoms of water where the overfalls take place.

To enter from the northward, steer along the south-eastern edge of Mwamba Rukyira at the distance of about half a mile, when, except with the sun ahead, the old castle should be seen closely backed by trees of thick foliage which overtop it. From the southward, Ras Matuso should be approached bearing N.N.W., or westward of that bearing. When the castle is made out steer for it on a W. $\frac{1}{4}$ S. bearing; from abreast the mangrove bush on the edge of the reef, south of Ras Matuso, the southern extremity of the white sand in Mso bay should be seen, with the yellow cliffs just to the left. When this extremity of the sand bears N.W. by W. $\frac{1}{2}$ W. steer for it, which course will lead in mid-channel past Balozi spit, but care must be taken that the tide does not sweep the vessel off the line of bearing.

When Castle islet bears W. by S. $\frac{1}{4}$ S. alter course to S.W. by W. $\frac{1}{2}$ W., with the observation spot baobab tree (which is not easy to identify from similar trees around it) right ahead; when Castle islet bears W. $\frac{3}{4}$ N., steer W.N.W. for the anchorage.

There is no difficulty in sailing out in the early morning with the land wind.

Caution.—The current runs continually to the northward off all this part of the coast, and frequently sets in towards the land. Sailing vessels making the land should therefore steer to the southward of

the desired point, and if closing at night heave-to in ample time to allow for drift. The current is stronger and more regular during the southerly monsoon, when its strength increases at times to 4 miles an hour.

Kilwa or Kilwa Kisiwani (in contradistinction to Kilwa Kivinje, a few miles north) is the village occupying the site of the old town (Quiloa of the Portuguese), and which was for several centuries the most important place on the eastern coast of Africa. The ruins of old Quiloa on the north-western portion of the island are extensive, but are mere foundations, excepting the castle (a tall and conspicuous, keep-like fortress), some mosques, and an embattled space, the walls of which are still standing.

The village of Kilwa Kisiwani stands behind the old castle. Most of the trade, which is of no great extent, is in the hands of the Hindis.

Observation spot.—A large baobab tree stands on an open park-like elevated space, 45 feet above the sea, half a mile east of the castle, and marks the observation spot which is in lat. $8^{\circ} 57' 32''$ S., long. $39^{\circ} 30' 50''$ E. The word *Fawn* is cut on the tree.

Supplies.—The inhabitants of Kilwa island are supplied with water from wells. Cattle, goats, and fowls are fairly plentiful, and the island abounds with bush buck.

Communication.—The Deutsche Ost Afrika steamers call every three weeks at Kilwa Kivinje, about 20 miles to the northward, p. 359.

Climate.—The harbour is mostly bordered by mangroves, and has a bad reputation for malaria, but it is no worse than Kilwa Kivinje, and were the site of the dwelling-houses as a rule better chosen, would be more healthy.

Winds.—Easterly winds prevail here in the form of strong sea breezes during the greater portion of the year, and generally occasion a considerable swell outside the harbour, so that in working out in a sailing vessel, if the wind falls light, it is sometimes difficult to get out: this consideration gives more importance to the outer anchorage ground mentioned, which is the only position where a vessel can possibly anchor outside. The land wind blows early in the morning. See Meteorological table for Kilwa Kivinje, p. 596.

COAST.—From Ras Matuso the coast trends northward for $7\frac{1}{2}$ miles to Ras Tikwiri, bordered by a reef which dries to the distance of a half to one mile, being a continuation of Mwamba Rukyira, p. 354. The coast is sandy and flat with several villages, backed by thick jungle.

Ras Tikwiri is a mangrove point broken at its extremity into isolated clumps of these trees. The edge of the shore reef is about 3 cables beyond the extremity of the mangroves.

Ras Miramba is a low mangrove point, 6 miles north-westward of Ras Tikwiri, with shallow water extending $1\frac{1}{2}$ miles; westward of Ras Miramba the coast forms a shallow bay as far as Gingwera river, a distance of 3 miles.

Off-lying dangers.—**Ruangale reef**, dry 7 feet at low water springs, and separated by a boat channel from the shore reef, lies 2 miles eastward of Ras Tikwiri. The sea always breaks on its outer edge.

Rukyira bay, between Ras Matuso and Ras Tikwiri, has good anchorage at its southern end, where the Mwamba Rukyira protects a vessel from the swell. It is, however, of little use, except to vessels of light draught, in consequence of Rukyira bar blocking the entrance from seaward.

Rukyira bar.—From Rukyira spit, the north extreme of Mwamba Rukyira, a narrow rocky bar, parallel, and about 5 miles distant from the coast, extends northward for 9 miles, with irregular depths of from 2 to 10 fathoms, and in one or more spots less. Though there are doubtless places where vessels can at all times pass over it into Rukyira bay, yet it should not be attempted without good cause, as there is usually a heavy swell, and from the irregularity of the bottom other shoal spots, besides those marked on the chart, may exist.

Mpovi reef,* $2\frac{1}{2}$ miles in length, with a sand bank which dries from 4 to 11 feet, is the southernmost of the mass of reefs protecting the anchorage of Kilwa Kivinje. There are a few mangrove bushes near the eastern edge of the reef, which is tolerably steep-to and dries 11 feet.

* See plan of channels between Ras Tikwiri and Mafia island, No. 1,032.

On all other sides the reef shelves gradually off, and although it lies $1\frac{1}{2}$ miles from the shore, the channel within it is only available for vessels of light draught. Shallow water extends 2 miles northward of the sandhead.

Mwanamkaya reef, forming the southern side of the south channel to Kilwa Kivinje, is $2\frac{1}{2}$ miles in length, and situated about 2 miles north-eastward of Mpovi reef, with 8 fathoms water between. Near the north-west corner is a sandhead, which only covers at springs; patches of 3 to 4 fathoms lie about one mile eastward of the reef, being the extension northward of Rukyira bar.

Fungu Amana, $1\frac{1}{2}$ miles in extent, lies westward of Mwanamkaya; the sand on its western end dries at half ebb.

KILWA KIVINJE is situated in lat. $8^{\circ} 44' 43''$ S., long. $39^{\circ} 25' 6''$ E., one mile westward of Ras Miramba, and partly surrounded with cocoa-nut trees; it consists of a labyrinth of huts and brick houses with from 8,000 to 10,000 inhabitants, and possesses a considerable trade. It is the seat of a District Controller with a garrison. Formerly, it was the principal port for the exportation of slaves.

At the back of Kilwa Kivinje is Singino hill, a flat cultivated plateau rising to a height of 550 feet, and about 3 miles in diameter. Its rim or edge is tolerably steep on all sides, and may be used for bearings. To the westward, connected by a low spur, is Nunguruku, a small conical hill, 480 feet in height. Other small hills stretch away to the westward, but the general prospect in that direction is flat and uninteresting.

Mto Gingwera enters the sea at 3 miles north-westward of Kilwa Kivinje, and its bar dries at low-water springs. The river can be ascended about 9 miles, and abounds in hippopotami.

Supplies.—The town of Kilwa Kivinje is amply supplied with wells, but the water is bad and there is no convenience for watering a vessel; an aqueduct was in progress in 1894. Cattle, sheep, poultry, and eggs are abundant, but vegetables (beyond the staple native crops of millet, manioc, and sweet potatoes) are not so easily procured.

Trade.—The exports are ivory, copal, caoutchouc, corn, rice, maize and sesame; the imports consist chiefly of stuffs and necessary articles for the native population.

Communication.—Telegraph.—The branch steamers of the Deutsche Ost Afrika Company from Tanga, *via* other coast ports, call here every three weeks on their way southward and on their return northward. There is telegraphic communication by land line with Dar-es-Salaam.

Anchorage.—The anchorage is open, though good protection is afforded by the reefs to the eastward in ordinary weather, but when the monsoon is strong, a little swell fetches through the passages. The sand and mud bank off Ras Miramba and the town dries off about half a mile and shallow water with patches of rock extends about $1\frac{1}{4}$ miles from the coast, at which distance it drops suddenly to 4 and 5 fathoms.

A vessel, in approaching this anchorage, should not shoal the water to less than 5 fathoms. A good berth, in about this depth, is $1\frac{3}{4}$ miles from the town, with the centre of Kilwa Kivinje bearing S. by W. $\frac{1}{2}$ W., the mouth of the Gingwera W. by N., and Ras Miramba S. by E. $\frac{1}{2}$ E.

A red barrel buoy, marked with an anchor, lies in $3\frac{1}{2}$ fathoms, between the anchorage given and the village.

Tides.—It is high water, full and change, at Kilwa Kivinje, at 4h. Om.; springs rise about 12 feet. There is but little tidal stream at the anchorage.

Winds and Weather.—*See* Metecrological table, p. 596.

KILWA MAIN PASS.—Islets and reefs.—The reefs on the south side are described on page 358.

Fungu Jewe, $3\frac{1}{4}$ miles in length east and west, and steep-to on all sides, lies on the north side of the pass and 3 miles northward of Fungu Amana. Along the south-east face it breaks heavily, and is at all times visible. At half tide a long expanse of sand uncovers, which has no particular head.

Luala reef, 2 miles in length north and south, lies $1\frac{1}{2}$ miles eastward of the north-east extreme of Fungu Jewe. The reef dries at half ebb, and the sea breaks on its eastern edge, but it is not so conspicuous as Fungu Jewe.

Luala channel lies between Fungu Jewe and Luala and Pweza reefs, and is useful to vessels coming southward that have taken the inner channel so far, but not bound to Kilwa Kivinje. The channel is $1\frac{1}{2}$ miles wide, and deep, and the reefs on either side can generally be seen.

Fanjove island and reef.—This small island, situated about 5 miles northward of Kilwa main pass, is covered with tall trees, and stands on the inner part of a reef 6 miles in length, in a northerly direction, on the edge of the deep ocean water. The reef extends 4 miles southward of the island. The outer edge of the reef is steep-to, dries a few feet, and the sea always breaks on it. At one mile W.S.W. of the south end are some patches of 3 fathoms, and steep-to.

LIGHT.—From a quadrangular white tower, 46 feet in height, erected on Fanjove island, is exhibited, at an elevation of 60 feet above high water, a *fixed white* light, visible from S. 22° W., through west and north, to S. 67° E., from a distance of 14 miles in clear weather.

Directions.*—The direct entrance into Kilwa Kivinje is by the channel known as Kilwa Main pass, between the reefs before mentioned; it is 3 miles wide and clear of danger. No soundings will be obtained with the hand lead until within Jewe and Amana reefs.

In approaching Kilwa Kivinje from seaward, Fanjove and the larger island of Songa Songa will be sighted on a clear day at a distance of about 14 miles; and the Singino and Mpara hills under similar circumstances at 18 or 20 miles; both hills are flat, the Singino being the longer. To the southward of Mpara hills nothing will be visible except in very clear weather, when the distant Machinga hills may perhaps be seen.

Steer to pass about 5 miles southward of Fanjove island; when the breakers on the reef extending southward of it are seen, the eye will be the best guide; give them a berth of at least half a mile. If the weather be clear and the sun not ahead, from a position in which Fanjove lighthouse bears N.N.E., the entrance to the Gingwera may perhaps be distinguished, forming a slight gap in the coast. Bring

*See plan of channels between Ras Tikwiri and Mafia, No. 1,032. Directions for approaching Kilwa, by Mafia and inner channels, see pages 386, 387.

the centre of gap to bear W. $\frac{3}{4}$ S. and steer for it until the western end of Jewe reef bears N. by E., when alter course to the south-westward for the anchorage off the town.

If the Gingwera cannot be distinguished when southward of Fanjove, the lighthouse on that island combined with Nungaruka and Singino hills should be good objects for fixing position, from which course may be shaped for the anchorage as requisite.

Within the outer reefs the water is discoloured.

COAST.—Aspect.—From Mto Gingwera, the coast trends in a northerly direction, with some slight sinuosities and points to Ras Samanga Fungu, a distance of 18 miles. For about 7 miles the shore is a sandy beach, but farther on it is fringed with mangroves. There are villages all along the coast, but mostly concealed by the mangroves. There are no reefs, except off Ras Wango, but a sand and mud flat dries off to a considerable distance.

The coast is backed by a flat plain, which to the northward gradually slopes upwards to a number of low wooded ridges, parallel to the coast, which again rise to the Matumbi range, 17 miles from the sea, averaging from 1,700 to 2,200 feet in height.

OUTER ISLANDS AND REEFS.—Clearing mark.—Fanjove island lighthouse, or the light in sight at night, bearing westward of S. 22° W., leads seaward of the reefs northward of Fanjove island.

Songa Songa island, situated $3\frac{1}{2}$ miles north-westward of Fanjove island, is a coral island $2\frac{1}{2}$ miles in length, covered with trees. It stands on a broad reef dry at spring tides, and surrounded by shallow water on all sides but the north-western, where Pumbavu, a sandy islet with a few scattered trees, is connected to the main island by a neck of sand half a mile in length. At the distance of a quarter of a mile westward of this islet the water is deep and clear. On the point of Songa Songa nearest Pumbavu is a clump of tall trees, conspicuous from the inner channel.

Supplies.—Songa Songa has a village near its eastern shore, and wells with tolerably good water in the coral nearly in its centre; these are difficult of access and best approached from the western side. Bullocks and goats are bred on the island.

Anchorage.—There is anchorage in about 6 fathoms, from 3 to 5 cables westward of Pumbavu islet. Small craft can anchor in 4 fathoms, nearer Songa Songa, and more sheltered, by passing over the sandy flat, joining Pumbavu islet with the reef southward of it, in not less than 2 fathoms, at low water.

Val rock, with 6 feet least water and steep-to, lies $2\frac{1}{2}$ miles S. by W. $\frac{1}{2}$ W. from Pumbavu islet, and one mile from Songa Songa island reef. As the rock does not show, it should be given a wide berth.

Pweza is a small reef lying $1\frac{1}{2}$ miles northward of Luala reef, with a small sandhead dry 8 feet at low water springs.

Between Pumbavu islet and Fungu Imbi is Sanders rock, with 7 feet water, and Mzuaji reef, which dries 2 feet; north-westward of these is Baniani reef, on which is a sandbank dry 10 feet at low water.

Fungu Imbi, northward of Fanjove, is $2\frac{1}{2}$ miles in length, with a sandhead dry 7 feet at low water springs; it is steep-to along its outer edge, on which the sea breaks heavily.

Nyuni is a coral and sand islet with bushes, and a few casuarinas on its eastern side, which can be seen from a distance of 12 miles.

The island lies 11 miles northward from Fanjove island, on the western side of a reef, 3 miles in length, dry at low water, and steep-to on its seaward side. Turtle frequent this island and Okuza north of it, from February to July.

Kimbore reef dries 7 feet, and lies about a mile westward of Nyuni islet.

Nyuni pass, between Fungu Imbi and Nyuni island, affords access to the Inner channel, with depths of 4 to 6 fathoms between the charted dangers, but as no good leading mark can be given, and the swell being heavy on the edge of the shallow water, the passage is not recommended.

Fungu Mombawaka, northward of Nyuni reef, is $1\frac{1}{2}$ miles in extent at its seaward edge, having a small area awash at low water, the remainder having a few feet depth always over it; the sea generally breaks over the reef.

Okuza island, 6 miles northward of Nyuni island, is small, sandy, and covered with casuarinas, the highest of which are at the eastern end, and can be seen about 14 miles in clear weather. The island is on the north-west part of a reef, 3 miles in length, all dry at low water springs, steep-to on its seaward side and tolerably so on the other sides.

Between Okuza and the reefs of Kibondo island is South Mafia channel.

Anchorage.—There is anchorage within Okuza reef, in from 7 to 12 fathoms; in the north-east monsoon a berth well to the south-west should be chosen to avoid the swell.

INNER CHANNEL.—Bordering reefs.—Between the outer reefs and islands before-mentioned, and the mainland southward of the Rufiji, is an inner chain of reefs, which for the most part have navigable channels between them. The recommended track is marked by a pecked line on the plan, and is best navigable by vessels when the sun is in a favourable position, and with a good look-out aloft. The reefs bordering it will be described, commencing from the southward. The channel is equally good on either side of the two first-mentioned reefs.

Buoyage.—A few of the most important shoals are marked by buoys. The track is westward of black buoys and eastward of red buoys, but they must not be depended on.

Pwajuu reef is $1\frac{1}{2}$ miles in length, and lies in the fairway westward of Songa Songa island. A long extent of sand on the reef dries at half ebb; it is mostly steep-to, and can generally be seen.

Poiasi reef, also in the fairway, lies three-quarters of a mile northward of Pwajuu, and is $2\frac{1}{2}$ miles in length by half a mile in breadth. The sand on it dries over an extent of $1\frac{1}{2}$ miles, the highest part being towards the north, where it dries 11 feet at springs; it is mostly steep-to.

Buoy.—A black conical buoy, marked 6, *Mafia*, in white letters, lies close to the north-west extreme of Poiasi reef.

Westward of these two reefs are Fungu Wango and Fungu Kiswasi, both of which dry 6 feet at low water; they mark the eastern side of the channel westward of Poiasi.

Machangi is the name of a collection of reefs on the east side of the best track lying from 5 to 7 miles northward of Songa Songa. The south-western reef dries at half ebb ; its edge is steep, but does not show well.

The north-western reef has a sandhead which is only covered at high water, and except at that time is a good guide for the channel. It is near the western edge of the reef, which is fairly steep-to on that side.

Banda is a small reef with a sandhead dry 8 feet at low water springs, $2\frac{1}{4}$ miles north eastward from Machangi sand, and its western side is not steep-to.

Bawara, also on the eastern side of the best track, is the name of a collection of reefs north-eastward of Banda reef. These reefs cover an area of $2\frac{1}{2}$ miles north and south, and 3 miles east and west, and show four sandheads at low water ; their western edges are fairly steep-to.

Chocha, on the west side of the best track, is 2 miles in length, uncovered at low water, with sand on its north-west extremity, which dries 9 feet. The south-east end tails off for 2 cables, but it can generally be seen showing green under water. The eastern point of Chocha lies West $1\frac{1}{4}$ miles from the sandhead on Machangi.

Buoys.—A black conical buoy, marked 5, *Mafia*, in white letters, is placed near the edge of the reef extending north-west of Machanga sandhead, and a red spar buoy, marked *D*, *Mafia*, marks the eastern edge of Chocha ; the channel is between them.

Membeuso, $2\frac{3}{4}$ miles north of Machangi, is about one mile in length ; the sand on it dries 8 feet, and its edge is steep. A patch dries between it and Chocha, and Miza reef farther to the westward, both away from the best track.

Simaya island, 4 miles southward of Membeuso reef, is composed of sand, covered with high trees, and visible at a distance of 14 miles ; it stands on a reef, three-quarters of a mile in length, which is steep-to.

Some patches of 5 fathoms are charted between Simaya island and the Bawara reefs, eastward of the best track.

COAST.—**Ras Samanga Fungu**, situated 18 miles northward of Mto Gingwera, is a point of high mangroves conspicuous from the northward when in shore. Immediately north of it is Samanga Fungu creek, with a village of the same name.

Samanga is the name of a large village and creek $1\frac{3}{4}$ miles north of Ras Samanga Fungu. It is the largest village between Kilwa Kivinje and the Rufiji, and is quite concealed from the sea; there are Hindis here who have most of the trade. The estuary contracts at a short distance from the sea, and is said to join another creek which debouches at one mile to the north-eastward.

MOHORO BAY, lies between Ras Ndumbo and Ras Pombwe. Its shore is fronted with a thick belt of mangroves, and it dries about $2\frac{1}{2}$ miles from its head at low water.

Kikwaju, a broad but shallow creek, lies at the north-west corner of Mohoro bay. On the western shore, a short distance up, is the village of Marendego.

Mohoro river.—Utagite and Lokotonasi, the two mouths of the Mohoro, are mangrove lined creeks, with depths of one to 3 fathoms at low water springs; they connect about 3 miles up. The Utagite has a depth of 3 feet at low water springs on its bar, which is 2 miles outside the entrance. There is no swell on the bar, but the sea breaks on the sandbanks on either side at half-ebb with any wind.

The Mohoro is 200 yards wide at the junction, and at the highest point reached by the *Fawn's* boats early in August 1877, 14 miles in a direct line from the coast, was 80 yards in breadth; at that distance it had become so shallow that the steam cutter could get no farther; here were several villages with cultivated ground around.

The land route from Kilwa to Dar-es-Salaam passes through these villages. Coasting craft ascend the river for trade.

The banks of the river were from 10 to 20 feet above the water, and where not scoured into cliffs by the current, densely covered with vegetation. The tidal influence extends above the villages.

Ras Pombwe, the eastern point of Mohoro bay, is of mangrove. Ras Pombwe is also known by some as Bachambao.

Fungu Okambara is a coral and mud reef that stretches off for $3\frac{1}{2}$ miles in a south-east direction, and dries 8 feet.

Northward of Okambara, is Mwamba Mkuu, another large reef, which also dries 8 feet.

Pombwe creek, half a mile wide in the entrance, extends in a north-west direction from Ras Pombwe for $2\frac{1}{2}$ miles, when it ends in mangrove swamps.

Kitope hill is a conspicuous flat-topped hill, 780 feet high, rising in the plain 5 miles westward of Mohoro bay. It is thickly wooded, and has a lower spur to the northward with a small conical summit.

RUFJI DELTA.—General remarks.—In Mohoro bay, northward of Samanga, commences the remarkable maze of creeks which form the delta of the Rufji and Mohoro. Some of these creeks do not communicate at ordinary times with either river, neither do the rivers themselves ever join, though at one point in their courses they approach one another closely; but in the rainy season of the interior, December and the two following months, the whole plain is frequently flooded, when the water doubtless escapes by either river indifferently, and all the large mouths that open to the sea assist to carry off the surplus.

The delta has been pushed forward in advance of the general line of the land, and now forms a convex projection with a coast line 50 miles in length, which is all low and of a uniform outline as viewed from the sea. Mangroves occupy the greatest portion of the shore line, and extend back for a varying distance from it. Within the swampy belt is a broad flat plain, covered with long grass and a few trees, and dotted here and there with small villages, in the vicinity of which and near the rivers is cultivation. This plain is 35 miles north and south between the boundary lines of Matumbi and Mtoti hills.

From Ras Pombwe, in Mohoro bay, to the village of Kikunguni, 41 miles to the northward, ten large mouths open into the sea, eight of which are connected at all times with the Rufji, the other two being only salt water creeks. All these mouths are connected by a series of small creeks, through the mangroves near the sea, that serve at high water as passages for canoes from one village to another without the necessity of crossing the bars.

Best Entrances.—If going to ascend the Rufiji, the Simba Uranga and the Kikunya (pp. 369, 370) are the best mouths to choose, on account of the absence of bars.

Rufiji ya Wake or Kiengieni.—This river is considered to be the southern mouth of the Rufiji; it connects with the main stream near Ruanda village, about 12 miles north-north-west of its entrance, which is known as the Yaya mouth. There are several ramifications of it unexplored which probably lead north and south into the adjacent mouths. The upper part of it is too shallow to allow a boat to reach the Rufiji in the dry season.

The bar, $1\frac{1}{2}$ miles outside the entrance points is never quite dry, but there is usually a nasty swell on it. Several patches, awash at low water, with 6 to 7 fathoms close-to, lie from 2 to 4 miles off the entrance. Yaya village is on its north point of the entrance.

Bumbura, the next creek to the northward, was not explored, as the bar, which broke, could not be crossed.

Ndahi mouth is $7\frac{1}{2}$ miles north-eastward of the Yaya, and may possibly be distinguished by a high grove of casuarinas on its northern bank. The sea rolling in through the break in the distant reefs south of Kibondo, makes the bar bad at all times. It connects with Kiassi.*

Kiassi mouth, $5\frac{1}{2}$ miles north-eastward of the Ndahi, is a broad arm, joining the latter at 5 miles to the south-westward.

Above the junction it takes the name of Mto Kimero, and trends through open grass country. About 6 miles up it is joined by the Useembe, which leaves the Rufiji 3 miles below the Kimero. Neither of these rivers afford a passage for a small steam launch in the dry season, unless perhaps at spring tides.

Msala mouth† may be looked upon as the true mouth of the Rufiji, although one of the smallest; but fresh water and terra firma are much sooner reached than in the larger mangrove entrances; it opens abreast Boydu island. Sand and mud banks dry off the Msala for 3 miles, and at low-water springs the entrance is impracticable; there is a considerable swell on the bar when the wind is fresh.

* See coast sheets, Nos. 1,032 and 458.

† See plan of Mafia islands and channels, No. 458.

Immediately within the mouth is a large creek trending to the southward, with the village of Msala on its west point. At 5 miles up the main branch the mangrove belt is passed; for 7 miles farther it is bordered by dense forest, in which are rice clearings, and then at the point where it branches, and where the Rufji proper is reached, it emerges into open country. A few miles from the sea, it takes the name of Bumba; its average breadth is from 80 to 150 yards, with a depth of 2 fathoms. See the ascent by *Fawn's* boat, page 370.

Ras Twana, the eastern point of the delta of low mangroves, is 6 miles northward of the Msala mouth. The sand and mud bank stretching off to the eastward for $3\frac{1}{2}$ miles, is dry in spots at low-water springs and tolerably steep-to, but generally only visible when the sea is breaking on it.

Twana creek, close westward, is a blind creek.

Kiomboni mouth lies 2 miles north-west from Ras Twana, and is one of the large mouths of the Rufji. The river runs through dense mangroves, with a width of 400 yards, and a depth of from a half to 3 fathoms, for 12 miles, before it joins the Simba Uranga.

Simba Uranga is the branch of the Rufji best known to the coast traders, who resort there to load with timber for house rafters. It has no bar, but the water is shallow for more than 5 miles from the land, and near low water there is sometimes a considerable sea, raised by the ebbing tide.

Buoy.—Directions.—There are some mudbanks just awash at low water springs, lying between 3 and 4 miles north-eastward of the entrance. A red buoy, in about $2\frac{1}{2}$ fathoms, marks the fairway, and is situated about one mile northward of the outer bank, and 5 miles N.E. by N. of the east point of the entrance, but it is not to be depended on.

From the buoy, steering S.W. by S. for the centre of entrance, a boat will carry about 8 feet water in, at low water springs. Inside, the water deepens to as much as 10 fathoms, but only for a short distance. Above, the estuary is 300 to 400 yards wide, and carries a depth of from one to 3 fathoms, to its junction with the Kiomboni 10 miles to the south-westward. Several creeks to the northward communicate with the Kikunya branch.

Immediately inside the entrance, the large ramifications of Suninga, branches to the southward and rejoins again $8\frac{1}{2}$ miles to the south-west. There are several villages in the creek, Suninga being the largest. The courses of both the Simba Uranga and Suninga lie entirely through mangrove swamps. See the ascent by this mouth, page 371.

Kikunya mouth* is the northernmost and largest of these great openings. It is 3 miles north-westward of Simba Uranga, and $2\frac{1}{2}$ miles wide at the entrance. There is no bar, and a depth of 2 fathoms at low water springs may be carried in steering S.W. $\frac{1}{2}$ W., for the centre of the entrance. Kikunya village stands on firm land near the head of a little branch creek, 9 miles from the coast, and is the most important in the neighbourhood.

The passage of the river presents no difficulties until within 2 miles of Kikunya; here the river becomes narrow, with sharp bends, with only about 3 feet at half tide. At the landing place, one mile below the village, there is a deep pool with from 4 to 6 fathoms water, where the dhows receive their cargoes.†

The Kikunya is only connected with the Rufiji by side communications to the Simba Uranga, and has no fresh water in it. In all the branches northward of Msala, the water is salt, as the amount of fresh water which finds its way into them is so small compared with their vast area, that it produces no effect.

THE RUFJI above the Delta.‡—The Rufiji is most disappointing above the delta. The number and size of its mouths, and the undoubted distance of its source, leads the traveller to expect a much larger stream than he will find. When the inundation caused by the interior rains has subsided, and the current of the river somewhat reduced, so as to allow a boat to ascend, the water channel is limited and obstructed by many shoals and banks, and whenever the river widens with a straight reach it is frequently all more or less shallow.

With the exception of these hindrances, the steam cutter of the *Fawn*, drawing 3 feet, made her way without difficulty for 30 miles to Kisoma, which is 20 miles in a straight line from the Msala mouth. She carried from 9 to 10 feet water all the way, except at one spot,

* See chart, No. 662.

† Remark Book :—Lieutenant C. Robertson, H.M.S. *Kingfisher*, 1885.

‡ See chart, No. 597.

a little above Ukema village, where there seemed to be no deep channel but a bar with 2 to 3 feet across the river, which would probably be altered by the next inundation. The ordinary depth in the channel was from 2 to 3 fathoms.

At Mpembeno village, just below Kisoma, the river was over 300 yards wide from bank to bank, but the water was not over 80 yards wide, and mostly shallow. Natives at Kisoma reported that higher up, the river was more encumbered with banks, but as they did not profess to navigate it, too much confidence cannot be placed in their report. The tide reaches to near the fork of the Kimero; above this, the current ran on an average $1\frac{3}{4}$ miles an hour. The country is perfectly flat and uninteresting, having very few trees.

At Mpembeno, is the main ferry by which the land route from Kilwa to Dar-es-Salaam crosses the Rufiji. Grain, roots, and pumpkins grow well here. No dhows go above the delta.

The Rufiji was ascended by the Simba Uranga mouth, by Lieutenant Fromm, a German officer, in a steam pinnace drawing $5\frac{1}{2}$ feet, and a whale boat, in May 1892. Entering the river on May 9th, he reached Korogero (Kungulio) on May 25th, formerly a large village, but was destroyed by the Mafite, a few huts only remaining. This place is within two days' journey of Kisake, a German station (on the Kingani river).

The Pangani falls (apparently about 150 miles from the entrance), were visited on foot from Korogero; the river was about 30 yards wide and the falls about 3 feet in height (about 5th June), the river had fallen about that amount in the previous fortnight.

The river is apparently navigable to the falls, at all seasons, for vessels of about 2 feet draught, but the channel is constantly shifting. One bar at least (at Kilindi) which just admitted of the passage of the pinnace going up was dry on the return some 3 weeks later, and the descent was made by a detour, joining the main branch lower down. In places the depths are from 20 to 26 feet.

The river fell $4\frac{1}{2}$ feet between 9th May and 23rd May, the last mentioned being the date the mouth of the river was again reached. The rise of the river is about 15 feet, and it is lowest in November, as in the Zambezi—the characteristics of the two rivers being much the same. The tide ceases at Jobine-Jongo.

Many villages were met with and in places the houses were built on piles, the localities being flooded at high river. Bananas, mangoes, and rice were plentiful near the villages. Wood for fuel (ebony) is abundant between Nyanda village and the Pangani falls, except for a short distance where there was no wood.

Lieutenant V. Gravert descended the Rufiji from Kangulio's village between the 13th and 16th March 1896, inclusive, the journey, in canoes, occupying 28 hours to Simba Uranga mouth; there does not appear to have been less than 6 feet water anywhere (but the river is high at this time of year). The northern village of that name is apparently about 13 miles from Pangani falls. Above Kooni (about 90 miles from the entrance) the left or northern bank only is inhabited, owing to former attacks of the Mafite, but below that village there are settlements on both banks.

MAFIA ISLAND.*—General remarks.—This island, composed of coral, is 27 miles in length in a north-east and south-west direction, with an extreme breadth of 9 miles, and situated between the parallels of 7° 38' S. and 8° S. It has a lighthouse on its north-east extreme. The coast of the island generally is low, but it has a central rocky plateau of about 100 feet in height, the trees on it making a total elevation of 200 feet; its outline is devoid of any feature. The island forms part of the German Protectorate.

The outer or eastern side is all cliffy, and fringed by a narrow coral reef, which is steep-to, and on which the sea breaks furiously. The south and inner coasts are bordered with reefs of varying widths, and have many shoals off them.

The island is much cut up by mangrove swamps and creeks, but a large part is fertile, and cultivated with cocoa-nut trees, manioc, &c.

The most considerable village in 1874 was on the island of Chole, on the south-east side of Mafia, at the entrance to the bay of the same name. The other villages, though numerous, are all very small.

Mafia is opposite to the delta of the Rufiji, from which it is separated by Mafia channel, p. 374.

SOUTH COAST.—Tutia reef is a detached reef, at the extremity of the reef extending 5½ miles south-westward from Kibondo island, and is the southernmost danger off Mafia. A sandbank on the north-western part of Tutia reef dries 12 feet at springs, and the outer edge of the reef breaks heavily, always showing its position;

* See plan of Mafia island and channels, No. 458; and chart, No. 662.

a rocky ridge on this edge is as high as the sand cay, but being black is not conspicuous.

Caution.—It must be borne in mind that the sandbank is on the inner side of Tutia reef, and a good berth should be given when rounding it from the eastward, as the current sweeps sets towards it.

Kibondo island is a flat coral island $1\frac{3}{4}$ miles in length, lying $3\frac{3}{4}$ miles from the south coast of Mafia. There is a village on the island, but no water or supplies. A clump of tall trees on the southern end are conspicuous, and some palms on the north-west point also show well.

The reef on which the island is situated dries several feet at springs, with several islets on it, and extends $4\frac{1}{2}$ miles south-westward from the island; its outer edge is steep-to and the sea breaks heavily.

Anchorage.—There is good anchorage sheltered from all swell within Kibondo reef. A good berth is in 6 fathoms, sand and mud, with the southern islet of Kibondo E. $\frac{3}{4}$ S., and Tutia sandbank S. by W.

Juani island lies north-eastward of Kibondo, on the same reef, and forms the southern shore of Chole bay. It presents seaward a straight face of cliffs 10 feet high, $4\frac{1}{2}$ miles in length, fringed by a narrow reef. Its inner coast is cliff and mangrove.

Chole island is one mile in length, and lies north-westward of Juani on the same reef. Chole is the principal place for trade in Mafia; it contains about 2,000 inhabitants, and is locally celebrated for its mats. There are many Banian and Hindi traders here. It is a difficult place to communicate with, as a vessel cannot get nearer than the anchorage westward of Kibondo, 8 miles distant, and the water is so shallow between the anchorage and Chole that at low water springs it is not easy for a light boat to find a passage. Supplies of fresh provisions are scarce.

Chole bay, $4\frac{1}{2}$ miles in diameter, is a deep indentation in the south-east shore of Mafia island, and nearly blocked to seaward by the islands of Juani, Chole, and Miewi. There is deep water in a limited area, but Kinasi pass, the entrance from seaward, is so

choked with rocks, and the tidal stream runs with such velocity through it, that unless well buoyed it would be unsafe for a vessel to use. It has not been thoroughly examined.

The channel from the south-westward is available for boats, except at low water springs. The shores of Chole bay are well cultivated and populated.

Tides.—It is high water, full and change, in Chole bay, at 4h.; springs rise 15 feet, neaps 10 feet.

Okuto reef.—The south coast of Mafia, from Chole bay to Ras Kisimani, is low, mostly fringed with mangroves, and backed by groves of cocoa-nut trees, with the exception of the red cliffs 60 feet high westward of Dongo Jekundu, which is conspicuous. It is bordered by Okuto reef, dry in places at low water springs, and other shallow water, extending $3\frac{3}{4}$ miles to the southward, and forming the north side of Kibondo anchorage.

Mange reef, south-westward of Okuto reef, and on the east side of Mafia channel, is 2 miles in length, uncovers at low water springs, and a sandhead on its northern extremity dries 12 feet. From the centre of this sandhead Ras Kisimani bears N. $\frac{1}{2}$ E. distant $6\frac{1}{4}$ miles. Mange reef can generally be made out even when the sand is covered.

Ras Kisimani, the east point of entrance to Mafia channel from the southward, is the western point of Mafia island, and situated in lat. $7^{\circ} 56' 42''$ S., long. $39^{\circ} 35' 32''$ E.; it is low, sandy, and steep-to immediately abreast, but shallow water extends both northward and southward of it; there is a swamp within the point. Water is obtained by the crews of dhows by digging holes in the sand on the northern side of the point, but it is difficult to obtain any other supplies, though there is a small village.

Boydu island lies westward of Ras Kisimani, on a reef, which dries for a considerable distance round it, in the centre of Mafia channel. It is a narrow sandy island, $1\frac{1}{2}$ miles in length east and west, and covered with tall casuarinas.

MAFIA CHANNEL.—General remarks.*—Buoyage.—Mafia channel, between Ras Kisimani and the mouths of the Rufiji, is about 9 miles wide, with Boydu island situated nearly midway.

* See plan of Mafia island and channels, No. 458; for Directions, see p. 386.

Though much encumbered with reefs, it is nevertheless perfectly navigable by day, and may be of great assistance to a vessel of moderate draught with small steam power on her way south against the south-west monsoon. The channel westward of Boydu is somewhat tortuous and therefore not recommended.

The best track, eastward of Boydu island, close to Ras Kisimani, is shown by a pecked line on the plan; this channel has a minimum breadth of half a mile and a least depth of 5 fathoms; it is buoyed in places, red pillar buoys being placed on the west side of the channel, and black conical buoys on the east side, but too much dependence must not be placed in them. The best time to navigate it is at low water, when the reefs are more easily seen, but the water off and to the northward of the Rufiji delta is, however, so thick, that the navigator cannot always depend upon seeing sunken dangers.

The current sets northward fairly through this channel as far as Sefo reef; *see* tides, p. 376.

Reefs.—**Marima**, 3 miles in length, which dries 4 feet, and **Kauri**, which dries 6 feet, lie on the west side of the main channel, southward of Boydu.

Buoy.—A red spar buoy, marked *C*, *Mafia*, in white letters, and surmounted by a white *C*, is moored in 6 fathoms, at the south-east edge of the shallow water extending from Funga Marima.

Mange reef, on the eastern side of the channel, has been described on page 374.

Belami, the next northward of Kauri, lies with its northern part bearing S.W. by W. $\frac{1}{2}$ W. $1\frac{2}{3}$ miles from Ras Kisimani. This portion is awash at low water springs, but there is a one-fathom tail that projects $1\frac{1}{2}$ miles to the southward, which is not easily seen, and forms with Kauri reef the western side of the passage.

The left extreme of Ras Kisimani bearing N. by E. $\frac{1}{4}$ E., will lead eastward of Belami reef.

Buoy.—The shallow water southward of Ras Kisimani, on the east side of the channel, abreast the tail of Belami reef, is marked by a black conical buoy, painted *4*, *Mafia* in white letters, in 11 fathoms.

Maduvi sandbank dries 13 feet, and is generally visible ; it lies on a reef 2 miles north-eastward of Boydu island. A bank, with 2 to 3 fathoms water, stretches N. by E. $3\frac{1}{2}$ miles from Maduvi, and forms the western side of the channel ; this bank is steep-to, and generally shows by a line of discoloured water.

Al Hadjiri reef lies 3 miles North of Ras Kisimani ; the sandhead on it dries 6 feet at springs, and is generally visible by the discolouration of the water. The western edge of this reef is not steep-to, and should be given a berth ; Sefo reef kept N. $\frac{3}{4}$ E. leads in the fairway. The breadth of the channel between it and the 3-fathom edge of Maduvi bank is 6 cables. There is a wider passage to the eastward of Al Hadjiri, but as it does not give a straight course the other is preferable.

Buoy.—A black conical buoy, marked 3, *Mafia* in white letters, is moored in 7 fathoms at the north-west edge of Al Hadjiri reef.

Sefo reef, 3 miles north of Al Hadjiri, has a sandhead which dries 12 feet at low water springs, and is therefore generally visible. It may be considered a fairway reef, but the buoyed channel is eastward of it. Shungu Mbili, and other islets and reefs bordering the channel, are continued on page 379.

Tides and Currents.—It is high water, full and change, at Ras Kisimani and throughout Mafia channel, at 3h. 55m. ; springs rise 15 feet, neaps about 9 feet. The direction of the tidal stream northward of Ras Kisimani is ebb to the northward and eastward, and flood to the southward. Southward of Ras Kisimani they are nearly reversed, the ebb runs south-east and flood north-west. The tidal streams, however, are frequently overpowered by the permanent northerly current, especially during neaps. This depends much on the wind, and if that be strong from the S.E., unless at spring tides, it is nearly certain that a strong northerly current will be found in Mafia channel, at any time of the tide. From Sefo reef to Mange reef the current is generally in the line of the passage, but a set north-eastward may be experienced on passing Al Hadjiri reef, when the ebb stream is strong.

DIRECTIONS, see page 386.

MAFIA WEST COAST.—Between Ras Kisimani, the west extreme of Mafia island, page 374, and Ras Mbisi, 10 miles north-eastward, is Tirene bay. Tirene is a plantation 7 miles from

Kisimani, where, under a hill covered with cocoa-nut trees, is a white house showing conspicuously when the sun is shining on it.

The land at the back of Tirene is about 100 feet high, and has two natural objects that will be found useful in ascertaining a vessel's position. One is Palm hill, covered with cocoa-nut trees, which form a conical summit 170 feet high ; it is easiest to identify at a distance, as its conical shape is then more marked.

The other is Ngombeni, a clump of mango trees, 175 feet above high water, at 3 miles eastward of Ras Kisimani, which show conspicuously against the sky ; there are a few other, but lower clumps.

Banks.—From Ras Kisimani, the sand dries off at springs for $1\frac{1}{2}$ miles in a north-east direction, reduced to half a mile at Tirene, again increasing near Ras Mbisi to $1\frac{1}{2}$ miles. Shallow water extends 5 miles north-eastward of Ras Kisimani or nearly to Tirene reef.

Salim bank, of sand and coral, with one fathom least water, is 3 miles in length, and $1\frac{1}{4}$ miles in breadth ; its northern end forms the eastern side of the fairway track and is $1\frac{1}{4}$ miles from the eastern edge of Sefo reef ; its eastern end is about 3 miles W.N.W. of Tirene white house.

Buoy.—A black conical buoy, with 2, *Mafia* in white letters, lies in about 5 fathoms at the north-west extreme of Salim bank, marking the eastern side of the fairway.

Tirene reef, awash at low water springs, lies with Tirene house, bearing S.E. by E., distant 2 miles. It is steep-to on its southern side, but shallow water extends two-thirds of a mile to the northward, and about one-third of a mile westward.

Tirene anchorage.—There is good anchorage off Tirene, in 6 fathoms with the house bearing E.S.E., distant $1\frac{1}{4}$ miles, and Ras Mbisi N.E. ; here shelter is afforded by the banks. This berth is within Tirene reef, to pass eastward of which Palm hill should be kept S. $\frac{3}{4}$ E. This bearing leads to the anchorage, and also westward of a coral reef, awash at low water springs, 4 miles N. by E. of Tirene reef.

Ras Mbisi is a coral point backed by trees. To the southward is the entrance to a mangrove creek.

Lechmere hill is an elevation 160 feet high, behind Ras Mbisi.

About $6\frac{1}{2}$ miles eastward of Ras Mbisi is Kirongwe creek, with a village of the same name.

Ras Murundo is the north point of the entrance to Kirongwe bay, and is of sand, with high trees on it.

Off Ras Murundo, Mwamba Mkuu stretches $2\frac{1}{2}$ miles north-westward, where its extreme dries 8 feet at springs.

From Ras Murundo the coast takes a north-east direction for $11\frac{1}{2}$ miles to Moresby point. It is chiefly sand with points of low coral cliff here and there, and some mangrove creeks; one of the latter, $4\frac{1}{2}$ miles from Ras Murundo, joins Kirongwe creek and has usually hippopotami in it.

Ras Mkumbi (Moresby point), the north extreme of Mafia island, is a coral cliff 15 feet high. Small bushes and trees cover the land within, which is not above 80 feet high. Reefs extend 7 cables northward of the point, on which the sea breaks in ordinary weather.

A tail of broken ground stretches 5 miles northward from Ras Mkumbi, and patches of 9 fathoms are situated about 5 or 6 miles north-west of this tail near the edge of deep water. In the *Fawn*, no less depth than 9 fathoms was found here, but it will be well to avoid the neighbourhood. The rush of the current, even in places where there is not less than 20 fathoms, is plainly seen, and makes them appear like dangers.

From Moresby point, the eastern coast of Mafia to Chole bay, a distance of 18 miles, is nearly straight, and bordered by a narrow reef which is steep-to.

LIGHT.—From a quadrangular tower, 98 feet in height, painted in red and white bands, erected on Ras Mkumbi, is exhibited at an elevation of 102 feet above high water, a *group flashing* light every thirty seconds, thus—red flash 6 seconds, eclipse 9 seconds, white flash 6 seconds, eclipse 9 seconds. It is visible in clear weather from a distance of 16 miles.

Anchorage.—There is good anchorage south-westward of Ras Mkumbi, in from 8 to 14 fathoms, sand and mud, at from $1\frac{1}{2}$ to 3 miles from the shore; but only during the south-west monsoon, and not

even then when the breeze is strong. A good berth is in 9 fathoms, sand and mud, with the lighthouse N.E. by E. $\frac{3}{4}$ E., and Ras Bueni S.E. by E. This is a convenient position for communicating with the shore. The best landing at low water and at half-tide, is at Ras Bueni, where there is but little reef. The edge of the reef which borders the shore, varies its distance near this anchorage, from a few hundred yards to one mile, and can be clearly seen at low water, but is not steep-to.

Supplies.—There are several villages south-west of Ras Mkumbi and at Bueni; bullocks, goats, fowls and a small quantity of yams and pumpkins may be obtained. Guinea fowls are also obtainable.

Barakuni islet, is a sandy islet, covered with casuarina trees, the tops of which are about 100 feet above high water, situated about 10 miles south-westward of Ras Mkumbi; it lies on the south-west edge of a reef one mile in diameter. A shallow spit extends 2 miles south-westward from Barakuni, leaving a narrow but deep channel between it and the edge of Mwamba Mkuu. This channel is not recommended, as the edge of the Barakuni shoal, which has from one to 3 fathoms water on it, does not show well, and the velocity of the tidal stream is great at times, and in places sets across the channel.

Northward of Barakuni islet are a collection of sunken reefs, some breaking heavily at times whilst others do not show, with narrow channels between, stretching up to Niororo island, and practically barring the passage between these islands; the tidal streams set with considerable strength here.

Shungu Mbili island is similar to Barakuni, and lies 4 miles north-westward of that island; its highest trees, about 100 feet, may be seen in clear weather from a distance of 14 miles. The island lies on the southern edge of a reef $1\frac{1}{2}$ miles in length, which dries 3 feet at springs. Shallow water, steep-to, extends to the westward or channel side for $1\frac{1}{2}$ miles. There are quantities of pigeons on this island and at Barakuni.

Southward of Shungu Mbili are several small patches of sunken reef, some of which are awash at low water.

Wumi reef, on the west side of Mafia channel, dries 2 feet at low water springs, but it is not easily distinguished at high water,

as there is no sand on it. A patch of 2 fathoms water lies West one mile from it.

Buoy.—A red spar buoy, with *B, Mafia*, in white letters, and surmounted by a white B, lies in 8 fathoms, on the eastern side of Wumi reef, marking the west limit of the best channel.

Fili reef lies also on the west side of the channel, 3 miles north-west of Shungu Mbili island. It dries one foot at springs, and is of the same character as Wumi, but smaller.

Buoy.—A red spar buoy, with *A, Mafia*, in white letters, and surmounted by a white A, lies in 11 fathoms on the eastern side of Fili reef, marking the west limit of the best channel.

Niororo island, 5 miles northward of Shungu Mbili, is about half a mile in length, and partly bordered by low coral cliff. It is covered with bushes, and there are one or more casuarina trees about 100 feet high. It is a resort of turtle in the season, January to June, when natives come from the mainland to turn them. The island stands on the western edge of a reef, which dries; one of a number joined by shallow water stretching north, south, and east, from one to $3\frac{1}{2}$ miles, but not much to the westward. A sand cay on the northern spur of the reef dries 5 feet at springs. The current deflected to the north-west by this part of the reef, often gives the appearance of the reef extending farther in that direction than it actually does.

A vessel approaching Mafia channel from the northward, will first sight Niororo island; in clear weather, the high trees can be seen at a distance of about 14 miles.

Buoy.—A black conical buoy, with *I, Mafia*, in white letters, lies in 12 fathoms, north-west of Niororo sand cay, and marking the east side of Mafia channel.

Anchorage will be found about 4 cables to the westward of the north point of Niororo island, in 9 fathoms, sand.

Gordon reef is a sunken danger with one fathom water. It lies with Niororo island bearing S.S.W. $\frac{1}{2}$ W., about $3\frac{1}{2}$ miles.

Vulture bank is about $1\frac{1}{2}$ miles in extent, within a depth of 10 fathoms; there is one head with 2 fathoms water, which lies with

Niororo island, bearing S.W. $\frac{1}{4}$ W., distant $6\frac{1}{4}$ miles. When entering Mafia channel, no vessel should be as far eastward of Niororo as this danger, or of Gordon reef.

Fawn bank, $6\frac{1}{2}$ miles to the northward of Niororo island, is $5\frac{1}{4}$ miles in length, with from 5 to 17 fathoms on it, and lies across the north entrance of Mafia channel.

Shungu Mbili just open westward of Niororo island, S. 8° W. leads over Fawn bank in 10 fathoms water, and westward of Gordon reef.

Dira reef, lying nearly midway between Koma and Niororo islands, is 3 miles in length, with a sandbank on its south-west side, which dries 10 feet; it generally shows, and the sea always breaks. From the sandhead, Niororo island bears S.E. by E. $\frac{1}{4}$ E., distant $7\frac{1}{2}$ miles. At 3 miles S.W. by W. is the northern extreme of a reef about one mile in extent, and awash at low water springs.

A patch of 5 fathoms lies E. by N. $\frac{1}{2}$ N. $1\frac{3}{4}$ miles from the north-east extreme of Dira reef; there may be less water.

Ukamba reef lies 9 miles north of Dira reef, and $6\frac{1}{2}$ miles E.S.E. from the north-eastern Chokaa islet. Its sandhead dries 10 feet at low springs, but the sea does not always break at high water. Between Ukamba reef and Kwale island, and also westward of Dira reef, are several other reefs mostly awash at low water, with navigable channels between them, but they lie out of the track of vessels.

Muni patches are three small coral heads, bordering the west side of North Mafia channel, with a least depth of 2 fathoms, rising abruptly from deep water. The easternmost patch lies 4 miles E. by S. from Ukamba reef. The position of these patches will only be known by the tide swirls.

Field patch is a small 5-fathom head, steep-to, 5 miles north-eastward of east Muni patch, and on the west side of North Mafia channel, with North Fanjove island bearing W. by N. $\frac{1}{4}$ N.

COAST.—General remarks.—Aspect.—Northward of the Rufiji delta, the coast, mostly sand, fronted by a mudbank dry at low water, trends, with no important projections, north-eastward for 35 miles to Ras Pembamnasi. It is intersected by many streams and

dotted with villages, the most important of which are Kavinja, about 7 miles northward of the Kikunya mouth of the Rufiji; Kivumungao and Yandope, 6 and 7 miles farther north; Kisiju, abreast Kwale island; and Bosa, abreast North Fanjove island.

Some of the streams have large mouths, which dhows enter at high water, to trade, but all are closed at low water springs. The country in this vicinity produces much copal and india-rubber, and near the sea it is well cultivated and populated. At 6 miles inland the Mtoti hills, a flat-topped range, averaging 600 feet in height, trend parallel to the coast.

Off the coast are several small islands, and outside these again are a number of dangers known as the Kwale reefs, most of which only show at low water springs, the water being muddy. These islands and reefs break the ocean swell, and, except at places abreast the channels between them, the water is smooth and landing easy all along the shore in ordinary weather.

The water deepens very gradually along this coast, but there is a navigable channel for small craft within the islands, and the bottom is soft mud. The best water lies generally towards the islands. Dhows invariably use this route.

Tides and currents.—The tidal streams are strong in all the channels, and along the shore; the flood stream running southward and towards the shore, the ebb to the northward and off the shore. Eastward of Kwale reefs there is sometimes a continuous northerly current, but this depends on the wind.

ISLANDS AND REEFS.—Koma island* is of coral, one mile in diameter, and the tops of the trees are about 70 feet above high water. It is 5 miles from the mainland, with depths of 3 to 4 fathoms in the channel between. The island stands on a reef which extends 2 miles north-eastward, having several small bush-covered islets on its outer part; the northern and largest is Pemba-juu, with trees 40 feet in height.

Supplies.—Bullocks, fowls, and goats are procurable at Koma at a cheap rate, and there is a well of good water easy of access near the west point.

Anchorage.—There is good anchorage in either monsoon northward of Koma island, in 6 fathoms, mud, with Pemba-juu islet bearing E. by S., distant three-quarters of a mile.

*See plan of Mafia island and channels, No. 458; also chart, No. 662.

Hatambura, a rocky islet, with trees about 40 feet in height, $2\frac{3}{4}$ miles north of Koma, is surrounded by a narrow reef with 5 and 6 fathoms water close-to.

Kwale island, situated $7\frac{1}{2}$ miles northward of Koma island, is of coral, $2\frac{1}{2}$ miles in length, and three-quarters of a mile in breadth; the tops of the trees are about 100 feet above high water. No supplies are to be obtained from the village; the water is unfit for use.

The island is bordered by a large reef, on which, to the eastward and southward, are three bushy islets. The easternmost of these, Chokaa, is 40 feet high, and one mile from Kwale. The channel within Kwale island is narrow, with a maximum depth of 2 fathoms at low water springs, mud bottom.

North Fanjove island, situated 5 miles north-eastward of Kwale, is sandy, covered with trees 60 feet high, and surrounded by a reef which dries to the distance of about half a mile. Several patches of reef lie between it and Kwale.

Sukuti reef, situated between 2 and 6 miles northward of North Fanjove island, and from 3 to 6 miles from the mainland, forms the south side of Shungu bay. There was one mangrove tree on its western side in 1877, where is also a coral head that dries 10 feet. The sea always breaks heavily on the outer edge of Sukuti reef.

Vyumbani are three small reefs awash, which lie west-south-westward about 2 miles from Sukuti reef, and $2\frac{1}{2}$ miles from the mainland.

Channels.—There are depths of 6 to 12 fathoms in the channel, $1\frac{1}{2}$ miles wide, between Fanjove island and Sukuti reef. The north side of Dendeni river entrance bearing W. $\frac{3}{4}$ N. leads through. A high clump of trees there usually shows out well.

There is a dhow channel inside Sukuti and Vyumbani reefs, with 3 fathoms at low water springs, but the latter reefs do not show at high water.

Anchorage.—There is good anchorage for small craft in either monsoon, in 3 to 4 fathoms water, westward of Sukuti reef, entered from the northward.

Binga hill is an isolated flat-topped elevation, 530 feet high, rising 8 miles north-westward of Dendeni river and conspicuous from the anchorage.

Shungu bay, within Pembamnasi, is shallow, the 3-fathom line being about $1\frac{1}{2}$ miles off shore. Shungubueni river, which discharges into it, is of considerable size at the mouth, but dries across at low water springs; a rock, which dries 6 feet, lies nearly one mile off its mouth. A boat can ascend for several miles at high water.

Ras Pembamnasi, the eastern point of Shungu bay is low and of mangrove, backed by higher trees. The shore reef dries off for half a mile, and there is a detached breaking patch two-thirds of a mile from the eastern extreme of the point; a rock, awash at low water springs, lies one mile west-south-west of the point.

Buuni bay, between Ras Pembamnasi and Ras Mwamba Mku, is a sandy bay 3 miles wide and open to the south-east, a large portion of which is shallow. Some red cliffs a little southward of the village in the centre of the bay show well with the sun in the east.

Ras Mwamba Mku is formed of high mangroves, bordered by a reef which dries off one mile southward; a 3-fathom tail extends south-west for another mile. Also a patch of 2 fathoms, half a mile in extent, lies S.S.W. $2\frac{1}{4}$ miles from the point, and 2 miles from the red cliffs in the centre of the bay.

Anchorage.—During the northerly monsoon there is anchorage in Buuni bay, protected by Mwamba Mku.

To enter the bay, steer for the Red cliffs bearing N.W. by N., which will lead between the 2 fathoms patch and the reef, in 5 fathoms water; when the right extreme of Ras Mwamba Mku bears N.N.E. $\frac{1}{2}$ E., haul up for it, and when the south end of its reef bears East, anchor in $5\frac{1}{2}$ fathoms, sand and mud. Or if from the southward, steer for the highest trees on Ras Pembamnasi when bearing N.N.W., until the right extreme of Ras Mwamba Mku bears N.N.E. $\frac{3}{4}$ E., then steer for it, which will lead between the 2-fathom patch and the breaking reef off Ras Pembamnasi in $4\frac{1}{2}$ fathoms, when anchor as before directed.

COAST.—From Ras Mwamba Mku the coast trends northward 7 miles to Ras Kanzi ; the southern portion for 3 miles is low and swampy, thence it rises into cliffs, which at Puna point are 80 feet high ; here the reef approaches within a few hundred yards of the shore with deep water close to.

Ras Kanzi.—About Ras Kanzi are a great number of palmyra palms, which form a good distinguishing mark, as there are none elsewhere on the coast.

LIGHT.—From a white quadrangular tower, 31 feet in height, erected on Ras Kanzi, is exhibited at an elevation of 62 feet above high water, a *fixed white* light, visible from S. 48° E., through south and west, to N. 36° E., from a distance of 14 miles in clear weather.

Puna hill is an isolated rounded hill 240 feet high, rising $3\frac{1}{2}$ miles at the back of Puna point, and is most conspicuous from the southward. Coast continued at page 389.

Current.—The current eastward of Mafia island is continuous to the N.N.W., but varies much in velocity, being from one to 2 knots in the north-east monsoon and 2 to 4 knots in the south-west monsoon. The breadth of the current belt also varies much, being sometimes only 30 miles off-shore, at other times considerably more. It is therefore very difficult to predict its rate when approaching the coast from the eastward. A vessel should, however, always steer well to the southward and make Ras Mkumbi lighthouse when bound for Zanzibar, to insure giving that dangerous Latham island a wide berth.

North-westward of Ras Mkumbi, the western limit of the current at times does not reach beyond midway from Latham island to the mainland, at which times even in the southerly monsoon a southerly set may be experienced about Ras Kimbiji, but more generally at this season the current strikes the shore somewhere near Ras Kimbiji and runs along the coast to the northward. On the bank of soundings north-west of Ras Mkumbi, the movement of the water is tidal, flood to the south-west, and ebb to the north-east, but varying several points either way.

Winds.—The seasons at Mafia island are similar to those of Zanzibar, and like them are very changeable, but the wind in Mafia channel is more steady during the day than in Zanzibar channel. There is more rain about Ras Kisimani than anywhere else in the island of Mafia. *See* pages 422, 423.

See plan of Mafia island and channels, No. 458 : also chart, No. 662.

DIRECTIONS for MAFIA CHANNEL.*—A vessel bound to the southward through Mafia channel, after passing Ras Kimbiji, should steer so as to pass about 8 miles eastward of Ukamba reef, and sight Niororo island bearing about S. by W. The trees on Shungu Mbili and Niororo can be seen in clear weather at a distance of about 14 miles from the deck. Bring Shungu Mbili just open to the westward of Niororo island bearing S. 8° W., and steer for it over Fawn bank, in 10 fathoms water, until within about 3 miles of Niororo island, when alter course to pass westward of Niororo reef, which can usually be seen when near; it is marked by a black buoy.

From abreast the buoy, steer S. by W. $\frac{1}{2}$ W., to pass eastward of Fili reef, until Niororo island bears N.E. $\frac{3}{4}$ N., or Fili reef red buoy bears W. by N. $\frac{3}{4}$ N. about $1\frac{6}{10}$ miles; then keep the island bearing N.E. $\frac{3}{4}$ N. astern, which will lead in mid-channel about one mile eastward of the red buoy on Wumi reef, as far as Sefo reef, the sand on which should be made out at least 2 miles distant, even if covered. (The outline of Mafia island will be visible when Shungu Mbili island is abeam.) When Sefo reef is in sight, the black buoy on the north-west extreme of Salim bank will probably be also; steer to pass westward of the buoy between it and Sefo reef,† thence half a mile westward of the black buoy on the north-west extreme of Al Hadjiri reef. From thence a course S. $\frac{1}{4}$ E., allowing for tide, will lead through the fairway between Ras Kisimani and Belami reef, to No. 4 black buoy (observing that Sefo reef, bearing N. $\frac{3}{4}$ E. astern, clears the south-west tail of Al Hadjiri).

(There is a fairly good channel westward of Sefo reef, but with depths of 4 to 5 fathoms only; it is unbuoyed.)

When about $1\frac{1}{2}$ miles southward of Ras Kisimani it should bear N. by E. $\frac{1}{4}$ E.; this bearing kept on, astern, will lead between black buoy No. 4 and the south-east tail of Belami reef, and nearly a mile westward of Mange reef.

Northward of Ras Kisimani there is at times a set north-eastward, which must be guarded against.

* See plan of Mafia island and channels, No. 458, and chart No. 662. Little or no advantage would be gained by a vessel proceeding northward using Mafia channel, as there is a favourable current eastward of the island, and no dangers.

† In 1877, the eastern extreme of the trees on Boydu island, bearing S.W. $\frac{3}{4}$ S., led through, but possibly the trees have extended. See plan No. 458.

The sand on Mange reef at low water springs will be seen from abreast Ras Kisimani, and it can usually be made out 2 miles off, even when covered, which is only at near springs.

With Mange reef abeam, course may be gradually altered to the south-eastward if bound to sea through South Mafia channel, or course shaped S.W. $\frac{3}{4}$ S. for the inner channel to Kilwa Kivinje.

In proceeding to Kilwa Kivinje,* steer S.W. $\frac{3}{4}$ S. along the pecked line, when the trees on Simaya island, which are visible at a distance of 14 miles, will shortly be seen on the starboard bow; continue that course until the island bears W.N.W., distant $1\frac{1}{4}$ miles, using that island with Okuza and Nyuni to determine the position of the vessel. From the position given a course S.S.W. will lead in the fairway between Membueso and Banda reefs, and thence between the red spar buoy on Choca reef and the black conical buoy on the north-west extreme of Machanga reef. Membueso reef, which dries 8 feet, and Machanga sand cay, which dries 10 feet, may usually be made out from a distance of one mile, even when covered. Simaya island bearing northward of N. by E. astern, leads nearly in mid-channel, eastward of Membueso. Choca reef is not easily seen, its highest part being 2 miles westward from its eastern extreme.

When southward of Choca reef buoy, shape course S.W. to pass westward of the black conical buoy on the west end of Poiasi reef, whence the course is S. $\frac{1}{4}$ E. to pass about one mile westward of Jewe reef; thence, with the east tangent of Singino hill bearing S. $\frac{1}{2}$ W., to the anchorage off Kilwa Kivinje, p. 360; or a vessel can steer to sea through Kilwa main pass, on either side of Jewe reef.

The passage, equally wide, also marked by a pecked line eastward of Poiasi, may be taken, but it is not buoyed. Poiasi and Pwajuu reefs are steep-to, and easily made out; a course South, passing half a mile eastward of them, will lead $1\frac{1}{2}$ miles westward of Val rock. When the high trees on the north end of Songa Songa bear N.E. $\frac{1}{2}$ N., keep them on that bearing astern, until Jewe reef, which is steep-to and generally visible, is seen on the port bow. When the eastern tangent of Singino hill bears S. $\frac{1}{2}$ W., steer for it as before, to the anchorage off Kilwa Kivinje.

* See plan, No. 1,032.

CHAPTER IX.

RAS KIMBIJI TO PANGANI BAY, INCLUDING ZANZIBAR ISLAND
AND CHANNEL.

(Lat. 7° S. to lat. 5° 25' S.)

VARIATION IN 1897.

Ras Kimbiji	-	-	-	-	-	9° 30' W.
Latham island	-	-	-	-	-	9° 15' W.
Zanzibar harbour	-	-	-	-	-	9° 10' W.

FUNGU KISIMKAZI or **LATHAM ISLAND*** is a low dangerous coral island in the fairway of vessels approaching Zanzibar channel from the south-eastward, in lat. 6° 54' 5" S., long. 39° 55' 45" E., and S.E. by S. nearly 36 miles from Ras Kizimkazi the south extreme of Zanzibar. It was discovered by the East India Company's ship *Latham* in 1758, and is of an oval form 350 yards in length north and south, and 180 yards in breadth. Its surface, 10 feet above high water, is quite flat, made so by the constant treading of myriads of sea fowl that have consolidated the sand collected on the coral substratum into a soft sandstone, which shines very white in the sun, but with a bad light, or at night, it is difficult to see.

The island is situated on a coral ledge which dries to the distance of about a cable; depths of less than 3 fathoms extend about 3 cables north and eastward of the island, and to about half that distance southward and westward.

A sand cay shifts from the northern to the southern end, and *vice versa*, according to the monsoon, being always at the lee side, and on this it is practicable to effect a landing in moderately calm weather. Two or three vessels have been totally lost on Latham island.

* See charts :—Pangani to Ras Kimbiji, including approaches to Zanzibar, No. 640a, No. 662.

Beacon.—To make the island more conspicuous, a beacon was erected by the officers of H.M.S. *Shearwater* in 1873, but, as no mortar was used, it was blown down, the base only remaining. It has been partly rebuilt, and was 10 feet high by latest reports, but no dependence should be placed on it.

Anchorage.—The bank surrounding Latham island, within a depth of 20 fathoms, extends 5 miles north, 4 miles south, 2 miles east, and half a mile west, beyond which the water rapidly deepens to 200 fathoms. The greater part of this area has a depth of from 5 to 10 fathoms, sand, interspersed with large lumps of coral, and the water is so clear that the bottom can be plainly seen. Anchorage may be taken north or south of the island, depending on the monsoon. In moderate weather it is a good place for a vessel to anchor for the night, when too late to get on to Zanzibar; but there is a nasty cross swell on the bank, rendering the anchorage an uneasy one.

This bank may be run for in safety at night with slow speed and the lead kept going, from any direction but the westward, the depths on that side being more abrupt than on the other sides. The bottom has been clearly seen by moonlight in 10 fathoms. There is good fishing on the bank.

From the masthead of a vessel at anchor, the mainland at Ras Kimbiji is just visible on a clear day.

Tides and Current.—The current on Latham bank is variable, but on either side of it, directly the deep water is gained, the current runs with considerable velocity to the northward all the year round. During the south-west monsoon the rate is from $1\frac{1}{2}$ to 4 knots, and in the north-east monsoon from 1 to $2\frac{1}{2}$ knots. At 5 miles westward of Latham island, the current is much weaker. *See current, p. 385.*

It is high water, full and change, at Latham island at 4h. 0m.; springs rise about 10 feet.

COAST.—Ras Kimbiji, a clifty, but low, promontory on the mainland, with a village of the same name close northward of it, lies in lat. $6^{\circ} 59' 15''$ S. Its position will be known by a rounded hill 150 feet high, conspicuous by its isolation, which rises 2 miles within the point, and by the lighthouse on Ras Kanzi, $1\frac{1}{2}$ miles to the southward; it is a good point for a fresh departure if bound up Zanzibar channel.*

* *See chart:—Pangani to Ras Kimbiji, with views, No. 640a.*

Fungu Miza is a narrow reef, one mile in length, and dry one foot at low water springs ; it lies $1\frac{1}{4}$ miles off Kutani cliff and village, with Ras Kimbiji bearing S. $\frac{1}{2}$ E. A rock with one fathom water on which the sea generally breaks, lies nearly a mile N.N.W. of it, with shallow water between.

Ras Manamku is a red cliff point 60 feet high, at 6 miles northward of Ras Kimbiji. The coast between, varied by cliffs and sandy bays, is higher than any part of the land for some distance to the northward. At the village of Kutani, to the southward, the cliffs are 70 feet in height, and of a red colour.

Anchorage.—Temporary anchorage can be obtained anywhere off this coast when the monsoon is light, in about 14 fathoms, at the distance of one mile, except near Fungu Miza. Care must be taken, however, not to run in too rapidly in seeking a berth, as the depths decrease suddenly from 35 to 15 fathoms, and from that again to shoaler water.

Ras Ndege is a cliffy cape, conspicuous when coming either from the northward or southward, and forms the south-west point of the southern entrance of Zanzibar channel. It is abrupt, fairly steep-to, and about 30 feet above high water, the cliffs being 10 feet. The point is backed by low rounded hills.

Coasting craft working southward along the mainland, meet the current off Ras Ndege, which makes it a difficult point to pass in the south-west monsoon period ; but there is good anchorage for dhows or boats one mile westward of the point.

From Ras Ndege the coast trends westward for 5 miles to Ras Koronjo, generally sandy beach, but with one or two small cliffs.

Dhow harbour is the name given to the bight in the reef, $1\frac{1}{2}$ miles north-westward of Ras Ndege, which affords anchorage in 2 fathoms during the south-west monsoon period. Here, and also farther to the westward, off Mboamaji and Mjimwena, at this season, there is at times a collection of dhows waiting for a lull to get round Ras Ndege.

Ras Koronjo* is a cliffy point 2 miles westward of Mboamaji village ; the coral ledge dries in a north-west direction nearly a mile from it.

* See Admiralty plan of Dar-es-Salaam and adjoining anchorages, No. 674 ; also chart, No. 640a.

Ras Mjimwema.—Between Ras Koronjo and Ras Mjimwema 3 miles north-westward, the coast forms a low and sandy bay, backed by mangrove swamps, with the village of Mjimwema on its western shore.

There are high cocoa-nut trees around the villages of Magogoni, Mjimpia, and Mjimwema. From Ras Mjinwema the coast trends westward for 2 miles to Ras Rongoni the rocky east point of Dar-es-Salaam harbour, the red cliffs of which are from 15 to 20 feet high.

Islands and reefs.—A little westward of Ras Ndege commences a chain of islands and reefs, which skirt the coast for about 20 miles, as far as Fungu Yasin. These islands and reefs afford shelter to several anchorages, and lie at an average of 2 miles from the mainland. About midway on the coast is also the land-locked harbour of Dar-es-Salaam.

Sinda islands, situated between one and 2 miles northward of Ras Koronjo, are two coral islands on a coral reef one mile in diameter. The outer and larger island is half a mile in length, about 50 feet in height, with some trees on it. A chain of islets fringe the eastern edge of the reef. Inner Sinda island is 40 feet high, and has white sand on its north and south extremes.

Mwamba Kikwero, three-quarters of a mile in length, dry 2 feet at low water springs, and steep-to, with 6 to 7 fathoms around, lies about 2 miles N.E. by N. of Mboamaji village. Between it and the shore reef is a patch awash at low water; the sea always breaks.

A patch with $3\frac{1}{2}$ fathoms lies three-quarters of a mile north-east from Kikwero reef, with the north extreme of outer Sinda island distant 2 miles, and in line with the left extreme of inner Makatumbe island.

Millard bank is one mile in length, with a least depth of 3 fathoms; from the shoalest spot, at the north end, the east extreme of outer Sinda island bears S. by E. $\frac{3}{4}$ E. distant $1\frac{3}{4}$ miles.

Gunja peak in line with Ras Kankadya bearing N.W. by W. $\frac{1}{2}$ W. leads about $1\frac{1}{2}$ miles northward of it. This bank cannot be distinguished until close upon it.

Mboamaji harbour is the name given to the anchorage within the Sinda islands. It is fairly protected by the surrounding reefs,

See Admiralty plan of Dar-es-Salaam and adjoining anchorages, No. 674; also chart, No. 640a.

but in a strong monsoon, especially the north-east, the swell sets round the islands.

Mboamaji village is situated on the shore abreast; a curve in the coral ledge fronting it affords protection to boats landing at low water.

Anchorage.—The best anchorage in the south-west monsoon period is in 10 fathoms, sand and mud, with the south extreme of inner Sinda island bearing S.E. by E. $\frac{1}{2}$ E., and the north extreme of outer Sinda E.N.E. There is also fair anchorage off Mjimwema village in 6 fathoms, sand, with the north extreme of Kendwa island bearing N.N.W. $\frac{1}{4}$ W., and the white house in Mjimwema village W. by S. $\frac{3}{4}$ S. Dhows and vessels of 10 feet draught may anchor close off the village, well sheltered. In the north east monsoon the best berth is in 6 fathoms, sand, with the south-west point of Inner Sinda bearing N.N.E. distant 2 cables.

The streams at this latter anchorage are strong. At the end of the flood, especially in the north-east monsoon, the stream runs rapidly to the eastward, and causes a vessel to swing to the swell in a most unpleasant manner.

Directions.—To enter Mboamaji harbour from the south-eastward, keep Inner Makatumbe island well open northward of outer Sinda island, to clear Mwamba Kikwero, until the Sinda islands appear to touch, when steer for them, passing about 3 cables off the islets on Sinda reef; the eye will guide to the anchorage.

To enter from the northward, west of Millard bank, from abreast the Makatumba group, bring the south-west point of inner Sinda island to bear S.S.E., and steer for it; anchor when convenient.

Kendwa island, half a mile in extent, is situated on the edge of the coral ledge fronting Ras Mjimwema to the distance of one mile. Its trees are 40 feet above high water, and its outline level and uniform.

Boat channel.—Between Kendwa island and Makatumbe reefs is a boat channel half a mile wide.

Boats working to windward in the north-east monsoon should run under the lee of Makatumbe island through this channel, but

in the south-west monsoon, at low water, the sea sometimes breaks right across, and discretion must be used as to taking the channel.

DAR-ES-SALAAM BAY, the outer anchorage of Dar-es-Salaam, lies between Kankadya promontory and the Makatumba group; its northern portion is encumbered by Daphne reefs, but there is sufficient space in the remainder, with depths of 7 to 12 fathoms, sand and mud, for all classes of vessels. During the south-west monsoon the bay is well protected by the Makatumba group, but during the north-east season a considerable swell sets in with a strong wind. Still, for a small vessel, which can lie near Inner Makatumba island, there is some shelter.

The shore of the bay is broken and indented, and presents to the eye a low outline, nearly uniform in height, but much diversified by alternate sand beaches and cliffs. Inland, at a distance of 12 miles, are mountains rising to a height of 1,200 to 1,500 feet. This chain extends south-westward and terminates abruptly.

Shallow water extends from the head of the bay to a considerable distance, the 3-fathoms line of soundings being $1\frac{1}{4}$ miles from the beach. At low water springs, sandbanks and coral ledges dry off a distance of 6 cables. The flat between Makatumba group and the southern shore has an average depth of 9 feet water, but near its western edge of 3 fathoms is a rock, with a depth of 3 feet on it, with the house in ruins on Inner Makatumba island bearing E. by N., about 6 cables; it seldom shows.

Makatumba islands, two in number, with several islets, are situated on the large coral reef forming the east side of Dar-es-Salaam bay. The inner island is 2 cables in diameter, with several trees near its centre about 50 feet in height; stone is quarried here: there is also a stone house, in ruins, near which is a masonry-faced well, but the water is not fit to drink. The outer island is of the same size, but of less height. *See Light*, p. 394.

The reef on which the group stands, dries at low water springs, is $1\frac{3}{4}$ miles in extent, and steep-to on the eastern side; off the north point the bottom shelves from the 5-fathoms line, which is 4 cables northward of Hammond rock; the western edge has also a gradual slope, but the southern is shallow, as before mentioned.

Hammond rock, the northern islet of the group, is 6 feet above high water, and forms a guide when rounding the reef.

Daphne reefs, three in number, lie in the north-west part of the bay. The outer and largest is three-quarters of a mile in length, with a least depth of 2 fathoms water; this shallow part can at times be made out, but it would not be safe to trust the eye. *See* Buoy, below.

The middle reef lies half a mile south-west of the outer reef with 3 fathoms least water.

The inner reef is 3 cables in diameter, with several rocky heads of one fathom water, which occasionally break. It lies 3 cables within the middle shoal, and 9 cables from the shore.

Clearing marks.—Gunja peak open northward of Ras Kankadya, leads half a mile northward of Daphne reefs; the western extremes of Bongoyo island, in line, also lead northward of them.

A boat, working up inshore in the north-east monsoon, when in the vicinity of the inner reef, should tack directly the south extreme of Bongoyo island opens of Ras Kankayda.

LIGHT.—From a square tower, 95 feet in height, painted in black and white stripes, erected on the north extreme of outer Makatumbe, is exhibited at an elevation of 96 feet above high water, a *flashing white light every thirty seconds*, visible from a distance of 15 miles in clear weather. The light shows for 6 seconds and is eclipsed for 24 seconds.

Buoys.—A white spar buoy with two black triangles, points downwards, marks the edge of the shallow water extending northward of Hammond rock, Makatumbe reef.

A white spar buoy with two black triangles, points upwards, in $5\frac{1}{2}$ fathoms, marks the south-east extreme of the outer Daphne reef.

Directions.—Approaching Dar-es-Salaam bay from the northward, Mbudya island will be first distinguished by its clump of trees. This island should be given a berth of at least 4 miles in order to pass outside Mbudya patches, as it is quite possible that shoaler patches than those marked on the chart may have escaped detection. Steer along the shore at this distance until the Makatumbe islands or the lighthouse are in sight bearing S.S.W.

Then steer for the islands on that bearing until the white tombs on the red cliffs of Ras Chokir bear S.W. ; this latter mark being steered for will lead midway between the buoys marking the outer Daphne reef and the spit extending from Hammond rock ; and when the obelisk on Ras Rongoni (or the middle of its red cliff) bears S.S.W., steer for it. This mark will lead through the bay, and when Inner Makatambe bears S.E. by S., haul towards it for anchorage, unless entering the harbour, in which case proceed as directed on p. 397.

In approaching Dar-es-Salaam bay from the southward, the Sinda island will first come into view. Give the outer island a berth of two miles to clear Millard bank, by keeping Gunja peak in line with Ras Kankadya ; steer on this line about N.W. by W. $\frac{3}{4}$ W., until Kendwa island is abeam, when alter course gradually to bring the tombs on Ras Chokir S.W., and proceed as from the northward.

Anchorage.—The best anchorage in either monsoon for vessels of moderate draught is in 4 fathoms, mud, with the house in ruins on Inner Makatambe bearing S.E., and Hammond rock N.E. by E. A vessel of light draught can with advantage lie nearer Makatambe, but those of heavy draught must anchor more to the northward, in 7 to 8 fathoms.

Tides and current.—The tidal streams in the vicinity of Dar-es-Salaam bay are variable and uncertain. The change of the monsoon works an entire reversal, in most instances, of their directions and strength. As a general rule, the flood runs north-westward, and the ebb in the contrary direction, but amongst the islands and reefs the streams will often be found setting to the opposite points. In the south-west monsoon, at 6 miles from the land, the current runs continually north-westward, at rates varying from one to 3 knots an hour. In the north-east monsoon, on Mbudya patches, the flood runs north-west, and the ebb south-east, while, at the same time, inside Bongoyo island the reverse is the case.

In Dar-es-Salaam bay the velocities are not usually great.

Weather.—See Meteorological table for Bagamoyo, p. 597.

DAR-ES-SALAAM HARBOUR is land-locked, the water is of a convenient depth for anchoring, and the shores are steep. There is room for a number of vessels, but the entrance, though it has a depth of about 20 feet at low-water springs and 34 feet at high-water springs, is narrow and somewhat tortuous and therefore scarcely to be recommended for vessels above a moderate draught.

It is the natural locality or the great trading port of the east coast, and was recognized as such by the late Seyd Majid, Sultan of Zanzibar, who commenced to build on a large scale on the northern shore, and intended to direct the Bagamoyo trade hither. His death prevented this project being carried out. It is now the headquarters of the German East Africa Protectorate and a considerable town has been built on the site mentioned.

The harbour is the lower portion of a long salt water inlet, and might be made available for 3 miles as a port. The anchorage immediately off the town is in a reach three-quarters of a mile in extent, with depths ranging from $3\frac{1}{2}$ to 8 fathoms, mud. The shore of this reach is nearly surrounded by cliffy land 20 to 30 feet high, generally steep, and at the town side, ascended by flights of stone steps. On the west is a shallow mangrove-lined creek. Southwards the inlet extends for two miles without a turn, and is a third of a mile in width, bordered by the same steep banks, but faced by mangroves.

The narrow entrance to Dar-es-Salaam harbour is not easy to make out, even from the anchorage in the bay. It lies between the red cliffs of Ras Rongoni and Ras Chokir, through an abrupt break in the coral reef bordering the shore. The break in the reef at the entrance, abreast North Sand head, which dries 2 feet at springs, is about $1\frac{3}{4}$ cables wide, reduced to about one cable at low water, at about one mile within, between East and West Ferry, two low sandy points.

A rocky patch, with a spit beyond, which projects from the North Sand head, into the channel, presents the greatest difficulty in the passage, narrowing it, at the turning point, to 120 yards; thence the channel is straight towards East Ferry point, and has a depth of 21 feet, on either side of a bank with 16 feet over it at low springs lying in the fairway about 4 cables from East Ferry point. The passage between the Ferry points is on a curve, but it is easy to keep in mid-channel. There is a small bank with 3 fathoms water, off the town, and a larger one with $2\frac{1}{4}$ fathoms, off the creek.

Landmarks.—From the bay, the following objects are more or less conspicuous. On the west side of entrance, are the red cliffs at Ras Chokir and the white stones in the cemetery within; farther southward is the boat-house with red roof, and between is the Government house and flagstaff; near West Ferry point is the Protestant mission house.

On East Ferry point is a white signal tower, visible about 10 miles in clear weather, whilst to the eastward are the red cliffs of Ras Rongoni.

Beacons.—Buoys.—On Ras Rongoni is a white obelisk, and on a rock N. $\frac{3}{4}$ E., about 180 yards from it, is a white pyramid, leading marks for the approach. Red spar buoys mark the starboard side of the channel on entering, and black conical buoys the port side, as follows, but they must not be depended on :—

The outer red spar buoy, with white topmark A, in about 4 fathoms, lies with the obelisk on Ras Rongoni S. $\frac{1}{2}$ W. distant $8\frac{2}{3}$ cables. The red spar buoy, with white topmark B, lies close eastward of North Sand head spit, with the obelisk S. by E. 3 cables. The red spar buoy, with white topmark C, lies with the flagstaff on East Ferry point S. $\frac{3}{4}$ W. $2\frac{1}{4}$ cables.

A black conical buoy, No. 1, lies close eastward of the line of beacons, with the obelisk S. $\frac{3}{4}$ W. $3\frac{3}{4}$ cables. Three black conical buoys, numbered 2, 3 and 4, mark the edge of the spit off Ras Makabe within East Ferry point. All these buoys are marked with the letter or number given above with the letters Dr. s.m. underneath. There is a mooring buoy in about $3\frac{3}{4}$ fathoms, with the port flagstaff N.W. by W. $\frac{1}{2}$ W., about 3 cables.

Pilot.—The German authorities will provide a pilot when requested.

Directions.—The best time to enter Dar-es-Salaam harbour is at low water, if the draught will permit, as the reefs on either side can generally be made out from aloft, or failing that at high water ; in no case should a vessel attempt it during the full strength of the flood stream, nor should she leave during a strong ebb.

From Dar es-Salaam bay steer in with the beacons at Ras Rongoni in line bearing S. $\frac{3}{4}$ W., eastward of the red spar buoy A (which line will carry not less than 21 feet at low water springs), until nearly up to and westward of black buoy No. 1 (the left extreme of the cocoa-nut palms on Kurasina, in the harbour, will be touching West Ferry point), *see sketch*. Then alter course, passing close westward of that buoy and within half a cable southward of red buoy B ; thence for red spar buoy C (which should be nearly in line with the tower of the Protestant mission), passing south-eastward of it. A conical beacon on the south shore, seen over any portion of a white wall fronting it, denotes that the vessel is passing the bank in the fairway ;

when the beacon is on with the west end of the wall, steer to pass midway between the Ferry points, thence northward of the black buoys of Ras Makabe to the anchorage. The ebb stream sets strongly towards these buoys.

Vessels may anchor anywhere in the harbour, unless an anchorage has been indicated to them by the pilot or other officials of the port. When anchorage is indicated to vessels, it is done so by a boat with a green flag. The vessels must steer towards the boat and drop anchor when the flag is lowered. Vessels should not anchor in the entrance channel except in case of emergency. Copies of the Port Regulations are supplied to vessels on first visit.

Vessels with explosives can only enter the harbour after obtaining permission.

Tides.—It is high water, full and change, in Dar-es-Salaam harbour, at 4h. 20m.; springs rise 14 feet, and neaps $9\frac{1}{2}$ feet. The stream at springs runs strong in the harbour channel, especially towards or after low water, as it is then confined to the channel itself. The ebb sets eastward over the flats towards Makatumbe islands, so that a vessel on reaching the turning point off Ras Rongoni in her passage out must take care, if *obliged* to choose that time of tide, that she is not swept on to it.

Dar-es-Salaam town, the capital of German East Africa, is situated on the northern shore of the harbour, some 30 feet above high water; several flights of steps lead down to the shore. The town has been built on the site of the town begun by the late Sultan of Zanzibar, Seyd Majid, referred to on page 396, and contains many well laid out streets and blocks of buildings. There are Government residences for the Governor and other officials, a fort, a chief custom house, post and telegraph offices, Protestant and Roman Catholic missions, &c.

Population.—The population in 1894 was about 10,000, of whom 440 were Europeans.

Position.—The observation spot on the north-west side of the Government buildings is in lat. $6^{\circ} 49' 41''$ S., long. $39^{\circ} 17' 8''$ E.

Piers.—There is a custom house quay, and several landing stages. Government officials only are allowed to land at No. 1 pier. Boats are not allowed to make fast to the piers or to lie alongside for any length of time.

Communication.—Dar-es-Salaam is connected with Zanzibar by submarine telegraph cable, *via* Bagamoyo; thence with the world. The main line of the Deutsche Ost Afrika steamers from Europe, *via* Aden and Tanga, call here every three weeks, and their branch line from Tanga every three weeks, both calling on their return northwards. The same Company's steamers from Bombay *via* Zanzibar, call about every six weeks.

Proposed Railway.—It is proposed to construct a railway from Bagamoyo to lake Tanganyika, about 900 miles, *via* Mrogoro, 160 miles, and Tabora, 625 miles; and from Tabora to lake Victoria, a further distance of 170 miles. A branch line is proposed to Bagamoyo.

Trade.—There is considerable trade with the interior, caravans of ivory and other produce occasionally arriving for shipment. The principal exports are copal, corn, maize, and sesame.

Supplies.—The usual supplies of poultry, eggs, goats, and possibly fresh beef and vegetables, are obtainable. There are several good wells of water. It is proposed to construct a dock here, and slight repairs may be executed.

Inlet.—Above the town the inlet of Dar-es-Salaam extends 2 miles in a S.S.E. direction, then turns south-westward, and continues the same breadth for another mile. It is navigable for vessels almost up to this point, but here at low water springs it may be said to come to an abrupt termination, as a sandbank dries nearly across the channel. Above this it divides into two branches, one extending south-south-westward, the other and larger, south-eastward, with high banks on either side. Both branches are nearly dry at low water springs, and, as little fresh water comes down them except during the floods, the statement of the natives that they end in mangrove swamps is probably correct. Mtoni is a considerable village at the fork.

COAST.*—Upanga bay.—About $1\frac{1}{2}$ miles north-eastward of the entrance to Dar-es-Salaam harbour is the bay of Upanga, a sandy inlet with cliffy points, half a mile wide, and dry at low water. A stream of the same name runs into the bay.

Ras Kankadya.—At $1\frac{1}{2}$ miles northward of Upanga is another sandy bay forming one side of the neck of the promontory of Ras

Kankadya ; a rocky coast thence trends northward for about 2 miles to Ras Kankadya. This promontory, which projects northward nearly 2 miles, appears from the north-eastward like an island, and a sand patch in a cove is conspicuous when the sun is in the east. A reef, dry at low water, extends from one to 2 cables off the promontory.

Kankadya patch, with 5 fathoms least water, lies with Ras Kankadya bearing West, distant $2\frac{3}{4}$ miles.

Bongoyo is a rocky island, facing Msasani bay, and protecting it from the swell. It is $1\frac{1}{2}$ miles in length, with an average breadth of 2 cables, and presents a uniform outline of stunted trees on cliffs 40 feet in height. There is an isolated rock 8 feet high off the north point, and a sandy bay in the centre of the eastern shore shows white and conspicuous with the morning sun. The island is uninhabited and all but impenetrable.

The surrounding reef, dry at low water, extends seaward more than half a mile from the island, not very steep-to, but the sea always breaks on it. A detached rock with 6 feet water, which breaks occasionally, lies 6 cables S.E. by E. $\frac{3}{4}$ E. from the south point of Bongoyo island. On the western side the reef dries nowhere more than one cable off.

The depths eastward of Bongoyo and its reef are irregular.

MSASANI BAY lies within the rocky promontory of Kankadya; it is sandy throughout, intersected by creeks leading from mangrove swamps and backed at a distance of 3 miles by a long featureless hill rising to Gunja peak, a slight summit, 600 feet in height. The bay affords good anchorage during either monsoon, and is safe and easy to enter from the southward. The south and west sides of the bay are, however, shallow, the sand drying in some places 6 cables from the shore, and the 3-fathoms line of soundings being in other parts nearly $1\frac{1}{2}$ miles from high water line. From the village of Msasani, at the head of the bay, the shore trends northward for 6 miles to the village of Konduchi.

Anchorage.—In the north-east monsoon the best berth is in 8 fathoms, sand, westward of the centre of Bongoyo, with its north extreme bearing North distant about three-quarters of a mile.

During the south-west monsoon a berth more to the northward, about half a mile off the north-west point of Bongoyo island, should be taken. Or, if preferred, in the southern part of the bay in about 6 fathoms, with Ras Kankadya bearing E. $\frac{1}{2}$ S. From the latter berth, landing is easy at the village of Msasani, in the angle of the bay, which is 2 hours' walk to Dar-es-Salaam.

Directions.—To enter Msasani bay, bring Gunja peak midway between Ras Kankadya and Bongoyo island, and steer for it, until Inner Makatumbe island is in line with Ras Kankadya; then alter course for Pangavini islet, bearing N.N.W. $\frac{1}{4}$ W., if proceeding to the northern part of the bay. If intending to anchor under Ras Kankadya, round the point as convenient.

MBUDYA, the northernmost of the chain of off-lying islands mentioned in page 391, is a coral island, faced with low cliffs, and standing on a ledge of coral. It is three-quarters of a mile in length, of a triangular form, and has or had a square clump of trees 60 feet high, showing above the other foliage. The surrounding reef is 2 miles in length, one mile in breadth, and dries at low water, the greater part of it being to seaward of the island. The inner side is tolerably steep, but the outer or eastern side deepens gradually, has outlying patches, and is therefore dangerous to approach.

Mbudya spit, with 3 fathoms least water, lies with the south point of the island bearing N.W. $\frac{1}{3}$ N. distant 2 miles. A patch half a mile in length, and $2\frac{3}{4}$ fathoms least water, lies half a mile eastward of the spit. Fishermen occasionally camp on the island.

Mbudya patches are a number of small patches at various distances outside Mbudya island, the outer one known being 4 miles from the island. They have from $3\frac{3}{4}$ to 5 fathoms water, but their neighbourhood should be avoided, as it is possible shoaler places may exist.

Pangavini islet, at one mile south-westward of Mbudya island is a rocky islet, on a coral bank, three-quarters of a mile in length. The islet is one mile from the main, with a narrow channel, with depths of 6 to 7 fathoms between.

At three-quarters of a mile northward of Pangavini islet, is a 3-fathoms patch of about 3 cables in extent.

See plan of Dar-es-Salaam, No. 674.

Fungu Mkadya is a coral reef, $1\frac{1}{2}$ miles in length, dry at low water. From the depth of $2\frac{1}{2}$ fathoms off its south end, the north-east extreme of Mbudya island bears S.E. by E. $\frac{3}{4}$ E., distant one mile.

KONDUCHI HARBOUR.—The village of Konduchi stands on the beach of the mainland, opposite Mbudya island, near the mouth of Peremji river. The sand dries off for half a mile.*

Konduchi harbour is the name given to the anchorage south-westward of Mbudya island, and is a convenient shelter during the north-east monsoon for a vessel wishing to find a quiet place for the night, though that under Bongoyo is preferable.

Directions.—Anchorage.—Konduchi harbour may be entered either from the northward or from the southward. The northern channel is but 4 cables wide at low water, for a vessel of 18 feet draught ; the centre of Pangavini island bearing S. $\frac{3}{4}$ W. leads in from seaward between Fungu Mkadya and Mbudya and eastward of the 3-fathoms patch northward of Pangavini. There is anchorage in the south-west monsoon period northward of that bank, in about 10 fathoms, with the north extreme of Mbudya E. $\frac{1}{2}$ S. and Pangavini on the above bearing of it. For a smaller vessel it is only necessary to give the west point of Mbudya island a berth of 4 cables. The northern edge of Mbudya reef, though not steep, generally shows.

To enter from the southward, the better channel, especially in the north-east monsoon period, steer in with the north point of Bongoyo island bearing W. by N. until Pangavini islet bears N.W. by W. $\frac{1}{2}$ W., when steer for it until the west extreme of Mbudya bears N. $\frac{3}{4}$ W. ; thence about N.W. by N. to the anchorage, in 10 fathoms, sand, midway between Mbudya island and Pangavini islet.

FUNGU YASIN.—Beacon.—Fungu Yasin is a coral reef, $1\frac{1}{2}$ miles in length ; it dries over a large area at low water springs, and has a sandhead on its north-west extreme, 4 feet above high water, on which stands a red and white beacon with triangle. From this head Mbudya island bears S. by E. distant $3\frac{3}{4}$ miles. On the western side the reef is steep-to, but at the south-eastern end shallow water extends off to a 3-fathoms patch, 2 miles S.E. $\frac{1}{4}$ E. from the sandhead. South-eastward of this patch are the Mbudya patches already mentioned.†

* See plan of Dar-es-Salaam, No. 674.

† See chart :—Pangani to Ras Kimbiji, No. 640a ; also chart No. 664.

Anchorage.—There is good anchorage within Fungu Yasin during either monsoon, in 16 fathoms, off the centre of the reef, with the sandhead bearing N.E. distant half a mile. The safest approach to the anchorage is round the north end of the reef.

COAST.—From Konduchi village the coast trends north-westward with some sinuosities for about 16 miles to Waso, thence westward for $3\frac{1}{2}$ miles to Ras Luale. It is a low sandy beach, bordered by coral ledges and banks, backed by mangrove swamps or dense bush. A few miles inland are low rounded wooded hills, which in the vicinity of Konduchi rise to the height of 500 feet. From Konduchi village the coast is sandy for a short distance, and then rocky to Ras Kiromoni; the latter point is low, and forms a small bay on its west side, where there is fair landing in the south-west monsoon period.

Bueni.—At $4\frac{1}{2}$ miles northward of Ras Kiromoni is the village of Bueni, conspicuous by some white tombs and large mango trees. There are several villages on the shore between Kiromoni and Bueni. Along this coast the sand or coral dries from 3 to 9 cables off, with outlying dangers.

Ukatani reef, $1\frac{1}{2}$ miles E. by N. of Ukatani village, is small, and awash at low water springs.

There is a small patch between it and Ras Kiromoni, about 8 cables off shore.

Bueni reefs lie off the village of Bueni, and are two in number. The northern one is a bank half a mile in extent, with a rock having a depth of 6 feet, from which Bueni village bears S.W. by W. $\frac{1}{4}$ W. distant $1\frac{3}{4}$ miles. The other, at one mile south-eastward, has 2 fathoms water. These dangers are both difficult to distinguish, as the sea seldom breaks, and the water is thick.

Kitapumbe reefs lie off the village of the same name; they are two in number, and of coral.

The south-easternmost, $2\frac{1}{2}$ miles from the land, and $3\frac{1}{2}$ miles northward of Bueni village, is about one mile in length, and dries 2 feet at low water springs. The other, nearly 2 miles north-westward, is one mile in diameter, 2 miles from the coast, and dries 4 feet. These dangers are fairly steep-to, and the sea generally breaks. The water is thick in this vicinity.

Buoy.—A white spar buoy, marked *Kitap*, and surmounted by two triangles with points averted from each other, lies in 9 fathoms, eastward of the patch which dries 2 feet on the easternmost reef.

Mshingwi is a small coral reef, on which the sea generally breaks even when covered, lying one mile off the centre of the sand spit forming Mwangotini lagoon ; it is steep-to, and dries 11 feet at low water springs, with 9 fathoms around.

Mwangotini lagoon is 4 miles in length in a south-east direction, by one mile in width. It is formed by a long narrow tongue of coral and sand about $1\frac{1}{2}$ cables in breadth, which extends from abreast Waso in a north-westerly direction, parallel to the coast. This tongue is covered with thick bush, and ends in Ras Luale ; Ras Mbegani, the western point of entrance, is also a low mangrove point, and distant one mile from it.

The lagoon is mostly dry at low water, but there are narrow channels leading to Mbegani and Mwangotini villages on the south side. Tall cocoa-nut trees and white tombs mark the latter. The lagoon ends in mangrove swamps.

Coast.—From Ras Mbegani, the coast forms a slight sandy bay for 5 miles north-westward to Ras Nunge, a mangrove point which shows well out from the land when inshore, with Kaole and Bagamoyo lying between ; Kingani river entrance is 3 miles westward of Nunge, the coast between being a mass of mangroves.

Kaole, a village almost hidden from seaward by trees, stands a little eastward of the red cliffs $1\frac{1}{2}$ miles south-eastward of Bagamoyo.

Kebandahodi is a large sand and mud bank nearly awash at low water springs, abreast the village of Kaole, with shallow water extending some distance east and west ; its north extreme lies with Kaole red cliffs bearing S.W. by S. distant 3 miles, and is tolerably steep. The sea generally breaks here, but if it does not, the bank cannot be made out, as the water is thick and muddy.

Buoy.—A white spar buoy, marked *Bagamoyo*, and surmounted by two black triangles, points upwards, lies in 6 fathoms off the north side of Kebandahodi.

Mbwakuni reef, nearly 2 miles in length and three-quarters of a mile in breadth, lies 6 miles north-eastward from Bagamoyo. It is all dry at low water springs, with from 6 to 9 fathoms close-to; many coral heads are visible at half-ebb, and on the western end is a sandbank which dries 11 feet, and is consequently nearly always above water, the sea usually breaking on it, when covered.

Beacon.—A mast beacon surmounted by a ball, the whole painted black, is erected on this sandbank, with the French Mission houses at Bagamoyo bearing S.W. by W. $\frac{1}{4}$ W., distant $6\frac{1}{4}$ miles.

Current.—The current off this part of the coast is variable, and depends much on the direction and strength of the wind. In the south-west monsoon the current runs strong to the north-westward past Mbwakuni reef, but nearer the shore it is not so strong. In the north-east monsoon, when the wind is fresh, it is only on the flood that there is any set northward, but at this season the stream is variable.

BAGAMOYO.—The town of Bagamoyo stands a few feet above the sea level, on a low but steep bank of a sandy bay. It is one of the most important towns on this coast, and has a fixed population of about 10,000 inhabitants, of whom about 50 are Europeans and 700 natives of India. It is the point of departure and arrival for many of the African caravans; the entire caravan transport is made by carriers, mostly Wanyamwezi, a tribe about 350 miles inland; the exports are chiefly ivory and copal.

A branch establishment of the Roman Catholic Mission at Zanzibar stands on the north side of the town. It devotes itself to the training of native children to agriculture and various industries.

There is a German official in charge at Bagamoyo, and there is a Custom house, a district office, a post and telegraph station, and a hospital.

Winds and weather.—See Meteorological table, p. 597.

Supplies.—Oxen, sheep, goats, and fowls are always procurable and very cheap.

Communication.—Bagamoyo is connected with Dar-es-Salaam and Zanzibar by submarine telegraph cable. The branch steamers of the Deutsche Ost Afrika Company call here every three weeks on their way southward, *viâ* other coast ports, and on the return voyage.

There is also constant communication with Zanzibar. It is proposed to connect Bagamayo with the projected railway from Dar-es-Salaam to Lake Tanganyika.

Landing.—At low water, the sand covering a coral ledge, dries nearly a mile from the Bagamoyo shore, on which the dhows are grounded near the beach, and unloaded when the sand is dry. The best landing with any wind is off the north end of the town, nearly abreast the French Mission. Here, at low water, a coral ridge which trends parallel to the beach, forms, by its abrupt termination at the sand bank fronting the town, a cove where the water is generally smoother than elsewhere. At high water, the same ridge, though covered, breaks the swell.

Anchorage.—The water shoals gradually to the shore, and renders it advisable to anchor at some distance off, as the swell sets heavily in with either monsoon, and makes a berth in shallow water an uncomfortable one.

A berth in about 5 fathoms well be found with the west extreme of Mbwakuni reef E.N.E., Ras Windi N. by W., and the red cliffs S. $\frac{3}{4}$ W. Small craft in fine weather may anchor nearer the landing.

There is a red barrel buoy marked with an anchor and surmounted by a white flag, in 2 fathoms water.

Directions.—Approaching Bagomoyo from Southern pass of Zanzibar, Hatajwa hill in line with the south point of Chumbe island E. $\frac{1}{4}$ N. astern, will lead between Tambare and Boribu reefs; thence course should be shaped to pass about a mile northward of Mbwakuni reef beacon. When Kaole red cliffs bear S.S.W. $\frac{1}{2}$ W., steer for the anchorage. From the southward, pass about midway between Mbwakuni beacon and Kebandahodi buoy; when the red cliffs bear southward of S.S.W. $\frac{1}{2}$ W. steer for the anchorage.

To make the passage to Zanzibar harbour, it is better, in thick weather and in the south-west monsoon when the currents are strong, to steer round Kebandahodi buoy, and steer about 10 miles to the eastward, whence course may be shaped to pass westward of Ariadne bank. Hatajwa hill, bearing E. by N. $\frac{3}{4}$ N., leads $1\frac{1}{2}$ miles southward of Boribu reef, which dries 8 feet, and midway between it and Ariadne reef.

Caution.—At times, such as high water, sun ahead of the vessel, calm weather with mirage, shadows of clouds on the water, or such like, it will be dangerous to trust to the eye, and bearings of objects alone must be depended on.

KINGANI RIVER.—The Kingani or Ruvu lies about 3 miles north-westward of Bagamoyo. It could be made practically useful as a means of transport for about 50 miles, and when the river is moderately high, even more. It has many names, of which Kingani is applied to the lower portion only; 15 miles up it is known as the Ruvu, but on the coast the former name is better known. Its mouth is in lat. $6^{\circ} 23' S.$, long. $38^{\circ} 52' E.$

Bar.—Kingani river is fronted by a shifting bar variable in depth, which dries about 2 miles from the shore, and the sea generally breaks heavily on its edge; there is possibly a canoe passage at low water. There are numerous snags in the direct approach, rendering it advisable to approach from either westward or eastward; there is possibly a depth of about 5 feet at three-quarters flood. After one hour's ebb, no heavily laden boat should attempt to pass either in or out.

The actual entrance is 6 cables broad from mangrove to mangrove, and 2 fathoms water is obtained immediately inside the points. At half a mile up is the ferry of Windi, over which was the old land route of the slave caravans. The river is winding, with a general south-west direction, and an average breadth of 100 yards for 12 miles, at which point the mouth is only 5 miles distant in a straight line. Up to this point it runs mostly through dense mangroves, though a few pieces of bare prairie are passed, inundated during rains; here the open country begins, with a flat grass plain on the right bank, which extends back from the river 2 miles to the edge of a low but steep-faced plateau.

In this locality cultivation begins; maize, manioc, millet, and sweet potatoes are the principal cereals and roots grown, together with cocoa-nuts and plantains. At 19 miles from the entrance (7 miles as the crow flies) is Kingwere ferry, the route by which most of the trade to Central Africa passes from Bagamoyo. The river is here but 40 yards wide. At 2 miles above Kingwere the river flows through forest, but the land is flat, the banks are steep, and about 8 feet high. The stream narrows to 25 yards, and becomes somewhat dangerous with snags and sandbanks. A little farther on,

a large feeder, the Kangeni stream, runs into it from the westward. At 10 miles above Kingwere the river meets the edge of the plateau before mentioned, and a steep cliff of about 40 feet in height forms the right bank ; (somewhere between this and Kingwere is the highest point that the tide reaches).

Thence, for 5 miles the river runs at a short distance from the steep edge of the plateau, now touching it, and now sweeping away with bold bends, till the small village of Dunga standing on the hill on the right bank is reached.

This was the farthest point attained by H.M. surveying vessel *Shearwater's* boats in 1873, and is about 35 miles from the entrance by water, but only 15 miles in a straight line. The river here is about 18 yards wide and 6 feet deep ; it is stated to maintain this size for many miles.

On the left bank a broad plain stretches to the foot of low undulating hills ; and 8 miles from the river, giraffe, zebra, buffalo, hartbeest, and other large game are found, especially in the dry season, when they come to the neighbourhood of the rivers to drink.

The Kingani, like other rivers on this coast, is unhealthy. Fever generally follows any sojourn on its banks, and sleeping in boats seems to afford no immunity.

COAST.—From the mouth of Kingani river to Ras Windi, a distance of 9 miles, the coast trends northward, upon which are two or three hamlets known by clumps of cocoa-nut trees, and is a mere strip of sand backed by mangrove swamps. There is a break in the sand 2 miles southward of Ras Windi, through which the tide ebbs and flows, and during the rainy season the superfluous water from the inundated plain escapes.

Windi, a large village, stands a little within the strip of sand, which hides the huts at low water, and on very low ground. Some white tombstones point out from the sea the position of the village.

Ras Windi, a sandy point, may possibly be known by a conspicuous tree just north-west of it. It is fronted at the distance of one mile by a coral ledge, dry 6 feet at low water springs, on which the sea breaks heavily, with shallow water beyond it.

Fungu Miko is composed of two small reefs on which the sea generally breaks: the northern one, a head of broken coral, dries 8 feet, and lies with the tombs at Windi village bearing W. $\frac{1}{4}$ N. 7 miles. The other, half a mile south-south-east, is larger, and dries 6 feet. There are depths of 12 fathoms water close to both these reefs.

Buoy.—A white spar buoy, with *Miko* in black letters, and surmounted by two black triangles with points away from each other, lies in 14 fathoms off the eastern extreme of Fungu Miko southern reef.

Windi patches, which generally break, are two coral reefs dry at low water springs. The southern one, 3 cables in diameter, dries 6 feet, is steep-to, with depths of 8 fathoms around; it lies with the conspicuous tree on Ras Windi bearing W. by N. $\frac{3}{4}$ N. distant 4 miles. The northern reef, one mile N.E. by N. of the southern, dries 4 feet, with 12 fathoms around it.

Buoy.—A white spar buoy, marked *Windi* in black letters, and surmounted by two triangles with points towards each other, lies in 7 fathoms westward of the southermost patch.

Ras Utondwe, $3\frac{1}{2}$ miles northward of Ras Windi, is a low sandy spit, with a small bay north of it, at the head of which is a salt-water creek having every appearance of a river, and named Mto Utondwe; the creek, however, ends in mangrove swamps $2\frac{1}{2}$ miles from its mouth, and has no fresh water. It was probably at one time in connexion with the Wami, as the intervening country is one vast mangrove swamp, and entirely inundated during the rains.

Wami patches* are eight separate coral patches lying 6 miles north-eastward of Ras Utondwe. They are very small, varying in depth from 6 feet to awash at low water springs, and occupy a space over 2 miles in a north-west and south-east direction, by one mile in breadth. They are steep-to, having depths of 12 fathoms water around them, and are dangerous, as the mud from the Wami and other rivers thickens the water at times to such a degree that at high tide they are invisible. The southern extremity of the flat Udoe hill bearing W. $\frac{1}{4}$ N. will lead nearly two miles southward of these reefs.

* See charts, Nos. 640*b* and 664.

Buoy.—A white spar buoy, marked *Wami* in black letters and surmounted by two black triangles with the points away from each other, lies in 14 fathoms just eastward of the easternmost Wami patch.

Tides.—It is high water in the vicinity of the Wami patches, at full and change, at 4h. 15m. ; springs rise 15 feet, neaps 10 feet.

MTO WAMI.—The southern mouth of this river is 2 miles northward of Ras Utondwe, and is named Chunango ; the northern entrance, one mile farther northward, is the Purahanya. Both are difficult to make out, the coast being fringed with mangroves, and the rivers taking abrupt turns from the entrances. Of these mouths, the Purahanya is the principal, but both have bars which dry across at springs, and a boat will find difficulty in getting in after half-ebb. These bars, like others on the coast, shift and vary with the seasons.

Hippopotami and crocodiles are found in Wami river, and large game is said to be plentiful 10 miles from the coast. It seems to be a less deadly river than some others, as several parties from the *Shearwater* slept in their boats on it with no evil effects. Behind the low lands of this part of the coast, Udoe hill, a flat range about 800 feet in height, slopes sharply on its south side, and forms the northern limit of a broad valley, down which the Wami probably flows.

The country is inhabited by the tribe of the Wadoe. Off the mouth of the Wami, shoal water extends a long distance, the 5-fathoms line being $3\frac{1}{2}$ miles off.

The Chunango branch, at 3 miles within its entrance, comes to an abrupt termination, and is completely dry at low water ; a little below this point, a narrow and tortuous channel, also dry at low water, leads to the principal branch.

The Purahanya branch, inside its bar, is about 80 yards wide, and 12 feet deep at low water springs, with mangroves on either side. At three-quarters of a mile within the entrance, on the right bank, is a piece of rising ground faced by a red cliff about 6 feet above high water. At 2 miles up, at the fork of the channel leading to the Chunango branch, the river at low water is only 20 yards across.

Above this it gets rapidly shallow, and snags and sandbanks block the channel ; at low water a steam cutter cannot proceed more than

a mile above the junction, and at a point $1\frac{1}{2}$ miles farther a small boat will find it difficult to proceed. Here is another cliff on the left bank. Above this the river was not explored by the boats of the *Shearwater* in consequence of the lowness of the river arresting further progress in the steam cutter, even at high water; but Captain Malcolm, R.N., of H.M.S. *Briton*, who went several miles beyond, states that the river slightly improves and deepens above, and that habitable land is reached at about 7 miles from the mouth, all below being dense mangrove and overflowed lands.

The Purahanya mouth is difficult to find, but the south fall of Udoe hill bearing W. $\frac{1}{2}$ S. will lead to it.

Mariner shoal.—A patch which dries in places about 3 feet at low water, half a mile in extent in a north and south direction, has been reported by H.M.S. *Mariner* to lie about 2 miles north-eastward of the Wami, with Saadani village bearing N. W. $\frac{1}{2}$ W. distant 4 miles.

Saadani.—The coast between the Wami and Ras Machuisi, a distance of 12 miles, is of the same character, low, with a sandy beach, much mangrove about the mouths of the several rivers, and a sand flat drying out for half a mile.

Saadani, a large village 7 miles south-west of Ras Machuisi, is the principal place between Pangani and Bagamoyo, and numbers about 4,000 inhabitants. There is a branch Custom house in the fort. There is no shelter for the dhows that trade to Saadani, they are simply beached at high water. There are several smaller villages to the northward of Saadani, and many streams and swamps open into the sea at this part of the coast.

Buoy.—A red barrel buoy, marked with an anchor and surmounted by a white flag, lies in $2\frac{1}{2}$ fathoms, E.S.E. $1\frac{1}{2}$ miles from Saadani station, and indicates the anchorage for small craft.

COAST.—Ras Machuisi is distinguished by a dense grove of trees, which show conspicuously from north or south; the point projects but little. Buiuni village is situated on the coast one mile northward of it.

From Ras Machuisi the coast, with slight sinuosities, trends north-eastward for 31 miles to Pangani bay. A sandy beach skirts the shore the whole distance, and is used as the road connecting the villages

near the coast. At low water, coral ledges or sand flats dry off for half a mile, which is again bordered by shallow water for some distance. The land immediately at the back is low, but at some distance within it rises gently to the coast range of from 300 to 500 feet. Behind this again occasional higher land is seen. All is densely wooded. Numerous small streams fall into the sea, but only one of any considerable size.

On the coast between Ras Machuisi and Sange islet are several small villages, amongst which Mkwaja is the most important.

Northward of Ushongu village for about 4 miles, the coast is a sandy beach bordered by shallow water for some distance and backed by forest ; thence rocky with low cliffs for about $2\frac{1}{2}$ miles to Ras Kikokwe, the south point of Pangani bay. At some distance inland are low flat hills, gently sloping to the eastward.

Outlying dangers.—**Machuisi reef** is about $1\frac{1}{4}$ miles in extent, and nearly awash at low water springs. Its outer part is 2 miles eastward of Ras Machuisi, with a depth of 3 feet in the channel between. The 3-fathom contour line extends one mile seaward of the reef.

Mwamba Buiuni lies $3\frac{1}{2}$ miles from the coast on the edge of the 5-fathom line of soundings. It is of dead coral and dries 8 feet, with Ras Machuisi bearing S.W. by W. $\frac{1}{4}$ W., distant $4\frac{1}{2}$ miles.

Buiuni Mdogo is a small reef, with one fathom at low water, and steep-to, with 9 fathoms close around. It lies $2\frac{1}{4}$ miles N.E. by E. of Mwamba Buiuni and 5 miles from the coast.

Mkwaja patches lie 3 miles northward of Buiuni Mdogo, and $4\frac{1}{2}$ miles S.E. by E. $\frac{1}{2}$ E. from Mkwaja village. They are of coral, four in number, steep-to, and lie within a diameter of half a mile, with 12 fathoms water between and around them. They have an average depth of 6 feet at low water springs, and are dangerous on account of their small size, as the sea rarely breaks, and they are difficult to be seen.

Buoy.—A white spar buoy, marked M K W J, and surmounted by two triangles points downwards, lies in 4 fathoms off the southern extreme of the patches.

Mwamba Alek, 3 miles east-north-eastward of Mkwaja patches lies 5 miles S.E. by S. from Sange islet. It is small, with one fathom least water, steep-to, and with 20 fathoms close around. It is generally visible from the masthead, but the sea does not break.

Buoy.—A white spar buoy, marked *Alek* in black letters, and surmounted by two triangles with their points away from each other, lies close to the east end of this danger.

Sange islet, is small, rocky, 15 feet above high water, and stands on a coral ledge, within low-water line. It lies one-third of a mile off a low point $4\frac{1}{2}$ miles southward of Kipumbwe river, and is not very conspicuous.

Kipumbwe river, which debouches in a bight about $4\frac{1}{2}$ miles northward of Sange islet, is of a considerable width at the mouth, but rapidly narrows, and though natives state that it is navigable for a few days' journey, it cannot be large. It probably rises in Genda Genda mountain, which is seen up the gorge, through which the river passes the hills. Mangrove swamps line the mouth, and the bar dries completely across at low water. A large village of the same name stands on the northern bank of the entrance. Fresh provisions are obtainable here.

Genda Genda, an isolated mountain, 17 miles inland from Kipumbwe, is conspicuous, and easily recognized by its two sharp peaks, the southern one 2,300 feet, and the northern about 1,900 feet in height. This appears to be a volcanic mountain.

Kipumbwe reefs.—At a distance of $6\frac{1}{2}$ miles from the coast, and a little southward of the mouth of Kipumbwe river, is the south extreme of a cluster of reefs which extend northward to Fungu Datcha, a distance of $7\frac{1}{2}$ miles. Another line of reefs, $2\frac{1}{2}$ miles from the coast, extends parallel to it. These reefs are of various sizes, with deep channels between them. Some dry a few feet, others never uncover, and all are covered at high water, but the sea on the outer reefs almost invariably breaks.

Buoy.—A white spar buoy, marked K P M B W., and surmounted by two triangles with points towards each other, lies in 20 fathoms, westward of the largest reef which dries, with Kipumbwe village bearing W. by N. about 5 miles.

Inshore channel.—There is a deep and navigable channel westward of the buoy, of an average breadth of 2 miles between the two lines of reefs, having smooth water even in a strong monsoon, and useful to coasting craft, as long as the buoy maintains its position, or when the reefs can be plainly seen. For boats beating to the southward against the south-west monsoon, this channel (the continuation of the one from the north) is invaluable. When about midway between Kipumbwe river and Sange islet, a boat should then stand over to the Zanzibar coast, and beat down on that shore.

MAZIWI ISLAND, situated on the western edge of a circular coral reef, one mile in diameter, about 5 miles south-eastward of Pangani bay, is small, sandy, and covered with casuarina trees, which are visible from a distance of 15 miles. The reef dries 5 feet at low water springs on its outer edge, where the sea always breaks heavily. Between Maziwi island and Mwamba Mawe northward of it is the best channel into Pangani bay. Maziwi island is the resort of fishermen, but there is no water. Turtle land at the season for laying their eggs, February to July.

Anchorage.—There is fair anchorage westward of Maziwi island during either monsoon, with more protection than will be found in Pangani bay. The water is deep, but care must be taken not to anchor too close, as the reef is very steep. A position in 15 fathoms, sand, with the north edge of the reef bearing N.E. by E. $\frac{3}{4}$ E., and Maziwi island E. $\frac{3}{4}$ S., will be found good in the south-west monsoon. A berth farther south, in 17 fathoms, sand, with Maziwi island bearing N.E. by E. $\frac{1}{2}$ E., is better during the north-east monsoon.

Dangers in the approach to Pangani bay.—**Mwamba Makome** is a narrow coral reef three-quarters of a mile in length, awash at low water springs, lying about $1\frac{1}{4}$ miles S.W. by W. $\frac{1}{2}$ W. from Maziwi island. It does not always break, and is the only danger requiring more than ordinary caution when approaching the coast southward of Maziwi island, as at high water, with the sun ahead, it is difficult to make out.

Fungu Ushongu lies southward of Makome, with a deep channel one-third of a mile in breadth between. The reef is one mile in length, dries 2 feet at low water, and its outer edge is steep-to; on its western edge is a white sandhead covered only at high water springs, and then the sea always breaks.

At one mile S. by W. of Fungu Ushongu is a one-fathom bank of small extent; a narrow bank, with about one fathom least water, lies half a mile south-west of it.

Fungu Datcha, a coral reef, that always shows by breakers when not awash, lies one mile south-east of Fungu Ushongu.

Mwamba Mawe, on the north side of the approach from the eastward to Pangani bay, is a coral reef which generally breaks at half ebb; a few heads dry about 2 feet at low water springs. It is three-quarters of a mile in length, and tolerably steep-to. From its southern end, Bweni bluff bears W. by N. $\frac{1}{2}$ N. distant 6 miles, and Maziwi island S. by W. $\frac{1}{2}$ W. $3\frac{1}{2}$ miles.

At half a mile N.N.E. $\frac{1}{2}$ E. from Mwamba Mawe is Mawe Mdogo, a patch with 2 fathoms water, on which the sea seldom breaks.

Briton shoal is situated about $1\frac{1}{2}$ miles northward of Mawe Mdogo, with the north point of Pangani bay bearing about W. $\frac{1}{4}$ S. distant $4\frac{3}{4}$ miles. It has 4 fathoms least water, and is steep-to, with 7 to 19 fathoms between it and Mawe Mdogo.

South Head reef, at about 3 miles northward of Briton shoal and about $3\frac{1}{2}$ miles off-shore, is of sand and coral, and about 3 miles in length; its northern half dries at low water, and is connected with Fungune Tongone northward of it by a ridge with about $3\frac{1}{2}$ fathoms water.

Buoy.—A white spar buoy, marked *South Head* and surmounted by two triangles points downwards, lies in 14 fathoms southward of the danger, with Maziwi island bearing about S.S.W. $\frac{1}{8}$ W. distant about 8 miles.

PANGANI BAY, on the west side of the north entrance of Zanzibar channel, is $1\frac{3}{4}$ miles wide, but so shallow that only very small craft can anchor inside the line of the points; nevertheless, the anchorage just outside the bay is fairly protected from heavy seas by the outlying reefs, and Pemba and Zanzibar islands break the ocean swell. Both sides of the bay are rocky, and bordered with coral ledges, backed by cliffs of about 50 feet in height. The head of the bay is a straight sandy beach, which dries off from the south end three-quarters of a mile at springs.

Landing.—When the bar prevents access to the ordinary landing place in the river, there is good landing, particularly in the north-east monsoon, at the northern end of the beach, under the lee of a rocky point. The best time to land is at high water.

Anchorage.—The best anchorage off the bar is in 5 fathoms, sand and mud, with Bweni bluff bearing N.W. by W. $\frac{3}{4}$ W., the north end of the sand beach N. by W. $\frac{3}{4}$ W., and the extreme of land to the southward S.W. $\frac{3}{4}$ S.

Directions.—On approaching Pangani bay, Maziwi island is conspicuous. Inland, the coast ranges show a tolerably uniform elevation of about 200 feet, and behind them again rise the picturesque peaks of the Usambara mountains, many miles inland. Tongwe, an isolated, round, dome-shaped peak, 2,200 feet high, is seen to the southward of them, and nearer the coast. This peak must not be confounded with Genda Genda, 17 miles farther south, which has two separate sharp peaks. Inland of Pangani bay, a bare yellow patch on the steep face of the flat hill can be seen many miles when the sun shines on it from the eastward, and marks well the position of the bay.

The best approach to Pangani bay is between Maziwi island and Mwamba Mawe. The island reef may be rounded at the distance of half a mile; Tongwe peak in line with Bweni bluff, bearing N. 53° W., will lead about that distance northward from Maziwi island reef, and to the anchorage off Ras Kikokwe. Should Tongwe peak be obscured (a frequent occurrence), the reef of Maziwi island is so plainly to be seen, that the eye can with safety navigate clear of its steep edge.

From the northward, Maziwi island may be steered for when bearing westward of S.W. by S., until Mbweni bluff bears northward of W.N.W., to avoid Mawe reef, when the bluff may be steered for.

For entering the bay close southward of Maziwi island, no marks can be given, but it is safe and easy with the sun in a favourable position for seeing the reefs.

The approach along shore from the southward has been referred to with Kipumbwe reefs, pp. 413, 414; there is a channel along shore from the northward from Tanga, within the reefs, or entering between South Head reef and Briton shoal, but we have no information beyond what is shown on the chart.

Tides.—It is high water, full and change, in Pangani bay, at 4h. 15m. ; springs rise 15 feet, and neaps 10 feet.

Pangani river, known as the Ruvu in its upper portion, is one of the largest on this part of the coast; it rises in Kilimanjaro, one of the highest of the east coast mountains, at about 150 miles in a direct line from the sea. Its course is through Yipe lake and is navigable for small craft between the lake and the Hohnel cataracts, below which it has numerous tributaries and many islands with villages on them, to the Pangani falls; from about one mile below the falls it is clear, though shallow, to the sea. Like all African rivers, its depth varies with the season.

Depths.—Vessels of 10 feet draught can cross the bar at high water and lie afloat off Pangani village, with local knowledge. Above this, the depth is not less than one fathom to Pombwe about 11 miles up; thence to Chogwe 4 miles farther, and possibly beyond that place, there is less than 3 feet in places at low water springs, but as the tide is felt some 7 miles above Chogwe, small craft can pass these shallow reaches towards high water. Above the spot where the tidal influence ceases (about 22 miles) it is stated there is not less than 3 feet water in the channel during the dry season to within about one mile of the Pangani or Margarethen falls, about 45 miles above the entrance. Possibly craft of 2 feet draught might reach the falls at all seasons.

Bar.—The channel to the river is along the south shore. Abreast Whani the bar commences and extends seaward from a half to three-quarters of a mile, varying in depth and probably also in position with the season. The depth on the bar at low water springs in the autumn of 1893 was $4\frac{1}{2}$ feet. On the flood, and with a moderate wind, the water on the bar is usually smooth; but at the ebb, and especially at springs, it is often dangerous, and many accidents have occurred to boats unwarily crossing at this time. At the time of floods in the interior (about June) the river discharges into the sea with great velocity.

Within the bar, abreast the village of Pangani, the river is about 350 yards wide and 12 to 15 feet deep. The southern side of the entrance is marked by a perpendicular bluff named Bweni, about 200 feet high, and conspicuous from seaward. The northern side of entrance is the flat sandy beach that extends from the head of the

bay within, and northward of the village is an extensive grove of cocoanut palms.

Buoyage.—A spherical buoy, painted red and black surmounted by a St. Andrew's cross, lies in 2 fathoms just outside the bar, marking the fairway. A black conical buoy marks the edge of the reef within it and on south side of channel. A black and red spar buoy marks the fairway north-east of Ras Muhesa. Two triangular beacons, white, on the north shore, are intended to mark the line of the bar, and a white mark on the south shore, near Whani, when in line with any part of the white board in front of it, denotes the width of the bar, but these marks are only useful to those who frequent the river.

Signals.—There is a signal station on Ras Muhesi.

River above Pangani.—For the first 6 miles of ascent, to Teufelsfelsen, the southern bank is a dense mangrove swamp, extending back to the hills; the northern portion is partially so. At Kumba, about 3 miles up, is the first sugar plantation. About a mile beyond, in the Mundo district, the German East Afrika Plantation Co. have established a station near Kidonge, and the coffee tree has been extensively planted here. Above Teufelsfelsen, the mangrove swamp ceases, and a beautiful and fertile country is reached. Here are extensive sugar plantations covering the plains on the north shore, as far as Pombwe, belonging to influential Arabs. There are some also on the south shore; during spring tides many of them are inundated.

At Pombwe a weekly market is held, and there are several stores kept by Banians and Hindis. At Chogwe is a station of the German East Africa Plantation Co. Above Pombwe the West African oil palm is met with, whilst below, the trees are chiefly areca and cocoanut palms. The river runs between hills on either side, which in some places extend to the banks; in others there are plains from a half to two miles wide, mostly under cultivation. These plains during high river are mostly flooded.

Tides.—Current.—The tidal influence is felt for about 7 miles above Chogwe, or 22 miles from the entrance to the river. Above this the current (except in the height of the wet season) is not so strong but what good oarsmen can work their way up; it is apparently strongest above Koleni, within 5 miles of the falls, where the river is narrower.

The river is highest about June and lowest in January. *See* pp. 422, 423, on the seasons.

Crocodiles are numerous, but the hippopotami are getting scarcer in its lower parts, being driven back by European hunters to the shelter of the upper waters.

Pangani town, on the north bank of the river at its entrance, lies very low, and bears an unenviable reputation for fevers, &c., a fact easy to understand, as the sand on which it stands is but a strip, separating the sea from the extensive mangrove forest that grows up to the doors of the outlying huts. This strip of sand is covered with cocoa-nut trees. It has about 10,000 inhabitants, and besides a large number of huts, possesses 250 houses in masonry. A small village, named Bweni, stands on the opposite bank of the river, under Bweni bluff. A fort has been established at Pangani, and there is a garrison, a District office, a chief Customs house, post and telegraph stations. There are German plantations up the river as before-mentioned.

The Mundo district, on the hills 200 feet in height, situated about 5 miles northward of Pangani, about half a mile from the river bank, is said to be by no means unhealthy. A fine view of the windings of the river, &c., may be had from Kovu Kovu hill, 360 feet high on the northern side of the river, and from the ridge 400 feet high on the southern side, both just below Pombwe.

Trade.—Produce.—There is considerable traffic with Zanzibar and Pemba; dhows load and discharge in the river. A large quantity of sugar is grown here in addition to the ordinary crops of maize, manioc, yams and pumpkins, also the cocoa-nut, areca and oil palm, rice, tobacco, and lately Liberian coffee, as well as mangoes, citrons, guavas, and other fruits. Ivory and copal are also exported. The products of the country are brought down the river chiefly on rafts made of the msala palm. These are then broken up and sold.

Communication.—The branch steamer from Tanga, of the Deutsche Ost Afrika Co., calls here on the way southward every three weeks, and also when returning northward.

Supplies.—Oxen, sheep, fowls, eggs, goats, fruits and vegetables may be obtained here. There are wells in the town, but the water is very bad, and boats' crews should avoid using it when possible.

See charts, Nos. 640*b* and 641. The description of the coast of the mainland is continued at page 470.

ZANZIBAR ISLAND AND CHANNEL.

General Remarks.*—Zanzibar and Pemba islands, governed by an Arab Sultan, are included in the British East Africa Protectorate; for details, *see* pp. 10, 11.

Zanzibar is the largest and most important of the many coralline islands bordering the east coast of Africa, and is the seat of most of the trade between this coast and the Arabian and Indian ports by sea as well as that with the central parts of Africa by land. The 6th parallel of south latitude runs through the island, which is 47 miles in length in a north and south direction, and about 20 miles maximum breadth, which is between the town of Zanzibar on the west side to Chuaka head on the east.* The island, 440 feet high, is undulating, the ridges being generally disposed north and south, with plains between, which, in several instances, show the same coralline surface, worn into little points and ridges, as may be noticed on any part of the ledge round the island at low tide.

The island stands on a coral flat, the result of many years' action of the waves on the original steep though low cliffs, which doubtless edged the island when it was first raised from the sea by upheaval, and which, at high water, still in most places border it.

This flat, as might therefore be expected, is much broader on the seaward side of the island than on the inner and more protected side. Except at a few spots, and in the inlets, it is very steep-to, dries a

* *See* charts :—No. 640*a*, and *b*; Nos. 664 and 665.

Some of these reefs still have islands on them, but a very short inspection of the latter will show that it is simply a question of time as to when they will be reduced to a broken coralline sandhead, which is the next stage of demolition, and in which state a majority of the reefs around Zanzibar are now in. The last stage, that of a flat coral reef, completely covered, except at low water springs, would seem to be the point at which change due to aqueous action ceases; but this is not always reached, as the wash of the water from different points of the flat coral edge tends to prevent the sand from being carried away.

As an instance of change may be cited Tree island, situated south-westward of Zanzibar town on the charts at the commencement of the century. At the time of Captain Owen's visit in 1822 this had disappeared, leaving two white sandheads always visible. In 1874 nothing remained on the reef (locally called Nyange) in the position of the island, though another sandhead on its northern or lee point visible in Owen's time, is, as far as can be determined, in *statu quo*.

There are several curiously isolated rocky hills in Zanzibar island, which show, by their water-worn and undermined sides, that during its upheaval the island was once stationary at a lower level, and that the same water action was taking place.

On the other hand, coral reefs are growing up in many places, but the survey of Captain Owen was too rapidly executed to admit of any comparison of depths.—Commander W. Wharton 1874.

foot or two at low water, with a rather higher outer edge than its average, but is otherwise level. All the small reefs of the adjacent channel and coast are of precisely the same character.

Parts of the island are most fertile ; in some places the soil is sandy, but even here all tropical cereals and edible roots grow in extraordinary profusion.

Zanzibar island possesses several good anchorages on its western side, but that of Zanzibar or Unguja, the principal town (page 433), is the only one frequented by vessels engaged in ocean traffic. The eastern coast of the island is unindented, save by Chuaka bay, but this is too shallow to be of any utility.

Zanzibar channel.—The island is separated from the mainland by a curved channel that averages 20 miles in breadth, the shores of the main and the island being generally parallel. The narrowest part of the channel, from Ras Fumba to the shore near Ras Luale, is $16\frac{1}{2}$ miles ; and its length from Ras Ndege (south entrance) to Pangani bay about 95 miles.

Zanzibar channel is studded on either side with coral reefs, which narrow the available clear passage, at two places, to only 4 miles ; but, except in those instances, an average distance of about 12 miles is left between the outlying dangers. On the island side the water is, generally speaking, clear, and the reefs are plainly seen, but towards the mainland there is much discoloration from the mud brought down by the rivers. The position of the sandheads on the coral reef usually change with the monsoon.

The western side of the channel is described on pp. 403—419 ; the eastern side commences on page 426.

Trade.—As most of the trade of the mainland passes through Zanzibar town, there is a considerable export and import.

The principal articles of export are, in the order of their value (piece-goods to the mainland), cloves, ivory, rice, copra, rubber, gum-copal, hides and tortoise-shell, amounting in value in the year 1895 to £1,199,841. The principal imports are piece-goods, rice, cloves, coins, ivory, grocery, coal, copra, hardware, petroleum, provisions, beads, wire, &c., amounting in value in 1895 to £1,293,646. Several of the articles of export and import are the same on account of the trade passing through Zanzibar.

Of the exports, goods to the value of £152,000 went to Great Britain, £116,000 to British India, £390,000 to German East Africa, and £89,000 to the Sultan's dominions.

Of the imports, goods to the value of £91,000 were from Great Britain, £466,000 from British India, £173,000 from German East Africa, and £179,000 from the Sultan's dominions.

Shipping.—In 1895, 170 vessels of the aggregate tonnage of 243,642 tons entered the port, 10 of these being sailing vessels; 70 were British vessels and 59 German. 119 coasting vessels of 19,608 tons entered, including small Government steamers running mails to the mainland.

Currency.—All sorts of coins are current, but accounts are generally kept in dollars. The gold coins are principally American. The silver most in use are rupees. Maria Theresa dollars are also in circulation. Indian pice are the only copper coins, and are most useful on the mainland in buying small supplies, &c.

Population.—The Arabs number about 4,000, and own the best part of the cultivated land. Next in importance, and as numerous as the Arabs, come the British subjects, the Banians, and Hindis (natives of Cutch in India), who have been long established as the main traders of the east coast of Africa, and who do nearly all the shopkeeping in Zanzibar. They are present in every trading place on the coast, and possess most of the money.

The rest of the population of the island is made up of negroes, who form the working class. In 1886 it was roughly estimated at 200,000, of whom 80 to 100,000 are in and around the town itself, the remainder distributed among the plantations and villages of the country.

A few of the aborigines of Zanzibar (the Wahadimu) linger on the east coast near Chuaka.

Winds.—Seasons.—The south-west monsoon sets in about March, bringing the heaviest of the rains; this is called the Masika season. The monsoon blows strong for two months or more, rain being prevalent all the time. By July or August the wind settles down to a steady breeze, and the rain clears off. This lasts till October, when the south-west wind gets fitful and uncertain and rain and squalls again may be expected. By the end of November the north-east

wind sets in, sometimes quietly, sometimes with a burst, and, after an interval of a fortnight, blows steadily until February, when it begins to die away. These seasons, however, are so uncertain as to make it difficult to attempt any rule at all, and any such must be understood to be subject to great deviations. Squalls and occasional rainy days may be expected all the year round.

The monsoons near the land do not blow steadily in one direction. In the south-west season it is usual, especially in Zanzibar channel, for the wind in the morning to be from the west or south-west, freshening up to 10 a.m.; after that its strength diminishes a little, and hauling round to the south, freshens again about 1 p.m., finishing in the evening at south-east; when this takes place the weather is usually fine; but if the wind does not commence at west in the morning, and veers to the southward, there is more chance of rain than if it did so.

After the north-east monsoon is well established, the wind in the morning will be N.N.E. veering to E.N.E., at about 2 p.m.

Cyclones are unrecorded prior to 1872, but in April of that year one of these scourges swept over the island from the north-eastward, destroying all in its path. The southern end of the island was, however, untouched. *See also pp. 23—26.*

Temperature and Climate.—July, August, and September, are the coolest months, the thermometer on board ship ranging by day from 77° to 81°, and by night it occasionally falls to 73°. During January, February, and March, the hottest months, the day range is from 83° to 90°, and at night the temperature rarely falls below 80°.

The climate has a bad reputation, but although there is undoubtedly much of a severe and sometimes fatal type of fever, its ordinary virulence and effects have been somewhat exaggerated. Europeans should, if possible, avoid being on shore at night until they are acclimatized, and especially so when they are in the vicinity of rivers.

The worst season for white people is from February to May, but the blacks seem to suffer more in July and August. *See also p. 29.*

Tides and Currents.—The tidal wave coming from the eastward makes the times of high water at full and change nearly identical for all this coast, only varying a little on either side of 4h. 10m. There is a great diversity between the neap and spring ranges, the latter being generally, in Zanzibar channel, 15 feet, and

the former 5 feet. This makes a vast difference in the appearance of the reefs and shores of the mainland and island, and especially in the neighbourhood of Zanzibar town, where the united areas of coral banks, covering and uncovering, amount to many square miles. This must be constantly borne in mind when navigating these waters, and it is hardly necessary to add that low water should, if possible, be chosen for passing through any passages new to the navigator.

The tidal streams, as a rule, are as follows: the flood runs southward in the northern part of Zanzibar channel, and in a contrary direction at the southern end, thus meeting at high water at a point near the centre, the position of which depends much upon the wind.

The ebb sets in the reverse way, namely, from the centre to the north and south points of the island.

It is high water, full and change, in Zanzibar harbour at 4h. 15m. Springs rise 15 feet, and neaps 10 feet. The direction of the streams is variable at the anchorage, as the tides meet near there. In the south-west monsoon off Ras Shangani the stream runs chiefly northward at all times of tide, but a vessel anchored under the lee of the point will be in the eddy, and will swing in all directions. During the season of the north-east monsoon the streams are not strong.

Off Bawi island and through the Great pass the direction of the set is always northward in the south-west monsoon.

In Zanzibar channel the current is variable. In the south-west monsoon, in the clear channel, it runs continually to the northward; but amongst the reefs and islands the tidal streams affect it, particularly at springs.

In the north-east monsoon the tide is more felt, and at springs, in all small channels and harbours, overcomes the northerly set.

In attempting to foresee how a stream will run in any part of Zanzibar channel, the navigator must take into consideration the age of the moon with its resulting strength of tidal stream, the direction and force of the monsoon and the shape of the land, and then judge as best he can what the result will be.

Outside Zanzibar island, the current always sets to the northward. In the south-west monsoon its rate varies from $1\frac{1}{2}$ to 4 miles an hour; in the north-east season, from one to $2\frac{1}{2}$ miles. This current runs

through the passage between Pemba and Zanzibar islands, and up Pemba channel with about the same velocity, *see* p. 466. It is or was a common thing for boats, when beating up in the south-west season, to start from the south point of Pemba island with a good breeze, stand over to the mainland, and fetch back to the north point of Pemba island, 40 miles to leeward.

Lights and Buoys.—The approach from the northward, only, is lighted; the buoys will be found with the description of the shoals they mark.

GENERAL DIRECTIONS from the Southward.—A vessel from the southward and eastward bound to Zanzibar during the south-west monsoon should endeavour to make Ras Mkumbi light, the northern extremity of Mafia island, page 378, in preference to Ras Kizimkazi, the southern point of Zanzibar island, in order to make sure of clearing Latham island, and that she may, if necessary, heave-to with safety. The northerly current, though generally strong, is so variable, that great caution is necessary.

Give Ras Mkumbi a berth of at least 3 miles, and when northward of it steer straight for Ras Kimbiji, with the expectation of making not much to northward of her course. The coast about Ras Kimbiji is clear of dangers, and the land is the highest for some miles in the vicinity. *See* light on Ras Kanzi, p. 385. To the north of Ras Kimbiji the current again strengthens as Zanzibar channel opens.

In the north-east monsoon a vessel should be guided by circumstances; the current is still continuous to the northward, and a sailing vessel had better pass outside Zanzibar island, and enter with a fair wind by the Northern pass. A steam vessel could either steer as above, or straight for Ras Kizimkazi.

Ras Kizimkazi, or the land at its back, will be sighted in clear weather at a distance of about 15 miles. There is nothing remarkable in its appearance, which is that of a long low wooded hill. Steer so as to keep it on the starboard bow till Pungume island is seen. Ras Kizimkazi should be given a berth of about 4 miles, or the extreme of the point should not be brought eastward of E.N.E. until Pungume island bears N. by W., when a vessel may steer N.N.W. $\frac{1}{2}$ W. Hatajwa hill well open to the westward of Pungume island about N. by W. will lead westward of Pungume patches and Moore bank.

When this mark is open, steer to pass $1\frac{1}{2}$ miles westward of Pungume and Kwale islands, and follow the directions given at page 432.

COAST.—**Ras Kizimkazi**, the southern point of Zanzibar island, is so rounded that the appearance of the land alters with every position of a vessel; at its south-western extreme is a small sandy bay, and a cliff 15 feet high, backed by gently rising ground covered with dense bush, the tops of which are from 70 to 100 feet above the sea, and may be seen about 15 miles. The portion of a tower, 12 feet high, situated here, originally intended for a lighthouse, appears like a ruin.

The cliffs are undermined, and landing is impracticable on this part of the coast.

The coral ledge dries off Ras Kizimkazi to a distance of three-quarters of a mile, having a steep edge on which the sea breaks heavily, with 30 fathoms water a few yards from it. A sandbank on its edge dries 5 feet at low springs.

About 4 miles eastward of the point, and one mile off shore, is Kizimkazi patch, three-quarters of a mile in diameter, with 6 fathoms least water, coral and sand.

Current.—The current sets north-westward past Ras Kizimkazi at all times, but is much stronger during the south-west monsoon; the flood tide increases its velocity. *See* page 423.

Peete inlet.—From Ras Kizimkazi the western coast, which is of alternate cliffs and sandy bays, trends northward to Peete inlet, a distance of $5\frac{1}{2}$ miles. It is bordered by a coral bank, which dries off from 2 cables to one mile. Peete inlet, 6 miles in length, and $1\frac{1}{4}$ miles in width, is nearly all dry at low water springs, except a narrow deep channel up its centre. The western side of the inlet is formed by the islands of Wundwi and Uzi. The head of the inlet is lost in mangrove swamps, through which there is a passage for canoes at high water northward of Uzi island into Menai bay.

Ras Bweni, the rocky south point of the little island of Wundwi, is the west point of Peete inlet.

MENAI BAY is a large sheet of water formed partly by the out-lying islands of Pungume and Kwale with their reefs, and partly by a deep indentation in the main island. It is about 12 miles in length,

and on an average $3\frac{1}{2}$ miles in width. The eastern shore of the bay from Ras Bweni is low, with small cliffs and sandy beaches, bordered by a coral ledge which dries off for half a mile. The head of the bay is lost in mangrove swamp, and is divided by a narrow island into two smaller bays named Kiwani and Kumbeni. The Mwera stream, one of the largest in Zanzibar island, falls into the bay, or, rather, loses itself in the mangrove swamp. The western side of the head of the bay is formed by the peninsula of Kumbeni, which projects from the base of Hatajwa hill, and is a flat, well cultivated tract of land of about 40 feet high.

Ras Yeketekambe and Fumba are the southern points of the peninsula; its west coast is low and faced by a coral reef to the distance of 3 cables. The chain of reefs and islands extending 8 miles to the southward of the peninsula, and terminating with Pungume island, protects the remainder of Menai bay from the westward.

Anchorage.—Good holding ground will be found anywhere in the outer parts of the bay, in from 12 to 15 fathoms, but, in the strength of the south-west monsoon, sheltered anchorage can only be obtained northward of Pungume island or between Niamembe and Miwi islands; or, for a small vessel, still higher up the bay, off the small islet of Sumi in about 6 fathoms. Here, however, the bay commences to be shallow, and the navigation is somewhat intricate; the eye and chart must therefore be the guide.

Hatajwa, a conspicuous isolated rounded hill, 206 feet high, stands on the flat ground of the main island, on Kumbeni peninsula, about a mile from the shore, abreast Ukombi islands. It is a mass of coralline rock rising from the level plain around, and the deeply cave worn sides and base give unmistakable evidence of its having once stood as a solitary islet in the sea, undermined by the waves. There are other isolated hills in Zanzibar island of the same character.

OFF-LYING ISLETS AND REEFS.—Pungume island, is the western point of entrance of Menai bay, and the first of the chain of small islands forming the east side of Zanzibar channel. This coral island is $1\frac{1}{2}$ miles in length by half a mile in width, and situated on the south part of a coral reef $2\frac{1}{2}$ miles in length. It is cliffy and covered with trees, the tops of which are about 40 feet

high. On its eastern side is a sandy beach, off which, on the edge of the coral reef, is an islet that is conspicuous from the southward. There are two islets on the fringing reef northward of the island, and a sandbank, which only covers at or near high water springs, lies on the northernmost point of the reef, one mile from Pungume island.

A ridge with 4 fathoms least water connects the sandbank with Kwale island.

Pungume patches, westward of Ras Kizimkazi and south of Pungume island, are several banks lying in the fairway of vessels bound to Zanzibar harbour.

Bedford bank, the southernmost of the Pungume patches, is 2 miles in extent, within the depth of 10 fathoms, with one small patch of 5 fathoms. The bank is steep-to all round. From the shoalest part, the islet on the east side of Pungume bears N. by W. $\frac{3}{4}$ W. $6\frac{1}{2}$ miles.

Moore bank, lying about halfway between Bedford bank and Pungume island, is a smaller shoal, having a depth of 3 fathoms least water, and steep-to; it lies with the south end of Pungume island bearing N. by W. $\frac{1}{4}$ W., distant 3 miles.

Another large patch, with 3 fathoms least water, lies $2\frac{1}{2}$ miles E.N.E. of Moore bank.

Clearing marks.—The bottom will be plainly seen when near Pungume patches, but a near approach is better avoided by heavy draught vessels. Hatajwa hill bearing N. by W. open westward of Pungume island, or the island bearing eastward of N. $\frac{1}{2}$ E. will lead westward of all these patches; and the extreme of Ras Kizimkazi bearing northward of E.N.E. leads southward of them.

Anchorage.—Convenient night anchorage, especially during the north-east monsoon, will be found on these banks for small vessels.

Kwale island, lying 3 miles north-westward of Pungume island, is a low, rocky, scrub-covered island, the highest trees of which are about 30 feet above the sea. The reef on which it lies uncovers at low water springs, and is always visible; it is steep-to on its east and west sides, but shallow water extends some distance north and south of it.

On the north end of Kwale reef, there is a sand cay, separated from the coral ledge which dries for 2 miles southward of Ras Fumba, by a narrow channel 6 feet deep, much used by dhows, and useful for boats working along the shore.

Anchorage.—There is a temporary anchorage between Pungume and Kwale islands in 8 fathoms water, with Pungume north islet bearing E. $\frac{1}{4}$ N., and the north-west point of Kwale island N.N.W.

Kipwa Gini, a small coral head, with $1\frac{1}{2}$ fathoms water, lies $1\frac{1}{2}$ miles W. by N. $\frac{1}{2}$ N. from the north end of Kwale island. It is not easily seen, but Hatajwa hill bearing eastward of N. by E. $\frac{1}{2}$ E. leads westward of the shoal.

Mwamba Ukombi, two reefs nearly joined together, lie $1\frac{1}{2}$ miles off Kumbeni peninsula, and extend parallel to the coast for a distance of $4\frac{1}{4}$ miles; they barely uncover at low water springs, but are steep-two and easily seen from the masthead. Patches of 2 to 3 fathoms lie about half a mile off both ends of the reefs. The north-western part has three rocky islets about 10 feet in height. Ukombi is the northern islet; the other two are named Tali.

Chumbe island is half a mile in length, with overhanging low cliffs, and covered with trees 45 feet above the sea, similar to Kwale island.

Light proposed.

Mwamba Chumbe, on which the island stands, extends nearly 2 miles in a south-easterly direction from it, but on the western side not more than one cable off; it is steep-to, discernible from aloft, and dries at low water springs.

Inner pass.—Between Kwale island and Mwamba Ukombi is an inshore passage running parallel to Kumbeni peninsula. In it the water is deep, and this passage and that between Chumbe and Ukombi reefs are much used by the dhows to avoid the current; but as they can only be navigated by the eye, no directions can be given.

SOUTHERN PASS, the channel from seaward to Zanzibar town from the southward, may be said to begin abreast Chumbe island, up to which, the reefs bordering the coast of Zanzibar island, have

already been described. The pass has a least depth in mid-channel of $5\frac{1}{2}$ fathoms, and is therefore available at all times of tide for all classes of vessels. Directions, *see* p. 432.

Aspect.—**The Coast** from Ras Buyu, abreast Chumbe island, to Ras Shangani, on which stands the town of Zanzibar, is mostly low cliffs with white sandy bays at intervals. Between Ras Chugwani and Ras Mbweni it is low, then red cliffs, followed by white cliffs, from 50 to 70 feet high, to within one mile of Zanzibar town. The red cliffs near Ras Buyu are the most extensive and the highest, but they are not generally so conspicuous as those at Ras Mbweni, which, from their brighter colour, usually catch the eye first, the more so as the English Mission, a tall white house, stands on them, forming another conspicuous object. With the morning sun, however, it is difficult to make out any feature on this coast. The ground rises at the back and is covered with trees.

Occasional light.—An electric light is exhibited from a framework tower erected on Chugwani palace when the Sultan is in residence there.

Reefs in the Approach.*—**Ariadne bank** is about 3 cables in length, with $2\frac{3}{4}$ fathoms least water, and steep-to, lying in the fairway of Southern pass. The bank can, however, be seen from aloft, and the channel between it and the southern part of Chumbe reef is $2\frac{1}{2}$ miles wide. It lies with the south end of Chumbe island bearing N. by E. $\frac{1}{3}$ E. distant $3\frac{1}{2}$ miles, and Hatajwa hill, in line with the northern part of Tali large islet.

Clearing marks.—To pass either eastward or westward of the bank, keep the Consulate at Zanzibar town well open on either side of Chumbe; to pass northward or southward, keep Hatajwa hill open of the Tali islets.

With the sun to the south, and clear weather, the town shows white and conspicuous; under other conditions it is not easy for a stranger to make out.

Boribu reef lies on the west side of the approach to Southern pass, and $5\frac{1}{4}$ miles westward of Ariadne bank; it is 9 cables in

* The position of the sandheads on the reefs, which dry, usually change with the monsoon, shifting to the lee end of the reef, their heights also will vary. *See* plan, No. 665.

length, and dries 3 feet at low water springs. On its northern point there is a small white sandhead, which dries 8 feet.

Tambare reef lies 2 miles north of Boribu reef; it has an isolated coral reef one mile in length, steep-to, and can generally be made out; the sandhead on its northern extremity dries 11 feet at high water springs.

Outer Tambare, lying $1\frac{1}{2}$ miles westward of Tambare sandhead, is a coral patch with $1\frac{1}{4}$ fathoms least water, and always discernible.

Pwakuu reef, nearly 3 miles in length and $1\frac{1}{2}$ miles in breadth, lies $1\frac{3}{4}$ miles north-eastward of Tambare sandhead; a large sandbank on its western part dries 10 feet at low water springs, and the reef dries at different times of tide. A channel 5 cables wide, with a rocky patch midway, separates Pwakuu from Nyange reef.

Nyange reef, eastward of Pwakuu, is 3 miles in length, $1\frac{1}{2}$ miles in breadth, and steep-to on its southern and eastern sides. A sandhead on the north extremity of the reef, dries 11 feet at low water springs, and is generally to be seen; the remainder of the reef dries 3 feet in places.

It forms the western side of Southern pass, and will be sighted soon after passing Chumbe island.

Mtwana.—Buoy.—Mtwana, on the eastern side of the pass, is a treble-headed shoal lying off the Zanzibar coast from $1\frac{1}{4}$ to $1\frac{3}{4}$ miles westward of Ras Chugwani. The western head has $2\frac{1}{4}$ fathoms least water, and is marked by a red buoy with staff and triangle in 6 fathoms 2 cables W. $\frac{1}{2}$ N. of the north end. The eastern head has but 6 feet. The southern head has a least depth of $2\frac{1}{2}$ fathoms, with Ras Chugwani E.N.E., distant $1\frac{7}{10}$ miles. These shoals are not easily seen, even at low water.

Two banks with depths of 4 to $4\frac{1}{2}$ fathoms lie from a half to one mile S.S.W. $\frac{1}{2}$ W. of the western Mtwana patch; they are steep-to, and must be given a berth.

Kisiki reef lies one mile northward of Mtwana, and $1\frac{4}{10}$ miles westward of Ras Mbweni; it is a coral patch just awash at low

water springs, but a sandbank on its north extreme dries 3 feet, and shows so white that the bank is generally to be seen at any time of tide. A shoal tongue extends southward from Kisiki reef, narrowing the available channel for heavy draught vessels at low water to about half a mile, with a depth of $5\frac{1}{2}$ fathoms. There is a depth of 21 feet on the tongue, 5 cables southward of Kisiki sandhead.

Buoy.—A black can buoy in 5 fathoms marks the east extreme of Kisiki reef.

Pange, on the western side of Southern pass, is a coral reef, with a large sandbank, which dries 13 feet at low water springs; this part lies $1\frac{1}{2}$ miles north-north-westward of Kisiki reef. Pange is nearly joined to Kisiki by a shallow ridge, leaving a narrow channel with 6 fathoms water between. A one-fathom patch lies N. by E, $\frac{1}{2}$ E., about half a mile from Pange sandbank. For shoals northward, *see* Western pass, p. 436.

Directions.*—To proceed through the Southern pass: having arrived abreast Pungume island, distant about 2 miles, and intending to pass eastward of Ariadne bank, steer N.W. by N., keeping the south extreme of Pungume eastward of S.E., until Hatajwa hill bears eastward of N. by E $\frac{1}{2}$ E., to avoid Kipwa Gini; then steer N.N.W. $\frac{1}{2}$ W. so as to pass about three-quarters of a mile westward of Chumbe island. The British Consulate, the western building of the town of Zanzibar, should be kept well open eastward of Chumbe island, or the south end of that island bearing northward of N. by E., until Hatajwa hill is open northward of the two Tali islets, to clear Ariadne bank.

(To pass westward of Ariadne bank the west extreme of Chumbe island should bear eastward of N.N.E. with the British Consulate well open westward of the island.)

From abreast Chumbe island steer about N. by W. and bring the staff with flag† (in front of Masingini house, hidden by trees) on the highest summit of the ridge to the north of Zanzibar town, in line with a white pillar on the white cliffs to the south of the English Kiungani mission house, bearing N. 44° E., which will lead through

* *See* plan of Zanzibar harbour and approaches, No. 665; also No. 640a. For approaching, *see* directions, page 425.

† It has been intended for some time past to erect a white pillar in the position of this flagstaff, which is probably not easily discernible.

the middle of the deep channel in $5\frac{1}{2}$ fathoms water, northward of the red buoy near Mtwana reefs. The mission is a white three-storied square house on the low sea cliffs, $1\frac{1}{2}$ miles south of the town ; (see view C. on chart No. 665).

When Ras Buyu and Ras Fumba are in line, the vessel will be in deep water, and may steer for Ras Shangani, rounding it at the distance of 3 to 4 cables for the anchorage northward of it.

Caution.—As accidents have occurred to vessels proceeding through the passes for Zanzibar harbour at night, it is recommended, unless in cases of necessity, to seek a safe anchorage outside until daylight. If compelled to go in, boats with lights should be sent ahead to mark the channel.

Anchorage.*—The anchorage at Zanzibar is good anywhere off the town. Vessels of war generally lie in about 8 fathoms, mud, northward of the British Consulate, a large square house on the extreme point. During the south-west monsoon the smell of the town is most offensive and unhealthy, if the vessel be too close in, and a berth a little off shore is to be preferred.

During the north-east monsoon the landing is sometimes bad on the north shore of the town, and boats have to go to leeward. In this season it is better perhaps to anchor to the westward of Shangani point, that boats may land on either side, but the vessel in that case must anchor southward of the telegraph cables.

There is a mooring buoy in the northern anchorage, belonging to the Messageries Maritime Company.

Prohibited Anchorage.—The limits of the telegraph cables are marked by three beacons on top of the telegraph house, all painted black. Two are marked *cable*, the other is plain. The latter in line with either of the others mark the limit of the prohibited anchorage on either side.

Two buoys also mark the cables.

In the Western pass there are four cables in the fairway ; vessels must not anchor anywhere near them.

ZANZIBAR TOWN, native name Unguja, is principally built on low land which projects slightly from the island and terminates

* The yacht *Glasgow* lies sunk in a depth of 6 fathoms, with British Consulate bearing S. by W $2\frac{1}{10}$ cables, marked by two *red vertical* lights on mainmast at night. See plan of Zanzibar harbour, No. 665.

in a rounded sandy point named Shangani. Hence it is conspicuous when entering from either northward or southward, as the houses are all of a dazzling white colour, and can be seen from a position 5 or 6 miles south of Chumbe island, and 10 miles to the north of Chapani island. The larger houses are built on the shore facing the north; the Sultan's palace has the Sultan's flag—red—flying on a staff in front of it. *See* light, page 444.

West of the palace, the low towers of the old fort are seen over a casemated water battery, and on either side are the houses of the consuls and European merchants, the large square building on Shangani point being that of the British political agency and Consulate-general. The town is, from this view, rather imposing, but these respectable buildings do but form a *facade* to the meaner habitations that compose the bulk of the town. The southern face of Shangani point presents a collection of mud huts, and the interior of the town is a maze of narrow and tortuous lanes, running between mud huts and dilapidated coral-built houses.

To the south and east is a salt water inlet or lagoon, dry at low water, but which at high tide nearly converts the town into an island, and is only cut off from the sea to the south-westward by a low coral and sand ridge which extends from Shangani point to the south along the sea-shore. The lagoon is crossed by a stone bridge which connects the main town with its suburb on the eastern side. This quarter is, if possible, more inodorous than the other, having the fish market in it. The entrance to the lagoon is one mile north-eastward of Shangani point. At this entrance and in the lower part of the lagoon all the old dhows, and dhows intending to make a long stay at Zanzibar, are laid up.

There are a few shops for European goods, but the stalls in the native bazaars are mostly kept by Banians and Hindis, who do nearly the whole trade of the town.

Position.—The position of the British Consulate General and Agency is lat. $6^{\circ} 9' 43''$ S., long. $39^{\circ} 11' 8''$ E.

Missions.—Zanzibar is the head-quarters of the English Universities mission of Central Africa, which has establishments for young negroes of both sexes to the southward of the town. A church; with short spire, and school houses have been built on the site of the old slave market. *See* other stations of the Mission, page 263.

There is also a Roman Catholic mission, presided over by French priests. They have a large blacksmith shop with a few hand machines. There is a branch of this mission at Bagamoyo, on the mainland opposite.

Mails.—The British India Company's steamers from Bombay *via* Aden and Mombasa call every four weeks ; the same Company's steamers from Bombay *via* Seychelles call every four weeks *en route* to Mozambique, Beira, Innambán, and Delagoa bay ; whence there is communication from the latter place by steamer and also by rail *via* the Transvaal to Cape Town.

The Deutsche Ost Afrika Company's main line steamers from Aden, and also their line from Bombay, call every three weeks ; their branch line from Tanga call also every three weeks on their way southward, and also on the return voyage when sufficient inducement offers. Their line from Bombay *via* Lamu and Mombasa call every six weeks. There is constant communication with Dar-es-Salaam and other ports on the main.

Telegraph.—Zanzibar is in telegraphic communication by submarine cable with Mombasa, and with Bagamoyo on the main ; also with Aden ; also with the Cape of Good Hope *via* Mozambique, Delagoa bay, and Natal ; also with Seychelles. Dar-es-Salaam and some of the other principal German stations are connected with Bagamoyo by land lines ; as also are Malindi, Lamu, &c., with Mombasa.

The Eastern telegraph establishment at Zanzibar consists of a large telegraph house on Ras Shangani, south of the Consulate, the station on Bawi island, where the cables are first landed, and a floating depôt.

Trade ; Population ; *see* pages 421, 422.

Supplies.—There are some large tanks of pure rain water at Shangani point. Water from the town should not be used, the wells being impregnated with the drainage of the houses. Water for washing purposes is obtainable at Mtoni and Bububu, pp. 437, 438.

Fresh provisions are plentiful, but the fowls, eggs, beef, and mutton are inferior ; goats can always be procured, and fish abound. Fruit plentiful in its season. There is an ample supply of all tropical vegetables.

There is also a naval depôt of provisions on shore, for H.M. ships, and a contract for the supply of fresh provisions.

See plan of Zanzibar harbour and approaches, No. 665.

H.H. the Sultan has an engineering factory where very small repairs for H.M. ships and mail steamers may be effected. Small craft can beach.

Coal may be taken on board at the rate of about 250 tons a day, of 24 hours, by means of native boats. About 2,000 are kept in stock for H.M. vessels, and there is generally a stock of about 5,000 tons for trading purposes.

Hospital.—There is a French Roman Catholic hospital at Zanzibar, with accommodation for four officers and four men, if required, and for which number arrangements have been made for H.M. ships, but it seems the patients would be better afloat, provided they can be kept under cover.

WESTERN PASS.—The Western pass into the anchorage of Zanzibar is between the reef of Bawi island on the north, and Mapape and Murogo reefs on the south; thence between Fungu Chawamba bank and the 2-fathoms patches northward of it. The telegraph cables are laid in the Western pass, so vessels should avoid anchoring near them.

Bawi is a low island on the northern side of the entrance to the Western pass, covered with cocoa-nut trees, and, with its reefs, forms the western protection to Zanzibar anchorage. It lies 3 miles westward of the town on a reef which extends one mile south-westward of it and dries at low water, with several sand patches dry from 6 to 8 feet at low water springs. Northward of the island, a one-fathom ridge connects a patch named Mwamba Bawi, which dries at half ebb.

The submarine telegraph cables are landed at the cable house, on the south-west extreme of the island, for which, *see* the plan.

Fungu Mapape and Mwamba Mapape are two reefs lying on the south side of the entrance to Western pass, with a channel one mile wide, and depths of 12 to 13 fathoms between them and Murogo. They lie north and south of one another, and dry 6 and 4 feet respectively, at low water springs, with white sandheads. Together they are 2 miles in length, with a 4-fathoms channel between them.

Murogo reef, about $1\frac{1}{2}$ miles in length north and south, lies between the Mapape reef and Pange, on the southern side of the pass, with a wide and deep channel on either side of it, which can be navigated by the eye with safety. A large sand bank on Murogo reef generally shows, and dries 9 feet at low water springs.

Fungu Chawamba is $1\frac{1}{2}$ miles eastward of Murogo reef, and only uncovers at springs ; it is steep-to, and generally to be seen.

Two-Fathoms banks.—About 4 cables northward of Fungu Chawamba, on the opposite or north side of Western pass, is the nearest of two small banks, with $2\frac{1}{2}$ fathoms water on each of them, lying about 2 cables apart, and north and south of each other.

Directions.—Steer in about S.S.E. midway between Bawi and Mapape reefs, until the group of trees around Walleso house (hidden in the trees) on the brow of the hill is in line with the small house between the British Consulate and the telegraph building, bearing E. $\frac{1}{4}$ S. (*see* view B. on plan No. 665), which leads between Fungu Chawamba and the two-fathoms banks north of it.

This channel can be navigated by the eye if the sun be astern of the vessel, but only when the sun is astern can the leading mark be seen. *See* anchorage, p. 433.

NORTHERN APPROACHES TO ZANZIBAR TOWN.—The northern boundary of Zanzibar anchorage is formed by three islands with their reefs, extending in a westerly direction from the coast at Mtoni village ; between these are three channels, viz. : English, French, and Great passes. English pass is buoyed and is the one commonly used, and has a depth of about 6 fathoms in the fairway, but is only about 2 cables wide in one place.

Coast.—**Aspect**.—From Zanzibar town and lagoon the coast is low and sandy, and trends northward to Mtoni, a small village, with a palace in ruins on the beach. This palace is used as a leading mark, but it is not so conspicuous as other white buildings on the shore ; its position being next northward of a house with a box-like projection from its roof is the best way to identify it. Here an aqueduct, ending on the sea beach, conveys good water from a spring called Chim Chim, about a mile back from the coast. This

aqueduct is, however, open, and as numerous negroes are generally washing either themselves or their clothes in it, the water is unfit for drinking purposes.

From Mtoni the coast to the north forms a slight bay to Bet-el Ras, a low rocky point on which stands a castellated white house with a portico, northward of which a depth of 3 fathoms will be found about 4 cables off shore. The land rises at the back of this part of the coast to a range of hills 440 feet high, which extend parallel to the shore at a distance of $1\frac{1}{2}$ miles, and is the highest land in Zanzibar island. This hill is crowned by group of trees, hidden in which is a white house named Masingini.

From Bet-el Ras the coast trends northward with slight indentations, sandy bays, beaches, and low rocky cliffs, for 13 miles, to Ras Oswawembe, the north-western point of Zanzibar island. The land behind rises gently, is well cultivated, and covered with trees. The shore is generally steep-to, and may be approached to within a long half mile, and it is better to close the shore to avoid the many out-lying reefs.

Bububu is a palace at the mouth of a small river, one mile northward of Bet-el Ras. Here another aqueduct conveys water to the sea, but the water is open to the same objections as that of Mtoni, namely, its use for washing purposes before it arrives at the shore.

A new palace for the Sultan has been built on the north side of the stream situated $2\frac{1}{2}$ miles northward of Bet-el Ras. It is a large white building with lofty columns and a metal roof. Near it are the waterworks with a tall chimney.

Mungopani.—At the village of Mungopani, 17 miles northward of Bububu palace, is a white pillar near a square brown house with flat roof. *See light, page 444.* Coast continued at page 441.

Islets and Reefs in the Approaches.*—**Chapani** is a low scrub-covered island, 800 yards in length, situated $1\frac{1}{4}$ miles from the coast of Zanzibar island—between them is English pass; unlike most others in this vicinity, the reef on which Chapani stands slopes gradually off in every direction, and has a number of small heads which crop up on the outer edge of the bank. Chapani island is used as a cemetery by the European community and by vessels

* As far as relates to chart of Zanzibar harbour and its approaches, No. 665.

visiting the port. From the northward, this island is not easy to make out, as it appears against the higher land of the main island.

Kebandiko is a small island to the north-westward of and on the same reef as Chapani island, the coral drying between them.

Chango is 20 feet high, 800 yards in length, and situated three-quarters of a mile westward of Kebandiko. Shallow water extends southward which terminates in a knoll with 2 fathoms water, at $1\frac{3}{4}$ miles S. by W. from the island. North of the island rocky ground extends more than three-quarters of a mile with a rock awash near its termination; thence a tongue with $3\frac{1}{2}$ fathoms projects westward into Great pass.

A prison and a Government bungalow with flagstaff has been erected on the north-east corner of Chango, visible from 9 to 10 miles.

Danzi reef, $1\frac{1}{2}$ miles north-westward of Chango island, is a small coral reef, awash at low water springs, with a one-fathom bank extending half a mile northward and 2 cables westward.

Shoal patches.—Between Danzi and Mwamba Bawi is another patch with $1\frac{1}{2}$ fathoms water, gradually deepening on all sides. Also, at 2 miles west of Danzi reef are a number of small patches, with 3 fathoms least water.

Fawatu is a large reef lying N.N.W. $\frac{1}{2}$ W., distant 2 miles from Danzi reef, and 5 miles from the nearest part of Zanzibar island. It is upwards of 2 miles in length north and south, and dries in patches, but more especially at the north and south extremities. About 6 cables from the south end, of 3 fathoms, is a sandhead, which dries 9 feet at low water springs. This reef is easily seen, but must be approached with caution.

Yambwa Ngome reef.—At 2 miles northward of the northern dry part of Fawatu reef is the western Yambwa Ngome, a flat coral reef, awash at low water, with a small head which dries at half tide. It is steep-to all round, 4 cables in length north and south, and 2 cables in breadth.

Eastern Yambwa Ngome, a similar reef $1\frac{1}{2}$ miles distant, dries only at low water springs; it is somewhat larger than the other, and is 3 miles from the Zanzibar coast.

ENGLISH PASS, the entrance to Zanzibar harbour generally used by vessels approaching from the northward, is the name given to the narrow curved channel between Chapani island and the shallow water bordering the shore of Zanzibar. Though the east end of the island is more than a mile from the shore, the available channel is narrowed to a quarter of a mile wide by the shoals extending from both island and main ; it has a least depth of about 6 fathoms at low water springs.

Seagull shoal, less than half a cable in extent, lies directly in the approach to English pass ; it consists of black sand and coral, with a least depth of $1\frac{1}{2}$ fathoms at springs over a coral head, and 4 fathoms close around ; it lies with the large house on Bet-el Ras S.S.E. $\frac{1}{8}$ E., and the ruin south of the Sultan's new palace E. $\frac{3}{4}$ N., distant $1\frac{1}{2}$ miles. *See* buoys below.

The clock tower at Zanzibar on with the west end of Chapani island leads just eastward of the shoal.

Buoys.—Seagull shoal is marked by a chequered black and red can buoy on its southern edge. The eastern end of Chapani reef terminates three-quarters of a mile eastward of the island by a steep fall from 2 to 8 fathoms water. This edge is marked by two red can buoys about $1\frac{1}{2}$ cables apart ; the northern buoy is surmounted by a cage. Two black can buoys mark the edge of the 5 fathoms line off Bet-el Ras ; the northernmost lies with Bububu house E. by N. $\frac{3}{4}$ N., distant $6\frac{1}{2}$ cables ; the southern lies with the large house on Bet-el Ras S.E., distant 3 cables. The buoys are now carefully attended to and less liable to be out of position than formerly.

Directions.—To enter English pass eastward of Seagull shoal.—From abreast Mungopani,* and being three-quarters of a mile from it, and in not less than 6 fathoms water, steer along shore, avoiding the shallow water marked by black buoys extending nearly half a mile off between Bububu and Bet-el Ras. When abreast the southern black buoy, off Bet-el Ras, steer to bring the small white house in Mtoni village, to bear S. 25° E., which being steered for will lead in the fairway ; when the northern red buoy, with cage, on Chapani reef is abreast, distant about a cable, alter course to bring the white stone pillar southward of Bet-el Ras to bear N. 50° E., astern, which mark will lead southward of the southern red buoy on Chapani reef and to the anchorage off Zanzibar.

* For directions northward of Mungopani, *see* p. 446. Also, *see* Caution, p. 433.

To pass westward of Seagull shoal, steer for Kibandiko islet, in line with the British Consulate, bearing S. $\frac{1}{2}$ W., until the small white house in Mtoni village bears S. 25° E., when proceed as before.

French pass.—Between Chango and Kibandiko islands is a channel with $4\frac{1}{2}$ fathoms at low water springs, but it is very narrow; no satisfactory leading mark is to be found, and the distance in any case is shortened so little that the pass is not recommended. The eye and chart must be the guides if attempted.

Great pass, between Chango island and Danzi reefs, is the widest and deepest channel into Zanzibar harbour from the northward; but unless buoyed it cannot be considered so good a passage as the English pass, as no leading marks can be given.

ZANZIBAR CHANNEL, Northern approach.—**Zanzibar shore.***—**Ras Oswawembe**, the north-west extreme of Zanzibar island, is a low clifly point, forming the south side of the entrance to Kokotoni harbour. Coast continued from page 438.

A small bank with 5 fathoms least water lies with Ras Oswawembe bearing E. $\frac{1}{2}$ N., distant $2\frac{1}{2}$ miles.

Between Ras Oswawembe and Ras Nungwe, the north point of Zanzibar island, lies Kokotoni harbour. Immediately eastward of Ras Oswawembe is a mangrove bay, named Mwanda. At the head of the bay the river Mzinga-Mzinga discharges itself from an extensive plain, which is mostly under water in the rainy season. Mwanda village lies at the head of the bay.

From Ras Mwanda to Ras Nungwe the shore is sandy, interspersed with low cliffs. Two islets lie half a mile off the Zanzibar coast, halfway between Gungodi hill and Ras Nungwe; they are on the shore reef which here dries $1\frac{3}{4}$ miles off.

Water.—The Mto Kipanga falls into the sea at Ras Mwanda, and the water, which is good, never fails, coming from perennial springs a few miles inland. A boat can easily send her barricoes a few hundred yards up the bed of the stream to be filled. The mouth is concealed in mangroves, and is not easy to find.

* See chart:—Pangani to Ras Kimbiji, northern portion, No. 640b. For Directions, see page 446.

Hills.—South-eastward about 4 miles from Ras Oswawembe, at the farther side of the Mzinga-Mzinga plain, are the Dongi hills, 330 feet high, and covered with cocoa-nut trees.

Kokotoni hill is an isolated rounded eminence 260 feet high separated from the Dongi hills by deep ravines, through one of which Kipangi river runs.

Northward of Kokotoni are several isolated hills, the most remarkable of which is Gungodi, a coralline tumulus similar to and greatly resembling Hatajwa near the south end of the island.

Ras Nungwe or Hog point, the north extreme of Zanzibar island, is sandy with low cliff at the back, clothed with dense jungle. The fringing reef extends three-quarters of a mile northward and eastward, following the trend of the land to the southward at a decreasing distance. The land behind Ras Nungwe is undulating, and the highest trees are about 200 feet above the sea. *See light, page 444.*

Anchorage.—There is good anchorage in the south-west monsoon, westward of Ras Nungwe in the northern approach to Kokotoni harbour, in 10 fathoms, sand, with the point bearing E. by N. $\frac{1}{4}$ N. distant about $2\frac{1}{2}$ miles.

Islands.—**Tumbatu** is $5\frac{3}{4}$ miles in length, $1\frac{1}{4}$ miles across at its widest part, and lies northward of Ras Oswawembe; its nearest point is distant $1\frac{1}{4}$ miles from the Kokotoni shore.

The island is flat and rocky, being faced with low cliffs, excepting a portion of its east side, and is densely covered with trees 40 to 50 feet high. Its western side is almost steep-to, the coral ledge nowhere extending off more than one cable distant. Off the southern point the reef is awash for $1\frac{1}{2}$ miles in the direction of Ras Oswawembe, and terminates in Mmawali sandhead, which dries 11 feet at low water springs. Off the eastern or inner side of the island, the coral dries at an average distance of one mile, greatly contracting the passage into Kokotoni harbour.

Tumbatu has the reputation of supplying the best sailors and pilots for the Zanzibar seas; there is no water on the island, the necessary supply being brought over from Kokotoni.

Puopo is a rocky, wooded islet, standing on the eastern edge of Tumbatu island reef. The reef here is steep-to.

Mwana Mwana is a small coral island covered with dense jungle, on the northern part of Tumbatu reef. The reef dries northward of Mwana Mwana for half a mile, and is shallow for a quarter of a mile beyond, while north-eastward the shoal water extends for $1\frac{1}{2}$ miles. *See* light, p. 444.

Shoals in the approach.—**Leven bank** is of coral with depths of 6 to 10 fathoms; it lies with Ras Nungwe bearing S. by W. $\frac{1}{2}$ W. about 5 miles, Kokotoni hill in line with the western extreme of that point, and Mwana Mwana island bearing S.W. The bank is $1\frac{1}{2}$ miles in length, a third of a mile in breadth, and steep-to, rising somewhat abruptly from a depth of 100 fathoms; in light winds it affords a good temporary anchorage.

Current.—At the Leven bank the current always runs north-north-westward, with a velocity in the south-west monsoon of from $1\frac{1}{2}$ to 3 knots an hour, decreasing to about half that rate in the north-east monsoon.

Nankivell rock, with 3 fathoms least water, lies with the north point of Mwana Mwana island bearing S.W. distant $2\frac{1}{2}$ miles, and Ras Nungwe E. by S. $\frac{1}{4}$ S. distant 3 miles. This small patch is near the fairway of vessels rounding Ras Nungwe and Mwana Mwana, and care must be taken to avoid it. To pass northward or outside the rock, keep Ras Nungwe lighthouse southward of S.E. by E. $\frac{1}{2}$ E., until the west side of Tumbatu opens westward of Mwana Mwana.

Shearwater patches.—Westward of Tumbatu island is an area of shallow water with patches of coral, covering a space of more than 8 miles north and south, by 4 miles in breadth, and varying in depth from a few feet to 10 fathoms, the nearest danger being $2\frac{1}{2}$ miles from Tumbatu island.

Wright rock, on the east side of the shallow ground, is a small head nearly awash, with the north point of Mwana Mwana island bearing N.E. by E. $\frac{1}{4}$ E. distant $4\frac{3}{4}$ miles. One mile E.N.E. of Wright rock is a patch with $2\frac{1}{2}$ fathoms water, the nearest shoal to Tumbatu.

Langdon rock, near the south end of this area, is also nearly awash; it lies with Ras Oswawembe bearing E. by S. $\frac{3}{4}$ S. distant 5 miles. At about three-quarters of a mile south-west of Langdon rock is a patch with one fathom water, the southernmost of the Shearwater

dangers. These reefs can sometimes be seen from aloft, but as they are frequently undiscernible until close-to, vessels should keep within about $1\frac{1}{2}$ miles from the coast of Tumbatu island and Ras Oswawembe, which are both steep-to. Kokotoni hill bearing E. $\frac{1}{2}$ S. and seen over Ras Oswawembe leads southward of these dangers.

LIGHTS.—Ras Nungwe.—From a white square tower with red top, on Ras Nungwe, the northern extreme of Zanzibar island (p. 442), is exhibited, at an elevation of 105 feet above high water, a light which *revolves about every half minute*, and is said to be visible in clear weather about 12 miles.

Mwana Mwana.—From a white pyramidal tower 65 feet in height, erected on the north extremity of Mwana Mwana, is exhibited a *revolving light every thirty seconds*, visible from a distance of 13 miles in clear weather.

Mungopani.—At $3\frac{1}{2}$ miles southward of Ras Oswawembe, and about 2 miles northward of the white pillar at Mungopani village, (p. 438), is exhibited from a white lighthouse 90 feet high, with a red base, at an elevation of 130 feet above high water, a *fixed white* light, visible in clear weather from a distance of about 12 miles.

Too much dependence must not be placed on these lights.

Palace.—An electric light is occasionally shewn from the Sultan's palace at Zanzibar town, but it is not intended for navigation.

KOKOTONI HARBOUR, formed between Tumbatu and Zanzibar islands, is a large and sheltered anchorage with depths of 4 to 9 fathoms. There are many little villages on the Zanzibar coast, and the country is well cultivated. Cattle, fowl, and eggs are plentiful. Most of the craft trading to Pemba start from Kokotoni.

Kokotoni is a district and village north of Mwanda. There is an extensive sugar estate here, in English hands, with a large factory on the banks of the Kipanga, fitted with steam machinery, both for sugar and cocoa nut oil manufacture.

The northern entrance between the reefs fringing Tumbatu and Zanzibar has not less than 6 fathoms water throughout and is available at all times. Abreast the north point of Puopo island the channel is reduced to a quarter of a mile in width, southward of which the harbour opens out to $1\frac{1}{2}$ miles in width.

The southern entrance, between Ras Oswawembe and Tunbatu island, is only adapted for vessels under 12 feet draught. It is narrowed at the entrance to a width of one mile by Mmawali reef and the bank stretching northward from Ras Oswawembe; there is not more than $2\frac{1}{2}$ fathoms, mud, in the deepest part between these points. Farther eastward is a bank of sand, awash at low water; this bank nearly blocks up the channel, leaving a narrow passage between it and Ras Mwanda, with depths of 5 to 6 fathoms. The bank can generally be seen from aloft, but the water is not clear.

Anchorage.—A good berth for a small vessel is in $4\frac{1}{2}$ fathoms, mud, off Kokotoni village, with the south point of Tumbatu island bearing W.N.W., and the eastern extremity of Puopo island N. by E. $\frac{1}{2}$ E. For a large vessel, a berth farther north, in 8 fathoms, mud, with the south point of Tumbatu island bearing W.S.W., and Puopo island N. by W. would be better, and the tidal stream not so strong.

Tides.—It is high water, full and change, in Kokotoni harbour, at 4h. 10m.; springs rise 15 feet, neaps 10 feet. As a rule the flood runs southward, and the ebb northward, but both streams are much influenced by the wind. In the south-west monsoon, at neaps, the stream is continuous to the northward, and during this season the greatest irregularity in the tides prevails. The streams are strongest off Ras Mwanda.

Directions.—To enter Kokotoni harbour from the northward; from about $1\frac{1}{2}$ miles off Ras Nungwe, steer for the north extreme of Mwana Mwana island, bearing S.W. by W., until Kokotoni hill bears S. by W. (well open eastward of Puopo island). Steer for the hill on that bearing, looking out for the reef, which stretches to a distance of nearly 2 miles off the coast of Zanzibar, and can generally be seen, until Gungodi hill bears S.E. by E.; then alter course to S. $\frac{1}{2}$ E., keeping a sharp look-out for the reef extending north-eastward of Puopo island, which is difficult to be seen.

When the eastern extremes of Puopo island open of one another alter course and steer to pass at a distance of 3 cables from it. When the centre of Puopo island is abeam of the vessel, all dangers will have been passed, and anchorage can be chosen as desired. There is considerable swell at times northward of Puopo island, but it does not fetch home through the narrows to the harbour.

A small vessel intending to enter Kokotoni by the south channel must be guided mainly by the eye and the chart, as there are no good leading marks. To enter, bring Kokotoni hill to bear E.S.E., and steer in for it, passing the sand bank on Mmawali reef (which is always to be distinguished) at a distance of 4 cables. When Puopo island begins to open of Tumbatu island, the centre reef will be on the port beam, and should be made out from aloft; in which case round it by eye, giving the visible part a good berth, as it deepens very gradually. Should the reef not be discerned when Puopo island begins to open, alter course for Gungodi hill, having Makutani flat islet slightly on the port bow; this course will lead to the anchorage.

The water is thick, concealing any shoal with more than 12 feet on it, and as the streams are strong, too much care cannot be taken. There is, however, no swell, and the bottom is generally soft.

DIRECTIONS.—Zanzibar channel, Northern approach.
—In making Ras Nungwe, the north point of Zanzibar island, due allowance must be made for the strong current setting north-north-westward through the channel between Zanzibar and Pemba. In the south-west monsoon the current runs from 2 to 4 knots an hour; in the north-east monsoon from 1 to $2\frac{1}{2}$ knots in the same direction.

Ras Nungwe, on which there is a lighthouse (page 442), makes as a low uniform woody point, and should be passed at a distance of about $1\frac{1}{2}$ miles to clear the projecting reef, which can always be seen by the breakers. To pass northward of Nankivell rock:—from off Ras Nungwe, bearing South distant $1\frac{1}{2}$ miles, steer West, till the west extreme of Tumbatu island is open westward of Mwana Mwana island, when a vessel may steer to the southward along the Tumbatu coast at a distance of about a mile.

Ras Nungwe must not be brought between the bearings of E. $\frac{1}{2}$ S. and E. by S. $\frac{1}{2}$ S. until the west extreme of Tumbatu is open westward of Mwana Mwana.

As the dangerous Shearwater patches do not generally show well, and there are other reefs to the southward at a few miles from the coast, vessels should keep along the land at a distance of one mile, to Mungopani lighthouse, when proceed through English pass as directed at page 440.

The above directions are for a steam vessel or for a vessel with a fair wind.

A sailing vessel in the south-west monsoon period should take the early morning, when the wind will probably be westward of S.W. ; or the afternoon, after it has come round to the south-eastward. At either time she may lay along the land from Mwana Mwana island, and escape working to windward, which is to be avoided if possible, in consequence of the numerous outlying reefs to the westward. The shore of Zanzibar island should always be kept aboard to avoid the outlying reefs.

At night.—Lights have been established at Ras Nungwe, the north extreme of Zanzibar, Mwana Mwana, and also at Mungopani, to assist in the navigation at night, but as these lights do not appear to be regularly attended to, the navigator must use his own discretion in the matter. *See* lights, page 444, and Caution on page 433.

LEAVING ZANZIBAR.*—Steam vessels leaving Zanzibar, will, of course, take the channel that leads most direct to their port of destination, thence proceeding as directed in pages 46–50.

For sailing vessels, in either monsoon it will generally be better to make a fair wind of it, and leave Zanzibar by the lee pass. If bound southward in the south-west monsoon this may appear to put a vessel a long way to leeward, but probably nothing will be lost by it, for to work to the southward, an offing of 90 miles must be gained in order to be outside the main current, which runs strong along the land, and the offing will be gained sooner by leaving by the north channel.

A sailing vessel must leave Zanzibar anchorage in the morning to make certain of anchoring off Ras Nungwe for the night (page 442), and should weigh from that anchorage with the first of the south-westerly or land breeze in the morning, and stand out to cross the strength of the current as soon as possible; a liberal allowance must be made for the current which sets about N.N.W. into Pemba channel. Any attempt in a sailing vessel to start with the afternoon sea breeze will result in the vessel being swept up Pemba channel, and if the morning wind be light, the same thing may occur; it would be better to run through Pemba channel at once than try to beat out to windward of it. There are no means of avoiding this drawback, and many vessels are set far north of Pemba before getting outside the current.

* *See* charts, Nos. 640a and b, and No. 664.

If bound northward in this season, the wind is favourable ; steer through Pemba channel (page 466) during daylight, if possible.

If the Southern pass be attempted in the south-west monsoon period, leave either early or late, and anchor off Chumbe island if necessary until the wind shifts again at night.

During the north-east monsoon, a sailing vessel bound northward might lay along the land northward of the town by starting about 2 p.m., but she would have to anchor that night, and wait until the same hour next day, unless the morning were favourable for short tacks between Shearwater patches and Tumbatu island. Altogether a vessel would probably gain by running south, and round Ras Kizimkazi, the south point of Zanzibar, and getting into the fair current outside.

Anchorage may be obtained anywhere in Zanzibar channel in 25 fathoms or less, on an emergency, if overtaken by night or thick weather, except near the entrances.

EAST COAST OF ZANZIBAR.*—From Ras Nungwe, the east coast of Zanzibar island trends south-eastward for 6 miles to a point, abreast which is the island of Mwemba.

The coast is alternately of low cliff and sandy bays, and nearly straight. The coral ledge dries off for three-quarters of a mile and is steep. It always shows by the sea breaking heavily.

From opposite Mwemba island the coast of Zanzibar island trends southward in a gentle inward sweep to Ras Urua, a distance of 16 miles. This latter part is mostly sandy and low, backed by rising ground a few miles inland, and bordered by a coral ledge extending from a half to one mile from the shore, and steep-to ; a depth of 30 fathoms is generally found at less than three-quarters of a mile outside the reef.

Northward of Ras Urua is a small bay in which are the villages of Pongwi and Mdudu, where a boat can obtain supplies.

Mwemba island is a small sand island, covered with tall casuarina trees, standing on the inshore edge of a coral reef, 4 miles in length north and south, and 2 miles in width. The reef dries at low water springs, with a steep edge, and is separated from the east coast of Zanzibar island, by a channel one mile wide, with a depth of 50 fathoms. The inner or western point of Mwemba island is steep,

and may be passed at a prudent distance. The island is resorted to by fishermen, and there is a small supply of good water in a masonry well, in the centre of the island.

Anchorage.—There is good anchorage three-quarters a of mile north of Mwemba island, in 10 fathoms, sand, where shelter will be found in the south-west monsoon period, under the lee of the extensive reef.

Chuaka head, 5 miles south-eastward of Ras Urua, is a bold headland about 70 feet high, faced with cliffs, and the northern extremity of a peninsula. It is surrounded by the coral reef, which stretches $1\frac{1}{2}$ miles northward of it, sheltering what anchorage there is in Chuaka bay. Its outer edge is not steep-to, and should not be rounded too closely, especially as the water is thick and discoloured.

Chuaka bay.—The coast from Ras Urua trends southward for 8 miles, forming the west side of Chuaka bay, the head of which is $3\frac{1}{2}$ miles across; the peninsula which terminating in Chuaka head with its projecting reef, about 5 miles in length, forms the east side of the bay. The shores are all low, and generally sandy or mangrove, with several mangrove creeks at the head of the bay. This large bay is, however, so shallow as to be nearly useless, and there is only a small area north-westward of Chuaka head available as an anchorage. Halfway between Chuaka head and Ras Urua is a reef just awash, on which the sea usually breaks.

Several villages stand on the shore, of which Chuaka, in the south-west corner of the bay, is the principal. Inland to the westward, several low but abrupt isolated coralline eminences rise above the surrounding vegetation.

Anchorage.—There is temporary anchorage in Chuaka bay between Chuaka head reef and the middle reef, in 5 fathoms, sand, with the outer edge of Chuaka head bearing S.E. by S., and the fringing reef 3 cables distant. The tidal streams set strongly and regularly into and out of the bay.

Coast.*—From Chuaka head the coast, which is low and generally rocky, trends southward for 4 miles to a low rounded point, well covered with cocoa-nut trees; thence it is sandy and nearly straight to Ras Makunduchi, a rocky projection 16 miles southward of

Chuaka head. There are several villages on the coast, and the coral ledge, which northward of Makunduchi village extends $1\frac{3}{4}$ miles from the shore, dries off on an average rather more than one mile, and is steep-to.

From Ras Makunduchi the coast sweeps in a curve for a distance of 9 miles to Ras Kizimkazi, and presents a uniform, low, cliff, backed by gently rising ground 100 feet in height. The cliff is only broken just southward of Ras Makunduchi, where there is a slight sandy bay, 2 miles in length. The coral ledge continues with the same features as before, but does not extend quite so far off the coast.

See charts, Nos. 640a and 664.

CHAPTER X.

 PEMBA ISLAND, AND THE ADJACENT COAST BETWEEN PANGANI
 BAY AND FORMOSA BAY.

(From lat. 5° 25' S. to lat. 3° 0' S.)

VARIATION IN 1897.

Pemba island	-	-	8° 45' W.
Tanga bay	-	-	8° 45' W.
Mombasa	-	-	8° 15' W.

PEMBA ISLAND.

General Remarks.*—Pemba island, named by the Arabs Al Húthera (the Green), lies 22 miles north-eastward of Zanzibar island, of which it is a dependency. The island is governed by a Wali, appointed by the Sultan of Zanzibar, who resides at Weti.

The island extends in a north-north-east and opposite direction for a distance of 38 miles, and is about 13 miles wide (including the islands off its western side which protect the numerous harbours on that coast).

The reef off the western side of Pemba island is generally steep-to, and less than one mile from the coast or the islets.

The eastern coast of Pemba is faced with a reef extending about half a mile off, and is apparently steep-to, with breaks opposite the several creeks that indent the coast; these breaks probably afford a passage in smooth weather to boats.

The height of Pemba island does not exceed 300 feet, and its surface is broken into ridges and valleys, covered with luxuriant vegetation. The soil is rich, the principal produce being cloves, most of the groves of which trees are situated on the western part of the island; the produce is sent to Zanzibar for export. The exports

* See charts, Nos. 1,390 and 664.

of Zanzibar and Pemba for the year 1895 amounted in value to £89,000. All tropical cereals and edible roots flourish, and on the eastern side the Wapembe, or descendants of the aborigines, tend considerable herds of cattle. Cocoa-nuts are in abundance.

Pemba makes as a low island with uniform outline, and cannot be seen far by night unless by moonlight. By day it is visible from a distance of about 15 miles.

Communication.—There is communication by trading dhows between Zanzibar and Pemba ; no telegraph.

Harbours.—Chaki Chaki is the best harbour, and most easy of access ; it affords shelter for all classes of vessels, and from all winds, but the depths are inconvenient for anchorage in many parts of it. Kingoje bay, Ngelema bay, port Cockburn, and port George are also good harbours, but the two latter are not so easily accessible. The best entrance to Port Cockburn is through Chaki Chaki bay, by Owen channel. Port Kiuyu is also a good anchorage.

Caution.—A good look-out from aloft should be kept when entering any of the anchorages in Pemba, as from the nature of the bottom other unknown small dangers may possibly exist which are uncharted ; and the time for entering chosen when the sun is in a favourable position if possible. Owing, however, to the muddy state of the water at times, the shoals are not always discernible from the masthead. The bearings of Mangrove points must be used with caution as the points are liable to grow out.

PEMBA.—SOUTH-WEST AND WEST COASTS.*—The south-west side of Pemba island, westward of Ras Upembe, is fronted by a detached sunken reef, some 10 miles in length, on which are several islands and rocks above water. Between this reef and the coast is Upembe passage, which is much used by dhows. A description is here appended, but the plan will afford more information than a written description of these passages.

Ras Upembe, the south point of Pemba, is a bold cliffy point 15 to 20 feet high, clear of bushes for 50 to 100 yards from its outer edge. It is steep-to, and the sea breaks heavily against it at times. The small sand beach on its western side is very conspicuous from the south-westward. Upembe passage lies close westward of it.

* See plan of Pemba island, south-west coast, No. 1,310.

Two miles northward of Ras Upembe is the eastern entrance of Upembe passage, which is marked by a small coral islet about 15 feet high. Between the islet and Ras Upembe are two white sand beaches.

Clump.—A little northward of the east entrance to Upembe passage is a conspicuous clump of trees, 80 feet high.

South Ras Domoni and Observation point, the entrance points of the harbour north-westward of Ras Upembe, are cliffy, overhanging coral projections, with bushes close up to the edge of the cliff. The entrance is nearly dry at low water springs.

Hinsuani islet, 54 feet in height, and the Twins 31 and 28 feet high, are wooded islets, with cliffy coral overhanging shores, situated on the reef at about one mile westward of Ras Upembe. The reef dries around them at low water.

Miugani islet, situated 2 miles westward of Hinsuani islet, is 51 feet high, and thickly wooded. The surf breaks against it at high water, but at low water the reef dries for some distance round it.

Ras Miugani, the southern point of the island of Pansa, is a bold cliffy coral point 40 feet high; it has a conspicuous white sand beach on its western side. The coral ledge on which it stands dries off about one cable.

Yombi, Pansa, and Matumbene islands, and the three between, are practically the same island, being only separated by mangrove creeks, which are available for boats at high water. They are all thickly wooded and about 100 feet high.

On the south-west side of Matumbene island there is a long white sand beach, backed by a grove of casuarina trees.

There are several other islets and rocks on the reef off Matumbene island, but they are not easily distinguished, unless close to.

Panani islet, 55 feet high, westward of Pansa, has a cliffy coral shore and is covered with bushes and trees. It is conspicuous from the south-eastward, when showing clear of the land.

Sumwago islet, a bare coral islet with overhanging cliffs 20 feet high, westward of Matumbene, stands well out on the reef and shows clear of the main island when seen from the southward.

Matumbe Makupa, situated 2 cables northward of Matumbene island, is 149 feet high and thickly wooded, with a cliffy coral shore on the western side. The reef dries between it and Matumbene.

Barue rock, 35 feet high, is covered with bushes and has coral cliffy shores. It shows well clear of the main island from both north and south.

Middle islet, 16 feet high, shows conspicuously between Kwata, 25 feet high, and Matumbe Makupa.

Makungwi island, the north-easternmost of the group, is $1\frac{3}{4}$ miles in length, east and west, between which and the coast of Pemba is the northern entrance to Upembe passage. The island is partly cultivated, has several low hills, and the tops of the cocoa-nut trees are about 100 feet above high water.

Depôt.—Anchorage.—There is fresh water at Pochin beach, near the north extreme of Makungwi; and a depôt established for H.M. boats cruising. There is anchorage about $1\frac{1}{4}$ miles northward of the depôt with the west extreme of the island S.W. by S. and the east extreme S. by E. $\frac{3}{4}$ E., in about 10 fathoms. The anchorage, for small vessels only, should be carefully approached on the latter bearing.

Reefs.—The fringing reef curves gradually round outside the above-mentioned islands and always breaks. It is steep-to, and its outer edge dries at low water.

Northward of Kwata and Makungwi islands the reef, broken in places, and irregular, extends from one to $1\frac{1}{2}$ miles.

The coast northward of Makungwi to north Ras Domoni, south point of Kingoje bay, is fronted by reef dry at low water to nearly $1\frac{1}{2}$ miles in places, and with not more than 3 fathoms at 2 miles off shore.

Dhow passages.—Upembe passage.—Between the islands above mentioned and Pemba, the space is encumbered with reefs and narrow passages much used by dhows and by the cruising boats of H.M. Ships. The principal channel, from the northward, is between Makungwi island and Pemba, thence along the coast of Pemba to Ras Upembe. It is known as Upembe passage.

The entrance from the southward to Upembe passage is close westward of Ras Upembe; at about one mile northward of that point it is almost blocked at low water springs.

Fufuni village lies near the coast about 2 miles northward of South Ras Domoni; fowls, eggs, &c., are obtainable, but the water is bad.

Current.—The current divides south of Ras Upembe, off the entrance of Upembe channel, and follows the line of coast to north-east and north-west with a velocity of one to 3 knots an hour, during the north-east and south-west monsoons, respectively. There are heavy tide rips at the dividing of the current, especially when met by the ebb stream running out of Upembe passage. Off Matumbe Makupa, and extending for about 2 miles to the northward there are tide-rips and occasionally overfalls.

ANCHORAGES.—Kingoje bay, between North Ras Domoni and Ras Kingoje, the east point of entrance to Chaki Chaki bay, is 2 miles wide, but the navigable channel is reduced to half a mile between the reefs which extend about 2 miles westward of Ras Domoni (before mentioned), and the south extreme of Mwamba Kisima. The latter dries at low water springs for the distance of $1\frac{1}{2}$ miles westward of Kingoje point, and there is not more than 3 fathoms at 2 miles from the point.

Kingoje bay, within North Ras Domoni, is reduced by the shoals which encumber it to a breadth of about 2 cables east and west, over a length of about 5 cables; in this space there is a depth of 6 to 7 fathoms, over mud, affording secure anchorage for moderate draught vessels. It is also a capital anchorage for boats, from whence the east coast of Pemba can be reached by Upembe passage.

Large vessels should anchor farther out in about 11 to 13 fathoms, south-westward of Ras Kingoje. Vessels should be navigated from aloft, as no definite marks are available. The best time for entering is naturally with the sun astern or in the afternoon.

Ngelema bay, close northward of Ras Kingoje, affords good anchorage; but the pilotage must be done from aloft and with the sun in a favourable position. *See directions, p. 458.*

CHAKI CHAKI BAY* is included between Mkumbuu peninsula, Ras Kingoje, and the reefs of Mesale island.

* *See plan of West coast of Pemba island, No. 1,812.*

Though there are many shoals in it, there are also large clear spaces, and it affords many good anchorages, with depths sufficient for all classes of vessels. The eastern part gradually contracts to the mangrove creek on which Chaki Chaki town stands, 9 miles distant in an easterly direction from Mesale island. *See* caution, p. 452.

The shores of this bay are cultivated with cocoa-nut trees, cloves, and cereals.

Ras Kingoje is the southern limit of Chaki Chaki bay. It is a low point, and not easy to recognise from the westward. Mwamba Kisima extends $1\frac{1}{2}$ miles westward of Ras Kingoje, and together with the shoal ground extending half a mile west of it, must be avoided when entering Chaki Chaki bay.

Ras Tundauwa, distant 3 miles north-eastward of Ras Kingoje, is low and fringed with mangrove trees. There is a watering place on the north side, half a mile from the west extreme of the point.

Ras Banani, on the south side of the entrance to Chaki Chaki inlet, $2\frac{1}{2}$ miles eastward of Ras Tundauwa, is low, but tolerably clear of bush; on it there is a white chimney, only visible near the anchorage. There is another white chimney about a third of a mile south-west of that on Ras Banani.

Mkumbuu is a narrow peninsula that divides Chaki Chaki bay from port Cockburn. It is of an uniform height of 50 feet, and has many cocoa-nut and palmyra palms. Its western extremity is formed by high mangrove trees.

Dongo Kundu is a wedge-shaped projection of bright red sandstone, which extends from the south side of Mkumbuu peninsula, and is a conspicuous object. There is another patch of red cliff, half a mile north-west of it, conspicuous in some lights.

Shoals.—A large patch of reef which dries, lies W. by N. $\frac{1}{2}$ N., about one mile from Ras Tundauwa, and there are patches of 2 to 3 fathoms on the continuation of the ridge towards Mesale island. The north extreme of the shoal, with a depth of 3 feet, extending westward from Fungu Sisimizi, south side of entrance to Chaki Chaki anchorage, is situated with Ras Tundauwa bearing S. by E. distant $1\frac{1}{10}$ miles.

A patch of $2\frac{1}{2}$ fathoms lies with Dongo Kundu bearing E.N.E. distant $1\frac{1}{10}$ miles. Patches of 4 to 5 miles extend some 6 cables west-south-westward of it. The limits of the reef dry at low water, extending southward of Mkumbuu peninsula, and the extensive shallow water fringing it, as well as isolated patches, will be best understood by consulting the plan.

Mesale island, on the west side of the entrance to Chaki Chaki bay, is low, covered with dense forest which attains a height of 70 feet above the sea, and is about one mile in length.

Mesale island is situated on a reef which dries for the distance of about 6 cables south-westward and south-eastward; on these sides also shallow water extends some distance from the edge of this reef, but on the northern side it is steep-to. Northward from Mesale island the reef extend about one cable off, forming the south side of Mesale gap. Mesale island appears to stand out well from the land behind, when seen from any direction.

Position.—The observation spot, on the north-east extreme of Mesale island, is in lat. $5^{\circ} 14' 9''$ S., long. $39^{\circ} 36' 18''$ E.

Target and torpedo practice.—In the north-east monsoon period, the space southward of Mesale island is said to be the best place for torpedo practice, and in the south-west monsoon under Ras Kiuyu north end of Pemba.

Mesale gap, situated north of Mesale island, and between it and the reef of Uta-wa-limani, is deep, but is not recommended, except at low water and when the sun is in a favourable position, as the reefs on either side are not steep-to, and sometimes do not show well. No leading mark can be given for this channel.

Anchorage.—Directions.—To enter Chaki Chaki bay, steer in with Ras Tundauwa in line with Ras Banani bearing E. $\frac{1}{2}$ N., until the left extreme of Mkumbuu peninsula bears N.N.E. $\frac{1}{2}$ E.; thence for that extreme until the south point of Mesale island bears West. Steer E. $\frac{1}{4}$ N. from this position, with Mifuni hill, a somewhat remarkable hill with a flat top covered with cocoa-nut trees, directly ahead, until Ras Kingoje bears S.S.W. $\frac{3}{4}$ W., or Dongo Kundu N. $\frac{1}{2}$ E.; thence E. by N. $\frac{1}{2}$ N. between the reefs distant about 3 cables on either side, until Dongo Kundu bears N.N.W. Then

steer E. by S. until Dongo Kundu bears N.W., when anchorage may be taken in about 10 fathoms, as charted. Vessels can proceed farther in, but the 3-fathom patch half a mile off the eastern side of the bay should be given a wide berth.

Or, to proceed to the anchorage north-west of Ras Tundauwa ; when the south extreme of Mesale island bears West, as before, steer E. $\frac{2}{3}$ S. with a large castellated house in Chaki Chaki town, seen over a mangrove islet in the centre of the narrows west of Ras Banani. This will lead to the anchorage in 8 fathoms, with Ras Tundauwa about S.S.E. $\frac{1}{2}$ E. distant 7 cables, and about $2\frac{1}{2}$ cables from the shoals on either side. If the shoals can be made out, a vessel can go a little farther east-south-eastward.

The anchorage in Ngelema bay, southern portion of Chaki Chaki bay, from a position south-eastward of Mesale, may be steered for with the conical hill (255 feet) bearing E. by S. $\frac{1}{2}$ S., until Ras Kingoje bears S.S.W.; whence steer S.E. $\frac{1}{4}$ E. for the western 100 feet hill, between the dangers distant about $1\frac{1}{2}$ cables on either side, until Ras Kingoje bears S.W. by W. $\frac{1}{2}$ W.; here is anchorage in about 8 fathoms. *See* caution, pp. 452 and 459.

Temporary anchorage may also be obtained in the north-east monsoon period, or during calm weather, on the bank south of Mesale island in 6 fathoms.

Chaki Chaki is a long straggling town picturesquely situated among mango and cocoa-nut trees at an elevation of 40 feet above high water. There is a dilapidated fort in the town which is not conspicuous but some of the stone houses show very clearly from Mesale island, especially the northermost one, which is castellated.

The town cannot be approached at low-water springs even in the smallest boat, the creek drying completely across, but at half tide there is a sufficient depth of water for a steam pinnace.

Supplies.—A contract has been made here for the supply of beef, bread, and vegetables.

PORT COCKBURN is a harbour of great capacity with depths sufficient for all classes of vessels, though much obstructed by reefs, and in many parts having inconveniently deep water ; long bays and creeks indent the shores, in some of which good anchorage can be found ; the dangers, however, are not marked. Kokota, Funzi, and

Pembe islands divide port Cockburn from port George. Port Cockburn may be entered either by Owen channel or Kokota gap, but the former is much to be preferred. This port is used as a head quarters for H.M. ships cruising. *See* caution, p. 452.

Supplies.—Fresh provisions are obtainable from the large village on Ras Kinazini, north shore of port Cockburn.

Islets and dangers.—**Caution.**—As the survey on which the plan of these harbours (No. 1812) is based was broken off by the ship being ordered elsewhere, before it was completed, it is very possible that other unknown small dangers may exist.

Mwamba Mkumbuu is a reef extending nearly one mile west from Mkumbuu peninsula and forming the east side of Owen channel; its south-west extreme, on which are isolated patches dry at low-water springs, is situated $1\frac{1}{2}$ miles from the peninsula; the water shoals very gradually towards the reef from the southward, and from that direction it is difficult to distinguish.

Uta-wa-limani is a long reef extending from Mesale gap to Vikunguni islands, a distance of 4 miles in a northerly direction. This reef is tolerably steep-to on its western edge, but towards Owen channel it slopes gradually. It dries in places, principally at the southern part.

Vikunguni and Kashani islands are both long, narrow, and rocky, being situated on the outer edge of the sea reef $4\frac{1}{2}$ miles northward of Mesale island. Off the south extreme of Vikunguni the three islets, 15 feet high, are very conspicuous.

Mapanya island is rocky, with one or two baobab trees, 30 feet high, that show conspicuously above the other trees; it is situated on the eastern horn of the same reef as the Vikunguni islands.

Patch.—A patch of $1\frac{1}{4}$ fathoms lies on the north side of Owen channel, with Mapanya island N. by E., distant $1\frac{2}{10}$ miles.

About half a mile eastward of Mapanya island are situated two large coral banks, with 4 feet water on the southern and about 10 feet on the northern.

Kokota island, separated from Kashani and Mapanya islands by Kokota gap, has a rocky sea face, and is covered with moderately high vegetation, but has a very few palm trees upon it.

Funzi island, situated three-quarters of a mile eastward of Kokota, has a central plateau 40 feet in height, covered with lofty palmyra palms and cocoa-nut trees to about 100 feet in height. There is a well on the north side of this island. *See* anchorage off north side, p. 463.

Depôt.—There is a Naval depôt on Funzi, and also a cemetery at the south-east extreme of the island.

A patch of 4 fathoms or less, with 10 fathoms close to, lies with the east extreme of Funzi, bearing N.N.E. $\frac{1}{4}$ E., and south extreme W. $\frac{1}{2}$ N. A patch of 5 fathoms is also charted about 3 cables south-eastward of it. For others, *see* the plan.

Pembe island, lying eastward of Funzi, is somewhat like it in appearance, but smaller, and has more mangrove trees around it. Some red cliffs at the south-west extreme are conspicuous.

DIRECTIONS.—Southern Entrance.—Owen Channel, leading from Chaki Chaki bay to port Cockburn, is deep, but contracts at one part to a width of $3\frac{1}{2}$ cables between the 3-fathom lines. It lies between Uta-wa-limani and the reefs north-eastward of it, and the reef extending from Mkumbuu peninsula. No good leading marks can be given for this channel, but at low water, with care, by the aid of the plan, there should be no difficulty in its navigation. The following marks, taken partly from the plan, may prove of some value.

From abreast and eastward of Mesale island steer in with the north-west extreme of Uvinje island, in line with the east extreme of Kashani island, N. by E., which leads in mid-channel, until the north extreme of Mkumbuu peninsula bears E. $\frac{1}{2}$ N.; thence the course is about E.N.E., allowing for tide, passing about midway between the sandbank which dries 8 feet on the edge of Mwamba Mkumbuu and the patch of $1\frac{1}{4}$ fathoms, each distant about 2 cables; thence as requisite. *See* caution, p. 459.

Kokota gap is the passage from seaward through the outer reefs into port Cockburn, passing northward of Kashani and Mapanya

islands, and south of Kokota island. This gap is about 2 cables wide between the reefs which are steep-to, with depths of not less than 11 fathoms in the fairway. The edges of the reef are well defined, and dry at low water. Owen channel, the southern entrance, is, however, to be preferred.

Entering the gap, pass about a cable off the east end of Kashani island, and also of Mapanya island; thence the best passage is between the two banks eastward of Mapanya, but they do not always show well. The east end of Kashani well open of Kokota, astern, leads between these banks, as does also the west end of Kashani, touching the north extreme of Mapanya; but it is recommended to navigate at low water by the eye, with the aid of the plan. Within the gap, the same method of proceeding must be adopted, to the required anchorage.

The passages between Kokota and Funzi and between Funzi and Pembe are only available for boats; between Pembe and the mainland the passage dries at low-water springs.

PORT GEORGE is a large harbour somewhat similar to Port Cockburn. Its principal entrance is by Uvinje gap between Kokota and Uvinje islands, and is deep throughout, but it is not recommended for vessels above a moderate draught of water. There is an entrance from the northward by Fundu gap, but the flats within the entrance can only be navigated by vessels of about 10 feet draught.

The northern part of the port is known as Weti harbour, into which discharges Weti creek, which is shallow as far westward as Ras Tungwi. The shores of port George are densely populated and well cultivated.

The western side of port George is formed by the islands of Uvinje and Fundu.

Uvinje is a rocky island on the outer reef, separated from Kokota island by Uvinje gap. It is covered with scrub and has several clumps of tall casuarina trees. On its western side are several sandy coves where boats may land at high water.

Fundu island is the largest of the outlying islands which form the western side of port George, being $5\frac{1}{4}$ miles in length and half a mile in breadth. It is flat, without any conspicuous feature, partly cultivated, and has large groves of palmyra palms. There are many small sandy bays on the western shore of Fundu island.

Haramu passage, between Uvinje and Fundu islands, affords at half tide a boat passage. At low-water springs it is dry.

Pasi islet, 20 feet high, and covered with scrub, is situated in the centre of the southern part of port George, on the opposite side of the channel to Uvinje.

Shoals.—Reefs border the entrance channel, eastward of a line joining Pasi and Kokota, and there is a patch of 4 fathoms on the same side of the channel $3\frac{1}{2}$ cables N.N.W. of Pasi islet. *See* the plan for other dangers.

Directions.—**Uvinje gap**, the main entrance to port George, lies between Uvinje and Kokota island, and is a perfectly clear channel, safe to navigate when the sun is in a favourable position. A vessel when entering should keep along the edge of Uvinje reef until abreast of Pasi islet, to avoid the dangers between that islet and Kokota island. There are two small grass-covered rocks on the reef which forms the north side of the channel; the southern (a double rock 10 feet high) is about 30 yards within the edge of the reef. The northern rock, also 10 feet high, is situated about 2 cables within the edge of the reef.

Good objects for fixing the position of the vessel, when approaching or leaving Weti anchorage, are Pasi island, the house at the watering place at Mtambwi, and the rock 20 feet high off the east side of Fundu; probably the rock 20 feet high off the south point of Fundu is also a useful mark for navigating the channel.

From abreast Pasi island, gradually bring the two 10 feet high rocks on Uvinje reef in line, astern, bearing S.W. $\frac{1}{2}$ S. (avoiding the 4 fathoms patch $3\frac{1}{2}$ cables N.N.W. of Pasi); this mark will lead to the approach to Weti harbour. When Ras Ukunjwi bears N. $\frac{1}{4}$ E., or the point eastward of Ras Tungwi is open, anchor in about 10 fathoms; or, if wishing to proceed farther in, steer N.E. by E. $\frac{1}{2}$ E. for about half a mile to Weti outer anchorage, keeping a good look-out for the dangers which are unbuoyed, close southward of the track.

Weti harbour.—Weti harbour affords secure anchorage in depths of about 4 fathoms abreast Ras Tungwi, gradually increasing to 10 fathoms at one mile westward of that point. The entrance is about a quarter of a mile wide between the reefs on either side. To enter

Weti harbour a vessel must be guided by the reefs on either side, which probably are all visible from aloft when the sun is favourably situated ; or a boat must be sent ahead.

A custom house is situated near Chozini. A small boat slip has been made at the watering place at Mtambwi, within Ras Tungwi. The chief or provisional administrator resides at Weti.

Supplies.—Good supplies are obtainable at Weti. A chief, whose acquaintance should be sought, resides at the conspicuous house at Mtambwi within Ras Tungwi.

Anchorage.—To proceed to the anchorage northward of Funzi island, having entered by Uvinje gap as before directed,—from nearly abreast the northernmost 10 feet rock on Uvinje reef, steer to bring the tall tree situated nearly 4 cables within the south extreme of Uvinje island, just open northward of the rock, bearing W. by N. $\frac{3}{4}$ N. This mark astern, leads in mid-channel. When the west extreme of Pembe island bears S. by E. $\frac{1}{2}$ E., anchor in about 10 fathoms, or haul towards the island on that bearing until the rock eastward of Kokota is just opening northward of that island.

There is also good anchorage in Port George in 8 fathoms, off Mkia wa-Paca, with Pasi islet bearing S.W. $\frac{1}{4}$ S., and the north extreme of Uvinje island W. by N. $\frac{1}{4}$ N.

Inner passage.—The passage from port George northward to port Kishi Kashi, is shallow, and is not recommended, though available for vessels of 10 feet draught.

KISHI KASHI PORT.—**Fundu gap.**—Kishi Kashi is small and much obstructed by reefs ; Fundu gap, its entrance, is somewhat intricate, for though the outer part is deep and straight, it is in one place only about half a cable in width, and the sides are not quite steep-to.

Being without natural leading marks, boats should be anchored on the edges of the reefs in order to enter with safety. It is advisable to anchor in the south-east part of the harbour, where there is most room for swinging and no current is experienced. It was intended to erect a beacon at Kishi Kashi to better mark the entrance to Fundu gap.

At Kishi Kashi port the chief of the Pemba Arab aristocracy resides. He owns all the north part of Pemba island.

Njao island, lies between Fundu gap and Njao gap, and is similar to Fundu island in appearance. A rock, about 30 feet in height, stands on the seaward edge of the reef near the centre of Njao island. Tundu rock, 20 feet high, stands on the edge of the reef at one mile northward of Njao gap.

PORT KIUYU.—**Njao gap.**—Port Kinyu is a more available harbour than Kishi Kashi port. Njao gap, the entrance, is wider, and the clear space inside larger. A good berth is in 12 fathoms with the south point of the main island eastward of Njao island, bearing S.W., and the north-east extreme of Njao island bearing N.W. $\frac{1}{4}$ N.

Many creeks and bays indent the shores of port Kiuyu, but they are all shallow. The shores are not so thickly inhabited as those of the harbours southward of it.

Directions.—The sides of Njao gap are well defined, except at the south side of approach, where shallow water extends about a cable north-west from the extremity of the reef. The reef on the northern side of the channel is steeper.

There is no difficulty in entering Njao gap at low water, by navigating from aloft, as the shoals are plainly discernible on either side. The last of the ebb sets towards the south side of the entrance.

NORTH COAST.—Northward of Njao gap the coast is nearly straight, with occasional little sandy bays, to Ras Kegomacha.

Aspect.—The appearance of the north coast of Pemba island is that of a low tree-covered country, the outline being very uniform ; the only point which can be recognised being the low clump on Ras Kegomacha.

Pemba island is safe to approach at night from the northward at a moderate speed and with the lead going.

Light proposed.—It is proposed to erect a lighthouse at the north end of Pemba.

MSUKA BAY* is situated immediately east of Ras Kegomacha, the north-west extreme of Pemba island, and is a good anchorage,

* See plan of Msuka bay on No. 1,812.

protected by reefs on nearly all sides. During the north-east monsoon a swell fetches home, but even then it is a safe anchorage. Msuka is the name of the district on the shores of Msuka bay. A good many dhows are built here.

Ras Kegomacha is a rocky point with a conspicuous clump of trees 60 feet in height.

The reef dries for a distance of 2 miles north-eastward of Ras Kegomacha; discoloured water northward of this reef makes it appear more extensive than it really is. A sand cay, situated 6 cables northward of Ras Kegomacha, dries 10 feet at low-water springs.

Directions.—To enter Msuka bay from the south-westward, do not round Ras Kegomacha until Ras Kiuyu, the north-east extreme of Pemba island, bears S.E. by E. $\frac{1}{4}$ E., to clear the reef, thence as requisite by cross bearings; anchor in 6 fathoms with Ras Kegomacha bearing N.W., and Ras Kiuyu E. $\frac{3}{4}$ S. The swell is troublesome here at times, as above stated.

Sisini creek, situated about $4\frac{1}{2}$ miles south-eastward of Msuka bay, is a long but shallow inlet, with several islands and villages, and affords good shelter for dhows. Sisini village lies at the head of the inlet. Fruit, poultry, eggs, and yams are obtainable at Pajii, off which there is good boat anchorage.

Ras Kiuyu, the north-east extreme of Pemba island, is a rocky promontory covered with bush, and faced by cliffs about 20 feet in height. On the north side of the point the reef extends but a short distance from the coast, and the anchorage north-west of the point is unprotected.

Pemba knolls.—The space between Ras Kiuyu and Ras Kegomacha, is occupied with numerous reefs, known as the Pemba knolls. The eastern of these only dries at low-water springs, but always breaks heavily.

Kundeni knoll, the northern of the group, dries 3 feet at low water, and is situated with Ras Kegomacha bearing S.W. by W. distant $4\frac{3}{4}$ miles.

There is a bank with 4 fathoms least water, lying 2 miles N. by E. of Kundeni knoll.

See plan of Msuka bay on No. 1,812.

Funguni knoll, within Kundeni, has a large sand cay which dries 8 feet at low-water springs; Punga Punge lies 2 miles north eastward of it. Several patches, dry at low-water springs, lie between them and Ras Kiuyu.

The bank of soundings to the depth of 100 fathoms extends for 11 miles northward of Pemba island; but little current is experienced when on it.

TIDES and CURRENT.—It is high water, full and change, at Mesale island, west coast of Pemba, at 4h. 0m. Springs rise 12 feet, neaps 8 feet.

In the northern part of Pemba channel, near the coast of Pemba island, the flood stream setting to the southward neutralises and at times overcomes the constant north-going current, and the ebb accelerates it. The streams meet off Uvinje island and cause a confused sea, dangerous at times to boats. In the southern part of Pemba channel the set is always to the northward, but the amount the current is influenced by the tidal stream has not been ascertained. However, the set of the current in mid-channel is about N.N.W., from 2 to 4 knots in the south-west monsoon period, and 0 to 2 in the north-east monsoon; towards the northern part it also sets in the line of the axis of the channel, or about N.N.E. When at its strength it frequently causes a strong ripple near the island, having the appearance of breakers. At all times a vessel proceeding through Pemba channel will find less current near Pemba island than in mid-channel. The tidal streams run strongly in all the gaps except that of Mesale.

North-east and eastward of Pemba island the current sets about N. by W., or rather on to the island, and renders any estimation of position very difficult. In December (north-east monsoon period), off the east coast, it has been found as little as three-quarters of a mile an hour.

PEMBA CHANNEL.—Directions.—The navigable portion of the channel is contracted by the Wasin and North and South Head reefs bordering the African coast, to a width of 26 miles at the southern entrance, and 19 miles at the northern, but between these dangers and the island it appears to be all deep water.

The eastern side is safer than the western, as the reef extends but a short distance from Pemba island, less current is experienced,

and the land is nearer to guide the navigator; but on the other hand, Pemba island is notorious for its large rainfall, and frequently will be enveloped in rain squalls and clouds, when the western side of the channel is clear.

A steam vessel proceeding northward from Zanzibar, through Pemba channel should, from abreast Mwana Mwana island, shape course direct for Ras Kegomacha; this will allow for the strong northerly current, and lead clear through Pemba channel. *See* directions from Zanzibar, page 447.

A vessel approaching from the northward, and being able to make Pemba island in daylight, is recommended to steer for Ras Kegomacha, the north-west extreme, and keep along the Pemba coast as far as Mesale island; then steer for Mwana Mwana island, allowing about 2 points to the southward for the set of the current.

The three islets southward of Vikunguni island, and about $4\frac{1}{2}$ miles northward of Mesale island, are easily identified, and useful for checking the position of the vessel. The reef southward of them shows well with the sun to the westward.

There is nothing to prevent a vessel approaching from the northward, from passing through Pemba channel at night if the weather be tolerably clear; and as before remarked, the island may be approached from that direction at a moderate speed, with the lead going, but it may be more prudent to keep well outside for the night, and steer in at daylight.

Good anchorage may be obtained on the bank extending southward of Mesale island, entrance to Chaki Chaki bay, in from 6 to 7 fathoms, if not wishing to proceed across to Zanzibar at night.

PEMBA.—East coast.—The east coast of Pemba is rather low, and should be approached with care at night, but there does not appear to be any danger beyond the coast reef, which, it is stated, nowhere extends more than one mile off, and is steep-to. Within 2 miles of the coast no soundings have been obtained with the hand lead.

From Upembe passage (page 454) near the south extreme of Pemba island, to Mtangani, a distance of about $7\frac{1}{2}$ miles, the coast is overhanging coral cliffs, about 15 feet high, thickly wooded, and fronted by a reef which always breaks.

See charts, Nos. 1,390 and 664.

MTANGANI*, a break in the reef in about lat. $5^{\circ} 23' S.$, can be entered by small craft if navigated from aloft. The passage is clearly defined, and the water smooth as soon as the outer line of breakers is passed. The channel is three-quarters of a cable wide, and the best anchorage is inside to the westward of the point forming the south side of the entrance. H.M.S. *Stork* moored there and found little or no tidal stream. There is a passage for boats through to Kiwani and from there to seaward through Mkiwani channel, available only for boats at high water; the entrance being 3 miles southward of Mtangani.

Caution.—Care must be taken in entering or leaving Mtangani, as the current runs strongly along the edge of the reef; but as soon as the outer edge is passed, the current is lost and the tidal stream met running fairly out or in.

The reverse being the case on leaving, the current catching the ship on the bow as she passes the outer edge. So clearly is the difference of current felt, that the bows of the ship may be in the tidal stream while the stern is in the current and *vice versa*.

Boat channel.—For about three days on either side of spring tides, there is a boat passage between Upembe harbour, northward of the island of which Ras Upembe forms the south extreme; thence along shore within the reef off Mkiwani creek. Mkiwani entrance has a bar with 6 feet at high water. Its narrowest part is but 14 feet wide, but is deep. Small dhows use this passage.

Coast.—From Mtangani the coast, composed of clifty, over-hanging coral, with numerous indentations and a few sand beaches, inclines to the northward to Mchengangazi. It is lined with trees and bushes to within a few feet of the edge of the cliffs.

Reef.—The coast is fringed with a reef which is steep to and generally breaks, without any off-lying dangers. The current runs northward strongly along its edge.

Mchengangazi passage,* in lat $5^{\circ} 06\frac{1}{2}' S.$, is a channel through the reef, about one cable wide. It must be entered by steering from aloft, the deep water being easily seen. H.M.S. *Stork* moored in 7 fathoms, $1\frac{1}{2}$ miles within the south point of the entrance. The tidal stream sets directly in and out of the passage, and care must be taken on entering or leaving when passing from the current

* See plan on No. 1,310, and chart No. 1,390,

running northward along the reef into the tidal waters, and *vice versa*. Little or no stream was experienced where the *Stork* moored. The large open space inside dries at low water, leaving narrow creeks between. At the head of the inlet a narrow creek and boat passage leads northward past Kodian village into Adamson bay.

Adamson bay.*—No passage could be found leading from seaward into Adamson bay; the reef was breaking right across and the rollers setting into the bay for some distance.

There is a small coral islet off the south point of Adamson bay.

Landmark.—On the north side of entrance to Adamson bay there is a conspicuous square clump of casuarina trees, 100 feet high, remarkable by being the only trees of the kind in the vicinity.

Just off the casuarina clump is a small black islet, 54 feet high, under the land and not easily seen.

The current sets northward along the coast with a velocity of one to 3 knots an hour. There is a fairly strong setting into Adamson bay at times.

COAST.—From Adamson bay the coast trends nearly straight to Kas Kiuyu; it is clifty, 15 to 20 feet high, with a few sand beaches, and covered with scrub and trees.

Haycock islet, a small bare islet 42 feet high, is situated 2 cables from the shore, and $2\frac{1}{2}$ miles southward of Ras Kiuyu. It does not show very well, being close under the land.

Landmark.—At $1\frac{1}{4}$ miles southward of Ras Kiuyu, and about one cable within the beach, there is a conspicuous rounded clump of trees, 115 feet high. It stands above a slightly projecting point of white sand extending for nearly a mile.

Coast reef.—From Adamson bay northward, the coast reef is steep-to, extending from a quarter to one mile from the shore, with no off-lying dangers; it generally breaks. Between Ras Kiuyu and the clump just mentioned, however, rocky ground extends for some distance, with coral heads, having 2 to 3 fathoms of water over them. They do not break, and it is not advisable to approach the coast within $1\frac{1}{2}$ miles between Ras Kiuyu and the clump.

The current follows the line of reef running to the northward at a rate of one to 3 knots an hour.

* See chart, No. 1,390.

THE MAINLAND.*

The description of the coast of the mainland is now resumed from page 419.

From Pangani bay northward to Tanga bay the coast of the mainland is low, well wooded and apparently fertile. The shore is sandy, with occasionally a small intervening cliff of coral; and there are two large bays. Large reefs front the coast to the distance of about 3 miles, with passages between. There are many villages along the coast, which are rendered conspicuous by the lofty groves of cocoa-nut trees, in the midst of which they are built.

Off-lying reefs.—South Head reef has been described with those close northward of Pangani bay, p. 415.

Fungu Tongone, northward of South Head reef, is connected with that reef by a ridge with about 3 fathoms water over it. This reef is about 3 miles in length, about the same distance off-shore, and steep-to on its seaward side. The northern portion, for about $1\frac{1}{2}$ miles in length, dries at low water; a sand cay, 19 feet in height, stands about the centre of the inner edge of that portion. A spit extends half a mile northward of its northern extreme, having a deep water passage of about the same width between it and Karange island reef.

About half a mile westward of the southern portion of Fungu Tongone is Kitanga reef, which dries at low water. At $1\frac{1}{2}$ miles south-west of it is Tengale, a similar reef. These, with the islet and reef off Dakali, form the west side of the inner passage.

Karange island and reef.*—Karange, a low and narrow island or islands covered with scrub, is about 3 miles in length, situated on coral reef, about 6 miles in length by $1\frac{1}{2}$ miles in breadth, at about 3 miles from the mainland. There is a deep water passage between the reef and Fungu Tongone to the southward, and also between it and Yambe island reef to the northward, the latter leading to Mwambani bay. Karange reef is steep-to on the seaward side, and mostly so on the inner or western side.

Tangata reef is the extreme of the coral reef, dry at low water, extending nearly 2 miles north-eastward of the low peninsula, within which is the village of Moarongo. There are mangrove bushes at about half a mile within its extreme.

See plan of Mansa and Tanga bays, No. 663, and chart, No. 1,390.

Mwambani bay, between Ras Kisangani and Ras Nyamaku, is nearly 3 miles wide, with depths of 6 to 8 fathoms; the reef fronting the shore extends about a third of a mile off. The bay is protected by Karange and Yambe islands reefs, and its entrance, about half a mile wide and deep, lies between them. In the fairway of the inner portion of the entrance is a 2-fathoms patch, with from 6 to 7 fathoms southward of it, and still deeper water northward of it. The passage northward within the reefs to Tanga is shallow and encumbered with rocks, but would be available for very small craft at high water.

Inner passage.—From Mwambani bay southward there is a smooth water passage between the reef described and the main, apparently easily navigable towards low water from aloft by the eye when the sun is in a favourable position. *See* the chart, 1,390.

TANGA APPROACHES.—**Aspect.**—The coast in the vicinity of Tanga is low, thickly populated, and dotted with villages, especially to the southward. These villages in many instances have mangrove-lined creeks, difficult for a stranger to discover, leading to them.

If the weather is clear, the Bondei mountains, the eastern spurs of the Usambara mountains, which cover a large tract of country, from lat. $4^{\circ} 30'$ S. to $5^{\circ} 20'$ S., and situated about 23 miles from the coast, will be conspicuous. Mbringa, the most prominent of the Bondei mountains, is a three-peaked hill, the centre and highest peak of which is about 3,600 feet above the sea, 24 miles from the coast, and in about lat. $5^{\circ} 5'$ S. Rukindo, a double peaked mountain, 3,400 feet in height, 8 miles northward of it, is also prominent with certain lights. Some of the distant peaks of this range must be nearly 10,000 feet high. During the south-west monsoon, however, these mountains are frequently obscured by haze, or perhaps only the easternmost of them will be dimly seen; during the north-east monsoon they are generally clear.

At 17 miles northward of Tanga, and about 6 miles from the coast, are three rounded hills, the northernmost of which, Kilulu, is about 918 feet above the sea; Kirimba is the name of the one next southward; these will nearly always be visible. Farther north are two isolated conical mountains, 15 miles north-westward of Wasin; Jombo, the more distant, is 1,573 feet high; Mrima, 1,052 feet in

height, is truncated ; both are visible from Pemba island. The land elsewhere is low and flat, with the exception of the Amboni hills, 495 feet high, about 4 miles north-west of Tanga, which serve well to mark its position. These hills are rounded and present no defined summit, but there is a well marked saddle between the two southernmost and highest eminences, which serve as one of the leading marks for entering.

There are several islands off this part of the coast, which are all low and densely wooded. In clear weather they are at times difficult to distinguish from the mainland, but with any haze they appear distinct. Karange, before mentioned, 8 miles southward of Tanga, is the southernmost of these islands ; Yambe, the next to the northward, will be known by a high group of trees towards its northern extremity. The islands to the northward of Tanga are so close to the coast that they are difficult to distinguish until near the off-lying reefs. The lighthouse on Ulenge is probably easily made out.

ISLETS and REEFS in the approach to Tanga.—There is a nearly continuous line of outer reefs which run parallel to the land at varying distances, with navigable passages between them here and there. These reefs, with few exceptions, break at all times and dry at low water ; they are not all steep-to, and should be given a good berth.

Yambe island and reef.—Yambe reef, on which is the island of the same name, is $3\frac{1}{2}$ miles in length, and dries from one to 6 feet at low water. Between it and the northern end of Karange reef is the entrance to Mwambani bay, before mentioned as a good anchorage. Within Yambe there is only a boat passage at low water. The island is about $2\frac{1}{2}$ miles in length, densely covered with jungle, with a clump about 70 feet high near its north extreme. A rock, 15 feet high, lies off the north end of Yambe, and is a good object for assisting to fix a vessel's position.

Channel.—Between Yambe and Niule, the next reef to the north, is a passage nearly one mile wide, available for light or moderate draughts, there being not less than 3 fathoms in the fairway over the ridge, marked by a buoy, which connects the two reefs. *See directions, page 475.*

Niule reef is $2\frac{1}{2}$ miles in length, with its northern end situated with Ras Kasone bearing W. by N. distant $4\frac{1}{4}$ miles. It is of coral,

See plan of Mansa and Tanga bays, No. 663, and chart, No. 1,390.

dries in patches at low water, and a large sand cay, whose height varies with the monsoon (dries about 8 feet), lies on the north-west side of the reef. Shallow water extends about 3 cables eastward of the north end of the reef and about 2 cables northward of it, into Ship channel, marked by a buoy.

Fungu Nyama is a quadrangular-shaped reef $2\frac{1}{2}$ miles in extent, lying $1\frac{1}{2}$ miles north-eastward of Niule, and drying in patches at low water springs. A large sand cay near the centre dries about 10 feet.

Banks with depths of 2 to 3 fathoms lie from half a mile eastward to $1\frac{1}{4}$ miles southward of Fungu Nyama. The latter forms the east side of Ship channel, and is buoyed.

Mwamba Wamba, the next reef northward, is described on page 479. The passage between Wamba and Nyama is barred by a ridge with several rocky patches of about 4 fathoms, and with possibly less water; it is unbuoyed.

Ulenge island presents a featureless line of mangrove trees and rocky points, with a conspicuous islet off its south end. The island lies on the shore reef, which dries between it and the mainland at low water. See lighthouse, on its north-east extreme, page 474.

Ulenge reef is a detached patch barely awash at low-water springs, lying $1\frac{1}{2}$ miles southward of Ulenge island. The water is thick or discoloured around the reefs.

Dixon bank is a small coral patch with 3 fathoms water on it, at about one mile southward of Ulenge reef, with Ras Kasone bearing W. by N. $\frac{1}{2}$ N., distant about 2 miles.

TANGA BAY for a large part of its area is shallow, but there is ample room and depth of water in the harbour, between Tanga island and town for many vessels of light and moderate draught, sheltered from all winds. The portion of the bay seaward of the island is available for all classes of vessels. The water is discoloured on and within Ulenge reefs, so that the reefs cannot be distinguished, but near the outer ones, Niule and Nyama, the water is generally clear. The southern shore of the bay is steep, being the edge of a plateau 50 feet above the sea; here is the town.

Ras Kasone, the south point of Tanga bay, is clifty, but covered with vegetation; in one spot, about half a mile to the southward, when the sun is to the eastward, a piece of red cliff shows very distinctly. A low line of mangroves surrounds Ras Kasone on all sides. The reef around is steep towards the north-east, but shoals off gradually for about 3 cables to the northward, where it is marked by a buoy.

A **white column** on the cliff between Ras Kasone and the town is useful as a leading mark to the harbour.

Tanga island, westward of Ras Kasone, is about half a mile in length; its eastern half is clifty, showing bare red cliffs, 30 feet high in places, but the western portion is low, with mangroves; these also extend off the north and east points.

There is a quarantine station and flagstaff on its north side, and a coal store on its south side.

The **observation spot** on Tanga island is in lat. $5^{\circ} 3' 40''$ S., long. $39^{\circ} 6' 53''$ E.

Ras Chongoliani, the north point of the bay, has detached patches of reef extending 8 cables to the southward, narrowing the entrance of the bay.

LIGHT.—From a square white tower, 85 feet in height, erected on the north-east extreme of Ulenge island, is exhibited, at an elevation of 85 feet above high water, a *group flashing white light every ten seconds*, and visible from a distance of 15 miles in clear weather. It shows a flash of $1\frac{1}{4}$ seconds, eclipse $1\frac{1}{4}$ seconds; flash $1\frac{1}{4}$ seconds, eclipse $6\frac{1}{4}$ seconds.

ENTRANCES.—**Ship channel.**—The main entrance from seaward is between Niule and Nyama reefs. This opening is about $1\frac{1}{2}$ miles wide, but the portion known as Ship channel is about 7 cables wide, with depths over 10 fathoms at low water. The channel between Niule and Yamba has a least depth of 3 fathoms in the fairway, and is a shorter route for light draughts when coming from the southward.

Buoyage.—Red buoys mark the starboard hand and black buoys the port hand on entering. Parti-coloured buoys are fairway or middle ground buoys.

The outer buoy of Ship channel is a red spar buoy, with white topmark A, and marked *A, Tanga* in white letters; it lies on the south side of the bank, with 2 to 3 fathoms, situated with the 10-foot sand cay on Fungu Nyama bearing N. $\frac{2}{3}$ E., distant $2\frac{2}{10}$ miles.

A black conical buoy, marked *1, Tanga* in white letters, marks the north-east extreme of the 5-fathoms edge of Niule reef.

A red spar buoy, with white topmark B, and marked B, *Tg.* in white letters, lies close southward of the 3-fathoms patch southward of Ulenge reef.

On the south end of Dixon bank is a spar buoy, painted with black and white stripes, with a black drum as topmark, and *Dixon Tg.* in white letters.

A black conical buoy, marked *2, Tg.* in white letters, marks the south-west extreme of the bank off Ras Kasone.

A red spar buoy, with topmark C, and *C, Tg.* in white letters, marks the extreme of the shallow water extending eastward of Tanga island.

In the Southern channel, in the fairway over the bar connecting Niule and Yambe island reefs, is a red and black spar buoy with St. Andrew's cross topmark, and marked T. A, with the clump on the north end of Yambe bearing N.W., distant $1\frac{3}{10}$ miles.

A black conical buoy, marked *1, Y.* in white, lies with the rocky islet off the north end of Yambe bearing S.S.W. $\frac{1}{2}$ W., distant $3\frac{1}{2}$ cables.

Directions.—To enter Tanga bay from the southward, by Ship channel, keep the rocky islet (10 feet high) off the south extreme of Yambe island bearing southward of S.W. $\frac{1}{2}$ W., until Ulenge island lighthouse bears N.N.W. $\frac{1}{2}$ W., when it may be steered for, passing about 3 cables eastward of Niule reef, between the red and black buoys. When the north cliff of Tanga island bears W. $\frac{1}{2}$ N., open of Ras Kasone (if the weather be clear, the northern of three peaks in the front Usambara range, will be on this line of bearing, *see* sketch on plan), steer for it between Ulenge and Dixon bank buoys, until the entrance of Mgambo river is in line with the saddle between the southern summits of Amboni hills, bearing N.W. $\frac{3}{4}$ W. Then steer for the river on that mark until the north-west cliff of Tanga island bears W. by S. $\frac{1}{4}$ S.; when alter course to West until the white pillar on the cliffs eastward of the town bears S.S.W. $\frac{1}{2}$ W., which

being steered for will lead between the black buoy off Ras Kasone and the red buoy off Tanga island, to the anchorage.

Light draught vessels from the southward can enter by the southern channel, between Yambe island and the Niule reef, passing on either side of the red and black fairway buoy; thence eastward of the buoy northward of Yambe island and westward of Dixon bank buoy; when Tanga island opens proceed as for Ship channel.

Shelter may be obtained in either monsoon under the lee of the outer reefs, should it be desirable not to enter Tanga bay.

Anchorage.—There is a good anchorage anywhere abreast Tanga island, but it will be much cooler to anchor as far out as possible, as the plateau in the rear of Ras Kasone shuts off the wind in either monsoon, if a vessel is too far in.

A good berth is in 7 fathoms, mud, with the north extreme of the mangroves off Ras Kasone bearing E. $\frac{1}{2}$ N., and the extreme of the mangroves off the north-east point of Tanga island N.W.

Tides.—It is high water, full and change, in Tanga bay at 4h. 0m.; springs rise 12 feet, neaps 7 feet.

Winds and weather.—See Meteorological table, p. 598.

TANGA is the principal town in the northern portion of German East Africa. It is the point of departure for all caravans to the interior as far northward as the Victoria Nyanza. The town is situated on a plateau about 50 feet above the sea on the southern shore of the harbour, within Ras Kasone, half concealed in mango trees and cocoa-nut groves. The shores of the bay elsewhere are mangrove swamps.

The river Zigi, known as the Mgambo at its mouth, discharges into Tanga bay; it is only navigable for a few miles, where it is obstructed by rapids; its entrance has about 3 feet at low water.

Above Amboni the river is free from mangroves, and passes between limestone hills, and the scenery becomes pretty.

Population.—Trade.—Tanga has a native population of from 3,000 to 4,000 inhabitants; there are also from 60 to 70 Europeans, and about half that number of Arabs and Hindis. The District official resides here, and there is a small garrison; there is also a Custom house, telegraph and post offices, and a mission station.

Most of the trade of the district passes through Tanga. The exports consist of cocoa-nuts, copra, corn, rice, maize and sesame; the imports, of staffs and necessary articles.

Railway. — Communication. — A railway from Tanga to Korogwe in the interior is under construction.

The first section, from Tanga, to Pongwe on the Pangani river, about 8 miles, was opened in 1894; it was expected to be open to Ngomeni, 15 miles, by the end of that year.

The main line steamers of the Deutsche Ost Afrika Company call at Tanga every three weeks on their way southward to Dar-es Salaam, &c.; also on returning. The branch steamer of that company leaves Tanga on the arrival of that steamer for the coast ports as far southward as Mikindani.

Supplies.—There is no better place on this part of the coast of Africa for supplies than Tanga. Meat is very good, and fish, vegetables, and fruit are abundant. There are many wells in the town and vicinity, but the water from the former should be avoided, as it is nearly certain to be impregnated with sewage. The greater part of the cattle, sheep, and goats imported into Zanzibar is from Tanga.

Coal.—There is a small coal store and a quarantine station on Tanga island.

KWALE BAY is another sheltered anchorage, situated northward of Ulenge island, Tanga bay. The entrance between the reefs fringing Ulenge and Kwale island is about 5 cables wide, reduced to 3 cables by the shallow water extending beyond the reefs; the depth is about 15 fathoms in the entrance, with anchorage in 5 to 12 fathoms within. The bay, fringed by mangroves, is shallow for about one mile from its head, with a boat channel northward, within Kwale island, leading to Mansa bay, but the shores of the bay are all mangrove, and bordered by shallow water. There are several villages in the bay, but nothing to attract a vessel under ordinary circumstances. Kwale village lies abreast Kwale island.

Kwale or **Mnasini island** is about $2\frac{1}{4}$ miles in length, triangular in shape, mostly composed of mangrove, and uninhabited. Its seaward side is steep-to, except off its north and south extremes, off which reefs, with shallow water beyond, extend from 2 to 3 cables; on the other sides, shallow water extends a considerable distance.

MANSA BAY, situated about 6 miles northward of Tanga bay, within Kwale island and Boma peninsula, is nearly one mile wide between the entrance points, Ras Mnasini and Ras Mavemavli; this is reduced to 4 cables between the reefs fronting them, with depths of 6 to 7 fathoms. Within, it is $2\frac{1}{2}$ miles in length by $1\frac{1}{2}$ miles in width, with depths of 6 to 10 fathoms over a considerable portion of it. Depths of less than 3 fathoms extend from a half to three-quarters of a mile off its south and west shores, and to about 3 cables off its eastern shore.

Villages.—Supplies.—The villages of Kwale, Dodo, Weiro, and Kitshalikani are situated on the west shore, which is low, with cocoa-nut trees in places, and fronted by a reef. Mansa, the principal village, is on the northern arm, as mentioned below. It has from 800 to 1,000 inhabitants, with about 12 Indian traders. At high water the largest dhows can reach Mansa, and the place has considerable trade with Tanga and Zanzibar in millet, copra, and caoutchouc.

Small supplies of cattle, sheep, and fish are obtainable; fruit occasionally in small quantities.

The water in the district is obtained from holes or wells, and is bad; the only stream of fresh water is the Msembasi, which rises in the Ambonia hills and discharges into Kwale bay.

Creeks.—Pani Mkumbi, a mangrove lined estuary, lies northward of Kitshalikani village. In the northern part of the bay is the Mto Mansa, a mangrove lined estuary extending about 5 miles northward of Ras Mkumbi, and parallel to the coast; it terminates at Mansa village, about one mile only from Kijirini village on the creek of that name, which discharges into Moa bay.

Directions.—The best approach to Mansa bay from the southward is by Tanga Ship channel, southward of Fungu Nyama, until northward of the first black buoy; thence course may be altered to pass about one mile eastward of Ulenge lighthouse and of Kwale island until abreast the entrance, when a mid-channel course may be taken into the harbour.

The channel northward of Fungu Nyama between it and the south end of Mwamba Wamba is apparently available. The bar connecting these reefs has a least charted depth of 4 fathoms, the best water being towards Fungu Nyama, where the depth is from 6 to 9 fathoms; it has not been closely sounded, so that less water may exist.

Patches of about 5 fathoms are situated about one mile northward of Fungu Nyama; and Kwale bank, consisting of two banks with depths of $3\frac{1}{4}$ to $4\frac{3}{4}$ fathoms, almost midway between Kwale island and Mwamba Wamba and near the fairway of the approach, must be given a berth.

The best approach from the northward is to enter from seaward by the wide and deep channel between Mwamba Kitugamue and Pungutiayu island, with Kilulu hill in line with Ras Kunkunganda W. $\frac{7}{8}$ N.; thence south-westward at about 2 miles off shore and avoiding Boma reef, until abreast the entrance.

Boma reef, dry at low water, lies nearly three-quarters of a mile off shore, and 3 miles northward of Mansa bay.

OFF-LYING REEFS.—Mwamba Wamba, the reef next northward of Fungu Nyama, is $3\frac{1}{2}$ miles in length, by a quarter of a mile in breadth; it dries at low water springs, and there is a sand cay towards its northern end which dries about 8 feet; it is fairly steep-to all round, and is situated about 5 miles off the entrance to Mansa bay. The passage southward of it has been mentioned on preceding page; that northward, between it and Mwamba Shundo, is about half a mile wide, with apparently a depth of $6\frac{1}{2}$ to 7 fathoms, but it has not been closely sounded.

Mwamba Shundo is $2\frac{1}{2}$ miles in length, and one mile in breadth at its northern end, at which it dries about 4 feet at low water springs; it is fairly steep-to, and lies about $4\frac{1}{2}$ miles off shore.

Foul ground, about one mile in extent, with patches of $1\frac{1}{4}$ to 3 fathoms in places, lies from a half to $1\frac{1}{2}$ miles north-eastward of Mwamba Shundo.

Mwamba Kitugamue, about one mile in length, and dry at low water springs, lies about 6 miles north-eastward of Mwamba Shundo; its northern extreme lies with Ras Kilifi, entrance to Moa bay, bearing W. $\frac{2}{3}$ N., distant about 8 miles. Its eastern side is steep-to, but there is a patch of $3\frac{3}{4}$ fathoms off its north-west extreme. A bank, $2\frac{1}{2}$ miles in length, within a depth of 10 fathoms, extends south-westward of Kitugamue, with patches of $2\frac{3}{4}$ and $3\frac{3}{4}$ fathoms as charted. Isolated patches of 7 and 10 fathoms are charted at one and $2\frac{1}{2}$ miles, respectively, from Mwamba Kitugamue.

Moa bay, native name, Pani Kibombo, about 10 miles northward of Mansa bay, lies between Ras Kilifi and Ras Kungunganda, over one mile apart, but reefs, dry at low water, extend so far from these points, and from the shores of the harbour, that a very narrow channel only remains. It is available for small craft only.

Moa.—The town of Moa lies on the west shore of the bay, and has from 500 to 600 inhabitants. Close to the shore is the Custom house, a small two-storied building, the only masonry house in the place; it is conspicuous from seaward. The place lies very low and is unhealthy for Europeans. Goats, sheep, fowls, and a little fruit are obtainable; the water is bad.

There is good anchorage for dhows off the town; in landing, there are many stumps of mangrove trees under water, and fronting the shore, to be guarded against.

Buoys.—A black buoy with square topmark, in $3\frac{1}{2}$ fathoms, marks the extreme of the shallow water off Ras Kilifi. A red buoy with topmark A, in 4 fathoms, marks the edge of the shallow water extending south-westward of Ras Kobueni.

Directions.—Kilulu hill, in line with the north point of entrance to Moa bay, leads in from seaward at about $1\frac{1}{2}$ miles northward of Mwamba Kitagamue, in depths of not less than 10 fathoms, to the entrance to Moa bay; thence the course is northward of Ras Kilifi buoy and southward of the red buoy, to the anchorage in the harbour; there are depths of 4 or 5 fathoms near the red buoy, and less depths farther in.

Outer anchorage.—**Fungu Kivani**, with a least depth of one fathom, lies three-quarters of a mile off Ras Kilifi, the south point of Moa bay. There is anchorage in about 15 fathoms between it and Ras Kilifi.

MOA BAY to CHALE POINT.—**General remarks.**—From Moa bay north-eastward to Chale island the land is low and well wooded, from which an occasional clump of trees and the islands lying off the coast stand up more prominently than the generality. The shore is alternately sand beaches and low rocky cliffs, with mangrove frontages, and a fringing reef. Between Moa bay and Wasin island a bay is formed, with isolated reefs; in its

centre is the island of Sii, and in its north-west part the Umba and Vanga rivers; this portion is more cultivated than that northward towards Chale.

From Wasin island to Chale point there are reefs from one to 3 miles off shore, near the edge of the 100-fathoms line, similar to those southward; the edge of the reef is shown by rippings in calm weather and a confused sea during strong winds.

Landmarks.—This strip of coast is by no means thickly populated; Vanga, Wasin, and Funzi being the only places of any size. It is drained by several small rivers navigable by the smaller class of dhows for a mile or so; and the background is marked by the following mountains and hills, forming the first land made in clear weather, viz.:—Kilulu, of 918 feet, situated 5 miles inland from Ras Kilifi, a rounded hill at the northern end of a coast range of half that elevation; Jombo, 1,573 feet, and Mrima, 1,052 feet, isolated conical mountains 15 and 12 miles respectively north-west of Wasin, with the conical hill Kiruki, 622 feet, about 2 miles eastward of the latter. Jombo is very sharp, whilst Mrima is more truncated.

Tides and current.—The current is very slightly felt inside the reefs and along the shore, but sufficient to make the ebb stream that sets to the eastward through the Wasin channel run between $1\frac{1}{2}$ and $2\frac{1}{2}$ knots during springs, whilst the returning flood either neutralises or slightly overcomes it.

It is high water, full and change, in the Wasin channel at 4h. 0m. Springs rise 12 feet and neaps 8 feet.

Winds and Weather.—In the three months, June, July, August, 1888, the weather off this coast was as follows:—

	Winds.				Bar.		Ther.	
	S.W.	S.	S.E.	Calm or variable.	in.	in.	°	°
June (days)	28	2	0	0	30·08 to	30·40	70·5 to	80·5
July „	15	6	5	5	30·15 „	30·32	72 „	80
August „	22	2	2	7	30·11 „	30·32	70·5 „	79·2

In June the rain fell on 16 days, and decreased as the season advanced; it fell generally between the hours of 6 and 11 a.m. See also Mombosa weather table, p. 599.

Coast.—Kirui island.—Between Moa bay and the mouth of the Yimbo river lies Kirui island, $5\frac{1}{2}$ miles in length, the sea coast of

See chart, No. 1,390; also No. 664.

which is low and rocky, with half a dozen sandy spots. The fringing reef extends off about three-quarters of a mile near its centre and at the mouth of the Yimbo. There is a canoe passage within it, as mentioned below.

Yimbo river is the southern of a series of mangrove-lined water-ways, and is 200 yards wide at the entrance. It is barred at low water by a reef and sandbank, with from one to 2 fathoms within. This so-called river is merely the channel by which the Uмба discharges. Westward of the mouth of that river it gradually decreases in width and depth, and leading around Kirui island southward to Moa bay; it is available by canoes at about high water.

The village of Yimbo, situated in a grove of cocoa-nuts on the northern bank, a third of a mile from the mouth, is partially stockaded, and consists of 60 huts and about 200 inhabitants. It is poorly supplied with water and provisions, but fish is plentiful.

Uмба river joins the Yimbo from the north-westward at one mile from the sea. It is the only actual river in this neighbourhood, its water being fresh at half a mile above its junction with the Yimbo. At 2 miles from the coast it runs between high banks 15 yards apart, and through a well-cultivated country; though deep during the rainy it is very low during the dry season, and does not appear navigable at any time. The tide is said to reach to Yasini, about 2 miles above Yimbo, where the river is 20 yards across, but at low water it is dry down to its mouth.

Boundary.—The mouth of the Uмба is the boundary on the coast between British East Africa on the north and German East Africa Territory on the south.

Vanga creek and town.—Hori Vanga, or Vanga creek, at $1\frac{1}{2}$ miles northward of the Yimbo, is much smaller and similarly barred. Amongst cocoa-nuts near the entrance, on the south bank, are the ruins of the old town of Vanga, the present town being on the same bank and one-third of a mile further up. Abreast the town the creek is 100 yards wide at high water, at which time its windings can be followed for $3\frac{1}{2}$ miles, where it is lost in the swamps; at this distance there was a depth of 12 feet at high water, but landing was impossible.

The town, walled and stockaded, consisted, up to 1895, of a small and miserable fort, two or three mosques, and about 1,500 inhabitants. It was burnt by the rebel Arab chief Mabruk, and was quite deserted, but since the rebellion has been suppressed the town is being rebuilt. A punitive expedition, consisting of 150 Indian troops, 40 naval detachment, 50 Askaris, and 650 porters, were disembarked here in February 1896, and re-embarked at Gaze bay 16 days later. It has a mangrove swamp at its back, and must be very unhealthy.

Supplies.—The usual supplies of bullocks, goats, fowls, &c., are probably now attainable as before the destruction of the town. There are several wells, but in the dry season the people have to send to the Umba river, some two miles, for their water, where also are their provision grounds and a large rice cultivation, much of the latter being exported to Zanzibar. Farther back are several small villages of the Udigo tribe, the names of which are given on the chart.

Directions and anchorage.—*See* p. 486.

Juma, Allene, and Pongwe rivers.—In the bay north and eastward of Hori Vanga and Sii island, are the rivers Juma, Allene, and Pongwe, with collections of huts here and there, and near the Allene a fairly large cultivation of corn. The chart shows a depth of 3 feet on the bar of the Juma, with one fathom within it. The Pongwe apparently has no bar, and depths of not less than 2 fathoms are shown as far as Kiwe, $1\frac{1}{2}$ miles above the entrance. Hippopotami are to be met in these rivers, and fish are plentiful.

Sii island, situated on the north side of the approach to Wasin from the south-westward, is uninhabited and thickly wooded with mangrove trees that rise in its centre to a height of 95 feet; it is one mile in length, half a mile in breadth, and stands on a long coral reef in the middle of and connected with the north shore of the bay.

WASIN ISLAND.—Trending parallel with and about one mile southward of the mangrove coast westward of Ras Wasin, is the coral island of that name, the principal one hereabouts. The island is 3 miles in length, east and west, and one mile in breadth, the trees on it giving an elevation of 70 to 90 feet. *See* town, &c., p. 485.

Reef.—The reef fringing Wasin island, of no great extent on the north and east sides, extends off three-quarters of a mile to the

southward, and 3 miles to the west-south-westward. The south-western portion of the reef is named Cha, and furnishes a large collection of cowries. The Howard rocks lie off its north-west side within the depth of 3 fathoms.

WASIN CHANNEL is about half a mile wide, between the island and the coast northward, has depths of $5\frac{1}{2}$ to 7 fathoms throughout, with better water in its entrances; a patch of $3\frac{3}{4}$ fathoms lies in the fairway at nearly one mile N.W. $\frac{1}{2}$ W. from Ras Mundini, the north-west extreme of Wasin island.

At half a mile westward of Ras Wasin, and close to the shore, is Shungilunzi islet, 30 feet high; $1\frac{1}{2}$ miles west of the islet is a sand cay on the edge of the shore reef. The reef fringes the shore on either side from one to 2 cables in places.

ISLETS and reefs in the approaches.—Ship shoals.—In the eastern approach to Wasin channel are the Ship shoals, with a least depth of 3 fathoms on the northern head, from which the north-east extreme of Wasin island bears W. $\frac{1}{2}$ N., distant $2\frac{3}{4}$ miles.

Stork patch, with a depth of one fathom, lies with the same point bearing W.S.W. about 3 cables.

Mwamba Waga lies at about half a mile off shore and one mile southward of Ras Wasin, on the north side of the approach, with a depth of 3 fathoms. The shore between Ras Wasin and Ras Raschid is fronted by a reef to the distance of about 3 cables.

Lockyer patches, with depths of $1\frac{1}{2}$ to 2 fathoms, lie about $1\frac{1}{2}$ miles south-westward of Ship shoals, with the north-east extreme of Wasin N.W. by W. $\frac{1}{4}$ W. about $1\frac{3}{4}$ miles.

Islets.—Three-quarters of a mile southward of the south-east end of Wasin island is a group of wooded islets named Pungutiachi, 55 feet in height; and three-quarters of a mile farther southward the larger island of Pungutiayu, also wooded to the same height. This group is a distinct feature in making the land hereabouts, a less prominent one being the small islet Kisiti to the westward, on which are a few weather-beaten bushes that rise to 12 feet above high water. Strong tide rips are found off these islets, and in any weather there is a heavy swell on.

Westward of Kisiti islet lies Mako Kokwe, which dries 3 feet, and also some patches with less than 3 fathoms on them.

Mwamba Midira, about $1\frac{1}{2}$ miles in extent, is the south-westernmost of the reefs around Wasin, and dries about 4 feet. The ground between it and the island is mostly foul. To the southward these reefs are steep-to in places.

The isolated reefs south-westward of Wasin are :

Mwezi, $1\frac{3}{4}$ miles north-eastward of Moa bay, small and uncovering 2 feet, with a passage about three-quarters of a mile wide inshore of it.

Minyani, two reefs $2\frac{1}{2}$ miles northward from Mwezi, and which show distinctly.

Kipwa Mtu, small, with 2 feet water, situated $1\frac{1}{2}$ miles eastward of Mwezi, with Bunjuu about one mile farther east and uncovering 2 feet at low water springs.

Directions.—Wasin anchorage.—Approaching Wasin channel from the eastward, steer in with Jombo mount bearing about N.W., observing when Ras Raschid comes in sight that the mount open northward of it, bearing N.W. $\frac{2}{3}$ W., leads north-eastward of Ship shoals. When Ras Mundini, the north-east extreme of Wasin, bears W. $\frac{3}{4}$ N., steer about W. by N. for Shungilunzi islet until within a half or three-quarters of a mile of it, when steer in mid-channel to the anchorage, passing well northward of Stork patch.

Anchorage in 7 fathoms with the town flagstaff at Wasin bearing S.W. is recommended, as during the south-west monsoon the swell is felt if anchored farther to the eastward. The reef fringing the shore must be guarded against.

Tides.—*See* page 481.

The town of Wasin, on the north-west side of the island, consists of two mosques, and about 220 huts, with 350 inhabitants. There are three wells on the island, but the water is brackish, nearly all for drinking purposes being brought from wells on the mainland abreast the town ; the provision grounds of the inhabitants are also on the mainland.

A reef fronts the town rendering landing awkward at low water.

Supplies.—Bullocks, sheep and fowls, may be obtained at Wasin, but no fruit or vegetables. Gazelle are to be shot in the neighbourhood. Fish may be had with the seine.

Directions.—Wasin to Vanga.—From abreast Wasin town keep on either side of the channel, to avoid the $3\frac{3}{4}$ fathoms patch in the fairway, until westward of it; then keep in mid-channel between Sii island reef and Howard rocks (the high clump of trees between Ras Keromo and Ras Mgomani bearing N.E., astern, should lead between these dangers); when the east extreme of Sii island bears North, haul to the westward for Vanga anchorage. *See Vanga town, page 482.*

Vanga anchorage.—There is anchorage off Vanga and the Yimbo river, in 6 fathoms, sand and shells, with the mouth of the Yimbo N.W. by W. $\frac{3}{4}$ W., and the west end of Sii island N.E. $\frac{3}{4}$ N.

Vanga and Wasin from south-eastward.—Steer in with Kilulu mount in line with Ras Kungunganda, the north point of entrance to Moa bay, bearing W. $\frac{7}{8}$ N., until the centre of Sii island bears N. $\frac{1}{4}$ W., or Jombo mount is just open westward of it; then steer about N.W. by N., to pass midway between Bunjuu and Midira reefs, allowing for current and tide. When the west end of Sii island bears N. by E., steer about North for the anchorage off Vanga, keeping a look out for Minyani reefs. The reefs bordering the channel will usually be seen towards low water, especially if the sun is in a favourable position.

FUNZI BAY, northward of Wasin, is about $2\frac{1}{2}$ miles wide between Ras Raschid and Ras Kidomini. Its eastern half, known as Mto Vikuarani, is shallow and encumbered with shoals, but there is a dhow channel to Funzi village. The western portion between Ras Raschid, and Mkame reef which dries 3 feet, has depths of about 4 fathoms, sandy bottom; Mdua reefs, which dry 2 feet, extend about about two-thirds of a mile off Ras Raschid. Mamoja river, lined with mangroves, lies at the head of this portion of the bay. It is not a desirable anchorage with Wasin so near. The tidal streams run with considerable strength.

Directions.—Anchorage.—In Funzi bay anchorage will be found by steering in with Kiruki mount open westward of some

casuarina trees on the east side of Mamoja river, N.W. by N.; this leads in mid-channel between Mdua and Mkame reefs, the latter of which usually breaks. Bring up in 4 fathoms, sand, with the two conspicuous fir trees on Pungutiachi just open of Ras Raschid.

Ras Kanda, on the north side of approach to Funzi bay, has a prominent clump of trees 126 feet in height, and visible for many miles.

COAST.—From Ras Kanda to Chale island and point, distant $9\frac{1}{2}$ miles, the coast is rocky and reef-fringed, with the long beach of Sambweni midway, and Gaze bay within Chale point at the northern end. Amid the cocoa-nuts on this portion of the coast there are several collections of huts.

The **WIMBI REEFS**, the last sign of the barrier reef southward of Mombasa, are four isolated patches, with depths of less than 6 feet, and shallow ground seaward of the three northernmost; the passages between these reefs should not be taken, but within them is a good channel along the land with an entrance of about a mile wide, southward of Chale reef, with depths of 6 fathoms in the fairway.

Chale island and Gaze bay.—**Anchorage.**—Chale island, with its tree tops at an elevation of 60 feet, is a prominent feature hereabouts: the reef on which it stands stretches $2\frac{1}{4}$ miles southward of Chale point and dries 4 feet in places, with several heads of 3 and 4 fathoms beyond it.

A patch of 3 fathoms is reported by H.M.S. *Barrosa* in 1895, as lying about 3 cables W. $\frac{1}{2}$ S. of the south extreme of Chale reef.

Between the south end of this reef and the mainland is good anchorage in about 5 fathoms, mud, with Chale island east extreme about N.E. and the southernmost clump of casuarina trees on the shore W. $\frac{1}{2}$ S. To enter, steer in with Jombo mount well open northward of the southernmost clump of casuarina trees on the coast, bearing N. 70° W.; when the east extreme of Chale island bears N.E. $\frac{1}{2}$ N., steer N. $\frac{1}{2}$ E. until the anchorage marks just given come on.

Light draughts wishing to anchor within Chale reef, nearer Gaze, should send a boat ahead. The eastern peak of Chale plateau, bearing N. 7° E. (and in line with the west extreme of some high clumps of trees southward of Gaze) is said to lead in, until the

point on the coast (near the letter *g* in the word undulating on chart 1,390) bears W. by N.; thence steer N. 18° E. and anchor when the large tree bears N. 55° W. and Chale point N. 63° E., in about 3 $\frac{3}{4}$ fathoms.

Town.—Gaze bay, northward of this position, is shallow, the 3 fathoms line being 1 $\frac{1}{2}$ miles from its head.

Gaze is now garrisoned by the British Protectorate troops (Askaris) under an English officer who is also the governor. There are about 100 native houses, built in regular rows, and one large and conspicuous white house. Landing is effected at low water, partly by wading, at the centre beach of the three, situated 1 $\frac{1}{4}$ miles southward of the town, whence there is a path to the town. At high water boats can land at the town. A supply of fish is obtainable, but nothing else.

Within Wimbi reefs.—**Directions.**—A vessel of light draught, coming from the northward desiring to avoid the current, is recommended to take the passage south of Chale island reef, which brings her along the coast inside Wimbi reefs. To enter, when nearly 3 miles southward of Chale island, steer in with the summit of Jombo bearing N. 70° W., well open to the northward of the southernmost clump of casuarina trees on the foreshore, or for the clump itself bearing about W. by N., until the clump on Ras Kanda bears S.W. $\frac{3}{4}$ S., when steer for it until the south end of Sambweni beach is abeam; then alter course more to the southward to clear Sambweni reef.

From abreast Ras Kanda steer to pass about a mile off Ras Wasin thence into Wasin channel, page 485.

COAST.*—Reef.—From Chale point the coast, generally low, trends north-eastward nearly straight to Mombasa; it is wooded with overhanging cliffy coral points and sand beaches. For about 12 miles northward of Chale point it is fronted by a reef, extending from half to three-quarters of a mile from the shore, with a narrow passage for boats within it. From thence to Black Cliff point the reef fringes the shore at the distance of a quarter to half a mile.

Black Cliff point, 16 $\frac{1}{2}$ miles northward of Chala point, projects slightly, but is rendered conspicuous by its black cliffs and clump of pandanas, 108 feet in height, over them.

* See chart, No 664.

From Black Cliff point to Ras Muaka Singe entrance to Mombasa, the reef gradually extends from the shore, being one mile off at the latter point, where it is known as Andromache reef (page 490). There is a blind passage for boats inside the reef from the northward, to within one mile of Black Cliff point.

There are apparently no dangers outside the line of coast reef, which is steep-to, and may generally be seen by its breakers.

Current.—Caution.—The current sets frequently in towards the land northward of Chale point. In January 1890, off Black Cliff point, it was found on one occasion setting W.N.W. at the rate of $1\frac{1}{2}$ knots an hour. The usual current runs north-eastward, from $\frac{3}{4}$ to $1\frac{1}{4}$ knots in the north-east monsoon period, and from $2\frac{1}{2}$ to $3\frac{1}{2}$ knots during the south-west monsoon.

Vessels, in the daytime, proceeding southward during the south-west monsoon period will avoid the strength of the current by keeping within half a mile of the edge of the reef, but a good lookout from aloft must be kept.

MOMBASA APPROACH.—Aspect.—Shimba mountains are situated about 10 miles from the coast, extending from 7 miles northward of Chale point for a distance of 15 miles, the highest point being 1,406 feet in height. On the southern shoulder of the range is a conspicuous tree, which is not visible, however, when bearing northward of West. On the northern shoulder of the Shimba range is a single tree, a little northward of which is Mombasa gap, between it and a separate flat range to the northward, 990 feet high.

There is a dip in the centre of the northern flat range, with a cluster of trees in it.

Mombasa gap is seen open when bearing northward of West, and is a conspicuous mark for making Mombasa. Between Shimba range and the coast is a range of hills about 400 feet high. On this range, 12 miles north of Chale point, and at an elevation of 368 feet, is a conspicuous clump of trees; and $1\frac{3}{4}$ miles farther northward, another clump somewhat similar in appearance, but not so conspicuous, though somewhat higher.

At $3\frac{1}{2}$ miles north-westward of Black Cliff point, on the same range, is a double bushy clump of trees 453 feet high; half a mile farther northward, on a separate summit, 446 feet high, is a cluster of palms.

Coroa Mombasa.—The hummocks of Mombasa or Coroa Mombasa, are three low but remarkable hillocks situated 5 miles northward of the port of Mombasa, the centre, which has an elevation of about 330 feet, being the highest; from the north-eastward they appear close together. They form one of the best landmarks for making Mombasa island from the offing.

On a nearer approach.—The hospital at Mombasa (white), built on the high ground above Ras Mitani, has been seen at a distance of 16 miles, and the fort with its flagstaff form capital landmarks.

Nearing the land, the sandy beach south of the port indicates the position of Ras Muaka Singe; and on Ras Serani are the leading marks, black and white horizontally-striped pillars 15 feet in height. Close eastward of the outer pillar is an old battery and a ruined keep.

PORT MOMBASA.—Port Mombasa, on the east side of Mombasa island, affords anchorage for all classes of vessels in depths of from 6 to 18 or 20 fathoms, and the depth in the fairway of the approach is not less than $5\frac{1}{2}$ fathoms at low water springs. The harbour is more than a mile in length, but only about 2 cables in width between the shore reefs on either side, so that for a large vessel, or a number of vessels, port Kilindini, and port Reitz within it, on the west side of the island, are preferable. Kilindini is chiefly used by H.M. vessels.

Port Tudor, page 495, lies within port Mombasa.

Reefs in the approach.—Off Ras Muaka Singe, Andromache reef extends for 4 cables; and patches of $2\frac{1}{2}$ to 3 fathoms, for 5 cables beyond with deep water between; there is generally a heave of the sea over them. A patch of $1\frac{1}{2}$ fathoms is charted, 9 cables E. $\frac{1}{4}$ N. from the point, but four days' searching at low water did not reveal it to H.M.S. *Stork*. Half a mile southward of these are several patches with $3\frac{3}{4}$ to 4 fathoms, rocky bottom.

Eastward of the fairway mark there is not less than 5 fathoms within a cable of it.

On the eastern side of the approach, the Leven reefs extend about $1\frac{1}{8}$ miles south-eastward of Ras Kunwongbe, a bluff 70 feet in height; the sea breaks heavily on their edges at times; the eastern edge is fairly steep-to, but the southern or channel side slopes gradually.

The shore reef extends about 7 cables S.E. by S. from Mackenzie point, on the east side of the entrance, and dries at low water. A patch, with less than 6 feet, lies S. by W. $\frac{1}{4}$ W., distant 4 cables from George rock, which is 12 feet high, and situated close to the shore. There are similar patches about 4 cables from the rock between the bearings of W.S.W. and West from it, and also about one cable off Mackenzie point, bordering the fairway.

The plan will afford better information on the shore reef within than any written description.

There is a boat channel within the Leven reefs.

The outer anchorage has from 8 to 10 fathoms, sand and coral, with Ras Iwa Tine just open of Ras Kunwongbe bearing N.E., and the outer leading mark pillar N.W. by W. $\frac{1}{2}$ W. It is very indifferent, there being always a heave which, during the south-west monsoon, is considerable.

Beacons.—On Ras Serani are two pillars, painted black and white in horizontal stripes, and about 15 feet in height; these in line mark the fairway from seaward. On Ras Kiberamini, northward of the town, is a similar pillar 15 feet high.

Directions.—Strangers should enter Mombasa on the ebb and large vessels at high water, or the first of the ebb.

A vessel from the southward should skirt the Andromache reef at about a mile or more, and then make towards the outer edge of the Leven reef until the pillars on Ras Serani are in line bearing N. 51° W., when she may proceed in on that bearing. These pillars are not easily made out in the afternoon without the aid of a glass; the whitewashed battery on the point just eastward of them best denotes their positions.

If from the northward, skirt the Leven reefs at the distance of half a mile or more, until the fort flagstaff bears N.W. $\frac{1}{2}$ N., when it may be steered for until the leading pillars are made out.

The tidal streams meet off Ras Serani, requiring at springs the greatest attention to the steering, especially if going in during the strength of the ebb, when the race will take the vessel first on one bow and then on the other.

When Ras Kunwongbe bears N.E., the vessel will be near the turn of the channel, and should alter course in good time. The mark in is

the flagstaff* at the Mission station at Kisaoni in line with the pillar on Kiberamini, bearing N. 6° W., which mark leads in the fairway of the entrance (only one cable wide between the 5-fathom lines at low water), and up towards the anchorage.

When nearing Ras Mitani a vessel should borrow to the eastward of the mark as the channel then becomes wider, and to avoid the reef projecting there, and also higher up off the town on to which there is a decided set on the flood, and at times a small tidal race. Anchor as directed if there is a berth, but if necessary to go farther on, a vessel should endeavour to anchor below the rock which dries 11 feet on the western flats, off which the depths are from 16 to 18 fathoms.

Anchorage.—There is good anchorage off the town in 7 fathoms, sand and shells, just to the westward of the leading mark, and with Ras Kidomoni N.E.; also in 10 to 12 fathoms in the pool off the Kisaoni Mission station, but in either place vessels are recommended to moor. The holding ground is good but the tidal streams are strong; and when the sea breeze sets in strong, vessels swing broadside on between wind and tide, which occasionally brings a heavy jerk on the cable.

Tides.—It is high water, full and change, at 4h.; springs rise 11 feet, neaps 8½ feet. The ebb and flood are about equal, and run at the rate of about 2½ to 3 knots at springs.

MOMBASA ISLAND (native name Kisiwa Mvita) separates port Mombasa from port Kilindini and port Reitz. It is 3 miles in length, north and south, by 2 miles in breadth, having a level surface 40 to 60 feet in height, and a steep shore all round. In most places there is deep water close to the shore, except on the north and north-west sides; at the latter is a ford to the mainland, passable at low-water springs. The railway from Kilindini, west side of Mombasa, crosses to the main over a pile bridge at the ford.

The town of Mombasa (native name Mvita), situated on the eastern coast of Mombasa island, is the most important town on the coast, being the head-quarters of trade and of British East Africa.

One of the most interesting features of the town is the old fort built by the Portuguese in 1594, and restored in 1635.

Besides the fort, the two or three mosques form the most prominent objects in the town, but on approaching the port, attention is

* This flagstaff, or a mark in lieu, has two white cones some feet apart on it (sketch in Remark Book of Lieut. E. Kiddle, H.M.S. *Swallow*, 1893). See plan, No. 666.

attracted by the fine new hospital for Europeans which has been erected on the ridge over Ras Mitani.

The town was formerly nothing but a cluster of Arab huts, but since the British East Africa Company first commenced its operations, commodious offices and residences have been built, the streets have been widened and improved, and sanitary measures are strictly enforced.

The house of the Administrator is situated at Ras Kilindini, on the west side of the island. *See* also p. 497.

The **observation spot** on Ras Kidomoni, opposite Mombasa town, is in lat. $4^{\circ} 3' 21''$ S. ; long. $39^{\circ} 41' 15''$ E.

The **population** is estimated at from 15,000 to 20,000 and chiefly consists of Swahilis, but it also comprises a number of natives from the mainland, a few Arabs, and also natives from India ; in the hands of the latter is the bulk of the wealth and trade of the place.

Trade.—It does a large trade with Zanzibar on one hand, and Bombay on the other ; the large dhows from the latter trading according to the monsoons, and bringing over rice, gampti (shirting), kaniki, ironware, and coloured cloths of various kinds.

The improvements constantly being made in the road to the Victoria Nyanza and to Uganda, and the establishment of new stations on the route (railway in progress) are gradually developing the movement of trade to this northern route from that hitherto conducted through German territory.

The imports consist of white and grey shirtings, coloured handkerchiefs and scarves, printed cambrics, broadcloths, iron, brass, and copper wire, beads of different kinds, knives, ironware, arms, ammunition, kerosine oil, sheeting, soap, salt fish and coffee.

The exports are ivory, india-rubber, gum-copal, hides, rhinoceros horns, hippopotamus teeth, copra, orchilla weed, tortoiseshell, Indian corn, grain, cattle and goats. Borites (mangrove logs) used for beams for native houses, are largely exported.

The **climate**, although hotter than Zanzibar, is drier and less enervating, and with improved sanitation and increased cultivation of the soil around it, Mombasa will, it is expected, be one of the healthiest places in the tropics. There is a considerable greater range of temperature here, and also at Wasin and Kilifi, than at Zanzibar, and thus these places are far more healthy in comparison. *See* winds, p. 495.

Supplies.—The supply of food is drawn chiefly from the mainland, which is covered with flourishing gardens and plantations. Here are grown most kinds of fruit, vegetables and cereals in abundance; sesame, millet, maize and rice are largely cultivated, palms and mangoes flourish, as well as oranges, limes, pine-apples and guavas. Cattle, poultry, and fresh bread can also be obtained. Water is scarce and mostly of indifferent quality at and around Mombasa.

Coal.—Messrs. Smith Mackenzie had in 1897 about 800 tons of coal stacked near the canteen at Kilindini, west side of Mombasa island; no great quantity could be put on board in a day with the present facilities. There are five 100-ton barges and three smaller ones at Mombasa.

Hospital.—There is a hospital for Europeans over Ras Mitani.

Repairs.—When the railway workshops are completed at Kilindini, it is expected that castings of about 2 cwt. and forgings of 6 inch diameter may be undertaken.

Landing.—Mooring buoys.—A landing pier of iron, 26 yards in length, with a steam crane, has been constructed abreast the Custom house at about half a cable northward of the south-eastern Mosque.

On the opposite side of the harbour, at Ras Kidomoni, is a stone wharf with a steam crane for loading and discharging cargo from vessels visiting the port. The offices and workshops of the public works department are also situated on this point. There is a steam launch and a few iron lighters for assisting in the discharge of cargo. Moorings have been laid down in the harbour for the convenience of shipping.

Telegraph.—Railway.—Mombasa is connected with Zanzibar by submarine cable; thence to other parts of the world. The cable is landed in port Kilindini, west side of Mombasa island, p. 497. There is a land line to Malindi and Lamu; it crosses Mombasa harbour between Ras Kiberamini and Ras Kisaoni.

The railway from Mombasa to Uganda is in course of construction. The terminus is near the house of the Administrator, on the west side of the island; the railway crosses to the mainland by a pile bridge near the ford, at the eastern part of the narrows which separates the island from the main. About 30 miles had been completed in 1896 (*see also* p. 14). An air telephone crosses the western part of the narrows.

A good road has been constructed from Mombasa to Kilwesi 200 miles inland.

Mails.—The British India Company's vessels from Bombay *via* Aden call monthly at Mombasa *en route* to Zanzibar, also on the return journey. The Deutsche Ost Afrika line from Bombay *via* Lamu call every 4 weeks *en route* to Tanga and Dar es Salaam, also on the return journey.

The winds experienced at Mombasa and at Kilifi for the last four months of 1888 were as follows :—

	S.W.	S.	S.E.	E.	N.E.	N.	N.W.	Calm or variable.
September ...	2	6	13	2	—	—	—	7
October	3	6	16	—	—	—	—	6
November ...	3	4	14	1	3	3	2	—
December ...	—	—	7	4	10	—	4	6

From the foregoing it will be seen that south-easterly breezes are very prevalent in these months, with a tendency to haul to the eastward and north-eastward in December. The wind set in daily about 10 a.m., and lasted fresh till sundown, when it hauled to the northward, and moderated to a light land wind during the night and early morning ; it was generally steadiest between 6 and 8 a.m., which is therefore a suitable time for going out under sail. The southerly monsoon blew right in the entrance. The day breezes of either monsoon lead in. See Table of Pressure, Temperature and Rain, p. 599.

Mission stations.—Above Mombasa and on the opposite side of the harbour is Kisaoni or Freretown, the head-quarters of the Church Missionary Society, a group of buildings pleasantly situated amongst grooves of coco palms and mangroves. Eight miles north-west is the Rabai mission, on the wooded Rabai hills at Kisolutina, 3 miles back from the creek at the head of Mombasa harbour and 750 feet above the sea. The small Mission station of Jomvu is situated at the landing for Rabai, 9 miles by the creek from Mombasa ; this route is the favourite way to the interior.

PORT TUDOR.—From the head of port Mombasa a narrow and winding but deep channel communicates with port Tudor, a land-locked harbour on the north side of the island. There are few more beautiful places than this winding channel with its steep wooded banks ; but the two points on the eastern side of the passage Ras Kisaoni and Junda are fringed with reef or foul ground to the distance of half a cable ; Kwamwana Ina, the north extreme of Mombasa island, is foul to the distance of $1\frac{1}{2}$ cables.

The air telegraph line crosses the entrance at Ras Kisaoni, so that only vessels with short masts, apparently, can pass up.

The anchorage is in 7 fathoms, mud, in its eastern part, with Ras Makame Jiwe, just open of Ras Junda, and the points of Makupa channel to the south-west (a boat channel leading to port Reitz) just beginning to open. The remainder of the harbour is spoiled by the extensive flats that limit the anchorage ground. There are several channels through these flats, that to the north leading to the Jumvu river, which at high water may be ascended for several miles and towards the head of which is the large Mission Settlement of Rabai.

KILINDINI AND PORT REITZ.—Kilindini, which means “in the deeps” is the name given to the fine sheltered harbour about 3 miles in length, situated on the south-west side of Mombasa island; it is available for all classes of vessels. Within it and to the west of the island is port Reitz, an equally good anchorage, with depths of 7 to 14 fathoms in its eastern part, over one mile in length; its western part, like port Tudor, is composed of flats and shallow water except in the small channel to the Doruma river.

H.M. vessels use these harbours, and here are the telegraph and railway stations, referred to on page 494.

Admiralty property.—A considerable area between port Kilindini and Mtongwa has been purchased for Naval purposes.

The entrance is about $1\frac{1}{2}$ cables wide between the reefs on either side, increasing to 7 cables in the port; but the latter portion is encroached upon by Buchanan rock, awash at low water, and the Kilindini reefs, about 2 cables in extent, which dry at low water springs. The port sweeps gradually round from a south-west to a north-west direction, the banks on either side being high, part bush and tree covered and part cultivated, with a shallow inlet on either side, Mbaraki to the north and Mueza to the south.

Directions.—Beacons.—The fairway of the entrance is marked by two pillars 12 feet high, on the south bank, within Ras Muaka Singe.

Steer in from seaward with the leading mark pillars on Ras Serani in line, N. 51° W. as for Mombasa, page 491, until the above mentioned pillars are in line, bearing S. 66° W., which being steered for will lead through the fairway of the entrance.

When abreast of Ras Muaka Singe, Ras Bofu will be seen to open of Ras Mbuyuni, the point on the north side within Mzimili; then alter course towards it and keep mid-channel until the beacon on the rock, 6 feet high, opposite Ras Kilindini is seen, when steer

for it on a N. 42° W. bearing,* which leads northward of Buchanan and Kilindini reefs. When Shamanzi the north-western point of Mombasa island is well open of Ras Kilindini, alter course to the northward, keeping in mid-channel until abreast Ras Kilindini, thence rather towards Mombasa island if bound into port Reitz.

Anchorage.—There is good anchorage in port Kilindini in 12 fathoms, mud, off Mbaraki creek, or farther in if desirable; the tidal streams are strong here. There is good anchorage in port Reitz, with considerably less tidal stream, in 12 to 15 fathoms, mud, with Ras Kigangone S.E. by E. 4 cables distant; and in other places, for which *see* the plan.

Eleven British men of war anchored in port Reitz in February 1890.

Tides.—It is high water, full and change, in port Kilindini, at 4 hrs., springs rise 12 feet, neaps 8 feet. The flood stream runs from 3 to 4 knots at springs and 2½ knots at neaps; the ebb, 3 knots and 1½ knots respectively.

In port Reitz, the flood and ebb streams run about 1½ knots at springs, and one knot at neaps.

Piers.—It is contemplated to build a pier with a cross head, 300 feet in length and a depth of 25 feet alongside at low water springs, in direct continuation of the railway line at Kilindini. There is a wooden pier, and also a temporary pier dry at low water.

Telegraph cable.—The submarine cable is landed at the old telegraph house and white stone pillar, 4½ cables south-eastward of Ras Kilindini; the new telegraph house, with flagstaff, lies about a cable southward of it. A black spherical buoy, in 5½ fathoms, marks the bend of the cable off the stone pillar; a red spherical buoy in 9½ fathoms marks the cable off Luatoni bay. The cable ship is moored off Luatoni bay but out of the fairway. *See* telegraph, railway, and supplies, on p. 494.

The residence of the administrator of Mombasa, with flagstaff, is situated within Ras Kilindini, as stated on p. 493.

COAST.—From Mombasa to Kilifi the coast trends north-eastward with sand beaches and overhanging cliffy coral points, and is thickly wooded as far as Malindi. It is fronted by a reef extending from half to three-quarters of a mile from the shore, to a distance of 12 miles

* Another beacon has been placed on the shore, on the same line of bearing, but it is too close to the other to be of much use as a leading mark. H.M.S. *Racoon*, 1891.

See plan of port Mombasa, &c., No. 666.

north of Matapwa river, with a passage for canoes within. That portion between Mombasa and Matapwa is known as the Leven reefs, before mentioned. From 12 miles north of Matapwa to point Senawe, the coast is steep-to, with overhanging coral cliffs about 15 feet high. On the top of this cliff, and 15 miles north of Matapwa, is a conspicuous white sand patch.*

There appears to be no off-lying dangers until the reefs off Kilifi are reached. The coast reef is steep-to and nearly always breaks.

Current.—The current at about 10 miles off shore runs north-eastward at the rate of 2 to 4 knots in the south-west monsoon period, and from one to 2 knots in the north-east monsoon, but is less in shore near the reef.

Matapwa river.—There is a passage through the reef abreast Matapwa river, and a least depth of $3\frac{1}{2}$ fathoms can be carried into the river in which there is deep water, but the channel is rather intricate. Vessels of 11 feet draught entered the river in January 1896. The boats of H.M.S. *Swallow* ascended the river about 6 miles at the above date.

The land telegraph wire crosses the river at the ferry, about 2 miles up.

Rabai range, about 8 miles from the coast, has five distinct summits, Jibana, the northern, 1,087 feet, being the highest. Near the southern summit is the Mission station, page 495. Between Rabai range and the coast the country is undulating and wooded. The Coroa Mombasa, seaward of the Rabai, is described on page 490.

Senawe range.—North of the Rabai range, and separated from it by a low hill, is the Senawe range, the southern peak of which, the Chogni, is 1,152 feet high, and rendered conspicuous by a group of palms on its summit. Between it and Kauna, a hill 978 feet in height, is Kilifi gap.

Coast range.—About four miles northward of Matapwa, a coast range commences which is 400 to 500 feet high, with thickly wooded country between it and the coast. At the south end are two peaks, the southern, 509 feet high, has a clump of trees on its summit; farther northward along the range is another peak with a clump of trees.

Takaungu river.*—Between Blowing point and the Takaungu river one mile northward of it, the coast is cliffy, and some 40 to 50 feet high, with a bright sandy beach 2 cables in length, just south of the entrance to the river. The latter is half a cable wide and runs at high water between rocky bluffs, but at low water the bed is confined to a narrow channel at the side of the northern bluff, all the rest of the bed uncovering. At low water springs the *Stork's* steam cutter entered with difficulty—the bottom being rocky with several coral heads.

It is navigable by dhows at near high water, but the tidal streams are strong, and there is considerable bubble and disturbance between the entrance and the town. After winding some $1\frac{1}{2}$ miles inland it is lost in the mangrove swamps. See Takaungu pass, p. 501.

Takaungu, a walled town, is situated in a grove of cocoa-nut palms on the south bank half a mile from the entrance, and has a varying population of 1,500 to 2,000. It has several mosques and some 300 to 400 houses and huts, with numerous wells, and is a thriving place. The surrounding country is well cultivated, there being a number of farms in the neighbourhood, whence grain is raised and exported.

Trade.—Supplies.—Meat is obtainable here, and fowls, eggs, and vegetables are abundant. There are several Indian traders here. There is a ferry across the river to the main coast road that leads to the northward.

Mbogolo hill, 250 feet high, rises out of the plain, some 2 miles south-west of Takaungu town, and is quoin-shaped, with the fall to the northward.

KILIFI APPROACH.—Coast.—Between Takaungu river and Kilifi river the coast is rock-bound and reef-fringed, the cliffs being from 40 to 60 feet high, with two sandy beaches in its southern part.

Leading marks.—Ras Kitoka, 57 feet in height, forms the southern side of the mouth of Kilifi river, the northern side being an abrupt rise to the same height and then a continued but gradual rise at the back, on which is situated the village of Kioni. In front of the eastern huts of the village is a stone pillar 15 feet in height and 70 feet above high water; this pillar in line with the trunk

of a whitewashed cotton tree below, whose top and limbs have been lopped off, leads up between the reefs from the roadstead to the mouth of the river. The leading mark pillar, 14 feet high, for the channel between the reefs in the approach, stands on the cliffs, 44 feet in height, at about one mile southward of Ras Kitoka. A whitewashed pole, surmounted by a triangle, lies about 300 yards W. by N. of it.

KILIFI RIVER* has not less than 6 fathoms at low water in the channels from seaward between the reefs, but it is not recommended for vessels above moderate draught, as the river channel, between the bordering reefs, is not above one cable in width with a depth above 5 fathoms. The river between its entrance points and Ras Nkoma has depths of 15 to 20 fathoms; above the latter it expands into Bandaria ya Wali, a basin about $1\frac{1}{2}$ miles in extent, of which the western portion is shallow.

The entrance lies between cliffs 70 to 100 feet high, with fringing reefs of slight extent everywhere, excepting the spit that extends one cable northward from Ras Kitoka, and another from the north side near the custom house.

Reefs in the approach.—The off-lying reefs named South, Middle, and North, extend about one mile from the shore; they are nowhere dry, but a few heads are occasionally visible at low water springs on the Middle reef. In the north-east monsoon they are not nearly so prominent as during the south-west monsoon, when they always break, and at times to such an extent during and after heavy weather, that no signs are visible of the channels between them.

North reef fronts the coast for some distance northward of the river entrance; its south extreme lies $1\frac{1}{2}$ miles S.E. $\frac{1}{2}$ E. of Ras Kitoka, and forms the north side of North pass. A similar horn within it extends nearly a mile southward of the east point of the river, forming the eastern side of the fairway.

Reef passages.—There are three passages between the reefs, namely: the Dhow passage between Blowing point and the Southern reef, used by dhows and light-draught vessels with local knowledge only.

Takaungu pass, about $1\frac{1}{2}$ cables wide between the Southern and Middle reefs, with a depth of 15 fathoms until within the reefs, where the depth is from 6 to 7 fathoms.

* See plan of Kilifi river, No. 238.

The Northern pass, between Middle and North reefs, has a depth of 7 fathoms, but is only a cable in breadth between the 5 fathom lines; it is the most direct for Kilifi river.

Tides.—It is high water, full and change, in Kilifi river, at 4h.; springs rise 12 feet, neaps 8 feet. The streams in the river run from $\frac{3}{4}$ to $1\frac{1}{2}$ knots, and obliquely across the entrance.

DIRECTIONS.—Caution.—In entering or leaving the passes, care must be taken of the tidal streams, which set directly across them, the flood to the northward and the ebb to the southward.

Takaungu pass is the channel usually taken by vessels wishing to anchor off Takaungu river; it is not so direct for Kilifi as the Northern pass, though it is wider and possibly better. To enter by it, steer in with the summit of Mbogolo or Quoin hill, in line with the bluff on the south side of Takaungu river W. by S. $\frac{1}{2}$ S. (view A), until the pillar near Kioni bears N. by W. $\frac{1}{2}$ W., or well open westward of the whitewashed tree below it; then anchor as convenient in about 6 fathoms, sand, off Takaungu river.

Or, to proceed for Kilifi river, steer for the pillar at Kioni on the above bearing, until Pinnacle point bears S.W., when edge to the eastward to bring Kioni pillar in line with the whitewashed tree in front of it, bearing N. by W. $\frac{4}{8}$ W., which mark will lead in between the reefs on either side.

Attention must be paid to the set of the tidal streams in entering the river; the flood sets northerly across the reefs until well up to the river mouth, and the ebb straight out across the reefs.

When nearly abreast the reef extending southward from Kioni, the pillar should be open to the westward of the tree, and when within 4 cables of Ras Kitoka a little open to the eastward of the tree, to give a wider berth to the reefs. When Ras Nkoma comes in line with the point eastward of it on the northern bank, haul into the river, in mid-channel; Ras Nkoma open of the point on the northern side, leads southward of the reef off the Custom-house point under Kioni. Anchor off Mnarani, or in Banderia ya Wali, as convenient.

Northern pass.—To enter by the Northern pass, steer in with the pillar on the cliff one mile southward of Ras Kitoka bearing

W. by N. (*see* view B), in line with the whitewashed pole with triangle within it, until within half a mile of the coast, when edge to northward to bring the leading marks at Kioni in line, then proceed as from Takaungu pass.

If not intending to enter the river, anchor in about 9 fathoms on the above bearing of the Northern pass leading pillar. There is always a ground swell in this anchorage.

Villages.—**Mnarani**, the principal village, is on the table land on the southern side of the river. It has a scattered population of 300 people, mostly engaged in agriculture, from whom small supplies of fowls and vegetables and an occasional bullock can be obtained. The old town of Kilifi, the ruins of whose mosques are still visible, was situated to the westward of it. Kilifi village, with about 70 inhabitants, lies just within Ras Kitoka, from whence is a ferry-boat to Kioni, abreast.

Telegraph.—The air line, between Mombasa and Lamu, *via* Malindi, crosses Kilifi harbour close westward of Mnarani village.

Anchorage.—There is good anchorage in the river, for craft that can pass under the telegraph wires, in 12 fathoms, mud, with the Custom house point E. by S., and the western cliff of the valley under Mnarani S. $\frac{1}{2}$ W. The wire is somewhat more than 80 feet above high water near the northern shore. H.M.S. *Blanche*, mast-head 80 feet high, passed under it at high water. The least height from the water is 68 feet at high water springs. Vessels with higher masts must anchor in the middle of the channel, in 15 to 20 fathoms below the wire, and where the anchorage probably is equally good.

Banderia ya Wali is $1\frac{1}{2}$ miles across with good anchorage in 9 fathoms, mud, in its eastern part, with Ras Nkoma S.E. and Ras ya Wali S.W. The foreshores are reef and mangrove lined, and rise gradually on all sides. The northern and western sides of this fine basin are completely choked with reefs and mud flats. In its north-western part is the populous village of Kibokoni on the northern bank of the mouth of the Mtanganyiko or Konjoro, a narrow river, with one foot water in its entrance, and from one to 12 feet within. This river bifurcates some 2 miles up, and leads to the grain-growing centres of the same names, Konjoro to the northward one mile, and Mtanganyiko the same distance to the west.

COAST.—Aspect.*—From Kilifi river northward to the Owyombo river the coast is similar to that southward, consisting of sand beaches and overhanging coral cliffs, and fringed with a reef extending to a distance of half to three-quarters of a mile. The coast is lined with thick scrub and bushes from 15 to 20 feet high. Northward of the village of Wasa there are red sand cliffs.

Just south of the Owyombo river, is a conspicuous sand hill, 25 feet high, and at the mouth of the river on the south bank is a hummock 131 feet high, steep on its southern side, but sloping on its northern.

Between Kilifi and Owyombo, and about 5 miles from the coast, there is a range of hills 600 to 800 feet high, but flat and without any well defined summit. Dongo Kundu, 815 feet high, is near its southern extreme.

Mangea mountain is 1,776 feet in height, and situated about 17 miles inland; it has a fairly well defined summit, the sides sloping gradually; standing alone it makes a good landmark, should the weather be clear enough for it to be seen.

Owyombo river.—In the centre of the entrance to the Owyombo there is an island 45 feet high. On the northern bank of the river entrance there are patches of red sand cliff.

The river is of no practical use for navigation, except for canoes. Dhows, however, anchor inside the island at the entrance.

From the Owyombo the coast trends east-north-eastward to Malindi point, fronted by a coral reef, which, towards the point, extends about one mile off.

Islets.—Landmarks.—Three miles northward of the Owyombo are six islets, 50 to 100 feet high, and close to the shore; these are backed by a sand beach, which gives them the appearance of cliffy points. The village of Watamu lies abreast them. Off these islets the bottom is rocky and uneven for a distance of one mile.

Just south of Malindi point are two long sand beaches, which are conspicuous by the double black coral points which separate them.

MALINDI APPROACHES.†—Malindi point is a cliffy, coral, rounded point, 20 feet high, but is rendered noticeable by Sail rock, 21 feet high, just off it.

* See chart, No. 664.

† See plan of port of Malindi and approaches, No. 667.

Malindi reef extends $1\frac{1}{2}$ miles off Malindi point; it dries about 3 feet in places and generally breaks. There is a passage within the reef, used by small dhows.

From Malindi point to Leopard point the coast is cliffy, wooded, and 15 to 20 feet high. There is a rock 12 feet high on the coast reef at half a mile south of Leopard point.

Leopard point is a white sandy point, with a conspicuous clump of casuarina trees within it. Between Leopard point and Vasco da Gama's pillar there is a long stretch of sand beach, fronted by a reef, which dries in places, extending half to three-quarters of a mile from the shore.

Quoin hill, a wooded hill about 200 feet high, and 8 miles west-north-west from Leopard point, shows conspicuously from the eastward.

Vasco da Gama's pillar is near the extremity of the cliffy point, situated close southward of Malindi town. The pillar is $18\frac{1}{2}$ feet high, having a cross with the arms of Portugal on the top (very much weatherworn), 25 feet above high water mark.

North reef lies from half to one mile off Leopard point, and affords some shelter from northerly winds to Malindi road. It has a sand cay on it which dries 10 feet.

Pillar reef fronts the coast between Malindi road and Malindi town to the distance of half a mile. Off Vasco da Gama's pillar the water is shallow to the distance of 7 cables; the sea nearly always breaks on its edges.

Leopard reef, which protects Malindi road to the eastward, is a reef nearly 2 miles in length, by $1\frac{1}{2}$ miles in breadth, within a depth of 3 fathoms, and dry in places at low water; its outer edge being $2\frac{1}{2}$ miles from the shore. On the inner edge of the portion which dries is a sand cay awash at high water spring tides.

Malindi bank is the continuation southward of Leopard reef for $2\frac{1}{2}$ miles, within the depth of 5 fathoms.

It is steep-to on its outer edge, gradually deepening to the southward. There are apparently no shallower heads, and the bottom of sand and coral can be easily seen up to a depth of 8 fathoms. There are heavy tide-rips and overfalls at its edge.

Griffon patches.—Shallow water in patches extends from a position one mile eastward of the sand cay on Leopard reef for a distance of nearly 3 miles to the northward, with depths of 3 to 5 fathoms coral, known as the Griffon patches. Single Tree hill, in line with the guardhouse on the north bank of the Sabaki river, N.N.W. $\frac{2}{3}$ W., leads northward of these patches.

MALINDI ROAD is the anchorage between Malindi and Leopard points, with depths of from 4 to 7 fathoms. It is protected from northerly and easterly winds by North and Leopard reefs, respectively.

A coral patch, awash at low water springs, lies on the east side of Malindi road, 4 cables southward of North reef, with Leopard point bearing N.W. by N. one mile; the reefs surrounding the road have been described.

Directions.—To enter Malindi road from the southward, steer in with the clump of casuarina trees on Leopard point, in line with the summit of Single Tree hill N. $\frac{1}{4}$ W. This will lead in with not less than $3\frac{1}{2}$ fathoms at low water over Malindi bank. When Sail rock shows clear of Malindi point, bearing S.W. $\frac{1}{3}$ W., keep it astern on that bearing, and anchor in $6\frac{1}{2}$ fathoms, sand and coral, when the clump of casuarinas within Leopard point bears N.W. by N.

Stork passage, the northern entrance to Malindi road, between North reef and Leopard reef, is 3 to 4 cables wide, and apparently clear of danger. From the southward, observe the mark for leading northward of Griffon patches, then steer to pass eastward of North reef, which is generally easily seen, and along its edge distant from one to $1\frac{1}{2}$ cables.

Sail rock, just open of Malindi point S.W. $\frac{1}{3}$ W., leads in clear, except of the south-east edge of North reef; thence anchor as before.

MALINDI, situated 3 miles northward of Malindi road, derives its chief title to notice from the first voyage of Vasco da Gama, who reached as far north as this place on his way to India in 1498.

The town is now under the control of an Imperial official, who collects the customs and administers the government. His residence, a two-storied whitewashed house, faces the sea, a flag being generally

hoisted on a flagstaff on the roof. There are now several other fair-sized houses. Trade is increasing.

Supplies.—Trade.—The town possesses a good supply of water from deep wells, and provisions are abundant. About 54 inches of rain falls during the year, and in the wet season the aspect of the country is most luxuriant. Sesame is the largest and most valuable product, and is exported to Aden and Maskat.

Telegraph.—Malindi is connected with Mombasa by a land line of telegraph. The mail communication will be *via* that place, page 495.

Landing.—There is no landing pier. At low water it is necessary to wade or be carried on shore from the boat. At high water, if it is smooth, landing may be effected by a gangway board.

Observation spot.—Malindi flagstaff, the observation spot of H.M.S. *Stork*, is in lat. $3^{\circ} 13' 0''$ S., long. $40^{\circ} 7' 41''$ E.

Patch.—A patch, with one fathom least water, on its north end, lies N. by E. $1\frac{1}{2}$ miles from Vasco da Gama's pillar; it breaks occasionally, but not unless there is a good deal of swell.

Tides.—It is high water, full and change, at Malindi at 4h. 5m., springs rise $12\frac{1}{2}$ feet, neaps 9 feet.

Directions.—Anchorage.—Approaching from the southward, Mangea mountain forms a good landmark for making the coast about Malindi. On a nearer approach the sand hill north of Sabaki river, the white house at Mambrui, the white two-storied house of the British official at Malindi, with Vasco da Gama's pillar to the southward of it, will be seen.

A pole with barrel has been erected on the ruin northward of the town, and the whole whitewashed; the conspicuous bluff has also been whitewashed, 1893. These may prove useful in fixing the position of a vessel.

A good berth having been given to Leopard reef, a vessel will be northward of Griffon patches when the pillar bears westward of W. by N., when course may be shaped to pass one mile northward of the pillar; the flagstaff may be steered for between the bearings of S.W. by W. and S.W.

Anchorage in about 5 fathoms, sand and coral, will be found with the flagstaff S.W. by S., and the conspicuous bluff N.N.W. $\frac{1}{2}$ W.

The anchorage is protected to the southward by Pillar reef, and affords shelter during the south-west monsoon period. The depths decrease gradually, but it is not recommended to go into less than 5 fathoms on account of the swell.

Approaching from northward, after passing Ras Ngomeni, the hills over Mambrui will be seen; then the conspicuous white sand hill north of the Sabaki river. The flagstaff bearing westward of S.W. $\frac{1}{2}$ S. leads eastward of the one-fathom patch; when anchor as before recommended.

Supplies.—Supplies of beef, vegetables, fish, fowls and eggs, can be obtained at reasonable prices. There is a market near the centre of the town. There are wells of great depth and of ancient construction, but after a dry season water is scarce.

Current.—In the months of November and December off Malindi, outside the reefs and within the 100-fathom line, a nearly constant current setting to the southward was found, running at a rate of three-quarters of a knot an hour. Outside the 100-fathom line, the current sets northward from one knot an hour in the north-east monsoon to 3 knots an hour in the south-west monsoon period.

COAST.—Between Malindi and the Sabaki river there is a long stretch of sand beach, backed by a range of sand hills about 50 feet in height.

Sabaki river is shallow, and only available for canoes. At low water the mouth, fronted by a rocky ledge, dries.

Mambrui point.—Northward of the Sabaki river the land rises to a coast range, forming Mambrui point. Near the south end of the range is a conspicuous white sand hill, 145 feet high, which shows out well from seaward.

A reef which usually breaks extends nearly a mile off the point.

Mambrui is situated on the north side of Mambrui point and 6 miles north of Malindi. There is a conspicuous house and tree near the centre of the town.

Coast.*—From Mambrui to Ras Ngomeni peninsula the coast is sandy with low sand hills and bushes; the fringing reef extends from one to $1\frac{1}{2}$ miles in places. The country is flat between the coast and Single Tree hill.

Anchorage.—Southward of Ras Ngomeni, and within an isolated reef, good anchorage will be found in 5 to 6 fathoms, sand. The entrance between the reefs is 2 cables wide.

Directions.—To enter, steer in with the summit of the peninsula of Ras Ngomeni, 160 feet in height, bearing N. by W. $\frac{1}{2}$ W. until the east extreme of the point bears N.E. by E. $\frac{1}{2}$ E., then haul up on that bearing and anchor as convenient. H.M.S. *Stork* anchored there in smooth water when there was considerable swell outside.

Single Tree hill, a round topped hill 569 feet high, with trees on its summit, situated 7 miles within Mambrui, is conspicuous from the southward.

* See chart, No. 848.

CHAPTER XI.

FORMOSA BAY TO RAS ASÍR (GUARDAFUI)

(From lat. 3° S. to lat. 11° 30' N.)

VARIATION IN 1897.

Formosa bay	...	8° 0' W.	|	Warsheik	...	...	5° 0' W.
Kisimayu bay	...	6° 10' W.	|	Ras Asír	...	...	2° 15' W.

FORMOSA BAY*.—General remarks.—Formosa bay lies between Ras Ngomeni and Ras Shaka. The dangers to navigation in the bay are the Mwamba Zeboma or Pamamba shoals in the southern and the Mwamba Zewoyu or Ozi reefs in the northern part, with a bank of $4\frac{1}{4}$ to 5 fathoms between. The rivers Kalifi, Tana, and Ozi enter the sea in Formosa bay, and there are several creeks in the southern part. The country immediately behind the coast is flat and covered with mkoma palm woods and prickly acacia jungle, with large open spaces apparently under water when the rivers are in flood. Between Ngomeni and Kipini the coast tract is uninhabited during the greater part of the year. Fresh water may be obtained by digging close to the coast almost anywhere.

Ras Ngomeni is cliffy, 15 feet in height, and the extreme of a peninsula about 4 miles in length; a hill, 69 feet in height, lies close within the point, and the summit of the peninsula, 2 miles to the westward, is 160 feet high, with two conspicuous white sand slopes on the northern face.

Aspect.—Westward of Ras Ngomeni the rocky coast gives place to sand beach; in the bight here formed the Mto Rasini discharges. The beach continues northward for 15 miles to the mouth of Kalifi river, the low sandy shore being covered with mangroves and casuarinas, and backed by creeks and swamps.

* See chart, No. 848, and plans on No. 1,747.

Northward of the Kalifi river mouth the coast consists of sandhills, and inclines gradually to the eastward past the mouths of the Tana and Ozi ; thence to Ras Shaka, the eastern extreme of the bay, the coast consists of low red cliffs and sandy beaches, backed by ridges thickly covered with mkoma palms.

Landmarks.—Single Tree hill, within Ras Ngomeni, can generally be made out, and on a clear day a distant table land without feature may be distinguished stretching away inland, but the only objects on the coast which will be sighted between Ngomeni and Shaka are the high mangrove clumps within Ras Kitua, the hills near the mouth of the Tana, and the hills within Ras Shaka.

Marereni, off which there is indifferent anchorage during the north-east monsoon, under the lee of the largest of the Zeboma reefs, is a stockaded post of the Administration, situated on the coast 8 miles to the northward of Ras Ngomeni.

Game is said to be plentiful in the immediate neighbourhood, which is yearly frequented for a few months by a number of people who collect marereni weed in the forest, hence the name.

The Telegraph line between Lamu and Malindi passes near Marereni.

Mwamba Zeboma or Pamamba shoals, off Marereni, are several patches which break heavily and uncover at low water ; the outermost lies about 5 miles from the shore, but depths of less than 5 fathoms extend about 8 miles off. The summit of Ngomeni peninsula, bearing to the westward of S. 40° W., leads clear of all danger.

Kalifi river cannot be approached from the southward on account of the Zeboma shoals ; the conspicuous sandhill, situated $1\frac{1}{4}$ miles to the northward of the mouth, kept on a W. by N. bearing, will lead towards the entrance northward and clear of these dangers. This river is said to flow from Lake Karawa, and is described as a deep stream with a strong current.

Tana river.—The mouth of the Tana is difficult to distinguish. The neighbourhood may be recognized by a range of bushy hills, from 108 to 140 feet high, which lie about 2 miles to the west of it.

A bank with $4\frac{1}{2}$ fathoms least water on it lies about $4\frac{1}{2}$ miles off the coast abreast the mouth of the river, and the discoloured river water during an ebb tide extends to this distance.

A narrow sandy bar crosses the entrance, which should not be attempted by a boat except in the finest weather, and at high water.

Probably during the north-east monsoon, and when the tide suits in the early morning craft drawing 6 feet could enter. The course of the river is nearly parallel with the direction of the coast for about 6 miles from its mouth, the direction is then about north and south for about 4 miles from the coast, to Charra, where there is a Custom house. Here it is joined to the Ozi by the Belaso, a narrow canal about 2 miles in length.

The Tana was ascended by the *Kenia*, $2\frac{1}{2}$ feet draught, a small steamer of the British East Africa Company, as far as Baza, about 300 miles from its mouth, reaching that place on the 27th June 1891. The course of the river is very tortuous, as shewn on the chart.

It has been traced to Mount Kenia, and is described as being a considerable stream up country, but during its course to the sea it disperses over the low land, and at the coast is insignificant.

Cultivation on the Tana commences about one mile south of the canal.

There are no inhabitants on the river near the coast, but parties of woodcutters from Lamu bivouac about the mouth during the fine season. The timber is said to be valuable.

During the rainy season, the surrounding country is inundated for many miles. Fish are abundant, and there are many alligators and hippopotami.

Ozi river.—The bar of the Ozi is passable by small craft during the north-east monsoon under ordinary conditions. The river is deep enough for small dhows to ascend to the mouth of the Belaso canal, connecting with the Tana about 14 miles from Kipini.

Kipini is a miserable collection of huts near a fort on the eastern bank of the Ozi river at its mouth, and is the only place in Formosa bay where there appears to be any probability of future trade. There is a white stone pillar just eastward of the bluff. The fort and village are not conspicuous, but the flagstaff shows above the sky

line. Kipini may be approached without danger during the north-east monsoon. Vessels will anchor according to their draught with the fort bearing about North.*

Kau and Witu.—Ten miles up the river is the town of Kau, with a population of about 500, from whence is the shortest road to Witu. It is stated to be about 16 miles from Kipini by road.

It was at Kipini that the force from Admiral Freemantle's squadron landed in October, 1890, and marched to Witu and destroyed it.

The country around Witu is very flat, cultivated in parts, especially with cotton plantations; it is bounded on the north by forests and swamps. The town is situated on a slight ridge in the midst of a flat, cultivated valley, but surrounded by dense forest. Population, about 3,000, consisting of Swahilis, mixed with some Gallas and Somalis. A small garrison is maintained at Witu. The headquarters of the Witu administration is at Lamu.

Communication.—Witu is connected with Lamu by telephone.

Ras Shaka, the north-eastern extreme of Formosa bay, is a low rocky point with a ridge behind covered with palms and jungle, which conceal the ruins of the once thriving town of Komana. It is surrounded by a fringing reef, dry at low water, with islets and sunken dangers fronting it to the distance of about 3 miles.

Mwamba Zewoyu, or Ozi reefs, are the south-westernmost of these dangers, and in thick weather or at night should be given a wide berth. They consist of two lines of rocks nearly parallel to one another and connected towards their northern ends by a flat. The outer line covers at high water spring tides and at that time is difficult to distinguish. The inner line is a succession of rocky islets, the highest being 14 feet above the level of high water springs. To the south-westward of the highest lie several heads which cover and uncover, the most distant being $1\frac{1}{2}$ miles off. Between the rocks and Kipini are some shallow patches named Lockyer shoal. Mwamba Mazarui, north-eastward of the Zewoyu, dries at low water and is usually marked by breakers.

Kipini flagstaff, the hill over Ras Shaka, and the rock 14 feet high, should afford sufficient marks for rounding these dangers in safety. Kipini or the mouth of the Ozi bearing North, leads westward of all danger.

* See chart, No. 848, and plan of Ozi anchorage, on No. 1,747.

Anchorage with good shelter from the sea may be found on the western side of Mwamba Zewoyu about $1\frac{1}{2}$ miles off the highest rock, in from 4 to 5 fathoms. It should be approached with the right extreme of the land 3 miles to the northward of Ras Shaka bearing N. 55° E.

COAST.—Aspect.—Four miles to the northward of Ras Shaka is a conspicuous sandhill, 180 feet high, with a white sand patch on the sea face.

At 11 miles northward of Ras Shaka is the sandy peninsula of Ras Tenewiati. Within this coastline are sandhills varying from 50 to 185 feet in height. The conspicuous hill, 174 feet high, 3 miles westward of Ras Tenewiati and the hills of Dongo Kondu, at the entrance to Lamu bay, are good marks. Tenewi and Kanyika islets are generally conspicuous, showing black against the land.

The coast between Ras Shaka and Kanyika islet is fronted by sunken dangers to the distance of about $2\frac{1}{2}$ miles and should be given a wide berth.

To the northward are the hills on Lamu and Manda, all good landmarks.

TENEWI is a line of rocky islets, from 5 to 40 feet high, on a reef off Ras Tenewiati, and distant $1\frac{1}{2}$ miles from the end of that point. They form good landmarks, and there are no dangers seaward of them.

The space between the islets and point is blocked by reefs.

Anchorage.—Good anchorage during the north-east monsoon will be found on the south-western side of the reef, entering from the southward, with the conspicuous hill (174 feet) bearing N. 50° W. which will lead 5 cables southward of Tenewi reef. When Kanyika is seen open to the westward of Tenewi haul up to N.E. and anchor under the lee, in about 6 fathoms.

Kanyika is a rocky islet 26 feet high, northward of Tenewi and $2\frac{1}{4}$ miles off the coast. Shallow water extends south-westward for about $2\frac{3}{4}$ miles.

LAMU BAY is 6 miles across between Dongo Kundu and Ras Kitao the south-west point of Manda island, but is partially obstructed by sandbanks, with from $1\frac{1}{2}$ to 4 fathoms water. In the

See plan of Lamu, Manda, and Patta bays, No. 668, and plan, No. 1,747.

south-west monsoon a swell sets in, but during the other season there is good shelter in 5 fathoms, west of the bar, and a vessel is nearer for communicating with the town than in Manda bay. Vessels whose draught will admit crossing the bar will find secure anchorage off Shella village.

Lamu island is about $6\frac{1}{2}$ miles in length ; its south shore is all sand, and forms a gentle sweep inwards, backed by white sand hills partly covered with scrub, ranging from 30 to 250 feet high, the latter height being near the west end, whilst the hills over the village of Shella at the east end reach 175 feet. Within the hills, the island is low, flat, and cultivated with cocoa-nut palms.

Mlango Kipungani separates Lamu island from the mainland, and is described on page 516.

Ras Kitao, the south-west extreme of Manda island, is low, and of rock bordered by shallow water, with bush behind it. **Ras Ukove**, the east extreme of Manda island, is of low rock backed by a hill 105 feet high.

Kitao knolls are coral shoals lying off Ras Kitao ; the outer and south-westernmost patch, with $2\frac{3}{4}$ fathoms water, lies with the west extreme of Ras Kitao bearing N.N.E., distant $3\frac{1}{3}$ miles. At one mile E.N.E. of this danger is Utende rock with $1\frac{1}{2}$ fathoms, on which the sea only breaks in the heaviest weather.

Seymour bank is an uneven bank of sand, with a least known depth of 3 fathoms, which probably varies with the monsoons. Its north-east end is distant $1\frac{3}{4}$ miles from Ras Kitao, and its inner edge about 2 miles from the shore of Lamu island. Within the bank the depths are 6 to 7 fathoms, gradually shoaling to the shore.

Anchorage.—There is sheltered anchorage in the north-east monsoon period, outside the bar, in Lamu bay, in 5 fathoms, sand, as before mentioned, with Shella point N.E. $\frac{3}{4}$ E., and the south extreme of Ras Kitao E. by S.

Directions.—On approaching Lamu from the southward, the white sandhills on Dongo Kundu are conspicuous, but those on Lamu

island are still more so, the whitest hill of all being the easternmost and at the entrance to Lamu harbour. Kanyika islet, when open of the land, is also a good landmark.

To enter the bay, bring the flagstaff on the Shella hills, in line with the pillar on the point bearing N.N.E., and steer for them. This mark will lead in between Kitao knolls and Seymour bank, in not less than 5 fathoms. When the south-east extreme of Manda island bears E. by N. $\frac{1}{2}$ N., then steer N. by W. $\frac{1}{2}$ W. between the bar and Seymour bank, to the anchorage before mentioned.

LAMU HARBOUR, between Lamu and Manda islands, is long, narrow, and, above Shella, encumbered with shoals, but it can be used with due caution by vessels of 20 feet draught, and with a proper system of marks and buoys by vessels of 23 feet draught.

A vessel of 20 feet draught and not more than 300 feet in length could swing at moorings off Lamu, as the channel at low water springs is 300 yards wide. The bottom is mud and sand. Unfortunately there are no natural leading marks, although it would be easy to place artificial ones, if the increase of trade made it worth while for steamers of heavy draught to lie off the town of Lamu.

Bar.—Lamu bar is formed by the reef bordering Ras Kitao and Diamond spit, a shallow bank extending southward from Shella point. The channel is straight but narrow and carries 18 feet at low water springs. A little westward of the leading marks there is not above 15 feet. The bottom on the bar is composed of sand and weed with probably rock underneath on the eastern side. The sea breaks on both sides of the bar with a swell from the southward.

Directions.—Beacons.—An octagonal pillar 18 feet high is situated on the southern extreme of Shella point. Above this on the eastern sandhill 170 feet high, is a mast from which steamers are signalled. These two kept in line bearing N.N.E., lead over the bar, until the battery on the north extreme of Ras Kitao comes in line with Manda peak bearing E. by N.; then steer in N.E. $\frac{1}{4}$ N. for the south-west point of entrance to Mto Hazini. The ebb stream sets strongly towards Diamond spit and the above bearing must be carefully kept on ahead until the pillar bears West, which is the most roomy position if a vessel anchors in mid-channel. Here the depth is 4 fathoms.

If intending to proceed up the harbour, incline towards the Shella side after passing the above bearing of the pillar, and when the fort at Lamu is seen opening of the square building on the point at Shella, steer N.N.E. $\frac{1}{8}$ E. to clear the south point of Mto Hazini by about 2 cables. When Chapel rock, if visible (dries $8\frac{1}{2}$ feet), is in line with the flagstaff on the Shella hills bearing S.W. $\frac{1}{2}$ S., alter course to N.N.W., which should lead a vessel in mid-channel between the banks, and to the anchorage in 4 fathoms, with Lamu fort bearing W. $\frac{1}{2}$ S. and the signal flagstaff at Shella S. $\frac{1}{2}$ W.

The mangrove points must not be trusted for fixing position by, but the Shella flagstaff, Lamu fort flagstaff, a tall conspicuous cocoa-nut tree on the north point of Lamu island, and the two conspicuous white houses of the Administration at the town are useful marks.

Tides.—It is high water, full and change, at Lamu at 4h. 40m., springs rise 11 feet, neaps 7 feet. At the bar it is high water 20 minutes earlier.

The tidal stream is much stronger at Shella (about $2\frac{1}{2}$ knots) than at Lamu and with a northerly wind especially.

Chapel rock is a useful mark for ascertaining the amount to be added to the soundings shown on the plan, as they are reduced to $8\frac{1}{2}$ feet below the top of it. When it is covered there must be at least 26 feet of water on the bar.

Creeks.—**Mlango Kipungani** is the channel which separates Lamu island from the mainland. It is apparently deep enough for boats at low water springs. The southern and western portion and as far as 3 miles eastward of Matadoni was sounded by officers of H.M.S. *Swallow* in 1894, and was found to have general depths of 2 to 3 fathoms at low water; but there is a bar right across with 6 feet water only at about one mile eastward of Matadoni. The flood streams meet off Matadoni. Its entrance from Lamu bay is impeded by a shallow bar on which there is a considerable sea during the south-west monsoon season.

Mlango Nkanumbi has also been partly sounded. The depth is about one fathom at low water for about half-way up to the village of the same name, whence it gradually shoals to one or 2 feet off the village.

LAMU,* the most important town northward of Mombasa, is situated on the east coast of Lamu island at about 3 miles above the

* See plan of Lamu harbour, No. 1,747.

bar, and has a sea front of about 1,400 yards. It stands on a slight eminence, with an old fort with walls about 40 feet high, in about the centre of the southern portion of it.

Lamu is the head-quarters of the administrator of the district (Witu).

Population.—Trade.—The population is about 5,000, including Arabs and Suahelis. There is a considerable trade in rubber, hides, ivory, sim sim, and mat bags.

Supplies.—Bullocks, sheep, poultry and vegetables are abundant, also rice and dates at times. The water is only fit for the boilers or washing purposes and can be brought off in open boats from wells at Shella or Lamu. There is a steam launch and an iron lighter available.

Mails.—Telegraph.—Lamu is connected with Zanzibar, *via* Mombasa, by telegraph, and with Witu by telephone. The steamers of the Deutsche Ost Afrika Co., from Bombay, call here every six weeks *en route* to Mombasa, Tanga, &c.

Winds.—The north-east and south-west monsoons blow regularly along this coast, but close into the land the wind draws in during the daytime, and a land wind prevails at night. In January the wind varies from N.E. to S.E. generally fresh, though at times light, and it is usually somewhat hazy. *See* also p. 25.

Currents.—The northerly current off Lamu is stated to be uncertain in strength, but this applies chiefly to the north-east monsoon period, when the northerly and southerly currents meet somewhere between Lamu and Castle point about 60 miles to the northward. The general northerly set, between Mombasa and Lamu, is from 2 to 4 knots during south-west monsoon and one to 2 knots during north-east monsoon period. There is a strong indraught on the flood to Manda and Patta bays.

MANDA BAY*, at the entrance of a large mangrove-lined creek, that trends many miles inland, is a capacious and sheltered anchorage, available for all classes of vessels and with deep water in its approach.

**See* charts :—Lamu, Manda, and Patta bays, No. 668 ; also No. 669.

It is situated between Manda and Patta islands, and is connected with Lamu harbour by Mlango Mkanda, a passage available for boats at half flood, northward of Manda island. For anchorage and directions, *see* page 521.

The great creeks which extend inland from Manda bay have only been partially explored; they are not fed by any large river, and the navigation of them appears intricate. Siyu channel, on the north side of Patta island, connects Manda and Kwyhu bays.

Manda island, about 6 miles in length, separates Manda bay from Lamu harbour, and is uninhabited, but the size of the stone remains, attest the importance of the old Portuguese town that once flourished on its northern coast.

The island has a few low hills along its sea face, the lower parts of which are also of sand, but of a much yellower hue than the hills of Lamu.

Ras Ukove, the eastern extreme of the island, is a low rocky point, fronted by Mwamba Tawangu to the distance of $1\frac{1}{4}$ miles.

Manda peak, 115 feet high, lies midway between Ras Ukove and Ras Kitao.

Ras Kilindini, the north-east point of Manda island, distant $2\frac{1}{4}$ miles from Ras Ukove, is low and sandy, with some tall casuarina trees along its beach.

Manda Toto is an island composed mainly of mangroves, on the reef extending from the coast between Ras Ukove and Ras Kilindini. The trees on it are about 35 feet high, and fairly conspicuous; the east coast of the island is rocky.

Position.—The north-east point of Manda Toto is in lat. $2^{\circ} 13' 35''$ S., long. $40^{\circ} 59' 40''$ E.

Patta island, forming the east side of Manda bay, is about 50 feet in height, nearly surrounded by mangroves, and with a central plateau of raised coral, principally cultivated with cocoa-nut palms. It is quite featureless, the tops of the trees, forming one uniform line, is all that is visible from seaward. The island has a large population, mostly inhabiting villages on its eastern end, where a considerable amount of ship (dhow) building is carried on. The town of Patta, whose solid remains attest its former importance, is

almost deserted, most probably on account of the creeks by which it is approached becoming entirely blocked up. The only approach to it now is from the eastward at spring tides, or by a swampy walk from the head of a small creek westward of the town.

The town of Siyu, situated near the centre of the island, is said to contain 5,000 inhabitants; it is situated on a winding and intricate creek which leads into Siyu channel, and a boat would have considerable difficulty in finding it without native assistance. Paza, or Faza, about 4 miles farther eastward, is also up a creek leading from Siyu channel.

Siyu channel appears to have a least depth of 3 fathoms from Manda bay to abreast Siyu creek; thence towards Kwyhu bay but little is known of it.

The mangroves off the south-western end of Patta island have increased to an enormous extent since Owen's survey, and the clumps of these trees, then detached from the shore, are now all joined to the main island. Change may therefore be expected about Ras Changoni and the mangrove islands to the north-westward.

Chaka Mzungu, and the islets to the northward of it, are merely clumps of mangroves on Patta island reef.

MANDA ROAD is the space between Presgrave and Vidal banks, and the shoals bordering the entrance to Manda bay. There are two entrances into the road; one to the westward of Vidal bank, the other to the eastward and north of the bank.

Shoals in the approach.—**Presgrave bank** lies on the south-west side of the approach to Manda road, at about 2 miles from Manda island. It is about $2\frac{1}{2}$ miles in length, composed of coral, with general depths of 4 to 6 fathoms, but there are two patches of 3 fathoms.

Mchangamneni is a coral shoal, $1\frac{1}{2}$ miles in length, within Presgrave bank, with depths of $1\frac{1}{2}$ to 4 fathoms.

Neither of these banks show in any way unless close to them.

Vidal bank lies on the east side of the southern approach to the road, and is about $3\frac{1}{2}$ miles in extent. The known depths are from $2\frac{3}{4}$ to 5 fathoms, but as the bottom is very uneven, there may be other shoal patches than those marked on the plans. On Vidal bank the water is always clear, but it does not otherwise show.

Mwamba Hanawi (Patta rock) is a coral reef awash at low water, situated $1\frac{1}{2}$ miles northward of Vidal bank; it is surrounded by a considerable area of shallow water, and the sea generally breaks at all times of tide. The passage to the northward of Mwamba Hanawi between it and the shore reef is useless for navigation.

Mwamba Kwiye stretches 3 miles south-eastward from Ras Chongoni, the south extreme of Patta island; it dries in patches at low-water springs.

Pazarli rocks, about 35 feet high, are several large masses of coral lying on the eastern edge of Mwamba Kwiye; they can generally be distinguished, and the easternmost is the highest.

Iwe-la-Manda is an isolated mass of coral, 25 feet high, on the western or channel side of Mwamba Kwiye, and at times is difficult to distinguish against the background of trees. From Iwe-la-Manda, a chain of flat rocks, which dry at half ebb, extend in the direction of Manda Toto island nearly into the narrows.

Gordon reefs, with about 2 fathoms least water, are of coral and lie between the fairway and Mwamba Kwiye; they do not show.

Clark patch is a knoll with $4\frac{3}{4}$ fathoms water, lying in the entrance channel to Manda bay, with Ras Ukove bearing W. $\frac{1}{2}$ N., distant 2 miles.

The sea breaks on the southern extremity of Tawangu reef, abreast Gordon reefs, but its eastern edge for $1\frac{1}{2}$ miles to the northward is not well defined.

Farther in, the edges of the reefs on both sides are tolerably steep-to, and at low-water fairly defined, but too much confidence must not be placed in this, as the water at times is discoloured.

The point of the sandbank extending northward from Manda Toto island is steep-to, but owing to the bubble of the sea caused by the tidal stream it cannot be seen.

ENTRANCE CHANNELS.—**Muhaji channel**, between Presgrave and Vidal banks, $1\frac{3}{4}$ miles wide, is used by vessels entering Manda road or bay from the southward. A ridge, with 6 fathoms water, connects the two banks.

Barracouta channel, between Vidal bank and Mwamba Hanawi, carries deep water throughout, and is the best passage for vessels coming from the northward.

Anchorage.—The best anchorage in Manda bay is off Kilindini creek, in 6 fathoms water, with the eastern extreme of Manda Toto island S.E. $\frac{1}{2}$ S., and the sandy point at the entrance of the creek S.W. $\frac{1}{2}$ S.

There is good landing at the entrance of Kilindini creek, and the plains of Manda island at certain times of the year abound with partridges, antelope, &c.

Directions.—In approaching Manda road and bay, the white sandhills of Lamu, the lower hills of Manda island, and Pazarli rocks at the entrance to Patta bay, will identify the entrance. *See also* views on plans.

To enter by the Muhaji channel, steer in with the left extreme of Chindikasi islet in line with the right extreme of Manda Toto island, bearing N. by W. $\frac{3}{4}$ W. (*see* view A.), over the ridge, with 6 fathoms at low water, connecting Presgrave and Vidal banks. When the south-westernmost Pazarli islet bears N.N.E., steer for it, (the ridge may also be crossed with this mark, which, in view of the mangrove islets growing out, may possibly be a better mark,) until Mark islet is just open eastward of Chaka Mzungu islet, and seen between the other islets bearing N.N.W. $\frac{1}{3}$ W. (*see* view D. on plan); steer in on this bearing, which will lead eastward of Clark bank, and to the narrows between Manda Toto and Mwamba Kwiyeye. When Iwe-la-Manda bears E. by S. $\frac{1}{2}$ S., steer W. by N. $\frac{1}{2}$ N., and haul towards the anchorage off Kilindini creek when its eastern point bears S.W. $\frac{1}{2}$ S.

Mark islet and the adjacent islets appear from seaward as clumps of trees or mangrove bushes. Mark islet is very small, and its mangroves are extending westward, reducing the gap, and it is only to be distinguished between the bearing given as the leading mark and a position about half a mile eastward of the mark, but when seen is unmistakable.*

To enter by Barracouta channel, bring the signal staff on Shella hills over the lowest part of a dip in the Manda hills bearing W. $\frac{1}{3}$ S. (*see* view C. on plan), and steer in until Mark islet is open, when proceed as before stated.

* Lieutenant H. Keane, H.M.S. *Kingfisher*, 1885. *See* plans of Lamu, Manda, and Patta bays, No. 668; also No. 669.

Caution.—The velocity of the tidal streams at springs in the narrow part of the channel to Manda bay is 4 knots or more, and at neaps is also considerable. The best time to enter is at low water, when most of the reefs are to be distinguished. No stranger should enter the channel on the flood. With adverse winds it is at times unsafe for boats. The time and height of the tide are the same as at Lamu, page 516.

PATTA BAY is separated from the entrance to Manda bay by Mwamba Kwiyeeye, (p. 520), which dries in patches at low water. The bay is about 4 miles in length, north-east and south-west, and fronted by Pazarli ridge, which is dry at low water. The entrance channels are at either end of this ridge.

The shore of this bay is very low, and bordered with flats and shallow water to the distance of one to 2 miles, rendering landing difficult at low water. The depths near the reefs and in the channels to the bay are from 5 to 7 fathoms. The bay is little visited, as the villages on Patta island are more easily reached through Manda bay and Siyu channel.

Patta island is described on page 518.

Kizingati island, situated at the head of the bay, on the flat fronting Patta island, is 2 miles in length east and west. Its southern face presents a remarkable feature, being fronted by a barrier of rocks which is a little separated from the shore.

Patta cliffs are 2 miles eastward of Kizingati island, and Patta Middle cliffs are between the two. These cliffs are similar to the south coast of Kizingati.

Shoals in the approach.—The Pazarli rocks, 35 feet in height, stand on the north-east extreme of Kwiyeeye reef, and form the west point of entrance to Patta bay; they are a good mark for approaching the entrance. See sketches on plan, No. 668.

South Middle bank lies about one mile eastward of Pazarli rocks, on the opposite side of South pass; it is about half a mile in extent, with a least known depth, near its west end, of 3 fathoms.

Pazarli ridge extends about $1\frac{3}{4}$ miles in a north-east and south-west direction; some of the rocks near each end of the ridge uncover

See plans of Lamu, Manda, and Patta bays, No. 668; also No. 669.

at first quarter ebb. From the western portion of Pazarli ridge a flat projects about three-quarters of a mile north-westward, near the extremity of which there is a one-fathom knoll.

North Middle is a $3\frac{1}{2}$ -fathom patch situated about midway in the channel between Pazarli ridge and the south-west end of Siwi bank.

Siwi bank or reef fronts the coast between Patta and Kwyhu bays and extends over a space of about 7 miles, with Sylph channel, a dhow passage, between it and the shore. The northern part of the bank dries at low water, and shallow water extends in places a long mile outside the bank, particularly Siwi spit, its north-east extreme. Sylph rocks, which dry at the last quarter of the ebb, are situated on Siwi bank, abreast and about $2\frac{1}{2}$ miles seaward of Patta cliffs.

Tides.—It is high water, full and change, in Patta bay at 4h. 30m.; springs rise 10 feet.

DIRECTIONS.—As Patta bay has not been re-surveyed, the plans and directions must be used with considerable caution.

North pass.—Coming from the northward, Siwi bank or reef may be approached to a depth of 14 fathoms, keeping Kwyhu peak bearing northward of N.N.E. $\frac{1}{2}$ E. until the western extremity of Patta cliffs bears N.W. or northward of that bearing.

To enter Patta bay by North pass, steer in with the west extreme of Patta cliff bearing N.N.W. $\frac{1}{2}$ W., about midway between North Middle patch and Pazarli ridge; the latter is probably always visible, as it dries at first quarter ebb. When within the ridge, steer for the eastern cliffs of Kizingati island, until Ras Ukove, the eastern sandhill of Manda island, is in line with Pazarli rocks, bearing S.W. by W.; then steer about W.S.W., and anchor as convenient in about 6 fathoms.

South pass.—From the southward, steer for the north-eastern Pazarli rock when bearing N.W. $\frac{1}{2}$ N., until the east extreme of Kizingati island bears N. by W. $\frac{3}{4}$ W.; this mark being steered for should lead midway between the west end of Pazarli ridge and South Middle patch, when anchor as convenient near the line of Ras Ukove hill in line with Pazarli rocks. The channels are apparently more easy of access at low water. There is a channel also westward of South Middle patch.

KWYHU BAY,* situated between Patta and Kwyhu islands, is about 3 miles wide at its entrance, but a great part of it is obstructed by shoals ; its continuation westward is Siyu channel, which separates Patta island and the main ; it is apparently all shallow, but has not been surveyed.

In the north-eastern part of Kwyhu bay, into which a river empties itself, is Fazy harbour and port Boteler.

Kwyhu island, with its conical peak 155 feet in height, and other rounded hills, and white sandy cliffs, is the most conspicuous part of this coast, and a good landmark for Kwyhu and Manda bays, when coming from the northward ; thence to port Durnford and as far north as Kiungamini island, the land presents one uniform range of low hills from 40 to 60 feet high, mostly sand with slight scrub. Boteler ledge, above water, forms its south-west extreme.

Kwyhu knoll, with 5 fathoms water, lies E. $\frac{3}{4}$ S. from Kwyhu peak, about $2\frac{1}{2}$ miles from the shore.

Boteler bank, situated nearly in the middle of the entrance to Kwyhu bay, is one mile in extent, with about $2\frac{1}{2}$ fathoms water.

Entrance channels.—In the southern channel, between Boteler bank and Siwi spit, the depth is about 5 to 7 fathoms, avoiding south-west patch, of 2 fathoms, which lies half a mile westward of Boteler bank. In the northern channel, which is better avoided, the depths are 4 fathoms between Boteler ledge and bank, with two coral patches of 3 fathoms nearly in mid-channel.

Directions.—Anchorage.—The plan and directions being old, must be used with considerable caution. During the south-west monsoon period, vessels stopping only a short time will find the best anchorage in the south-west part of Kwyhu bay, under the lee of Siwi spit. Vessels should enter by the South channel. A good berth will be found in 6 fathoms, sand, with the east extreme of Fazy island N. by E. $\frac{1}{2}$ E., and Siwi village N.W. by W. $\frac{3}{4}$ W.

We have no information on Fazy harbour or port Boteler, which apparently afford good shelter for small craft.

* See plan of Kwyhu bay, &c., No. 669.

The JUBA or DUNDAS ISLANDS.—General remarks.—The Juba islands extend from lat. $2^{\circ} 0'$ S., nearly to the equator, the coast trending north-eastward, nearly straight. They are generally narrow, having their length parallel with the coast, from which they are rarely distant more than $2\frac{1}{2}$ miles, and hence may be mistaken for the main land. The islands and rocks which are above high water amount to nearly 500, of which some measure from 2 to 5 miles in length, but the majority are small and barren, rising abruptly from, and overhanging, a narrow line of reefs. They are for the most part connected by reefs, but have navigable passes here and there, thus forming secure anchorages for small craft.

Caution.—Seaward of the islands a bank extends from 3 to 5 miles, with general depths of 7 to 25 fathoms, but there are coral patches of 3 fathoms and possibly less, here and there at 2 miles or more off-shore, which render a near approach to the coast dangerous for large vessels.

Anchorage.—In the whole extent of these islands there are but two anchorages of any importance; namely, Kisimayu or Refuge bay, and Birikau river (Port Durnford). Vessels proceeding along this coast without requiring to touch anywhere, will avoid all danger by keeping off the bank of soundings, and those proceeding to any of the islands or ports must be guided by the chart and a careful look-out.

Kiungamini island (north end), in lat. $1^{\circ} 45\frac{1}{2}'$ S., long. $41^{\circ} 32'$ E., is about $1\frac{1}{2}$ miles in length; the mainland abreast appears as two ranges of hills, moderately high, and regular. Rocks extend nearly three-quarters of a mile seaward of the southern part of Kiungamini. H.M.S. *Barracouta* anchored in 12 fathoms, coral and mud, abreast the village, with the north extreme of the island about N.W. by N., distant $1\frac{1}{4}$ miles.

The village of Kiunga is situated on the mainland abreast the north end of the island.

The three Arlett hills, on the main abreast Simambaya island to the southward, about midway between Kwyhu bay and Kiungamini are apparently somewhat conspicuous when close in.

* The description of these islands and the adjacent coast is chiefly from Owen. See chart:—Juba or Dundas islands, No. 670; also No. 848.

Dicks head, about 8 miles north-eastward of Kiungamini island, is a low rocky promontory with a slight elevation in the centre, on the south side of which there is a red sandy patch ; the rocky face when seen from the eastward appears to have a narrow sandy cove in the centre. The islets to the south-westward are low, flat, and bluff.

Castle point.—What is known as Castle point, is a bare islet in lat. $1^{\circ} 37' S.$, having, as its name implies, somewhat the appearance of a castle. There is a landing place on the south-west side in a sandy cove.

Some white tombs are visible close to the beach at about one mile to the northward.

Another islet, $3\frac{1}{2}$ miles north-eastward of Castle point, has also the appearance of a castle, and is a mark well known to coasting craft. The islets lying close northward of it are low and flat, with bluff sides.

Current.—In the vicinity of Castle point, or between it and Lamu, during the north-east monsoon, the north-easterly and south-westerly currents generally meet and produce a current to the south-eastward ; the limits of the place of meeting must, however, depend on the state of the monsoon and other circumstances, *see* currents, pages 35 and 517.

Fair point, 5 miles north-eastward of Castle point, is a bold round-topped rocky hill over a sandy beach ; it is the most conspicuous object, with the exception of Rozier hill, between Dicks head and Birikau river.

Just southward of Fair point are some white sandy patches which at times show well from seaward ; and just northward of Fair point are some hummocky rocks, 100 feet high, near the beach.

Sherwood point, 8 miles north-eastward of Castle point, is low and rocky, with a hillock rising from a flat top ; the point is not conspicuous from the offing.

Rozier hill, about 10 miles south-westward of Birikau river is the best distant mark on this part of the coast ; it is flat-topped, with a bluff north side, and sloping south side, and shows above the coast range of hills.

To the southward of the hill in about lat. $1^{\circ} 23'$ S. is a hill on a projection of the land, which has a ridge of cliffs just below its summit ; it shows best when bearing N.W.

Rozier bank, $1\frac{1}{2}$ miles in extent, with 3 fathoms water, lies 2 miles from the shore abreast Rozier rocks.

Mount Budara.—The coast between Rozier hill and mount Budara (Barreti) becomes more barren, many sand patches showing along the low coast range. Mount Budara, 150 feet in height, on the south side of the entrance to Birikau river, when seen from the southward, has a slight dip in its summit. Shimowongo (mount Gibbon), 215 feet in height, is the summit of a range about 3 miles within it.

BIRIKAU RIVER,* formerly known as the Bubashi river and port Durnford, affords well sheltered anchorage in 6 fathoms, abreast the village of Birikau about 2 miles above the entrance points, but there is more room for swinging at about $1\frac{1}{2}$ miles above the village. The river is scarcely to be recommended for vessels above 13 feet draught, unless properly buoyed, as it is subject to change. The country around the river seems capable of the highest cultivation, the soil varying from light red to a dark fine earth ; the banks of the river are formed of coral with a narrow fringe of mangrove, within which the country is thickly covered with thorn bush, through which, however, it is possible with some difficulty to make way.

The steam cutter of the *Swallow* ascended for about 20 miles, but no villages and only a few canoes were seen. There was but little water in the river at that distance, but it was the dry season (November).

Bar.—Depths.—The entrance is nearly half a mile wide between Kiembo point and Kete Kete rocks, but at about 2 cables within the rocks there is a bar about 2 cables in length and one cable in width, over which there is a depth of about 3 fathoms at low water springs ; within the bar the depths range from 5 to 8 and 10 fathoms in the fairway to the town, over a width of one to $1\frac{1}{2}$ cables.

Islets and rocks.—The estuary of the Birikau is nearly $2\frac{1}{2}$ miles wide between the cliffy point under Budara mount and Kiembo point. The first mentioned is fronted by pinnacle rocks and sunken dangers to the distance of about $1\frac{1}{2}$ miles and extending to within half a mile of Kiembo point. Near the north-east extreme of these dangers lie

* See plan of Birikau river (port Durnford), No. 425. Survey and remarks from Lieutenants Kiddle and Lockhart, H.M.S. *Swallow*, 1895.

the Kete Kete rocks, forming the west side of entrance to the river, the one nearest to the channel being 20 feet high. Needle rock, 10 feet high, lies 2 miles south-west of these. The sea breaks heavily on the foul ground seaward of these rocks.

A ledge with breakers beyond, extends about $1\frac{1}{2}$ cables into the channel from Kiembo point. Nott rock, above water, lies in the bight within Kiembo point, from whence foul ground extends half a mile south-westward into the channel.

The western shore is fronted by a coral reef, dry at low water to the distance of three quarters of a mile, on which stands Kuapisi islet, 30 feet in height. Depths of less than 3 fathoms extend about half a mile off the eastern extreme of the reef.

Beacons.—A pole with triangle is erected on the largest and most conspicuous tree at the south-east end of the clump abreast Kuapisi islet, as a mark for leading in. About 2 cables above Yunda point on the eastern shore are two iron beacons, surmounted by white triangles, 110 yards apart and about 25 feet above high water; and on the beach near the village are two similar beacons, 540 yards apart, and 17 feet above high water; each pair form a leading mark for a portion of the fairway.

Tides.—It is high water full and change at about 4h. 25m.; springs rise 12 feet, neaps 8 feet. The flood stream in the river runs at about $1\frac{1}{2}$ knots at springs and the ebb at about 2 knots. There is an indraught towards the entrance on the flood.

Directions.—In approaching Birikau river the break in the coast line formed by it, between Burgal peninsula and Budara mount, is very conspicuous; Rozier hill to the southward and Budara mount on the south side of the entrance are easily recognized. On a nearer approach, the three coral islets on Kete Kete or Hood ledge, the clump of casuarinas, and the flag staff at the settlement are conspicuous.

The following directions applied in 1896, but the channel is subject to change, and should be verified before entering.

To enter, steer in with the summit of Shimowongo (mount Gibbon) in line with the beacon in the south-easternmost and most conspicuous of the casuarina clumps, bearing N. 65° W., which leads over the bar in about 3 fathoms at low water; when the two beacons near Yunda point on the eastern shore are in line bearing N. 27° W., steer for them up the fairway until the

* See plan of Birikau river (port Durnford), No. 425.

beacons near the village are in line bearing N. 47° W., when they should be steered for. When the east extreme of Kuapisi island is in line with the point to the southward, bearing S. 21° W., steer to pass about a cable off Kiweni point, thence to the anchorage. The edge of the reefs show distinctly, when within the island.

During the south-west monsoon period there is usually a heavy swell and sea on the bar, especially on the ebb.

Anchorage.—The anchorage off the town has been already mentioned. Port Foot, within Kiembo or Foot point, on the north side of the entrance, is a snug little anchorage for small vessels during the north-east monsoon. Temporary anchorage may be taken outside the bar, but steam should be kept ready.

Settlement.—The town of Birikau is on the western shore, about 2 miles above the bar. The district belongs to the Witu administration, which has its headquarters at Lamu. There is a district superintendent here and a guard of 15 Askaris; the population is about 120. The flagstaff, white, with topmast, is visible from the offing, and situated in lat. 1° 13' S., long. 41° 50' E., approximate.

Communication.—There is communication with Lamu by runner (4 days), and with Kisimayu (3 days); also by occasional dhows.

Landing.—The best landing is just north of the village.

Supplies.—The water in the wells at the village is brackish, but it is stated that good drinking water has lately been found near the village. A few sheep may possibly be obtained here.

COAST.*—Port Johnes is situated about 4 miles northward of Birikau river, on the north side of Burgal peninsula. The entrance is between the islets off the north-east end of that peninsula and Tandraa island, and has 3½ fathoms water in the entrance, shoaling to 2 fathoms within; it is, however, a commodious harbour for coasting craft.

Tandraa island has a long sandy beach on its south-east side. The mainland at the back of port Johnes is thickly wooded. At 3 miles northward of the island the coast range of hills suddenly drops into a plain which extends as far as port Tula.

* See charts, Nos. 670 and 848. As the survey of this coast dates as far back as 1824, the directions must be used with caution.

Burgal shoal, of coral, with a depth of 2 fathoms, lies E. by S., about one mile from Ras Burgal, or in the approach to port Johnes from the southward.

Darakas island, situated about $6\frac{1}{2}$ miles north-eastward of port Johnes, is hilly, and higher at the north end than the south. The east side of the southern hill is barren and sandy.

Bluff hill is formed by a dip in the coast range behind Darakas, and is difficult to distinguish. Rising from the flat-topped range at about 2 miles southward of Bluff hill, there is a large square flat-topped rock which is conspicuous from seaward.

PORT TULA lies within Tula island and Vidal ledge, at about 13 miles north-eastward of Birikau river. The entrance is apparently about half a mile wide between the islets southward of Tula, and Vidal ledge, with depths of 5 to 9 fathoms. Within the entrance the depths drop suddenly to 3 fathoms. The anchorage in port Tula is northward of Vidal ledge, in 3 fathoms water, gravel and sand, with the west extreme of Tula island bearing N.E. $\frac{1}{2}$ N., and the small rock off the south end of Tula islets E.S.E. There is also limited anchorage off the village on Tula island in 2 fathoms at low water. The tidal streams here are strong.

The approach to Mto Umborini or Tula river is shallow with irregular depths. Within the river there are many Portuguese ruins.

Tula island has numerous sandhills along its whole extent. The village on the west side of the island is a place of resort for dhows, where they water on their way northward, during the south-west monsoon period.

COAST.—Port Shamba, situated about 10 miles north-eastward of port Tula, is formed by Tovai island, which lies nearly 3 miles from the main and off the entrance to Tovai river. There is a passage on either side of Zigadi island, but that to the northward has but 9 feet at low water, and the sea breaks right across during a moderate swell. The passage southward of Zagadi has a bank with 3 fathoms water, rising abruptly in the centre with 6 and 8 fathoms, just within it; after passing the bank depths of not less than 4 fathoms may be found.

Port Shamba abounds in fish.

Tovai or Tuala island is high, with barren sand hills, the most conspicuous being near the south end, where there are several low rocky islets off a high sandy beach. The north point of this island is in lat. $0^{\circ} 51'$ S. There are two flagstuffs at the north end of Tovai, and a conspicuous sandy path up the slope southward of them.

A few heads with 6 fathoms on them were found on the bank off Tovai; it is probable that other shallow spots not marked on the chart may exist. The positions of the banks near the islands are generally indicated by the colour of the water, and should always be avoided.

Mto Tovai or Shamba river is deep within, but the bar between it and the port nearly dries at low water springs; by the chart there appears to be a better passage to it from port Thenina.

Vuma or little Kwayama island, situated about 7 miles north-eastward of Tovai, rises gradually to the centre, where it is about 170 feet in height.

Thenina island, of a brown colour, lies between Tovai and Vuma, and is of less elevation than those. Port Thenina lies within Thenina island, but we have no information on the approaches to it. A wooded bluff on the mainland abreast Thenina is, or was formerly, conspicuous, and said to be visible from a distance of 16 miles.

Kwayama island, the north point of which is in lat. $0^{\circ} 37\frac{1}{2}'$ S., is about 3 miles in length; the eastern side is skirted by a reef which continues round the islets off its south extreme; the village is on the north-west side. This island is the northernmost of the large and prominent islands of the Juba group, and therefore may be a useful mark for identifying the position of a vessel.

There is a passage on either side of Kwayama island leading into anchorages; that to the southward, leading to port Kwayama, is between the island and Doubt rock, with depths of 4 to 6 fathoms, on either side apparently of a $2\frac{1}{2}$ fathoms patch lying in mid-channel. Doubt rock is stated to be foul to the distance of half a cable, and the channel to be only $1\frac{1}{2}$ cables in width. Within the pass is a spacious bay where vessels may anchor in from 4 to 5 fathoms, under Kwayama island, or westward of the rocky islets extending from the north point of Vuma.

The islets and reefs between Kwayama island and Kisimayu bay are known as the Schmalcalder chain, the Humaul rocks and the Hawaween chain of rocks, and lie parallel to the shore, and from 2 to 3 miles distant; shallow heads lie between them and the 100-fathoms line, as to the southward. They should be given a wide berth.

KISIMAYU BAY (Refuge bay) the northernmost anchorage on the east coast of Africa, which can be called a harbour, is better than any other at present known northward of Manda bay, and for this reason will always be valuable as a port of refuge for vessels of war cruising on this part of the coast, but otherwise it will be of little importance until trade with the interior increases by way of Juba. There is sheltered anchorage at either end of the bay for light or moderate draughts, according to the direction of the wind, though a considerable swell sets in at times.*

Aspect.—The land about Kisimayu is undulating and in no way remarkable, and haze often obscures it rendering identification of the few landmarks difficult. The soil is sandy and covered with grass, low bushes, and umbrella-like mimosa trees and scrub. To the northward of the Juba the coast appears much more sandy and bare than to the southward. The hills westward of Blankett point are not remarkable, but appear as an undulating ridge. Round hill only shows round when bearing southward of West, but at no time is it very conspicuous. Wooded peak is more serrated than the other eminences. At the mouth of the Juba is a rounded bluff with denser bush on it than elsewhere, which serves as a mark, though not a good one.

Murder hill, northward of Kisimayu, is a small conical eminence, no higher than the adjoining plateau, but it is separated on either side by a distinct dip, and is remarkable by its shape. The best view of it is on about a north-west bearing.

REEFS in the approaches.—Owen barrier.—The entrance to Kisimayu bay is barred by a succession of outer reefs and shallow patches; the outermost, Owen barrier, is a narrow coral chain running parallel to the shore at a distance of about $2\frac{1}{2}$ miles, with depths of from $2\frac{1}{4}$ to 6 fathoms, and is apparently connected to the southward with the Hawaween rocks, but to the northward it

* See plan of Kisimayu (Refuge) bay, with views, No. 860.

terminates a short distance north-eastward of Kisimayu. South-westward of Middle reef, which breaks heavily, the bottom is uneven and rocky.

Dædalus knoll, of $2\frac{1}{4}$ fathoms, and Vulture patch, of $2\frac{3}{4}$ fathoms, lie on the barrier reef, north-eastward of Middle reef; the positions of these and similar patches will be seen by consulting the plan. There are many openings through the barrier, but as there is always a heavy swell, not even the smallest vessel should risk passing through, unless the leading marks can be clearly seen.

Islets and inner reefs.—Kisimayu island, within which is a sheltered anchorage during the north-east monsoon period, is 85 feet high, and appears a reddish yellow compared with the land behind which is mostly green, with white sandy spots. There is a dome-like projection at the south end of Kisimayu joined by a low neck to the main island.

Position.—The neck of Kisimayu island is in lat. $0^{\circ} 23' 6''$ S., long. $42^{\circ} 33' 31''$ E.

Mear's tomb islet, situated north-eastward of Kisimayu, is 40 feet high, and shows very green after rain; seen from the north-west it appears double, as there is a low dip in its centre. It is connected to Kisimayu by a rocky ledge, 2 miles in length, which breaks in places.

North Mears is a bare black looking rock, 28 feet high, standing on a rocky ledge which extends one mile northward of it.

Fawatu islet, situated on the prolongation of the reef southward of Kisimayu island, is 13 feet high, with a white pillar beacon on it. A patch of $1\frac{1}{4}$ fathoms lies half a mile south-west of it.

Shoal.—A doubtful cast, giving a depth of $2\frac{1}{2}$ fathoms at low water, was reported by H.M.S. *Racoon* 1893, as lying with Smyth islet touching the north-west extreme of Green islet, S.W. $\frac{1}{8}$ S., and Fawatu island beacon S.E.

Pillar rock, on the shore reef in the north-west part of the bay, is a sail-like rock, 48 feet high. It is an unmistakeable mark, and at times can be seen from some distance outside.

Fred rock, with less than 6 feet water, lies in the approach to the south anchorage, with Pillar rock bearing N. $\frac{3}{4}$ E., distant $1\frac{4}{5}$ miles.

Mtanga ya Papa, a flat-topped island, about 4 cables in extent, situated $1\frac{1}{2}$ miles north-eastward of Blankett point, the south extreme of Kisimayu bay, is 45 feet high, and covered with scrub; it is difficult to be seen in some lights, though with any haze it appears prominently forward. Green islet, 25 feet in height, lies 2 cables north-westward of it.

Nyuni or Smee rocks, 25 feet in height, and dome-shaped, lie near the edge of the foul-ground extending off Blankett point. South rock, 25 feet high, and several other islets, lie inshore of Nyuni.

Beacons.—A column, 20 feet high, stands on the south-west shoulder of Mark hill, a white pillar on Fawatu island, and a cairn on Pillar rock.

Anchorage.—There is sheltered anchorage for light or moderate draughts at either end of the bay according to the monsoon; but in both corners a long swell generally fetches home through the passage and over the shallows, which, as the vessel will be broadside on, causes her to roll. From $3\frac{1}{2}$ to 4 fathoms water, over sand and mud, will be the best berths at both anchorages. The south end of the bay is the best berth in the height of the southerly monsoon.

Tides.—It is high water, full and change, at Kisimayu bay at 4h. 0m.; springs rise 10 feet, neaps 6 feet, neap range 2 feet. The tides, however, are variable and probably much affected by the winds and currents.

DIRECTIONS.—The routes here described are those that have been closely sounded; elsewhere there may be shoaler patches than those marked on the plan. The water is thick, especially during the north-east monsoon, when the water from the Juba river discolours the sea for some miles. Fawn pass is the one recommended for vessels from the southward, in fine weather; North channel for those for the northward, and from any other direction when there is much wind and sea, as it is wider than the other passes.

It must be borne in mind when entering the Passes, that the direction of the current in either monsoon will be on the beam, and a vessel should be steered well to windward, so as to maintain the line of the leading marks, until through the Inner pass.

Fawn pass leads over Owen barrier in $5\frac{1}{2}$ fathoms at low water springs, and north of the Middle reef in 5 fathoms, between it and a 4-fathom patch.

To enter, bring the fort in Kisimayu village over the low neck at the south end of Kisimayu island bearing N. 16° W., *see* view A on plan, and steer for it. This is an excellent mark, but must be closely adhered to, and any deviation on either side will be known by shutting in the fort.

(It is recommended to bring the mark on at some distance outside Owen barrier, so as to observe the effect of the current before crossing the barrier. The current inside the barrier is frequently as strong as outside, but at times it slackens. If the current is strong and much difficulty is found in keeping the leading mark on, a vessel after passing Owen barrier, which will be known by the lead, can be kept to the northward and steered in with the mark for Knott pass, which leads well northward of Middle reef.)

When the pillar on Fawatu islet is in line with Pillar rock, alter course to S. 79° W. for the entrance of Inner pass, taking care to keep North Mear's rock open of Kisimayu island until Pillar rock bears N. 30° W., which being steered for leads through Inner pass in not less than $5\frac{1}{2}$ fathoms to Kisimayu bay.

When the fort bears N. 25° E., or Fawatu pillar N. 59° E., steer for the fort, which leads between the one-fathom patch and the doubtful Racoon shoal in about 19 feet at low water. North Mear's rock on with the centre of the rock between the north end of Kisimayu island and the shore, N. 52° E. (Smyth island touching the eastern side of Green island, astern), leads eastward of the Racoon patch in not less than $3\frac{3}{4}$ fathoms.

Anchor in $3\frac{1}{2}$ fathoms, sand and mud, with the south extreme of Kisimayu island S.E. by E., and the fort N. by E. $\frac{3}{4}$ E.

To proceed to the southern anchorage;—keep on the leading mark through Inner pass until the west extreme of Green island bears S. 43° W. (when four small islets or rocks will be open between the land about Blankett point and Green island, not counting Wills rock,

which is close inshore and apparently barely clear of the point). Smyth islet, the northernmost and nearest of the four, kept just touching the west extreme of Green island, S. 43° W., will lead eastward of Fred rock. When Nyuni islet is but twice its own breadth open of Mtanga ya Papa, steer West, and anchor in $3\frac{1}{2}$ fathoms, sand, with the north extremes of Mtanga ya Papa and Green island in one, and a piece of rocky cliff near Blankett point S.W. $\frac{3}{4}$ S.

Knott pass, at about one mile northward of Fawn pass, is also safe, and the depth of water in this route gives more room for any deviation that may occur from the direct line, but the marks are not nearly so good from outside the reefs as those for Fawn pass. Knott pass leads over the barrier in 5 fathoms water.

To enter by this pass, bring the column on Mark hill in line with the cairn on Pillar rock, N. 55° W., and steer for it; (Pillar rock, open 2° southward of Fawatu, is the same line over the barrier;) when Kisimayu fort is well open of the south end of Kisimayu island, bearing N. 8° W., steer S. 79° W. for Inner pass mark, and proceed as directed from Fawn pass.

Zig Zag pass, the great natural entrance, has no leading marks, and cannot therefore be used. Its proximity to the Dædalus knoll makes good marks a necessity.

North channel leads round the north end of Owen barrier, and is the nearest way in from the northward. With a heavy sea, much wind and current, this is the best passage for a large vessel, as the water is deep and there is abundance of room.

To enter by North channel, bring Mear's tomb islet to bear N. 85° W., and steer for it until Round hill is in line with the north extreme of Kisimayu island, bearing S. 73° W. (view B. on plan); keep this mark on (which also leads straight in from seaward if coming from the north) until Mear's tomb islet bears N. 56° W.; then alter course to S. 47° W., until the fort opens of the south end of Kisimayu island, when steer S. 79° W. for the Inner pass mark, and proceed as directed from Fawn pass.

Kisimayu village.—On the northern shore of the bay is the village of Kisimayu. The white house of the Resident and its flagstaff are conspicuous from seaward; the old yellowish square

fort south-west of it, and also the village, are enclosed by a stockade. A watch tower has been built on the sandhill at the back of the town, which is also conspicuous.

Supplies.—Beef and mutton were obtainable in 1893, but no vegetables. The water is of poor quality. Fish may be obtained with the seine on the beach fronting the village.

Communication.—By the Protectorate steamer *Juba*, and by dhows with other places on the coast.

Trade.—A small trade in hides and ghi passes through here, but the actual trading place for this part of the coast is at the mouth of the Juba river, where there is a much larger settlement, of which Kisimayu is, to some extent, the port, the dangerous bar of the Juba river preventing much communication with the sea.

The value of the ivory exported from Kisimayu in 1895 amounted to 41,822 rupees as compared with 37,442 in 1894.

Climate.—Fevers are said to be unknown. In the immediate vicinity of Kisimayu bay, there is a great dearth of vegetation, which, perhaps, may contribute to its healthiness; but its salubrious character is by no means confined to the sandhills around; for at the Juba river, where the land is excellent and vegetation abundant, it is also said to be free from fever.

The climate in the north-east monsoon period is far preferable to that of Zanzibar, the nights being almost cool and the air at all times dry. Temperature in October about 82° maximum.

Winds and Currents.—The alternate monsoons are strong in the neighbourhood of the Juba islands and Kisimayu, and carry the currents with them. From November to April the north-easterly winds prevail with a south-westerly current, being at its strongest, about 2 knots an hour, in January and February, on an average; during the other months of the year the winds and current are reversed, the latter running from 2 to 3½ knots north-eastward, or a direction nearly that of the trend of the coast. *See Currents*, pages 35 and 543.

The Commander of the Eastern Telegraph vessel *Great Northern*, from 5th to 12th January, 1895, found the current much stronger than that mentioned. At 22 miles east of Kisimayu island (where he

had several buoys moored in from 600 to 800 fathoms), he observed it setting S. 70° W. (true) at a rate of $3\frac{1}{2}$ to 4 knots an hour continuously.

MTO YA VUMBA or **JUBA RIVER** forms the boundary between the British and Italian spheres of influence. The mouth of the river is situated in about lat. 0° 14' S., long. 42° 39' E., about 10 miles northward of Kisimayu bay. The entrance is not easily seen as the points overlap, but the town is visible over the south point, from the anchorage; Murder hill (page 532) will also assist in identifying it. Within the bar the river is about a cable wide, with depths of 3 to 12 feet, and is navigable for a considerable distance; its banks abound with large game.

Bar.*—The bar breaks heavily but apparently never dries; the least depth in the fairway when examined in July 1892 between the shifting sands, on which the sea broke heavily to seaward, and similar sands to the westward, was 2 feet, which would give about 11 feet at high water springs; the natives state that they can wade across it in November.

It is at all times dangerous, and impracticable during strong winds; the months of April and May, and the latter part of September and October (the change of the monsoons), would seem to be the best times. However, with suitable decked light-draught steamers, taking every precaution, such as anchoring off the bar and noting the best channel, it may be available at high water for a considerable portion of the year. The passage over the bar is somewhat across the prevailing currents, which adds to the difficulty.

The boats of the German vessels of war *Carola*, in January 1887, and of the *Gneisenau*, had to abandon the attempt to cross the bar, but it was successfully passed on two consecutive days in April 1887, by the steam cutter, and another cutter from the *Carola*, with depths at high water neaps, of from 5 to 10 feet, over an extent of about 600 yards. Also by the *Kenia* in July 1892, as mentioned on page 539.

Anchorage.—The depths decrease gradually from the offing towards the mouth of the Juba, to about 6 fathoms at a mile from the bar, where temporary anchorage may be taken, with the flagstaff at the town bearing W.N.W., distant about $3\frac{1}{3}$ miles, but there is considerable swell here.

* See sketch survey of Juba river entrance, on No. 671, and charts Nos. 597 and 670.

Tides.—It is high water, full and change, at Juba river, about 4h. 30m. ; springs rise from 9 to 10 feet.

The town of Gobwen, formerly known as Juba or Vumba, is about 3 miles within the entrance ; it stands on a moderately high hill, is somewhat large, and surrounded by a clay wall 10 or 12 feet high. It is the centre of trade of this part of the coast, but owing to the dangerous bar of the river, most of the produce is taken to Kisimayu for shipment.

River above the town.—This river was ascended by Commander F. G. Dundas, R.N., of the Imperial British East Africa Co.'s service, in the *Kenia*, in July—September 1892, as far as the rapids, situated about 20 miles above Bardera, and about 407 miles above its mouth.

The *Kenia* is 86 feet in length, 23 feet in breadth, with a draught of $2\frac{1}{2}$ feet.

The following is a summary of his remarks :—

Leaving Gobwen, the village 3 miles within the entrance, on 23rd July, the vessel without any very great difficulty reached the rapids about 14th August, and left again on the 16th, finally reaching Gobwen again on 20th September. On account of the river having fallen considerably great difficulty was experienced on the return journey, the vessel being many times aground.

The bar, on entering, was much the same as described on p. 538. About a fortnight was occupied in obtaining permission to proceed peacefully through the lower part of the river, possibly about 100 miles. Above Gobwen depths of $2\frac{1}{2}$ to $3\frac{1}{2}$ fathoms were carried for about 8 miles or nearly to the large villages of Hajowen and Hajualla ; these are the only large villages between the mouth and Munsur, 360 miles up, and they each have a population of about 900. (These two large villages were destroyed in 1893.) The country still consisted of large grass plains with occasional woods, and game was exceedingly plentiful, but the river was very tortuous, doubling back on itself in places, and snags were plentiful. Near Mataku (on the equator) the river was only from 15 to 20 yards wide in places, with dense overhanging foliage. The river forked below this place, re-uniting some miles above it, and expanding to a width of about 120 yards.

At **Fuleile**, lat. about $0^{\circ} 10' N.$, the chief of the Gusha district resides; the Swahili language is spoken here. From the village to Bilo, 100 miles above the entrance, there are numerous densely populated villages, the banks are cultivated, and large groves of bananas, &c., were constantly met with. A few miles above Bilo is a branch to the south-west, which was explored for about 20 miles; it had depths of about 3 fathoms, a 3-knot current, and the trees overhung in many places, so that the vessel was turned only with considerable difficulty. Returning to the main branch, there was dense impenetrable forest on either side, which continued for about 5 days, without any sign of human life, when the village of Kabote was reached (lat $1^{\circ} 35' N.$), on August 2nd. (The river rose 18 inches in one night.)

Above **Anole** (lat. $2^{\circ} 0' N.$), the banks entirely change, becoming hard and stony, and a plateau 200 feet in height extended on either side. Three rocky bluffs, 150 feet high, rise abruptly from the river just before arriving at the large Somali village of Mansur.

Bardera was reached on 10th August, and after much palavering, peace was made with the chief, who at first was hostile. It is a town of about 1,200 inhabitants; the people live chiefly on their flocks and herds, there being but little cultivation around it.

The great caravan route from the Boran country crosses the Juba here; by it are brought ivory and hides, which find their way to Brawa and the other northern ports.

Logh, another large town, is 5 days' journey from Bardera.

Rapids.—(Lat. $2^{\circ} 34' N.$) The river was now falling rapidly. Past the village of Manda, the river ran between a range of rocky hills 300 to 400 feet high. Arrived at the rapids, the bed of the river was found to be a mass of rocks with depths of 6 inches to 3 feet, and a current running at the rate of 6 knots.

It is stated that at four hours' journey above the rapids the river falls over a ledge of rocks, so that if a vessel could ascend the rapids at high river, she would be stopped by the falls. At the foot of the rapids, the remains of the Baron Von der Decken's ill-fated steam vessel *Guelph*, with funnel still standing, which ascended the river some 27 years before, were observed. This expedition, with the exception of two who escaped, were all murdered.

Leaving the rapids on the 16th August, the vessel, owing to the falling of the river, took 3 days to reach Bardera, having several times to clear everything out of her. Remaining only one day there eventually arrived at Gobwen on 20th September, having been for days on shore on various sandbanks during the descent.

Height of river.—The river usually is in high flood part of July and in August; in the latter month and in September freshets from the interior cause the water to rise suddenly, and in a week or ten days to fall again with the same rapidity, this taking place several times during these months. The river is low in November, when it is fordable or nearly dry in a great many places. In December and January the river is at its lowest: in February it rises, and is partially in flood during March and April, when it falls a little, rising in July.

Health.—Not a single case of fever occurred; this is attributed to the dry heat, and to the fact that the river does not overflow its banks and cause malarial swamps like the Tana, &c. Mosquitos also were fortunately rare. The average temperature was 90° in the shade during the day, and 83° at night.

Supplies.—Game was abundant, and bananas, &c., were obtainable at most of the villages. No firewood was cut, there being numbers of dead trees to be had along the banks, thus saving considerable labour.

COAST.*—From the Juba river, northward to and beyond Ras Asir, the country is under the Italian sphere of influence.

From Juba river the coast trends north-eastward in a nearly straight line to Brawa, about 115 miles. It is composed of reddish sand downs, covered here and there with stunted bush, and backed by high sand hills, most of which are bare and visible from a distance of about 25 miles. A high surf beats against the ledges which usually front the shore.

Between Juba river and the red sandhills, about 40 miles to the north-eastward, the depths are said to be only from 6 to 7 fathoms at 2 miles from the shore; H.M.S. *Wasp*, 1865, anchored in 16 fathoms, within half a mile of a coral reef estimated to be from 1½ to 2 miles from the coast, at about 40 miles southward of Brawa: this places it between Jua and Cascara. In most places the coast may be approached with safety, to depths of 9 or 10 fathoms, which will be found at about one mile off.

Large herds of cattle are seen at times along the coast.

* See chart:—Delagoa bay to Ras Asir (Guardafui), No. 597.

The Doho or Haines river (Webbe Shebali), the course of which is charted parallel to that of the Juba, at about 120 miles to the eastward, passes at the back of Mogdishu, Merka, Brawa, &c., and discharges into a marsh.

BRAWA, in lat. $1^{\circ} 6\frac{3}{4}'$ N., long. $44^{\circ} 31\frac{1}{2}'$ E., is a walled town built on an eminence of about 100 feet in height, close to the beach.

The Government house and flagstaff are situated at the north-east part of the town, near the sea, and the custom house near the middle of the sea face.

The land at the back of the town is high, has a reddish appearance, and is spotted with dark clumps of brushwood. Both northward and southward of the town is a bare white hill; the northern is the higher of the two. The tower on Kisiwa Mnara, about 50 feet in height, and 60 feet above high water, at $1\frac{1}{2}$ miles southward of the town, shows out well against the white hill behind it, and is a good landmark, being visible about 10 miles under favourable circumstances.*

The two Kila islets, 30 and 36 feet in height, are situated on a reef nearly half a mile in length and about the same distance from the shore, affording some protection to the dhow anchorage, but there is generally a heavy swell there, even in fine weather. Several islets and reefs front the shore within, and north and south of these islets, for which *see* the plan; but notwithstanding the shelter they afford, dry landing is generally difficult.

Trade.—The exports consist of hides, orchilla weed, sesame, gum, ghi, and earthen pots; the latter, in large quantities, are distributed along the coast by local traders. Most of the products are taken to Zanzibar by dhows, and the months for trading are from November to April; then the wind is light easterly during the day, with a land breeze at night. The imports are cotton goods, iron, sugar, molasses, and dates. Loading is carried on with native boats.

Supplies.—Cattle and other supplies in small quantities can be obtained.

Water may be obtained in fair quantities: the best place for watering is about 2 cables to the northward of Mnara tower; the water here, although of a slightly brackish taste, is good for use.

* *See* plan of Brawa on No. 671; too much dependence must not be placed on its accuracy.

Climate.—The climate of Brawa is reported healthy.

A shoal with a depth of 8 feet, the extent of which is not known, is reported to lie with the southern Kila island bearing S 64° W., distant about one mile. Mnara tower, S. 60° W., or westward of that bearing, leads seaward of this position.

Anchorage.—The bank of soundings off Brawa is distinctly marked by the change in the colour of the water, the deep ocean blue suddenly changing to green, and farther in shore as suddenly to dirty yellow.

During the south-west monsoon period, anchorage may be obtained in 6 to 7 fathoms water, with Mnara tower in line with the Kila islets, bearing S.W. $\frac{1}{2}$ W., and the Government building in Brawa, marked by a flagstaff, W. by N. $\frac{1}{2}$ N. The occasional trading vessels from Europe lie here, it being the most convenient place for discharging cargo.

In approaching this position, care must be taken to avoid the shoal above mentioned and the breaker reported to lie half a mile north-eastward of the northern Kila islet, with that islet in line with Mnara tower.

In the north-east monsoon period, there is exposed anchorage southward of the Kila islets, in from 6 to 12 fathoms, good holding ground, but it is not recommended in the south-west monsoon period.

During the north-east monsoon a vessel may anchor half a mile south-westward of Mnara tower, and be better sheltered than in the anchorage just referred to.

Vessels of 7 to 9 feet draught can enter the dhow anchorage, westward of Kila islets, where there is fair shelter. The southern entrance is always available, but the northern has little depth at low water.

Tides.—It is high water, full and change, at Brawa at 4h. 10m.; springs rise 8 feet. The current in the road follows the direction of the coast, running N.E. or S.W., according to the monsoon, with variable strength. The northerly set is least felt at low water, and is at its maximum at high water, running at times from 3 to 4 knots per hour.

Current.—Caution.—Nav. Lieut. H. E. Wood, H.M.S. *Diamond*, 1876, writes :—On the night of the 8th December, the ship was set during the night whilst hove to, 36 miles W. $\frac{1}{2}$ N. nearly direct on to the land, which at daylight was distant only 5 or 6 miles; it was then almost calm, and the ship drifting W.N.W. towards the shore,

at the rate of 2 miles an hour. Steam had to be got up. The current which affected the vessel after daylight was apparently a surface current, as the line on the in-shore side of the vessel, after the lead had descended 4 or 5 fathoms, led directly under the bottom. As the ship neared the shore the drift appeared to turn more to the southward, and close in would probably have been to the south-west parallel to the coast. The part of the coast was in $1^{\circ} 20' N.$, or about 22 miles north-east of Brawa.

COAST.*—From Brawa the coast extends north-eastward, about 96 miles to Mogdishu; it is generally bold of approach to the distance of one mile, sterile, sandy, and destitute of trees, with a few rocks near the shore in some places. From Dai, situated about 18 miles northward of Brawa the coast hills are overgrown with a stunted bush, but towards Merka they resume their usual sterile appearance.

The road to Merka from Brawa follows the coast, and numerous strings of camels and herds of cattle are to be seen on it at times.

The rock, which breaks, charted about 7 miles north-eastward of Brawa, lies about $1\frac{1}{2}$ miles off shore, and apparently dries about 6 feet at low water.

H.M.S. *Columbine* anchored in 8 fathoms, fine dark sand, $1\frac{1}{2}$ miles off the point 10 miles northward of Brawa, and about 3 miles northward of the patch of rocks just referred to. The point projects in a south-west direction for about half a mile, but affords no shelter, not even for landing. The vessel rode easily with 50 fathoms of cable, though the heavy swell caused her to roll much. The junction of the blue and shallow water is most remarkable. Between Brawa and this point the land falls back, forming a deep bay, in which there are several dangerous rocky patches, some extending as far as $3\frac{1}{2}$ miles from the shore.

The coast, along which there are several villages, should not be approached within the depth of 20 fathoms. The hills about Merka are about 300 feet in height; a small mosque or tomb stands on the point about 2 miles south-westward of Merka.

Torre.—The town of Torre, about 35 miles north-eastward of Brawa, is a compact village of huts near the coast on a sloping headland, between a widely-extended patch of red sand to the north,

and a smaller patch of white sand to the south. It may be further known by a hill of red sand and brushwood to the southward, by a long patch of black rocks on the beach about 30 feet high, and by a remarkable horse-shoe shaped gap at the north end of the town. The town is of moderate size, and surrounded by a wall which encloses it on the land side. There is a depth of 8 fathoms water at half a mile off the point of the headland, and south-westward of the point there is a detached dry rock; it is probable there would be fair landing here in the north-east monsoon.

Munguia is a straggling village of huts, at about 20 miles north-eastward of Torre, and would not be seen from a vessel unless close in. From Torre to Munguia the shore is fronted by a reef nearly all the way, inside which is smooth water, but apparently shallow.

MERKA * is a large walled town of a far more imposing appearance than either Brawa or Mogdishu, with a considerable trade in hides, ivory, and gum copal. Its south point is situated in lat. $1^{\circ}42' N.$, long. $44^{\circ}54' E.$

Shallow water, with patches from nearly dry to one fathom at low water, extend from 3 to 5 cables off shore, and detached patches of about 3 fathoms lie three-quarters of a mile eastward of the town; outside and to the southward of these patches the water deepens rapidly. Southward of the town the shore should not be approached nearer than three-quarters of a mile.

Supplies.—Sheep, fowls, eggs, and water can be obtained.

The anchorage is unsheltered, and much contracted in space, owing to the steepness of the bank. Large vessels may anchor in 15 fathoms, sand and coral, with the town bearing N.W. by W. about one mile distant; communication with the shore is difficult. There is anchorage closer in, in about 5 fathoms, with the flagstaff bearing North, distant about 6 cables, and the house, one mile southward of the town bearing West, but the water shoals to 3 fathoms at half a cable nearer the shore.

There is a dhow anchorage close south-westward of the town, the entrance of which has 3 to 4 fathoms between the reefs; here they lie sheltered by the reef, which partly dries at low water, but at high water the swell rolls in over the reef without breaking, causing a heavy surf on the beach; landing is then frequently impracticable.

* See plan of Merka anchorage, with view, on No. 671.

In November, when the monsoon changes and north-easterly winds prevail, a vessel of light draught can lie at the dhow anchorage; the expense of loading will then be less.

Tides.—The tides and current off Merka are similar to those off Brawa, page 543.

MOGDISHU* (Magadoxa) may be observed from a considerable distance when approached from either direction, as it stands about 40 feet above the sandy plain.

The town of Mogdishu is divided into two distinct parts.

The south-western portion is called Hamerween by the natives, and has about 150 stone houses; it was originally the Portuguese settlement, but a few inscriptions only remain to denote its former proprietors. This portion of the town, when seen from seaward, has quite as imposing an appearance as the more modern and eastern one of Shangani, but it is deserted and in ruins. Formerly there were two towers: the northern one, which stood on an eminence, has been down for many years; the southern one may be still standing in the midst of the old town, but it is not conspicuous. Its position is lat. $2^{\circ} 1\frac{3}{4}'$ N., long. $45^{\circ} 24\frac{3}{4}'$ E.

The old disused lighthouse, which appears as a sort of beacon, is of considerable elevation, and stands isolated on the beach close to the water, at half a mile north-east of Shangani; the white sandy background renders it conspicuous at a distance, and especially on a clear night.

A large white house like a palace stands westward of Shangani, the new town, and can be seen for many miles; and a white turret stands in the centre of that town. On the beach there are a great number of large boulders.

Anchorage.—The roadstead is open and exposed: vessels may anchor in about 13 fathoms water, fine sand, with the old town bearing about N.W. by N., about one mile.

Reef.—Dhow harbour.—A reef fronts the town to the distance of about 2 cables; at 3 cables off shore, abreast the town, is the west extreme of a reef about 3 miles in length, which fronts the shore to the eastward at the distance of about 2 cables, and always breaks. Within this reef is the dhow harbour, with a depth of 2 fathoms

* See plan of Mogdishu, on No. 671.

in its western entrance, and from one to 2 fathoms within, with space for 12 to 16 dhows in all weathers. There is good landing in the harbour, but the entrance may probably be dangerous for boats during the south-west monsoon period.

Supplies.—Fresh beef, sheep, and goats are plentiful, but water is scarce.

Trade.—Most of the Arab dhows visit this place in their coast navigation to exchange sugar, molasses, dates, salt fish, and arms, for ivory, hides, gums, and home-spun cloth. November to April are the trading months, being the fine weather period.

Tides.—It is high water, full and change, at Mogdishu at 4h. 30m. ; springs rise 8 feet.

Current.—The south-westerly current commences at Mogdishu, almost invariably with bad weather from the N.E. about the second week in December ; it sets in the same direction at a distance from the land nearly a month earlier. It does not last above three months.

Off Mogdishu, in August, the current has been found to set about 3 miles an hour to the north-east, nearly parallel but inclining towards the shore. When hove to with the vessel's head to seaward, the shore has been neared, and it has been necessary to stand off for an hour or two. On the 20th August 1865, H.M.S. *Lyra* recorded the current as N. 48° E., 82 miles per day.

In the route to the southward, between the coast ports, during south-west monsoon period, Nav. Lieut. E. Nankivell, H.M.S. *Daphne*, 1873, remarks :—I believe that except when the monsoon is at its height, and perhaps even then, that a moderate-powered steam-vessel, by anchoring at night and closely following the coast by day, would always be able to get to the southward. The winds and currents are so *very* variable in strength and direction, that it is at best a doubtful experiment to try to get to the southward by standing offshore ; on the other hand, the inshore passage requires the most unremitting attention, and is most harassing work. See remarks on winds and current, pages 25 and 35.

COAST.—About 12 miles northward of Mogdishu a chain of hills commences, and extends some miles to the north-eastward ; about this part of the coast there are two or three bays with white

See plan of Mogdishu, on No. 671.

sandhills. The depths decrease suddenly from 40 to 10, 5, and 3 fathoms, and a wide berth should be given to this part of the coast, which is in general sandy, sterile, and rather low.

At about 15 miles north-eastward of Mogdishu is the south extreme of a line of reefs about 20 miles in length (excluding Warsheik bank), and extending parallel to the coast at a distance of 4 or 5 miles. Abreast the centre of the reef, and inshore of it, is an island, or what appears like one, of black rock, of about the height of Warsheik, on which is an Arab village.

WARSHEIK* lies about half a mile to the westward of Ruin point, and appears to be a thriving and well-populated village. It is visible from a distance of 12 miles; some lofty stone houses on Ruin point give it the appearance of a fortress.

Position.—Ruin point is in about lat. $2^{\circ} 19\frac{3}{4}'$ N., long. $45^{\circ} 54'$ E.

Dhow harbour.—Pyramid islet.—A ledge of rocks extends about 2 cables in a westerly direction from Ruin point, near the extremity of which is Pyramid islet, a small flat-topped islet with steep sides, and the base of a small pyramid or beacon on it. This ledge of rocks between Pyramid islet and Ruin point is awash: one piece of rock only, like a boat under sail, being visible at a distance. The ledge, together with a rocky spit with from 9 to 12 feet water, which extends nearly 3 cables S.S.W. $\frac{1}{2}$ W. from Pyramid islet, forms a dhow harbour which is completely protected from all but S.W. winds; in November it is usually filled by dhows from Arabia loading with orchilla weed, of which there is a great quantity in the neighbourhood, for Zanzibar.

When the wind comes in strong there is much sea, and the entrance of the harbour is impracticable for boats. There is a depth of $2\frac{1}{2}$ fathoms in the harbour, but this depth is not of great extent, and to the northward of Pyramid islet, near the ledge of rocks which form the harbour, there is only a few feet.

Warsheik or Ducouedic bank lies in the approach to Warsheik road; it extends parallel to the coast and distant about 2 miles, with depths of 3 to 5 fathoms, sand and broken shells, over its western end; its extent eastward has not been determined, and as there may probably be less water, a wide berth should be given to it.

* See plan of Warsheik on No. 671; also chart, No. 597.

The anchorage off Warsheik is between Warsheik bank and the village, in 16 fathoms, gray sand, good holding ground, with Pyramid islet bearing North, distant half a mile. The same bearing of Pyramid islet leads in from seaward, westward of Warsheik bank. The spit extending 3 cables south-south-westward of the islet must be guarded against. H.M.S. *Teazer* anchored here in November, at which time the wind was E. by N. and blew strong, with rain, which raised a considerable sea and swell, but not sufficient to prevent communication with the dhow harbour. It is, however, an exposed anchorage.

Tides.—It is high water, full and change, at Warsheik at about 4h. 30m.; springs rise about 8 feet. The current generally follows the direction of the coast, according to the prevailing monsoon; its velocity is variable, sometimes reaching 3 knots.

Supplies of live stock to a limited extent are to be had, with some difficulty, as they are brought from three or four days' journey in the interior. Water is scarce and bad.

Warsheik point, situated about 15 miles north-eastward of Warsheik village, is fronted by a reef which extends north-eastward along the coast, attaining off the next point a distance of 3 miles from the coast. South-west of Warsheik point the coast is skirted by rocky ledges for about 9 miles.

COAST.—**Murot hill** is situated apparently about 10 miles north-eastward of Warsheik point.

ATHELET† is a village situated in the northern corner of a bight in the coast, fronted by narrow and detached reefs to the maximum distance of $1\frac{1}{4}$ miles. The entrance between the reefs, situated about $1\frac{1}{2}$ miles S. by W. of the village, is apparently about half a mile wide, with a depth of about 5 fathoms; within the entrance is a charted depth of 3 to 4 fathoms, and as the reefs fronting it are awash, there should be protection for small craft.

Tide.—It is high water, full and change, at 3h.; springs rise about 6 feet. The Zeriba, just northward of the town, from an Italian sketch survey, is in lat. $2^{\circ} 46' N.$, long. $46^{\circ} 22' E.$

See plan of Warsheik anchorage on No. 671.

† See plan of Athelet on No. 671: also chart, No. 597.

Ternate shoal, in lat. about $3^{\circ} 15' N.$, projects about 2 or 3 miles from a low point of land, which is otherwise destitute of any distinguishing marks. The ship *Ternate*, 1811, nearly ran upon this shoal, having had 18 and 20 fathoms close outside it, and not observing it until the sea was seen to break.

Daphne shoal lies in about lat. $3^{\circ} 56' N.$, and 4 miles from the shore: the weather being unfavourable, an accurate determination was not obtainable.

The least water obtained was 4 fathoms (low water), but as there was only time to pull across the shoal once, there may be less. Between the shoal and the mainland soundings of 11 fathoms were obtained, and 9 fathoms at $2\frac{1}{2}$ cables from the beach.

A dhow lay at anchor near the shore trading with the natives, who had erected temporary huts; they called the place Sharoti.

The coast between Ternate shoal and Ras Asswad is generally low and clear of danger.

Ras Asswad, or Black point, in about lat. $4^{\circ} 30' N.$, is a point of low black cliffs projecting from the sandhills over the beach into the sea. The land is low near it to the southward, but the elevated land to the northward may be seen at the distance of nearly 30 miles. This part of the coast is called by the Arabs Al Herab or the mountainous country. There are depths of 20 to 30 fathoms about 2 miles off, along this portion of the coast.

OBIAT,* a small village situated in lat. $5^{\circ} 19\frac{1}{2}' S.$, long. $48^{\circ} 30' E.$, consists of a large flat-topped white house with flagstaff, and several huts around. It lies in a shallow bight, protected from south-west winds by a point extending about 2 cables north-eastward of it. Two islets lie in the prolongation of the point, distant about 3 cables, with depths of $2\frac{1}{2}$ fathoms between them and the point, and also around them.

Dhows find shelter in the bight within these rocks, and there is room for a few close under the point in about 2 fathoms water in the south-west monsoon period.

At about 3 cables eastward of the rocks there is anchorage in about 5 fathoms, but there is no shelter. The German vessel of war *Hyane* anchored here in October, 1887, at which time there was a heavy

* See plan of Obiat, on No. 671; also chart, No. 597.

swell, necessitating a large amount of cable being veered. There is good landing under the house at all states of the tide.

Reef.—A projecting sand-down, in lat. $5^{\circ} 30' N.$, or about 12 miles north-eastward of Obiat, is faced by a rocky cliff, and has a reef extending 2 miles off, with a depth of 10 fathoms close-to.

RAS AWATH, a slight projection of the coast, is now charted in lat. $5^{\circ} 52' N.$; it is doubtful whether the shoal charted off the sand-down in lat. $5^{\circ} 30' N.$ does not apply to Ras Awath, which was formerly assigned to that latitude.

From Ras Awath some hills continue a short distance to the northward, thence the coast becomes low, with sandhills in places. It is known to the Arabs as Sef Tweel or low coast, and has depths of 10 to 18 fathoms at several miles from it, and 25 to 40 fathoms at from 9 to 10 miles distant. The German vessel-of-war *Hyane*, 1887, anchored off Al Bugh, in lat. $5^{\circ} 55' N.$, in 10 fathoms water, but could not effect a landing. The coast between lat. 6° and $7^{\circ} N.$ continues low and steep, but is fertile, and numerous flocks of sheep, goats, and herds of camel were seen. The village of Garad is charted in lat. $6^{\circ} 50' N.$ Northward of lat. $7^{\circ} N.$ it becomes high and rocky, with a deserted aspect, to Ras al Khyle.

RAS AL KHYLE (Moro Cobir or Serpent's head) is in about lat. $7^{\circ} 43\frac{1}{2}' N.$, long. $49^{\circ} 42' E.$ It is the northern of three distinct cliffs jutting out from the coast, about one mile apart, and forms the southern extreme of Negro bay, at the head of which is Wadi Nogal. Between the point and Wadi Nogal there are depths of 6 to 7 fathoms at one mile off shore.

The village of Al Khyle is situated about one mile westward of the point on a low part of the coast. It consists of from 30 to 40 huts, containing about 200 inhabitants. They form a portion of the Esra M'Hamud tribe, whose northern limit is Ras Mabber. They are a branch apparently of the Mijjertheyn tribe who inhabit the territory lying between Wadi Nogal and the gulf of Aden. The Osman M'Hamud tribe occupy the coast between Ras Mabber and Alula. The Esra M'Hamud tribe consist of several thousand people, whose territory extends about 15 days' journey inland. They possess large herds of cattle, sheep, horses, donkeys, &c., and dried shark forms a

considerable article of export. The dhows trading between Zanzibar and Arabia call here at the change of the monsoons, exchanging rice, sugar, tea, and cotton goods for the produce of the country.

Anchorage.—There is anchorage during the south-west monsoon under Ras al Khyle in about 6 fathoms, good holding ground, with the point bearing S. $\frac{3}{4}$ E., village W. by S., and mouth of Kolule river N.W. by N. Between this and the village the water shoals gradually, there being a depth of $2\frac{1}{2}$ fathoms off it. Landing in the south-west monsoon period is not difficult at the village, in native surf boats, which come off on the arrival of a vessel.

The wind blows with considerable force at this anchorage, and the heavy swell causes a vessel to roll violently, but it is not advisable to go farther in, as the sea appears to be worse there.

During the north-east monsoon period there is probably anchorage under cape Bowen, the north-east extreme of the bay. Close westward of this cape is a ravine, up which at about one mile distance there is supposed to be a spring named Ghobak.

Bank.—H.M.S. *Leven*, in hauling off shore for the night, shoaled the water from 19 to $6\frac{1}{2}$ fathoms when the north point of Ras al Khyle bore S.W. by W. $\frac{1}{2}$ W. about 6 miles; the water then deepened regularly to 26 fathoms on the edge of the bank, when the north point of Ras al Khyle bore W. $\frac{1}{2}$ N. about 8 miles. The German vessel-of-war *Hyane* (1887) reports a depth of about 6 fathoms, with the point S.S.W. about $1\frac{1}{4}$ miles, but she did not examine the spot.

Wadi Nogal.—The Kolule river entrance lies about 3 miles westward of Al Khyle village; it is quite dry and its mouth barred by sand in the dry season. There are a few huts near its mouth, with trees, shrubs, and pools of water in the ravine, but the coast itself is desolate.

Wadi Nogal is 10 miles or more northward from Al Khyle village; it forms a deep hollow in the coast hills in a south-east and north-west direction. Its entrance may be recognised by a red cliff, under which are two yellow points, with a dark round-topped hill at the back. There is a basin just within the entrance containing brackish water, but the water, where it enters the basin from above, is quite fresh; in October there was but a slight overflow to the sea.

From Ras al Khyle to Berbera, the Wadi Nogal, or the happy valley, extends in almost a straight line between two ranges of mountains. It is spoken of in the most glowing terms by the natives, and apparently forms their great road for trade; the people of Ogáhdén, Murreyhan, &c., bring all their gums, ivory and ghí along this valley, as being the safest and least fatiguing route, and the people are described as a peaceful race, who subsist chiefly by the chase, and by their sale of ostrich feathers, myrrh, and ghí or clarified butter. Berbera, in the gulf of Aden, is the principal port from which these products are exported.

COAST.—From Ras al Khyle the coast trends north-eastward for 120 miles to Ras Mabber; this part of the coast is rocky, varying from 200 to 400 feet in height, and is known to the Arabs as Hazine, or “rough ground.” There is a point in about lat. $8^{\circ} 25'$ N. covered with drifted sand, but the coast is everywhere equally sterile.

There are no known dangers off this coast, and there are apparently depths of about 20 fathoms at no great distance off the southern portion of it.

Winds.—The south-west monsoon ends at Ras al Khyle about mid-October, and after a few days variable winds and calms, and an easterly swell, the north-east monsoon usually sets in; but sometimes it is as late as the middle of November; it continues until mid-April, when the south-west monsoon sets in. *See page 35.*

Ras Mabber, also called cape Stand-off, in about lat. $9^{\circ} 24'$ N., is fronted by a reef upon which the sea breaks; the land in its vicinity is generally low. During the south-west monsoon period there is good anchorage in 6 fathoms on the north side of the cape, where dhows at times put in for water. Both north and southward of the point, the coast is steep, with deep water close-to; in places there are depths of about 16 fathoms at 2 cables off.

The name of the cape indicates the customary practice of the Arab coasters bound northward during the south-west monsoon, who always stand well off from this point in order to round Ras Hafún, and so prevent being embayed in the intervening deep bight.

The Coast from Ras Mabber trends nearly north, to the bight south-westward of Ras Hafún, for a distance of about 60 miles. Depths of from 20 to 30 fathoms are charted from 5 to 10 miles off this coast.

RAS HAFÚN,* or "The Surrounded," is a peninsula and prominent headland, 12 miles in length east and west, 8 miles in breadth north and south, and from 400 to 600 feet in height, rising in steep cliffs from the sea, and formed of sandstone and limestone. The extreme of the peninsula is perfectly flat, and the interior consists of undulating hills, deeply intersected by ravines and watercourses. The south-west point of the promontory of Hafún is high and flat, like a barn, whence it is called Barn hill; at a distance it appears separated from the rest of the peninsula, the land between being low.

Ras Hafún is connected with the mainland by a long narrow neck of white sand, shells, and mud, with a few stunted bushes thinly scattered along it, and from its being almost an island, probably takes its name of Hafún. On either side of the narrow neck of sand is formed a deep bay, with good anchorage, according to the season. There are only a few miserable huts, and a population probably of 50 persons; they are friendly to strangers, and may be trusted. The water in the wells is bad. Cattle and firewood are procurable.

Hafún South bay is best adapted for vessels during the north-east monsoon, but a change of two or three points in the direction of the wind causes a swell to roll in, and a surf to break on the beach. The bay is much frequented by the shark fishers from the Arabian coast, many of whom reside here throughout the year, merely moving their fishing boats to the other side of the isthmus as the monsoon changes.

The depths in the bay are regular, decreasing gradually towards the shore, with the exception of a 3-fathoms patch of sand situated about 7 cables off the north shore, with the west extreme of the table land N. by W. $\frac{1}{2}$ W. The best anchorage is in 6 or 7 fathoms, sand, at one to $1\frac{1}{4}$ miles from the head of the bight in the peninsula, with the south-west point of the peninsula bearing about S.E., distant $2\frac{1}{4}$ miles. On the seaward sides of the peninsula there are depths of 15 to 20 fathoms close in to the cliffs, increasing to 100 fathoms at a distance of 13 miles. The nature of the bottom is sand and rock.

Hafún North bay is clear of danger, and the depths are regular outside the 5-fathoms line, affording anchorage during the south-westerly monsoon in 7 to 10 fathoms, hard sand, but the

* See charts, Nos. 100a, 6a, and 597. From Ras Hafún to the end of the chapter see also the Red Sea and Gulf of Aden Pilot.

holding ground is not very good. Near the north-west extreme of the peninsula the shore must not be approached by large vessels within three miles, as depths of 3 to 4 fathoms extend nearly that distance from it.

There is shelter in this bay from southerly winds, but it is doubtful whether a vessel could ride in safety in the full strength of the south-west monsoon, owing to the heavy swell that must roll round the point, and the violent gusts of wind blowing across the headland. These gusts of wind render it necessary to be ready to shorten sail when standing close along the cape or coming to anchor under it.* Large quantities of fish may be caught by hook and line in this bay.

Khor Hurdia, on the north side of the isthmus of Hafún, is a harbour, $2\frac{1}{2}$ miles wide at its entrance, and 12 miles in depth. As an anchorage it is only available for boats, the depth of water inside being only from one to $1\frac{1}{2}$ fathoms. This is probably the most unhealthy spot on the Somáli coast; its shores and the bottom of the bay are covered with decomposed vegetable matter, which, on being disturbed, gives forth a noxious gas that is perfectly sickening; yet there are many fishermen living on the sea-shore who, from long habit, have become accustomed to the exhalations. There is no fresh water in the bay, but it is said by the natives that at Khor Hashera, at the bottom of the bay, there is a stream of fresh water running into the sea.

Trade.—During the south-west monsoon, a kind of fair similar to that at Berbera, though smaller, is annually observed at Khor Hurdia. The merchants from Arabia, and from the harbours to the westward of Ras Asír, attend this meeting at the end of May, when their dhows are hauled up on the beach; and a brisk trade is carried on throughout the south-west monsoon in gums, ostrich feathers, hides, ivory, and ghí; quantities of ambergris are also brought for sale.

Tides.—It is high water, full and change, at Hafún, at 6h. 15m.; springs rise 4 feet.

CAUTION.—Many vessels have been embayed southward of Ras Hafún in the night and in thick weather; caution is therefore

* See charts, Nos. 100a and 6a. H.M.S. *Forte*, in May, during a moderate gale from the southward, was anchored in $7\frac{1}{4}$ fathoms, with the north-west extreme of the peninsula bearing West, and dragged with 70 fathoms of cable out. H.M.S. *Nimble*, at anchor three cables S.S.E. from the *Forte*, also dragged, with 60 fathoms of cable out.

necessary when approaching it. (*See* pages 42 and 43 for precautions when rounding Ras Asír in the south-west monsoon period.)

The COAST from Ras Hafún to Ras Asír, a distance of 80 miles, trends nearly north, forming two large bays, which are separated by the bluff cape, Ras Ali Bash Kil; between the latter point and Hafún the shore of the bay is low and sandy, and thickly covered with bushes; at a distance of 3 or 4 miles in the interior is a range of flat table hills, elevated about 700 feet above the sea, which gradually approach the sea at Ras Ali Bash Kil.

The depths in the bay are regular, and shoal gradually towards the shore; the 10-fathoms line is about 4 miles from the shore of Hafún bay, decreasing to a quarter of a mile at the northern extremity; the edge of the bank, or line of 100 fathoms, is about 12 miles distant from the coast. The general nature of the bottom is grey sand and shells.

Water.—There appears to be a plentiful supply of water in this bay. At 5 miles to the northward of the entrance to Khor Hurdia is Handeh, a salt lagoon, except at the head, where it is barely drinkable. There is, however, a well of good water a few yards higher up. At Deligúbo, 8 miles north of Handeh, there is a well of good water; and 10 miles south of Ras Ali Bash Kil, in a valley formed in the table-land, there is plenty of fresh water, and the inhabitants are numerous.

RAS ALI BASH KIL is a prominent bluff headland, rising in a steep cliff 400 feet above high water, with a depth of 20 fathoms water at one mile distant.

Ghubbet Binna.—Between Ras Ali Bash Kil and Ras Jard Hafún the coast forms a bay named Ghubbet Binna; for the first 12 miles the shore is low, sandy, and thinly covered with bushes, backed by a range of tabular limestone mountains 2,700 feet in height, descending to the plain in steep precipices, and intersected by fertile valleys. North-westward of this range is Jebel Gúraleh about 5,000 feet in height and terminating at Ras Jard Hafún.

Immediately to the westward of Ras Ali Bash Kil, is Khor Binna, a salt water lagoon. At 12 miles to the southward of Ras Jard Hafún, and close to the beach is Khor Abdihan, another salt water lagoon, with fresh water in the upper part, where it is fed by a stream running from the valley.

There are no dangers in Ghubbet Binna beyond the 5 fathoms line, and the depths increase gradually from the shore, to 20 fathoms, which depth will be found at from 2 to 5 miles distance ; the general nature of the bottom is sand and shells off-shore, and rock close-in.

Anchorage.—There is good anchorage, in not less than 7 fathoms, and shelter from southerly winds, off the village in the south part of the bay, being free from the heavy squalls off the high land.

RAS JARD HAFÚN.—**Aspect.**—Ras Jard Hafún or Shenarif, is formed by the bluff termination of lofty table land, 2,900 feet in height.* This table land on its seaward face falls precipitously for about 400 feet, and immediately over the cape the ground from the foot of the precipice is much broken in its slope to the sea, with deeply-scored sides, and some remarkably formed rocks. The cape itself is rounded, rocky, and bold to approach, there being from 10 to 16 fathoms water close-to. It is in appearance a remarkably bold and rugged headland, especially when seen from the south-eastward. The land about it and to the southward is dark, and in great contrast with the whitish-brown colour of that between it and Ras Asir.

Quoin hill, 3,000 feet in height, about 10 miles southward of Jard Hafún, is a conspicuous mark from the southward ; and a rounded sandhill near the coast, at 17 miles southward of Jard Hafún, with a considerable tract of sand extending northward of it and well up the hills at the back, is also a good mark, being the only white sand in this neighbourhood. From Jard Hafún, northward, the high table land of which it is the extreme, takes a north-west direction for about 5 miles, at which distance there is a deep ravine, with a sharp peaked hill, 2,760 feet in height, northward of it. Between this peak and Ras Asír the hills recede still farther from the coast, the space between being occupied by an undulating light-coloured ground resembling hard sand, and rising in a gradual slope from the sea. It is this receding of the high land, combined with the light colour of the slope intervening between it and Ras Asír, that causes the difficulty of making out any land to the northward of Jard Hafún at night, and which has led to so many disasters.

Wadi Tohum is a fertile valley $4\frac{1}{2}$ miles north of Ras Jard Hafún, full of large mimosa trees, with a stream of water running through it. Near its entrance, which is apparently blocked up in the dry season,

* See sketches on charts, No. 100a and No. 6a.

are numerous habitations, and a cliff about 160 feet in height extends nearly one mile southward from it, beyond which the shore is sandy to Jard Hafún. Northward of Wadi Tohum, to near Ras Asír, the shore is sandy, with the exception of a small cliff about midway.

RAS ASÍR (CAPE GUARDAFUI), the north-eastern point of Africa, 10 miles northward of Ras Jard Hafún, is a precipitous rocky cape 780 feet in height, of a whitish brown colour, and when seen from the south-eastward appears with a moderate slope towards the sea; the land westward of Ras Asír is a level ridge, the sandhill at 3 miles distant being apparently the end of it. This sandhill is in no way remarkable from the south-eastward, being but little above the ridge. About 3 miles further westward is a steep bluff, forming the eastern extreme of a range of hills facing the north coast, and not far back from it. The cape is frequently enveloped in thick haze, rendering it deceptive in estimating its distance. Approaching from the north-eastward Ras Asír may be known by the light coloured sand on the top, and the sandy bay to the westward. There is a depth of 12 fathoms close in-shore, and increasing gradually to the 100 fathoms line at the distance of 18 miles; to the northward the 100 fathoms line is only $2\frac{1}{2}$ miles from the shore.

Current.—Care is necessary in making Ras Asír from the southward during the south-west monsoon, the current setting up the coast strong to the northward, and close round the cape to the westward; but at a short distance it continues its course to the northward and eastward. *See* a full description of the current, page 35, and precautions when rounding Ras Asír, pages 42, 43.

Tides.—It is high water, full and change, at Ras Asír, at about 6h. 15m.; springs rise 6 feet.

For coast westward of Ras Asír, *see* Red sea and gulf of Aden pilot.

See charts, Nos. 100a and 6a.

CHAPTER XII.

ISLANDS AND DANGERS IN THE MAIN ROUTE THROUGH THE
MOZAMBIQUE CHANNEL.*

VARIATION IN 1897.

Europa island - - -	18° 0' W.	Johanna, Comoro islands	10° 10' W.
Juan de Nova island -	13° 10' W.	Mayotta, „ „	10° 10' W.

EUROPA ISLAND.

EUROPA ISLAND, situated in the fairway of Mozambique channel, is circular, about 4 miles in diameter, from 50 to 80 feet high, and visible from 12 to 15 miles. Its north-east point is in lat. $22^{\circ} 19\frac{1}{4}'$ S., long. $40^{\circ} 27\frac{1}{2}'$ E. The island was annexed by the French in 1897.

The island is sandy, with low hummocks in places, and for the most part covered with dwarf trees, bushes, rushy grass, and a few small casuarina trees.

The east side presents low perpendicular cliffs, and is apparently steep-to; off the north-east point, however, a reef extends half a cable, with depths of 12 to 18 fathoms, at one cable distant from it.

On the north side is a coral flat, which dries at low water springs, and extends from a quarter to half a mile from the island, except towards the north-west point, where it terminates. The flat is steep-to, with no bottom at 30 fathoms at the distance of one cable; it shows well towards low water. Inside this flat is a large lagoon, with depths of 4 or 5 feet at low water, and well stocked with fish.

The north-west point is sandy, with low bushes, and a rocky ledge extending from one to 2 cables. The west side is rocky, but apparently steep, with a considerable surf on the beach at times.

* See Bassas da India and Europa island on chart, No. 851, with sketch; also chart, No. 597.

The south side of the island is low, and a reef is said to extend one mile or more off the south-west side, but this appears to be doubtful.

Anchorage.—There is no safe anchorage, but vessels may let go their anchor on the edge of the coral reef, on the lee side of the island. There is a small spot with 7 to 10 fathoms, close southward of the north-west point, but it is very close to a depth of $2\frac{1}{2}$ fathoms; also at a cable distant from the reef extending from the north point there are depths of 12 to 18 fathoms.

Landing.—At the north-west point there is a small extent of steep beach, with good landing in moderate weather; landing at times may also be effected between the rocks on the west beach.

Supplies.—There are some goats on the island and plenty of turtle, in the season; water may probably be dug from under the casuarina trees. There are no permanent inhabitants, but the island is occasionally visited by traders for its orchilla weed; there is a hut on the beach at the north-west point used by them.

Current.—H.M.S. *Flying Fish*, in visiting this island in the middle of November, 1875, was drifted to the northward by the current; when near the island, its direction was to the north-west with a velocity of from 2 to $2\frac{1}{2}$ miles an hour, causing strong tide-rips, whirls, and in places almost a race. The current in this neighbourhood is exceedingly variable, both in direction and force, rendering constant observations necessary, to ensure the correct position of a vessel.

BASSAS da INDIA, sometimes named Europa rocks, was discovered by the ship *Europa* in 1774.

It was examined in 1878 by Commander Wharton, H.M. Surveying ship *Fawn*, whose observations place the east point of the reef in lat. $21^{\circ} 27\frac{1}{4}'$ S., long. $39^{\circ} 45\frac{1}{2}'$ E.

Bassas da India is a circular reef about 9 miles in diameter and steep-to, enclosing a shallow lagoon; some rocks from 7 to 10 feet high, are situated on the north and east sides of the reef; the west and south sides dry 4 feet at low water, and most of the remainder is dry at that time. Several anchors lie on the reef, all that remains of former wrecks. Soundings of 720 fathoms, sand, were obtained at

See Bassas da India and Europa island on chart, No. 851, with sketch; also chart, No. 597.

one mile from the west side of the reef; 470 fathoms, sand, one mile from the north side, and 200 fathoms three-quarters of a mile from the south side.

The sea breaks on the reef.

Pilot shoal was reported in 1850 by Captain White, of the American whaling barque *Pilot*, in lat. $21^{\circ} 10'$ S., long. $38^{\circ} 57\frac{1}{2}'$ E. The vessel at 7.30 a.m. on January 5th passed over the end of a shoal with, it was assumed, not more than 3 fathoms on it, as the bottom was distinctly seen; at the same time several patches to windward were observed, which looked shoaler; the whole extent of the shoal was estimated to be $1\frac{1}{2}$ to 2 miles. This shoal ground was said to lie N.W. by W. $\frac{3}{4}$ W. by compass, distant 35 miles from Bassas da India, but this position does not agree with the lat. and long. given by Captain White; assuming that the lat. and distance from Bassas da India are correct, then the bearing is probably a true one.

In this locality, namely N.W. by W. $\frac{3}{4}$ W. (true) 35 miles from Bassas da India, an unsuccessful search, extending over a period of four days, was made by Commander Wharton in February 1878. The weather was favourable and the water clear, but no bottom could be obtained within distances of 5 to 15 miles on all sides of the reported position of the shoal, nor could any sign of shoal water be seen from the masthead. A depth of 1,620 fathoms, gray ooze, was obtained 3 miles south-eastward of the alleged position of the shoal.

JUAN DE NOVA ISLAND.

JUAN de NOVA ISLAND,* the centre of which is in lat. $17^{\circ} 3\frac{1}{2}'$ S., long. $42^{\circ} 46'$ E., is low, flat, sandy, and covered with shrubs, some of which are cotton bushes. It is about $2\frac{1}{2}$ miles in length, about 15 feet in height, and the rendezvous for great numbers of aquatic birds in the breeding season, the south-west monsoon period. The island should be carefully avoided at night. A few stunted trees fringe the cliffs, which are about 30 feet in height, and higher than the centre of the island, and visible from a distance of 10 miles. A solitary cocoa-nut tree marked its north extreme in 1878. The island was annexed by the French in 1897.

Reef.—The reef fronting the north shore dries off nearly half a mile at low water springs; at half a mile or more beyond it are

* See chart:—Madagascar, west coast, cape St. Andrew to cape St. Vincent, No. 759; also No. 597. For islands and dangers eastward of Juan de Nova, see Sailing directions for Islands in the Indian Ocean.

several rocky patches of 5 fathoms and less, some of which break at low water, with deep water a short distance beyond them. Breakers extend $1\frac{1}{2}$ miles or more off the east and west extremes of the island, and should be given a wide berth. There is said to be a reef bordering the south shore, but H.M.S. *Penguin*, 1888, found no bottom at 90 fathoms about a quarter of a mile off this shore.

Anchorage.—A bank, with depths of 8 to 12 fathoms, extends about 4 miles northward of Juan de Nova; it affords good anchorage during the south-west monsoon period, under the lee of the eastern end in 8 to 10 fathoms, sand, at $1\frac{1}{2}$ to 2 miles from the island.

From the edge of the bank the bottom is plainly visible and continues tolerably level, till about one mile of the shore, where patches of rocks may be met with, as before mentioned. Between the south side of the island and the encircling reef, there is a sheltered anchorage for boats, with 4 feet water.

Landing in moderate weather is easy at high water, on the sandy beach on the north shore, as the swell gradually lessens as the island is approached; at low water the reef dries off a considerable distance, with breaking patches beyond.

Supplies.—There is apparently some water on the island, as H.M.S. *Penguin*, November, 1888, found a party of 50 natives of Madagascar on the island, who had been there four months catching turtle, and who stated there was fresh water to be had in the centre of the island. Fish is fairly plentiful on the bank.

Shoal water may exist in the vicinity of lat. $17^{\circ} 35'$ S., long. $42^{\circ} 42'$ E., or about 30 miles S. by W. $\frac{3}{4}$ W. from Juan de Nova, as, according to the report of the Captain of the *Fabert* in 1879, the vessel was struck by a heavy sea during moderate weather.

A patch of 10 fathoms is charted in lat. $18^{\circ} 10'$ S., long $42^{\circ} 16'$ E., or about 45 miles south-westward of the doubtful shoal.

ST. LAZARUS BANK.*

General remarks.—St. Lazarus bank was formerly much misplaced on the charts owing to the erroneous positions of the few vessels which had struck soundings on it in passing. Some doubted

* See chart of the Comoro islands with the adjacent coasts of Africa and Madagascar, No. 2,762.

its existence altogether, in consequence of finding no bottom over almost the entire space assigned to it on the charts, but any doubt on this subject was set at rest by the fact of H.M. ships *Frolic* in 1855, and *Cyclops* in 1861, having anchored on the bank. H.M.S. *Penguin* in 1851, and the barque *Empress* in 1859, also obtained soundings on the bank.

Two vessels are said to have grounded on this bank; the ship *Reliance* in 1833, and the slave barque *Charles et George* in 1857; the latter vessel laid out an anchor in 17 feet water to heave off.

The question has now been set at rest by an examination, which lasted six days, made by the boats of H.M. Surveying Vessel *Stork*, Commander T. F. Pullen, February 1889. From this it appears that, the area of the bank within the depths of 100 fathoms is of oblong shape, 11 miles in length north and south, with an extreme breadth of 6 miles, and is included between the parallels of $12^{\circ} 7' S.$, and $12^{\circ} 17' S.$, and long. $41^{\circ} 20' E.$ and $41^{\circ} 26\frac{1}{2}' E.$

Beyond the depths of 100 fathoms the depths increase rapidly; at 6 miles north-east of the shoalest part 1,080 fathoms was found, and at 14 to 20 miles eastward of the shoal part, 1,308 and 1131 fathoms were obtained.

Shoal head.—The general depth was found to be under 20 fathoms, the nature of the bottom being sand and coral. The shoalest part within the depth of 10 fathoms is near the northern end of the bank, and is about 4 miles in length in a north-west direction and 2 miles in breadth; the least depth found, $3\frac{1}{2}$ fathoms, being confined to a small coral patch in lat. $12^{\circ} 8' S.$, long. $41^{\circ} 21\frac{3}{4}' E.$

Fish in abundance were caught on the bank.

Having regard to the nature of this examination it is considered that the several shoal soundings hitherto reported on or near St. Lazarus bank fall within the area now assigned to it.

In bad weather the sea on any shoal spot would probably break. The lead, however, will give warning of an approach to any dangerous part, and with a proper look-out no risk will be run in passing this bank by day; but at night large vessels will do well to avoid it, and should they strike soundings it will be advisable to anchor without delay until daylight.

See chart of the Comoro islands with the adjacent coasts of Africa and Madagascar, No. 2,762.

Tides.—Current.—A regular tide was observed when at anchor on the bank, the flood setting E.S.E. about 4 hours, and the ebb W.N.W. about 7 hours, with about half an hour slack water; the strength at springs was 2 knots; the rise and fall, approximately, 12 feet. It is probable that at a little distance from the bank, and when out of the influence of the tidal streams that exist upon it, the current varies in direction and velocity at different times of the year.

The Telegraph Construction and Maintenance Co.'s steamer *Seine*, in August 1885, experienced no current when in the vicinity of the bank.

THE COMORO ISLANDS.

General Remarks.—The Comoro islands, four in number, lie nearly midway between the north extreme of Madagascar and the African coast; Comoro, the largest and highest of the four, giving its name to the group; the others are Johanna, Mohilla, and Mayotta, all of which are high and of volcanic origin. These islands, except Mayotta, are generally safe to approach, with clear passages between them; but Mayotta is the only one that affords secure anchorage at all times. The inhabitants are a fine race of people.

The islands are under a French Protectorate.

Winds.—The prevailing winds at the Comoro islands are the north-east monsoon and the south-east trade wind. The former, beginning at the end of October or early in November, is the period of greatest heat and the rainy season. During this period the wind is variable and irregular, with frequent squalls. The south-east trade, on the contrary, is regular, blowing softly from the south-east, but occasionally fresh, especially during the month of July, shifting to south-west at night. There are occasional showers during this season. The change of the monsoons is marked by calms, variable winds and squalls of wind and rain of short duration. It must be borne in mind that occasionally a cyclone from the Indian ocean passes into the Mozambique channel, and it is not impossible that one may reach to the Comoro islands; seamen, therefore, should be on their guard, especially during the months of February to April. See also winds at Johanna, page 579.

See chart of the Comoro islands with the adjacent coasts of Africa and Madagascar, No. 2,762.

Current.—The current between Lazarus bank and the Comoro islands averages about $1\frac{1}{2}$ knots in a westerly direction ; a little north-westward of the Comoro group, in December, it has been found setting with a velocity of from 2 to 3 miles per hour in a direction nearly West. In the vicinity of Mayotta island the current is very variable. This island appears to be to the southward of the general westerly stream which flows past Johanna. Between Mayotta and Johanna the current is generally south-westward, but at times sets south-eastward with considerable strength. About the south end of Mayotta an easterly current is common.

Climate.—The Comoro islands, with the exception of Mayotta, may be considered healthy. *See* remarks with the different islands.

Rain.—The rainy season is from November to March ; but the mountains probably throw down the rain at all seasons on the weather side ; at Pomoni, south side of Johanna, the rain is incessant in May.

Communication.—The Messageries Maritime line of mail steamers between Réunion and France call at Mayotta monthly ; these steamers also call at ports in Madagascar. Many dhows trading between Madagascar, Mozambique, and Zanzibar touch at Mayotta. *See* also p. 16.

VAILHEU SHOAL* is situated on the eastern side of the fairway of the northern approach to Mozambique channel, and about 12 miles W. $\frac{1}{4}$ S. of Mantzeza hill at the south-west point of Comoro island. It is about one mile in extent, steep-to, and reported to be dry in places at extreme low tides. Depths of 4 to 10 fathoms surround the shoal in most places to the distance of about half a mile. It does not always break in calm weather, but the water over it is of a light green colour, and it may be discerned at some distance from aloft, with the sun in a favourable position.

It is situated in lat. $11^{\circ} 47\frac{1}{2}'$ S., long. $43^{\circ} 3'$ E.

When near the parallel of the south end of Comoro at night, vessels should keep to the westward of the meridian of 43° E., in order to avoid Vailheu shoal.

* *See* plan of Comoro island (Grand Comoro), on No. 563.

COMORO ISLANDS.*—General remarks.—Comoro, the northernmost as well as the largest and highest island of the group, is about 35 miles in length, north and south, and about 12 miles in breadth. The principal anchorages are Maroni and Itzandha, on the west coast. See pages 569, 570.

Comoro is divided into several districts, each governed by a chief or Sultan, under the French Protectorate. The vicinity of every village is cultivated with cocoa-nut trees, and the valleys are richly covered with trees and vegetation. The island is remarkably healthy, sickness being scarcely known.

Mount Kartala, 7,874 feet in height, the highest part of Comoro island, is situated about 8 miles from its southern extreme. 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: in clear weather it may be seen at over 100 miles distance.

The whole island is volcanic: an eruption is said to have occurred about the year 1830, and again in 1855; in this latter eruption the lava issued from several old places, and also on the more eastern part of the island; it then had the effect of driving several dhows on shore, and of casting a great quantity of fish upon the coasts. Another eruption took place in 1858, on which occasion the lava flowed out of the side of the mountain into the sea on the west coast, between the towns of Maroni and Itzandha, which being only 3 miles apart, thus narrowly escaped destruction. As late as 1861 the lasting effects of this eruption could be seen; all trace of vegetation was destroyed where the stream of lava had passed, and a projecting black point of lava which previously had no existence, had been formed about a mile to the northward of Maroni.

At the south-west point of Comoro, ignited sulphurous vapours are said frequently to issue from the crevices in the ground, showing as lights at night to vessels when passing close. H.M.S. *Undine*, on 1st March 1883, when off the south point of the island, observed an eruption break out which lasted three days; lava was noticed running down the mountains in red hot streams, and immense clouds of scorïæ were flying about.

* See plan of Comoro island (Grand Comoro), on No. 563. The information relative to Comoro island, from the north-west point round by north and east to the south-west point, is by Com. Wharton, H.M. Ship *Fawn*, 1878.

NORTH COAST.—**Ras Baku**, the north point of Comoro island, is in lat. $11^{\circ} 21\frac{1}{2}'$ S.; long. $43^{\circ} 22'$ E. All the north shore is low, but rises suddenly within towards the mountains, which are topped by numerous peaks and craters. A reef, partly dry at low water, was formerly said to extend off the north-west point for the distance of three-quarters of a mile, but this is not borne out by the plan; the north shore is fringed by a reef to the distance of about 2 cables.

Mtamuhuli.—**Anchorage.***—The town of Mtamuhuli, fronted by a sand beach, lies close to the north-west point, and is next in size to Maroni and Itzandha. A sand flat with less than one fathom water fronts the shore to the distance of about 3 cables.

There is anchorage in about 30 fathoms at a quarter of a mile off the flat, with the flagstaff bearing E. by S. $\frac{3}{4}$ S. distant $1\frac{1}{10}$ miles, but it is not a desirable one, on account of the great depth of water and tide rips. There is considerably less water in the direction of North point, but possibly the bottom is foul there. A plentiful supply of good water is obtainable, and landing is easily effected at three-quarters flood, on the sandy beach abreast the village.

Springs rise about 11 feet, and the time of high water will probably not differ from Johanna which is 4h. 30m. at full and change.

Bangúa.—About 2 miles eastward of Ras Baku is Ras Habu, a rocky promontory, 250 feet high, joined to the shore by a low neck; the town of Bangúa is situated near it.

THE EAST COAST† of Comoro island is straight, and the water apparently everywhere deep. The mountain ridge slopes to the water's edge with but little level land, and there are several lava streams.

Near the north-east extreme of the island (possibly within the reef extending off Tortues island), there is said to be a small dhow harbour in which those vessels may lie in safety even during the north-east monsoon period.

There is a table-topped hill on the east coast 1,640 feet in height, and a lava cliff $4\frac{1}{2}$ miles northward of it; for other information, see the plan, No. 563.

* See plan of Mtamuhuli, on No. 2,066

† See plan of Coromo island, No. 563.

Mbajini is a walled town about two miles northward of the south-east point, and is said to be one of the largest in the island.

The south-east point is low, with a cone-shaped crater near its extremity and a mosque at Mahate northward of it. The point is here bordered by a narrow reef which extends nearly half a mile off, and steep-to beyond. Inland are sharp cone-shaped peaks rising from the southern spur of the summit of the island.

THE SOUTH COAST of Comoro island is also low, with flat land within, the hills beginning to rise at $1\frac{1}{2}$ miles from the coast.

At the south-west point the land rises rapidly from the water's edge, without a break, to the summit of the island. There is a village close to the sea a little eastward of the south-west point.

The south coast is rocky and steep westward of Shindini, and the country vessels frequently sail along within speaking distance of the shore.

Shindini.—Anchorage.*—Southward of the south-east point of the island is the village of Shindini; dhows find an anchorage here inside the reef fronting it; the passage through the reef is narrow, and situated a little southward of the village. There is a patch of $3\frac{1}{4}$ fathoms steep-to in the anchorage, with the white house in the village bearing N.W. $\frac{1}{2}$ W. nearly 6 cables; and anchorage in about 18 fathoms south-westward of the patch at about 2 cables off the shore reef.

THE WEST COAST is said to be bold of approach, and to have no anchorages, except Maroni and Itzandha; there are several villages along it.

Mantzeza hill, better known as Round hill, situated about 2 miles southward of Iconi, is remarkable; it is about 700 feet high, and presents a bluff face to seaward. The village of Mantzeza is situated on the south-east side of the hill. When seen from the westward this hill alters its aspect; it then appears to be an oblong hill with small ravines from top to base, as if it had been ploughed.

Sunken rocks extend about one-third of a mile off shore at about one mile southward of the hill; from thence a reef fringes the

* See plan of Shindini, on sheet of plans, No. 2,066; also plan of Comoro island, No. 563.

shore to about the same distance northward to Iconi, and at a less distance northward to Maroni.

Iconi hill, when seen from the southward, appears like a saddle ; when seen from the westward, it presents two peaks with a deep hollow between them ; there are the ruins of a white stone building on the apex of the northern peak. Just to the southward of and under the hill will be seen the town of Iconi.

Northward, to Maroni, the coast is low. Between Maroni and Itzandha, a distance of $2\frac{1}{2}$ miles, the coast is rocky and steep-to, and about a mile to the northward of Maroni a low black point projects, forming the northern extreme of Maroni bay ; this point was produced by an eruption of lava in 1858. At about one mile northward of Itzandha a walled town will be seen some way up the side of the mountain. For the coast from Itzandha northward, *see* the plan.

MARONI BAY,* on the west coast of Comoro island, is half a mile wide and about a quarter of a mile deep, but it is occupied by a shallow flat of coral and sand, steep-to, extending out to about the line of its entrance points.

Beacon.—Abreast the north end of Maroni town lies Suadzu islet, connected with the shore at low water.

A pole beacon surmounted by a cage, painted white, stands on Suadzu islet, as a mark for the anchorage.

Anchorage.—Abreast Suadzu, with Iconi hill bluff seen just open west of the trees of the south point of Maroni bay, there is a depth of 12 fathoms at about 120 yards from the edge of the shore flat. There is a depth of 12 to 18 fathoms at $1\frac{1}{2}$ cables off the edge of the flat ; the Sultan's flagstaff in line with the beacon on Suadzu bearing S. 48° E. leads into it ; vessels should proceed very slowly as the depths decrease so rapidly ; strangers will do well to send a boat in previously to find a berth, and anchor as a guide.

Dhows pass to the head of the bay at high water and lie aground ; there is good landing here.

This anchorage is protected from the violence of the southerly wind and swell by Iconi hill, but it is too close to the rocks for a sailing vessel to get out, if the wind comes in from the westward ; and in the northerly monsoon it is worse.

* *See* plan of Maroni bay, on chart, No. 2,762.

The town of Maroni stands at the head of the cove, and is surrounded by a wall ; it is chiefly composed of detached huts, with narrow streets ; besides the huts there are several substantial stone buildings. The Sultan of Maroni is one of the principal chiefs in Comoro.

Supplies are cheap and plentiful, particularly cattle, which are exported to the other Comoro islands. Water, however, is scarce, and said to be so all over Comoro.

Tides.—It is high water, full and change, at Maroni at 4h. 53m. ; springs rise 10 feet.

ITZANDHA BAY and town are situated about 3 miles northward of Maroni, the two bays being somewhat similar. The anchorage, like that of Maroni, is very indifferent, being deep and close to shallow water ; vessels should not anchor in less than 20 or 25 fathoms, which depth will be found about midway between the extreme points of the bay. There is a good landing at the head of Itzandha cove.

Itzandha is walled in, like Maroni, and is about the same size. There is a village northward of the town, and at the north extreme of the bay, at the head of a small inlet, there is a well.

MOHILLA or MOHÉLI ISLAND—**General remarks.***—Mohilla, 2,050 feet in height, is the smallest and least elevated of the Comoro islands, being about 16 miles in length east and west, by 10 miles maximum breadth north and south ; some small islands lie about 3 miles from its south coast. The island is well wooded, being covered with trees to the summit. On the east side the land is low near the sea, rising gently to the mountainous ridge extending through the middle of the island, which has no peaks, and appears capable of cultivation to its summit. The natives are a peacefully disposed people, very similar to those of Johanna, but the population is not large. The island is very fertile ; coffee and spice trees grow luxuriantly, and cocoa-nuts abound. Cattle are good and cheap.

Fumboni, on the north-east side, is the principal town and the residence of the Sultan. As before stated, all this group are under a French Protectorate.

* See plan of Mohilla island, on No. 563.

Muchaco islet or White rock lies about 4 miles eastward of the south-east end of Mohilla; it is about 98 feet in height, flat-topped with steep sides, except to the westward. There is a good channel with depths of 10 to 12 fathoms between it, and Mianga islet to the westward.

The **East coast** of Mohilla is nearly straight, with depths of 8 to 14 fathoms at one to $1\frac{1}{2}$ miles off, and 14 to 17 fathoms from $1\frac{1}{2}$ to 2 miles; it appears to have anchorage everywhere at these distances, but it should not be approached within one mile.

Table bluff (or square top), situated about midway between the south-east point and Fumboni, is steep-to, with good anchorage close northward of it.

FUMBONI BAY,* in which is situated Fumboni, the principal town, lies 6 miles south-eastward of the north point of the island. The shore of the bay abreast the town is fronted by a reef to the distance of half a mile, with detached rocks and shallow water for about one cable beyond; two breaks in the reef afford shelter for small craft, of which the easternmost, off Tsoa, the landing place, is the larger.

Fumboni, formerly known as Duéni, is a brown, dull-looking town close to the beach, in the western part of Fumboni bay. The Sultan's residence is near the centre of the town. Near the north-west corner of the town, facing the beach, is a sugar factory with white chimney; the house of the manager, with a square tower and flagstaff, adjoins it. These are conspicuous from seaward, having the appearance of a casemated barrack. The place is not particularly healthy.

Position. — The Sultan's residence is in lat. $12^{\circ} 16\frac{1}{2}'$ S., long. $43^{\circ} 45\frac{1}{2}'$ E.

The **Anchorage** off Fumboni is good during the southerly monsoon, although at times there is more swell than would be expected under the lee of the island; during the north-east monsoon there is a considerable swell, and being a lee shore it is not safe.

A patch of $4\frac{3}{4}$ fathoms lies with the flagstaff bearing S. 45° W., distant $1\frac{2}{10}$ miles.

The flagstaff bearing S. 41° W. will lead in westward of the patch to the anchor marked on the chart in 7 to 8 fathoms, at about 2 cables

* See plan of Fumboni bay and road, on No. 2,066.

outside the edge of the shallow water, and about $8\frac{1}{2}$ cables from the flagstaff. The anchorage is considered good in these depths, but large vessels are recommended not to go within the depth of 9 fathoms. The anchorage should be approached with caution.

Duéni cove is a dhow harbour formed by the coral reefs. The entrance between the reefs is narrow and said to be obstructed by a central coral shoal, but this does not appear on the new plan from the French. The Sultan's flagstaff, bearing S. 36° W., apparently leads in clear. Inside the harbour there is not room for anything larger than dhows to swing.

There is a landing place in this cove; it is inconvenient at low water, owing to the sandy beach stretching out very flat, when boats cannot approach within 250 yards of the dry beach. When there is much surf on the reef the entrance to the cove shows plainly, but if only breaking occasionally some care is necessary not to miss the entrance.

The best landing, and the best place apparently for small craft in the southerly monsoon period, is in the break of the reef off Tsoa, a mile to the eastward; this inlet is about 2 cables in extent, with a depth of 4 fathoms. (This information is taken from the plan.)

Tides.—It is high water, full and change, at Duéni at 4h. 30m.; springs rise 13 feet.

NORTH and WEST COASTS.*—Between Fumboni bay and Oani, the north point of Mohilla, the coast is said to be skirted by a reef, with a boat passage inside it, but this does not appear on the plans. There is a black rock always above water about one mile south-west of Oani point, with a depth of 12 fathoms about one mile north-westward of it. Chiconi rocks, under water, lie about $1\frac{1}{2}$ miles south-westward of the black rock, and there is a rock above water off Miringoni, the point to the southward.

Anchorage.—There is anchorage on the bank fronting the shore between Fumboni bay and the north point of the island, abreast Batsé village, and also westward of the north extreme, abreast Domoni village. The depths at these anchorages are tolerably regular, from 8 to 14 fathoms at $1\frac{1}{2}$ miles from the shore. There appears to be a good watering place at or near Domoni,

* See plan of Mohilla island, on No. 563.

available for boats ; the stream is situated in a ravine about 200 feet above the beach, by an easy ascent. Boats can land near it between half flood and half ebb.

From Miringoni the west coast forms a bight, in which lies an islet close to the shore, near Luola ; from thence southward to the south-west extreme of Mohilla a reef fringes the shore to the distance of half a mile in places, and is steep-to.

Tidal streams.—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.

THE SOUTH COAST.—Islets and dangers.—The south coast of Mohilla has a chain of volcanic islands near its south-western part, from 2 to 3 miles off, with depths within them of 15 to 30 fathoms, sand and shells, on their northern sides. They are named Magnuni, Kanzuni and Naussi, which are joined together, Chumadini, Sanzi, Mbuhu, Moa, and Foro, the last three being very small.

The north, north-east, and a part of the west sides of Chumadini and the north end of Sanzi have fringing reefs ; off the south end of Sanzi is an islet perforated with round holes, and is steep-to. Mbuhu has a rock which covers at high water near its south point.

Sail rocks, possibly 50 feet in height, being visible about 10 miles, stand on the reef which extends one mile southward of the south-west extreme of Mohilla ; Numa Choa and the bight eastward is fronted by a reef to the same distance. Flat rocks, 13 feet high, lie off shore in the bight between, which is fringed by a reef to about 3 cables in places. Eastward of Foro island, the shore is fronted by a reef to the distance of $1\frac{1}{4}$ miles.

NUMA CHOA HARBOUR, on the south side of Mohilla, is a bight in the coral reef fronting the bay south-east of the town. It is about 2 cables in width, with depths of 6 to 10 fathoms, partly protected to the south-eastward by Moa island, which lies off its entrance, and to the south-westward by the other islands ; a swell sets in with south-easterly winds, but there is little danger of dragging.

In the northerly monsoon period it affords complete shelter. At this latter period it is frequently crowded by dhows trading between

Zanzibar and Madagascar, but in the south-west monsoon period some make Fumboni their port of call. A good position for anchoring is in about 10 fathoms, sand and mud, with Numa Choa point N.W. by W. $\frac{1}{2}$ W., and the extremes of Choa Moa South and S.S.E.

Directions.—Approaching from the westward, steer in with the south extreme of Foro islet in line with the north extreme of Moa; this leads between Mohilla and its outlying islands. Foro islet may be known by having a peculiar rent near the south end, whilst the north point forms a pillar. Moa should apparently be passed at the distance of 2 cables or less, to avoid the reef extending from Numa Choa point. After passing Moa, the high red cliff at Numa Choa point will be observed; bring the west end of the cliff, which is a bluff with some large mango trees on a sandy beach below it, to bear N.W. by W. $\frac{1}{4}$ W.; this will lead into the harbour.

With the bluff on this bearing, a peaked hill situated about one mile eastward of Miremani bay, will be seen just open of the bluff; this hill must not be shut in until Mbuhu island is well open of Sanzi island, when the course can be altered to the northward, and the vessel anchored in 8 to 10 fathoms. There appears to be no bottom with the hand-lead until near the entrance to the harbour.

The reef around the harbour is steep-to, and can generally be seen from aloft.

Approaching from the eastward, if bound to Numa Choa, pass the south-east end of Mohilla at 2 or 3 miles distance, and follow the south coast until Sail rocks (off the south-west extreme of Mohilla) are open southward of Moa island N.W. by W. $\frac{1}{2}$ W. (Moa is a small but high conical island with a flat top.) This mark kept on will clear the reefs which front the south-east shore of the island, to abreast Foro; when Foro island bears North, steer midway between it and Moa; thence Numa Choa red cliff bearing N.W. by W. $\frac{1}{4}$ W. will lead to the anchorage, as before.

The Town of Numa Choa, situated to the westward of the harbour cliffs, is a walled town of considerable size, and fronted by a sandy beach. The principal trade is in cocoanuts, which are sent to Madagascar. The natives appear to be good artificers.

Supplies.—There are several convenient watering places on the south side of Mohilla; one of them is at the head of Numa Choa harbour. The beach on Moa island is very convenient for hauling up or repairing boats, &c.; fair seining can be had here, and men can bathe with safety as there are no sharks.

Tides.—It is high water, full and change, at Numa Choa at about 3h.; springs rise about 14 feet.

Miremani bay lies half a mile eastward of the south-west point of Mohilla, and $3\frac{1}{2}$ miles westward of Numa Choa. It is said to be a well sheltered anchorage in 10 to 20 fathoms, sand and mud, being protected on each side by coral reefs, which extend from 4 to 6 cables off shore. On the western reef, at rather less than a quarter of a mile from the shore, there are the two Sail rocks with perpendicular sides, and to the eastward the isolated Flat rocks, before mentioned.

Bank.—A depth of 15 fathoms is charted $2\frac{1}{4}$ miles N.W. by W. of Magnuni island. H.M.S. *Undine* anchored in 18 fathoms upon this bank, with the west extreme of Mohilla bearing N.N.E., and the south extreme of Kanzuni island, S.E. by E. Upon weighing, the following morning, soundings from 16 to 10 fathoms were obtained and carried to an anchorage off Chumadini.

JOHANNA or ANJOUAN ISLAND.*—General remarks.
—Johanna is next to Comoro in size and in height, but far surpasses it in beauty and fertility: in form it is triangular, each side averaging about 20 miles in length; the east side trends nearly north and south, and the north-west side forms a deep bay where the principal town is situated. This island as seen from the westward is a succession of peaks one rising behind the other; all are wooded to the top.

When first seen from the eastward it makes in two peaks.

Johanna is governed by a Sultan, who resides at the town of Johanna on the north-west side, under a French Protectorate. The natives are hospitable and well disposed; they are of Arab origin, but the lower orders are much intermixed with the African race;

* See plan of Johanna island, on No. 563.

the Swaheli language is fairly understood here. The population of the island in 1882 was from 15,000 to 16,000.

The Climate of Johanna is on the whole healthy, the shores being nearly everywhere free from mangrove swamps. The cruisers formerly on this station considered this island a sanitorium as compared with the other parts of East Africa.

Trade.—The export from Johanna is chiefly sugar, though there is not much land suited for its growth; what has been produced is of excellent quality. Coffee is also cultivated, the climate and soil being well adapted for it.

Johanna peak, situated near the centre of the island, is 5,250 feet above the sea, of conical form, and nearly a thousand feet higher than any of the others; except in the early morning it is rarely to be seen, being obscured by clouds. From the peak a spur of mountainous land projects towards each of the three ends of the island. Johanna is, like the other Comoros, volcanic, but not actively so now; the traces of former eruptions are very distinct close outside the town of Johanna, where vast accumulations of cinder may be observed cropping out on the roadside.

There is a lake, probably the crater of an extinct volcano, at a considerable elevation in the mountains at the back of Pomoni.

NORTH COAST.—A reef extends about 3 cables off the north-east point of Johanna, outside which the depths are regular; tide rips extend some distance beyond the reef, so that it is advisable to give the point a good berth in rounding.

The coast between the north-east point, and Saddle island off the west point, a distance of 17 miles, forms a deep bay, in which is the town of Johanna. For about 5 miles eastward of Saddle island the shore is fronted by a reef extending nearly half a mile in places; the green line of reef shows at high water, and at about half tide the reef breaks everywhere, except with smooth water. There is a rock above water half a mile off shore, and the same distance eastward of Afombani.

From the head of the bay the depths increase regularly from the shore to 20 fathoms, increasing to 40 fathoms at half a mile, and 350 fathoms, soft black mud, at one mile.

Patsi or Oani road,* formerly known as Stangini bay, is separated from Johanna anchorage by Mirondsi point. It is fronted by a reef, dry at low water, extending from one cable off the northern shore of the bay and to about 2 cables off the southern shore, with a depth of 7 to 10 fathoms at a cable beyond.

Settlements.—Near the middle of the bay, a narrow point extends about 300 yards beyond the line of coast, and nearly to the edge of the reef. On it is a house or store with a flagstaff, named Patsi. The town of Oani, in which there is a minaret, lies half a mile northward of it.

Beacons.—Anchorage.—Two beacons, white, and surmounted by cages, situated a little southward of Patsi, when kept in line bearing S. 73° E., lead in to anchorage in about 20 fathoms, coral and sand, at nearly 3 cables from the shore reef, with Oani point N.E. $\frac{1}{2}$ N. Small craft might get nearer the reef as here there is a bight in it.

H.M.S. *Undine* was at anchor here in June 1883; during this time the water was smooth, though occasionally a swell set in, but not sufficient to cause any uneasiness. Supplies are obtainable here, and the beach is a good place to haul up boats under shelter of the trees.

There is a landing stage on the north side of Patsi point. A small light is shewn on the plan, on the extreme of the point.

JOHANNA, or MUTSAMUDU TOWN, lies about 2 miles south-westward of Patsi road, and westward of Mirondsi point. The town, which is on low ground close to the sea, is substantially built of stone, with narrow winding streets, and is surrounded by a wall; it is overlooked by a dilapidated citadel, with flagstaff, on a height immediately at the back; there is another flagstaff a little south-westward of the minaret. Johanna is the residence of the Sultan of the Comoro islands, and contains from 5,000 to 6,000 inhabitants.

Position.—Johanna town is situated in about lat. 12° 9 $\frac{1}{2}$ ' S., long. 44° 24 $\frac{1}{2}$ ' E.

Supplies are plentiful at Johanna; the cattle are small, but good. Fowls, sweet potatoes, yams, cocoa-nuts, fruits, and other supplies are abundant.

* See plan of Mutsamudu and Patsi roads, on No. 2,066.

The watering place is abreast Fontaine anchorage, and is a small stream near the front beacon; it flows through the cocoa-nut plantation, and generally discharges itself into the sea by two mouths; there is also a fountain here. This water is easily obtained and 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.

Reef.—A reef fronts the shore from Mirondsi point southwards nearly to the beacons, to the distance of about $1\frac{1}{2}$ cables; immediately abreast and a little south-westward of the town the reef is broken, permitting access to the shore at all times of tide.

Beacons.—At about three-quarters of a mile south-westward of the town, near the shore, is a beacon, and on a hill 500 yards S. 47° E. from it is another, serving as marks for Fontaine anchorage.

Anchorage.—The anchorage off Johanna town, known as the Town anchorage, and to a less extent off the watering place known as Fontaine anchorage, is limited, and close to the shore reef; vessels should therefore be prepared to anchor immediately on obtaining soundings with the hand-lead.

A European resident states that in 7 years, during which the bay had been visited at all seasons, the only accidents which had happened were two vessels being blown to sea by the wind off the land. Nevertheless this is not a desirable anchorage during the north-east monsoon.

During the south-west monsoon this anchorage is quite smooth and safe. Vessels should lie with a good scope of cable, as violent gusts blow off the land.

The best anchorage is the Fontaine, abreast of the cocoa-nut plantation. A good berth will be found in about 15 fathoms, sand and shells, by approaching with the beacons in line bearing S. 47° E., and anchoring when the rock off Merondsi point bears N.E. by E. $\frac{1}{2}$ E., which position is about 2 cables off the 3-fathoms line.

The Town anchorage is not recommended, the bank here being steep, with a depth of about 12 fathoms at half a cable only from the 3-fathoms edge.

Tides.—It is high water, full and change, at Johanna town at about 4h. 30m. ; springs rise 14 feet.

Directions.—No further directions are necessary for a steam vessel than the remarks on the anchorage. Sailing vessels during the southerly monsoon should approach Johanna town from the westward, where a fresh breeze will often be found, whilst it is calm to the eastward ; approaching from this direction, give Saddle island a berth of 2 miles, as at times there is a considerable swell and no wind under its lee ; thence a vessel will 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 should be approached from the eastward, on account of light winds and westerly currents, which sometimes sweep a sailing vessel away towards Mohilla.

Winds.—The north-east monsoon reaches Johanna about a fortnight later than Zanzibar. Its first decided blow occurred three consecutive years on December 25th at Johanna. January is generally considered the worst month in the year for anchoring on the north side of Johanna, as strong northerly winds sometimes occur, but heavy winds seldom blow home to the island ; frequently the only indication of a very strong breeze outside is a surf on the beach, which prevents landing.

Saddle island, situated off the north-west point of Johanna, is small, bluff, and saddle-shaped, as its name implies, and is about 400 feet high. The island is apparently bold on its northern sides, but a reef extends nearly one mile south-westward of it, whence it trends eastward, and skirts the southern coast of Johanna. There is said to be good anchorage in about 12 fathoms, off the north side of Saddle island.

Tide rips.—Off Saddle island (as well as off the other extremities of Johanna) tide rips give an appearance of shallow water beyond the reef to an extent of a mile or two. The bottom is probably rocky and uneven, but in passing over these appearances of broken water no bottom has been reached with the hand-lead, and it is considered that no dangers exist beyond the reef, which is plainly visible except at high water.

See plan of Johanna island, on No. 563.

THE SOUTH-WEST COAST of Johanna is about 23 miles in extent, and slightly concave; several spurs of high land extend from the summit towards the coast.

The western half of the south-west coast is skirted in most parts by a reef, which extends in places nearly one mile. Eastward of Pomoni, in places, there is no reef.

There is an isolated patch of $2\frac{3}{4}$ fathoms about half a mile off Voani; the shore abreast is free from reef, and there is said to be a dhow anchorage here.

POMONI HARBOUR* is an oval basin, about 3 cables in length by 2 cables in breadth, between coral reefs dry at low water springs; it has depths of from 7 to 12 fathoms, black sand, with deeper water in the entrance, which is less than a cable wide. The reefs, within the harbour, are steep-to, but abreast the shore the bank is shelving; in case of necessity a vessel can beach for repairs. This harbour will safely contain 5 or 6 small vessels if properly moored, but vessels of over 200 feet in length should not enter the harbour, there not being space enough for them to moor with sufficient scope.

During the north-east monsoon the harbour is quite smooth, and at low water it is as smooth as a dock at all times of the year, though strong gusts of wind come down occasionally off the land.

During the south-west 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 very hard from that quarter at high water springs, the harbour would be 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 long scope of cable; but the south-west monsoon rarely blows home with force, and there are no reports of its ever having amounted to a gale.

Shoal.—A coral patch, one cable in extent, with a least depth of 5 feet on its eastern extreme, lies in the centre of the entrance to the harbour, abreast the south point of the north-west reef, and less than half a cable distant from it; the patch does not generally show well, and is treacherous for boats, blind rollers occurring at long intervals.

* See plan of Pomoni harbour, on No. 2,066.

Beacons.—An iron pole, surmounted by an arrow, is placed 30 feet within the northern extreme of the south-east reef, east point of entrance to the harbour. Two white pillars are erected westward of the village northward of the harbour. They are about 250 yards apart, in a N. 20° E. and opposite direction.

Directions.—Pomoni harbour may be known from seaward by being under a saddle in the high land, and by two peaks like dogs' ears, which are immediately over the harbour; also by the sugar factory with its white square chimney, situated about three-quarters of a mile eastward of it.

The best entrance channel is that eastward of the centre shoal; it is about 150 yards wide, and the reef forming the east side of the channel is steep-to and distinctly visible. The two white beacons near the village kept in line bearing N. 20° E. lead in mid-channel. When abreast of the beacon on south-east reef, distant about 50 yards, haul sharp round to the eastward into the harbour:

There is also a deep channel between the centre shoal and north-west reef, but it is very narrow, and should not be used except on emergency. 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 the extreme of the south-east reef. Vessels should moor with open hawse.

Outer anchorage.—There is good anchorage in 14 fathoms, at about a quarter of a mile off the mouth of the stream near the factory, with the factory chimney bearing N.E. by E.; here there is a break in the reef fronting the coast: there is said to be a depth of 30 fathoms, at half a mile from the shore.

The anchorage should be approached on the above bearing of the factory, as on the north-west side of this bearing the reef extends 2 or 3 cables from the 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 stream is convenient for vessels watering during the north-east monsoon; at the south-west monsoon period vessels will generally find this anchorage practicable, but they should be prepared to leave on the appearance of strong winds or heavy swell.

Winds.—During the north-east monsoon light land and sea breezes generally prevail, and occasionally shift from one to the other several times during the day ; at this time there is no difficulty in going out under sail if a proper time is chosen, but it should not be attempted unless the land wind is steady. In 1883, the first-blow of the north-east monsoon came on the 14th January, accompanied by heavy squalls, lightning, rain, and occasional thunder.

During the south-west monsoon sailing vessels will frequently have to wait some days for an opportunity to get out. In May, rollers are heavy at times along this coast, and the rain is incessant.

Tides.—It is high water, full and change, at Pomoni at 4h. 30m. ; springs rise 14 feet.

Supplies.—Cattle and other supplies are plentiful, the latter being brought round from Johanna town when required in any quantity. Fruit is cheap and plentiful.

There is a good watering place at a stream which enters the sea near the factory ; here the water is excellent and may be made to run 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 stream 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 the ship channel : of course when there is much surf, landing at the stream is impracticable, but this is of rare occurrence.

There is also a stream in the harbour near the new village, with a deep pool inside ; this is convenient for washing clothes at, but it comes from marshy ground and is probably not wholesome for drinking. Boats can reach it within the reef at all times.

Small repairs to vessels with no competent artificers, may be done through the kindness of the sugar planters, who possess a forge ; they also have a steam launch.

Communication.—Sugar ships trade between Mauritius and Pomoni, at intervals of about 2 months ; except by dhows there is no other communication. A French mail steamer calls at Mayotta. *See* page 565.

EAST COAST.—The south point of Johanna is bluff, of considerable height, and surrounded by a reef to the distance of about

three cables : two islets or rocks stand on the south-east extreme of it. During the southern monsoon there is occasionally a heavy sea off this point, with overfalls ; at times it has been found rolling heavily as if the water were shallow, but no bottom has been reached with the hand-lead.

From the south extreme of Johanna the coast trends north for about 20 miles to the north-east point ; it is high and rocky, with few indentations, and is apparently steep-to ; coral reefs skirt it in places to a short distance.

At **Deumoni**, 7 miles from the south point, there is a boat harbour, and northward of that point are three rocks above water near the shore. At Deumoni is a sugar estate belonging to the Sultan, with a large factory built of stone, and all the machinery necessary for making sugar. There is said to be good anchorage off the factory in 8 to 15 fathoms, at 3 or 4 cables distant from the shore, at all times of year except August and September, when strong easterly winds prevail. As but little is known of the depths along this coast, it should be given a wide berth.*

Off **Bambao** there is anchorage ; close northward of it, the fringing reef extends about half a mile off shore.

MAYOTTA.—**General remarks.*** — Mayotta lies 40 miles south-eastward of Johanna. It is of irregular form, 21 miles in length, north and south, with an average breadth of 6 or 7 miles, and outlying reefs, varying in distance from 5 to 12 miles. The island is remarkable from all points of view, owing to its uneven surface ; volcanic looking peaks rise in all parts, the highest of which is Mavégani mountain, situated about 4 miles southward of the centre of the island ; Mavégani has two peaks close together, of which the westernmost is the higher, being 2,164 feet above the sea.

The most remarkable mountain is Uchongui, a sugar-loaf peak, 2,105 feet high, which rises from land of inconsiderable elevation, at less than 3 miles from the southern extreme of the island. From the southward, Uchongui mountain will be seen before any other part.

* See plan of Johanna island, on No. 563.

† See chart of Mayotta island, with views, No. 2,741.

Mayotta is a French colony, with a small military and naval depôt at Zaudzi, on Pamanzi island, established in 1844. There are many villages on Mayotta.

Off Zaudzi is the principal anchorage, which is a secure one at all times (page 590); from the westward it is approached by Zamburu or Duamuni passages (pages 585, 587), and from the eastward by the Bandéli (page 588). There are many other good anchorages.

Products.—The island is productive in most parts; large trees suitable for shipbuilding exist, principally near Boëni and Debeny bays. The southern part of the island is covered with cocoa-nut, banana, orange, citron, tamarind, and other fruit trees, in a wild state; sugar cane, cotton, tobacco, rice, sweet potato, maize, and other articles of food are grown in abundance; the western portion of the island, also Pamanzi island, afford excellent pasturage.

Population.—The total population amounts to about 10,000; the white population number about 200, chiefly located at the military establishment at Zaudzi.

The Climate of Mayotta has the reputation of being very unhealthy; the shores of the main island are lined in places with mangrove swamps, which uncover at low water, and are productive of malaria and fever. In this respect, as well as in others, Mayotta differs from the other Comoro islands, which are generally considered healthy.

The mean temperature at noon, from January to April, ranges from 84° to 90°; the period of greatest heat is in January and February, when at times it reaches 93°; the mean temperature of the year is 77°. The range of the barometer is between 29·7 and 30·0 inches. The rainy season is from November to April.

Winds, Currents, Communication.—*See* pp. 564, 565.

Pilots.—There are Government pilots who reside on Pamanzi island, and will generally come off to vessels about to enter by 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.

Vessels must communicate with the authorities before seeking anchorage in other places than Pamanzi bay.

OUTLYING REEFS.—Mayotta is surrounded by a chain of reefs which extend from the main island on the north, north-east, south-east, and south sides between 4 and 5 miles, and on the west side upwards of 8 miles; besides which, to the north-westward there is a detached reef about one mile in diameter, with $2\frac{3}{4}$ fathoms water; its centre lies with the high part of Zamburu bearing S.E. $\frac{1}{2}$ E. distant nearly 8 miles.

The circle of reefs round Mayotta has about 14 passages through it, most of which are deep enough for all classes of vessels. These reefs, whilst forming spacious sheltered anchorages and secure ports in all directions, are most dangerous to vessels approaching the island without due caution, owing to their great distance from the land, and the uncertain currents which prevail in the vicinity.

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 steep, with no bottom in places at 50 fathoms close-to.

ZAMBURU or Saddle island, which is separated by a distance of $2\frac{1}{2}$ miles from the north-west end of Mayotta, is about one mile in diameter and 918 feet in height. The saddle appearance of the island is most conspicuous from the north-east and south-westward.

Anchorage.—There is temporary anchorage on Prudente bank, 2 miles north-westward of Zamburu, in from 6 to 10 fathoms, sand and coral. Also on the edge of the flat extending north-eastward of Zamburu; the flat is steep-to and must be approached with caution, anchoring as soon as the depth of 10 fathoms is obtained.

Between Zamburu and the main island are the two Choazil islands visible about 12 miles.

ZAMBURU PASSAGE.—The approach from the westward, to Zaudzi, in Pamanzi bay, wherein is situated the French Naval and Military establishment, is by Zamburu pass. Its entrance, $1\frac{1}{2}$ miles wide between the reefs, lies between Zamburu island and North reef, about 17 miles from Zaudzi.

Vessels above 20 feet draught should use the Duamuni passage, eastward of North reef, which has no bar; though the channel to Zaudzi, common to both, is scarcely to be recommended for vessels above moderate draught. Bandéli passage, the eastern approach, page 588, seems preferable.

Bar.—Zamburu passage is about $1\frac{1}{2}$ miles wide, but obstructed by a bar about half a mile across, connecting Zamburu island with North reef; the least known depth is 23 feet at about a third of a mile southward of the leading mark, on which the depth is 28 feet; possibly less water may exist.

Abreast cape Duamuni the Zamburu and Duamuni passages join; thence for about 3 miles southward of the cape, the passage is but 3 cables wide between the shoals, but the water is deep.

Uniform system of buoyage.—The buoyage of Zamburu and Bandéli passages is in accordance with the French uniform system of buoyage, that is:—Starboard hand buoys entering from seaward are conical with conical topmarks, and painted red; port hand buoys are conical with cylindrical topmarks, and painted black.

Red buoys mark the north-east extreme of Chaloupe reef, the south side of the channel abreast the $2\frac{1}{4}$ -fathoms patch, north-west of Belette reef, a 2-fathoms patch abreast Belette reef, Coq and Prevoyante reefs. Black buoys mark the south-west side of Great North-east reef (abreast Chaloupe buoy), a patch of $2\frac{1}{4}$ fathoms between it and Belette, Belette reef of $1\frac{1}{2}$ fathoms, Laclocheterie reef, and the south-west extreme of the southern of the three reefs eastward of point Congo.

No dependence must be placed on the buoys maintaining these positions. The shoals are distinctly visible towards low water, which is the best time for entering or leaving.

A reef, on which the S.S. *Peiho* touched in 1894, is situated with Longoni point bearing about S.W. by W., distant about $1\frac{9}{10}$ miles, and cape Duamuni N.W. $\frac{1}{2}$ W., on the east side of the channel south-eastward of Prevoyante reef.

Directions.—Approaching Mayotta from the north-west, Zamburu island will be easily recognised; it should be approached on a bearing that will clear the outlying dangers. When from 3 to 4 miles distant from the island, steer to bring the second summit (a conical peak) of Pamanzi island on with the extreme of cape Duamuni, bearing S.E. $\frac{1}{2}$ S.; and steer in on that mark, which leads over the bar, in about 26 feet at low water, between Zamburu and North reef, until Zamburu peak bears West.

From thence steer about E. by S., until the second summit of Pamanzi is a little open of Congo point, when steer in between Chaloupe buoy and the buoy abreast it; from abreast Chaloupe buoy edge to the southward to bring the same summit in line with Congo point bearing S.E. by S. (*see* sketch C on plan). Observe, however, that Congo point is not quite the extreme of land as shown in sketch C on the chart; there is Mokaun point beyond it, ill defined on the chart, which a stranger is apt to mistake for Congo point.

The marks in line, with a little variation to give the buoys a berth, will lead through the channel, between the buoys, nearly up to Congo point. When Zamburu island peak comes in line with Morne hill (*see* view D), bearing N.W. by W., astern, keep them so, steering S.E. by E., which will lead between the shoals fronting the shore from Congo point eastward, and the shoals marked by a buoy on the opposite side of the channel.

When eastward of Congo point, keep Zamburu peak a little open northward of Morne hill, to give a wider berth to the shoals fronting the shore. Aombé island, which is steep-to on its west and south sides, may be passed at the distance of about 2 cables, thence pursuing a mid-channel course into Pamanzi bay, or round to the anchorage south-west of Zaudzi. In proceeding to the last mentioned, when rounding Zaudzi spit, marked by a buoy, observe that the four Nossi Effatsi islands open westward of Mouniameri island leads westward of it. *See* Zaudzi town and anchorages, pages 589, 590.

DUAMUNI, or North-east passage, is the channel about one mile wide, between North reef and Great North-east reef, and, with the exception of the $4\frac{3}{4}$ fathoms patch close eastward of the leading mark, about $1\frac{8}{10}$ miles from the summit of cape Duamuni, appears free from danger.

To enter, bring cape Duamuni on with Muruanu-Be mountain, S.S.W. $\frac{1}{3}$ W. (view B on plan), which will lead in between the reefs, and when Zamburu peak bears W. $\frac{1}{2}$ S., haul to the northward of the leading mark to give a wide berth to the patch mentioned, until the peak bears West; thence haul to the south-eastward between Chaloupe buoy and the buoy north-eastward of it and proceed as for Zamburu passage, above.

Choazil islands passage lies southward of Zamburu island ; it is apparently half a mile wide between the reefs, with depths of $5\frac{1}{2}$ fathoms ; the leading mark is the northern Choazil island on with Morne hill, E. $\frac{1}{4}$ S., thence northward of North Choazil island and cape Duamuni, where it joins the Zamburu.

BANDÉLI PASSAGE, on the eastern side of Mayotta, is situated about 5 miles southward of Pamanzi island, and is the usual one for vessels approaching Zaudzi from the eastward.

Beacons.—Buoys.—A whitewashed obelisk is erected on a spur of Mavégani mountain, and a white conical beacon on the cliffs immediately behind White rock, to serve as a leading mark for the entrance.

The passage is marked by red conical buoys with conical topmarks, on the starboard hand on entering, and by black conical buoys with cylindrical topmarks, on the port hand.

No dependence must be placed on the buoys maintaining their charted position.

Directions.—To enter Bandéli pass, steer in with the white beacon on the spur of the Mavégani, in line with the white beacon over White rock, bearing W. by N. $\frac{3}{4}$ N. (view E on chart), which will lead between the buoys ; as the mark leads a little diagonally across the entrance, the back beacon should be kept a little open to the southward of the front one, in the outer part of the passage. Entering in the morning, when the sun is astern, the reefs will show well. The flood stream sets towards the north side of the channel, and must be guarded against.

When Uchongui peak is open north-westward of Bandéli island, a vessel will be within the reefs, and may haul northward for the west extreme of the Ajangua islands ; pass these islands at the distance of about two cables, and thence steer eastward of Buzi island, giving the islet off it a berth of at least a cable. If preferred, a vessel may pass westward of Buzi, but in this case give its south-west end a berth of a quarter of a mile, to avoid an outlying reef, and pass within 2 cables of its north side to avoid the patches of coral which extend southward from Choa point.

Buzi island is 541 feet high, and wooded near the summit. The rock off its north-east side is covered at high water.

From Buzi island, if bound to the anchorage south of Zaudzi, steer direct for it, avoiding Orestes rock, which lies in the anchorage.

If bound to Pamanzi bay, the anchorage north of Zaudzi, observe that the eastern of the four Nossi Effatsi islets kept touching the west side of Mouniaméri island leads eastward of Choa point shoals, and that the same islet kept well open of Mouniaméri, leads westward of Zaudzi spit. *See* anchorages, page 590.

Longorori passage is a narrow cut in the reef, about $3\frac{1}{2}$ miles southward of Pamanzi island ; it has plenty of water, but is tortuous and only suitable for boats.

PAMANZI ISLAND is situated about $1\frac{1}{4}$ miles from the eastern side of Mayotta, on the eastern part of the Great North-east reef ; it is about $3\frac{1}{4}$ miles in length, north and south, and $2\frac{1}{4}$ miles in breadth. Its eastern hill, the summit, on which there is a signal station, is 782 feet high, with a flat top ; the conical hill three-quarters of a mile westward of the signal station is named Second summit, and is a leading mark for Zamburu passage. Near the north-east extreme of Pamanzi is Zeánn lake, apparently the crater of an extinct volcano.

PAMANZI BAY, or ZAUDZI ROAD, on the west side of Pamanzi island, and northward of Zaudzi island, is a secure anchorage, especially during the south-west monsoon period.

Military Establishment.—Zaudzi island lies to the westward of Pamanzi, and is connected with Mamutzu peninsula 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, besides a few native ones. There are a few substantial government buildings and storehouses, numerous huts, and jetties available for boats at half-tide, on the north-east and south-west sides of it.

The semaphore at Zaudzi is in lat. $12^{\circ} 46\frac{3}{4}'$ S., long. $45^{\circ} 16'$ E. (approx.).

Town.—Mamutzu peninsula is the western extreme of Pamanzi island. The commercial town is situated at the foot of the peninsula,

in Pamanzi bay. The governor has a house on the summit of the peninsula, and there is a jetty at its foot.

Lights.—*Fixed white* lights are exhibited from posts on the two jetties at Zaudzi island, and also on the jetty at the foot of Mamutzu peninsula, visible about 2 miles.

Zaudzi spit extends nearly 4 cables westward of the north end of Zaudzi; it is marked by a white buoy in about 8 fathoms. The four Nossi Effatsi islands open westward of Mouniaméri island leads westward of it.

Orestes rock lies about $1\frac{1}{4}$ cables southward of Zaudzi spit, with Zaudzi west jetty light in line with a lightning conductor on one of the buildings, bearing about East and distant 2 cables. It is a cone of coral not more than 12 yards in diameter at its base, rising to two sharp pinnacles, which are so small that the lead can hardly be placed on them; one of these pinnacles appears to have a depth of 3 feet only at low water spring tides, with 4 to 5 fathoms all round at 25 yards distance. A white buoy marks the rock.

Anchorage.—There is good anchorage in the north-east monsoon period anywhere southward of Zaudzi spit, avoiding Orestes rock. A good berth is in 11 fathoms, mud, with the west extreme of Zaudzi N. by E. $\frac{1}{2}$ E., and the south extreme of Pamanzi S.E. by S.

The best anchorage during the southerly monsoon period is in Pamanzi bay, which at that season is smooth. It is clear of danger with the exception of a coral shoal, with 6 feet water, situated about one cable north-eastward of Zaudzi jetty, marked by a white buoy. The bottom is foul southward of the buoy. A good berth will be found in 7 fathoms, with the north point of Pamanzi bearing N.E. by E., and Second summit of Pamanzi S.E. $\frac{1}{2}$ S.

There is also good anchorage in Longoni bay on the north coast of Mayotta, about 7 miles from Pamanzi bay, in depths of 10 to 20 fathoms. Under Longoni point, the north extreme of the bay, is Longoni cove (*see* plan on chart No. 2,741) about 2 cables in length by one in breadth, with depths of 4 to 9 fathoms, mud. Good firewood and water may be obtained here, and fish are plentiful.

See chart of Mayotta island, with enlarged plan of Pamanzi bay, No. 2,741.

Tides.—It is high water, full and change, at Zaudzi at 4h. 10m. ; springs rise 12 feet ; the flood runs southward and the ebb to the northward.

Supplies of poultry, vegetables, and fruits may be obtained at Zaudzi, and cattle are brought from the main island ; see products mentioned on page 584. A government supply of provisions is kept here for the troops and for the French cruisers on this station.

There are two wells on Zaudzi, but the water is not good. The establishment is supplied from the main island, where there is an abundance of good water ; it is brought over in boats, and stored in a large reservoir on Mamutzu peninsula.

Light draught vessels can beach for repairs abreast the east end of the causeway in Pamanzi bay, buoying the rocks previous to beaching. H.M.S. *Seagull* beached here.

Coal is stored at Zaudzi for the use of French vessels of war, and small quantities can usually be obtained. About 500 tons are usually kept in stock. Coaling is by lighters and very slow, owing to the insufficiency of labour.

Communication.—The Messageries Maritime line of steamers between France and Réunion call here monthly, *via* ports in Madagascar, as stated on page 565.

SOUTHERN and WESTERN PASSAGES.—The southern and western passages are not often used, as they lead to parts of the island but little frequented, and are unbuoyed ; a short account, however, is here given of them.

Saziley passages, on the south-east side of the island, are three in number, divided from each other by coral flats, the southern of the two flats being crowned by a sand islet. These passages are not much frequented, but they have deep water.

North Saziley is the narrowest of the three. The leading mark between the reefs is the sugar-loaf part of Uchongui mountain, just open northward of Morne Carré, about W. by N. This mark takes a vessel rather close to the coral reef on the south side of entrance (view F on plan).

Middle Saziley lies with the sugar-loaf part of Uchongui mountain just open southward of Morne Carré, about W.N.W. This passage has about 7 fathoms water (view G on plan).

South Saziley is about one mile wide. To enter, bring a group of trees near the south point of the island over Dapani point, bearing W. by N. $\frac{3}{4}$ N. Buni island bearing W. $\frac{3}{4}$ N. will also lead in (*see* view H on plan).

Boat passage, situated about 3 miles southward of Boéni passage, is probably so called from its being very narrow, but it has deep water. The leading mark is Uchongui mountain, midway between Cani point and Cani hill, bearing E. $\frac{1}{4}$ S. (view K on plan). This passage should not be attempted without a pilot.

Boéni passage, about 14 miles southward of Choazil passage, lies with Boéni point hill on with the easternmost peak of Mavégani mountain, bearing East (view I on plan). This passage is about half a mile in breadth, but its distance from the coast renders Boéni point difficult to distinguish from the other land.

The leading mark formerly given for that known as Great Western passage (northward of Boéni and Rouge passes) has been removed, as several shoals, as charted, have been found on and near the mark, namely Combani mount in line with Red mount.

Note.—For a description of the islands and dangers eastward of Mayotta, *see* Sailing Directions for Islands in the Southern Indian Ocean.

See chart, No. 2,741.

METEOROLOGICAL TABLE COMPILED FROM TWO YEARS' OBSERVATIONS.

MONTH.	BARO-METER, reduced to 32° & Sea Level.		TEMPERATURE.				RAIN.		WIND.								REMARKS.							
	Mean Height.	Extreme Range.	Mean.	Mean Daily Range.	Max. Feb. 77 to June 78.	Min., 1878 only.	Relative Humidity.	Clouds 0 to 10, Mean Amount.	RAIN.		WIND.													
									No. of Days.	Average Force.	Number of Days from								No. of Days Gales.	No. of Days Fogs.				
	Ins.	Ins.	°	°	°	°	Ins.	Total Fall.	S.E.	S.	S.W.	W.	N.W.	Calm.										
January ..	2983	30	81.2	..	100.4	68.0	..	61	583	12	4	7	5	6	1	..	2	5	2	..	2	..	2 years, 1877-8.	
February ..	2982	36	82.8	..	96.8	68.5	..	50	650	12	3	2	5	4	1	..	3	7	3	..	3	..	Do.	
March ..	2990	70	80.6	..	94.1	65.1	..	47	397	10	4	1	3	4	1	..	6	6	6	..	6	..	Do.	
April ..	3012	34	76.7	..	86.5	60.4	..	33	30	6	3	3	6	3	5	1	..	8	2	..	2	..	Do.	
May ..	3016	36	74.1	..	85.3	54.5	..	22	54	3	3	3	3	2	4	1	..	7	3	..	3	..	Do.	
June ..	3032	74	68.1	..	79.7	49.1	..	17	24	3	3	4	2	5	4	3	2	..	8	2	..	2	..	Do.
July ..	3019	55	68.0	..	81.1	..	..	30	32	6	3	1	6	7	5	1	..	10	3	..	3	..	1 year, 1877.
August ..	3012	45	70.9	..	84.2	..	..	26	09	2	3	3	4	6	4	3	..	9	3	..	3	..	Do.
September ..	3001	82	70.3	..	89.6	39	138	6	5	4	2	3	5	8	1	..	5	8	..	8	..	Do.
October ..	3064	114	73.4	..	88.2	51	197	7	4	4	5	5	4	8	1	..	4	3	..	3	..	2 years, 1876-7.
November ..	2988	39	77.1	..	92.1	55	102	10	4	3	5	5	4	6	2	..	1	4	6	6	..	Do.
December ..	2981	31	80.1	..	95.5	60	382	11	4	3	5	5	4	7	1	..	1	4	5	5	..	Do.
Means and Totals	3002	134	75.3	41	2678	88	4	37	39	60	53	67	13	..	18	77	46	

NOTE.—The Mean Temperature given above has been obtained from observations taken at 8 a.m., Noon, and 8 p.m., and is therefore above the true mean. Those for January to June 1878 are from 2° to 24° above the mean from the maximum and minimum observations.

PLACE—BEIRA. OBS. Δ LAT. 19° 50' S. LONG. 34° 50' E.

METEOROLOGICAL TABLE COMPILED FROM TWO YEARS' OBSERVATIONS, 1895-96.

MONTH.	BARO-METER, reduced to 32° & Sea Level.		TEMPERATURE.				Relative Humidity.		RAIN.		WIND.		No. of Days Gales.	No. of Days Fogs.	REMARKS.
	Mean Height.	Extreme Range.	Mean.	Mean Daily Range.	Maximum.	Minimum.	Clouds, 0 to 10, Mean Amount.	Total Fall.	Maximum in 24 hours.	Hourly Velocity.	Most Prevalent Directions.				
January ..	Ins. 29.91	32 79.8	° 79.8	° 89.8	° 72.0	° 5.2	°	Ins. 9.2	3.9	Miles 10-25	.. S.E. S.S.E. East. E.S.E. ..	..	..	..
February ..	29.93	30 80.2	80.2	88.8	74.0	5.1	..	18.8	4.3	8-16	.. East. S.E. ..	..	..	..
March ..	29.97	24 80.2	80.2	88.0	72.3	4.3	..	9.2	1.9	7-19	.. S.E. E.S.E. S.S.E. ..	..	..	..
April ..	30.06	32 77.2	77.2	86.0	68.3	4.2	..	5.0	2.0	7-20	.. S.E. E.S.E. ..	..	..	..
May..	30.13	39 73.5	73.5	86.0	62.8	4.1	..	1.9	7	6-18	.. South. S.E. ..	..	..	..
June..	30.21	37 69.2	69.2	81.5	59.3	3.1	..	1.4	3	5-15	.. S.W. N.W. S.S.E. E.S.E. ..	..	..	..
July ..	30.20	38 69.0	69.0	83.0	58.0	3.4	..	1	1	5-11	.. E.S.E. S.E. South. ..	..	..	..
August ..	30.17	42 70.7	70.7	83.8	59.8	3.6	..	2	1	7-16	.. S.S.E. E.S.E. East. ..	..	..	..
September ..	30.08	55 73.5	73.5	83.0	61.8	4.6	..	6	7	8-14	.. S.E. E.S.E. East. ..	..	..	..
October ..	30.03	47 76.0	76.0	87.2	64.3	4.7	..	2.1	1.0	8 20	.. East. E.S.E. ..	..	..	..
November..	30.01	47 79.0	79.0	90.2	69.8	4.7	..	1.7	8	9-17	.. East. E.N.E. S.E. ..	..	..	..
December..	29.93	38 80.8	80.8	90.5	72.8	4.5	..	15.0	4.6	9-15	.. East. E.S.E. S.E. ..	..	..	..
Means and Totals	30.05	55 75.8	75.8	83.0	59.3	..	..	65.2	4.6	..	..	..	..	..

The rainfall in 1895 was 85 inches, in 1896 it was only 36 inches. See remarks, p. 225.

METEOROLOGICAL TABLE COMPILED FROM TWO YEARS' OBSERVATIONS.

MONTH.	BARO-METER, reduced to 32° & Sea Level.		TEMPERATURE.				Relative Humidity.		RAIN.		WIND.										REMARKS.			
	Mean Height.	Range.	Mean.	Mean Daily Range.	Maximum.	Minimum.	Total Fall.	No. of Days.	Average Force Beaufort's Scale.	Number of Days from														
	Ins.	Ins.	°	°	°	°	Ins.	Ins.	°	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Cal.	No. of Days Gales.	No. of Days Fogs.				
January ..	2988	31	79.5	8	86.4	73.9	°	67	11.97	20	13	40	87	7	3	70	3	80	20	80	..	..	Means of readings taken at 7 a.m., 2 p.m., and 9 p.m.
February ..	2982	22	80.0	9	88.5	73.9	°	47	1.15	4	22	20	83	..	13	86	..	77	..	77	..	..	..
March ..	2987	19	79.3	10	89.2	72.1	°	49	10.88	15	15	..	80	10	3	97	4	103	..	103	..	..	..
April ..	2991	20	80.1	10	89.4	71.2	°	36	5.00	16	20	3	40	7	7	136	50	50	..	50	..	..	..
May ..	3000	22	78.3	13	86.7	65.5	°	31	.97	8	21	..	23	13	67	117	50	40	..	40	..	..	..
June ..	2999	16	77.2	19	91.2	63.1	°	24	0	0	29	..	13	..	87	130	20	50	..	50	..	..	..
July.. ..	3007	30	75.0	17	89.4	64.9	°	36	22	2	24	3	22	26	55	124	13	62	..	62	..	..	..
August ..	3006	37	73.8	14	90.0	64.0	°	34	1.08	3	27	7	73	19	35	54	35	63	12	10	20	..	..
September ..	3005	21	75.4	12	84.9	66.9	°	38	.83	5	28	7	79	37	45	73	21	32	15	2	13	..	..
October ..	2998	26	77.5	11	88.2	66.4	°	33	.97	4	29	8	97	32	52	67	10	39	4	..	..	..	..
November..	2994	33	79.7	10	88.5	69.6	°	36	.88	5	33	6	130	17	47	62	19	21	..	..	..	..	..
December..	2992	29	81.0	10	99.0	73.0	°	49	4.42	14	30	13	132	51	38	40	13	25	1	1	3	..	..
Means and Totals	2996	52	78.1	12	90.0	63.1	°	40	38.77	96	23	106	859	219	452	1056	235	43	35	43	40	Aug. and Sept. (1893), station frequently surrounded by slight fog in the morning.

PLACE—KILWA KIVINJE. OBS. Δ LAT. 8° 45 S. LONG. 39° 25' E.

METEOROLOGICAL TABLE COMPILED FROM TWO YEARS' OBSERVATIONS.

MONTH.	BARO-METER, reduced to 32° & Sea Level.		TEMPERATURE.				RAIN.		WIND.										REMARKS.						
	Mean Height.	Range.	Mean.	Mean Daily Range, 1 year.	Maximum.	Minimum.	Relative Humidity.	Clouds, 0 to 10, Mean Amount.	Total Fall.	No. of Days.	Average Force, Beaufort's Scale.	Number of Days from													
												N.	N.E.	E.	S.E.	S.	S.W.	W.		N.W.	Cal'm	No. of Days Gales.	No. of Days Fogs.		
January ..	29.86	.28	80.7	10	86.4	71.1	..	5.9	6.82	17	3.4	12.2	8.2	.2	..	1.0	.8	5.5	1.7	1.5	5	..	..	Means of readings taken at 7 a.m., 2 p.m. and 9 p.m.	
February ..	29.80	.25	81.3	10	92.8	70.5	..	5.1	5.04	9	2.7	9.2	9.0	1.2	.2	1.0	2.0	3.8	2.0	2.0	.2	5	..	..
March ..	29.85	.18	80.9	9	90.0	73.2	..	5.8	6.76	14	1.9	3.0	5.3	2.6	4.5	1.5	5.3	5.3	5.3	5	28	..	..	..
April ..	29.89	.20	80.2	14	90.9	69.1	..	5.2	13.78	15	2.2	..	1.3	1.7	7.0	9.3	7.0	1.8	..	..	2.0	..	..	..
May ..	29.99	.25	79.2	15	90.0	70.5	..	4.5	2.88	6	2.4	..	.7	1.3	12.8	10.2	5.2	5	2	2	2	..	..	..
June ..	30.00	.18	78.2	18	89.6	64.9	..	3.9	.03	2	2.8	..	.2	2.7	13.7	7.5	4.3	8	2	7	5	..	..	..
July ..	30.06	.19	76.4	17	89.4	64.2	..	3.5	1.00	2	2.7	..	.5	2.0	16.5	6.3	3.3	1.2	..	1.2	..	..	..	..
August ..	30.02	.20	75.9	15	86.9	66.4	..	3.9	.94	5	2.7	..	1.2	6.5	11.0	6.0	1.0	2	..	5.2	5	..	..	..
September ..	30.02	.15	77.7	12	86.2	66.6	..	4.6	3.09	5	3.1	.5	4.0	11.3	9.3	2.2	.8	..	..	1.8	..	..	..	..
October ..	29.98	.23	79.2	11	85.6	69.6	..	4.9	.40	5	3.1	.7	5.2	13.6	8.3	1.5	..	2	..	1.3	..	..	..	..
November ..	29.92	.31	80.8	9	88.2	72.5	..	4.7	1.18	6	3.5	1.5	11.5	10.8	5.0	.5	..	.5	..	2	..	..	..	..
December ..	29.90	.24	81.5	14	88.5	63.1	..	4.9	3.30	11	2.9	3.8	18.0	2.5	.8	.2	.4	2.7	1.0	1.5	..	..	..	..
Means and Totals	29.94	.51	79.3	13	92.8	63.1	..	4.7	45.02	97	2.8	30.9	65.1	56.4	89.1	47.2	30.1	22.5	5.6	18.6	2.0	..	..	..

METEOROLOGICAL TABLE COMPILED FROM TWO YEARS' OBSERVATIONS.

MONTH.	BARO-METER, reduced to 32° & Sea Level.		TEMPERATURE.				RAIN.		WIND.										REMARKS.			
	Mean Height.	Range.	Mean.	Mean Daily Range.	Max, 1 year.	Min, 1 year.	Relative Humidity.	RAIN.		WIND.												
								Total Fall.	No. of Days.	Number of Days from												
	Ins.	Ins.	°	°	°	°		Ins.	Average Force, Beaufort's Scale.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calim.	No. of Days Gales.	No. of Days Fogs.		
January ..	2985	29	79.9	11	90.0	70.7	..	6.6	5.14	14	3.5	5.5	14.7	8.0	..	3	7	1.8	..	..	..	..
February ..	2984	27	82.4	..	89.4?	72.7	..	6.1	1.51	10	3.5	3.2	14.3	10.2	..	..	..	..	8	..	..	..
March ..	2986	27	80.3	..	..	70.6	..	6.0	4.94	11	2.7	3.3	8.3	6.2	1.3	2.7	7.2	3	5	..	..	..
April ..	2990	22	78.8	..	..	69.6	..	6.4	8.37	21	2.8	..	4.2	7	1.5	1.2	2.5	2	..	1.0	..	..
May ..	2998	25	77.0	..	..	65.8	..	6.2	5.76	19	2.8	..	8	2.2	5	3.5	4.0	..	2.2	..	..	..
June ..	3001	20	75.2	..	..	60.8	..	4.7	5.2	8	2.8	..	1.3	2.5	2.2	8.2	2.3	2	1.0	..	..	..
July ..	3005	26	73.4	..	..	57.2?	..	4.7	2.10	8	2.6	..	7	6.0	2.3	7.0	2.0	..	2.7	5	..	..
August ..	3005	28	73.4	..	..	..	..	4.7	1.08	10	2.7	..	2.7	8.8	2.2	2.3	2.2	5	3.3	5	..	..
September ..	3000	22	75.0	..	..	..	..	4.3	9.8	9	3.0	..	1.2	10.2	2.7	3.5	1.3	..	3.0	..	..	..
October ..	2997	27	77.4	..	..	68.6?	..	3.9	1.30	6	3.2	..	1.8	12.5	4.5	8	1.0	..	2.8	5	..	..
November ..	2994	25	80.6	..	..	68.0	..	4.3	2.26	11	3.2	..	5.3	14.0	2.5	..	1.7	..	1.2	5	..	..
December ..	2989	24	82.2	..	..	71.2	..	5.1	0.97	10	4.3	3.3	17.0	6.7	1.0	..	3	1.0	..	..	..	..
Means and Totals	2985	49	79.8	..	?	?	..	5.3	34.88	137	3.1	15.3	72.3	87.8	20.7	27.7	25.7	4.0	17.5	3.0	..	..

Means of readings taken at 7 a.m., 2 p.m. and 9 p.m.

PLACE—TANGA. OBS. Δ LAT. 5° 4' S. LONG. 39° 6' E.

METEOROLOGICAL TABLE COMPILED FROM ONE YEAR'S OBSERVATIONS.

MONTH.	BARO-METER, reduced to 32° & Sea Level.		TEMPERATURE.				Relative Humidity.		RAIN.		WIND.										REMARKS.				
	Mean Height.	Range.	Mean Daily Range.	Maximum.	Minimum.	Clouds, 0 to 10, Mean Amount.	Total Fall.	No. of Days.	Number of Days from																
									N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.	No. of Days, Gales.	No. of Days, Fogs.						
January ..	Ins. 29.42	24 80.0	14 88.5	56.7	0	45	5.91	8	37	83	150	1.0	1.0	5	1.8	3	2.7	3	3	90	..	Means of readings, taken at 7 a.m., 2 p.m., and 9 p.m.			
February ..	29.87	32 81.5	11 93.4	72.9	0	43	3.35	7	34	73	118	5.8	..	..	3	3	2.7	..	..	15	..	..	
March ..	29.92	29 82.3	14 93.0	73.8	0	41	2.27	5	33	42	80	7.5	3.0	2.5	2.6	2.7	3	..	..	..	60	..	..
April ..	29.96	23 81.1	13 91.2	72.0	0	40	9.59	13	31	..	2.0	6.8	8.5	8.3	4.2	..	..	..	..	..	..	..	..
May ..	30.01	19 78.3	13 88.9	70.2	0	52	9.26	12	31	..	..	4	9.5	15.8	5.3	..	..	..	..	..	45	..	..
June ..	30.03	22 77.8	15 87.6	67.5	0	44	9.1	5	37	..	..	..	8.2	14.3	7.3	2	..	..	..	..	95	..	..
July ..	30.04	21 75.0	19 86.0	63.9	0	37	4.43	9	32	..	..	..	7.8	11.8	10.3	8	..	..	3	30	..	..	..
August ..	30.00	26 75.0	21 86.0	62.1	0	40	3.42	7	25	5.7	11.8	11.2	5	18	10	
September ..	30.05	25 76.3	19 86.0	60.4	0	42	5.40	6	14	4.2	9.7	10.8	5	48	
October ..	30.06	18 79.0	18 89.8	66.6	0	27	1.65	7	18	..	2.0	1.9	8.0	4.3	9.2	2.0	2.5	1.2	1.2
November ..	29.97	30 80.1	15 90.0	68.4	0	40	7.29	12	25	2	3.3	4.3	10.0	2.7	5.0	1.5	1.2	1.2	1.8
December ..	29.98	23 81.6	12 92.3	72.9	0	42	1.77	9	32	1.7	13.4	6.8	5.0	2.3
Means and Totals	29.98	47 79.0	15 93.4	56.7	0	41	5.25	100	28	21.7	55.5	34.5	70.9	84.0	63.0	8.8	10.4	11.2	84.5	94.5	

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