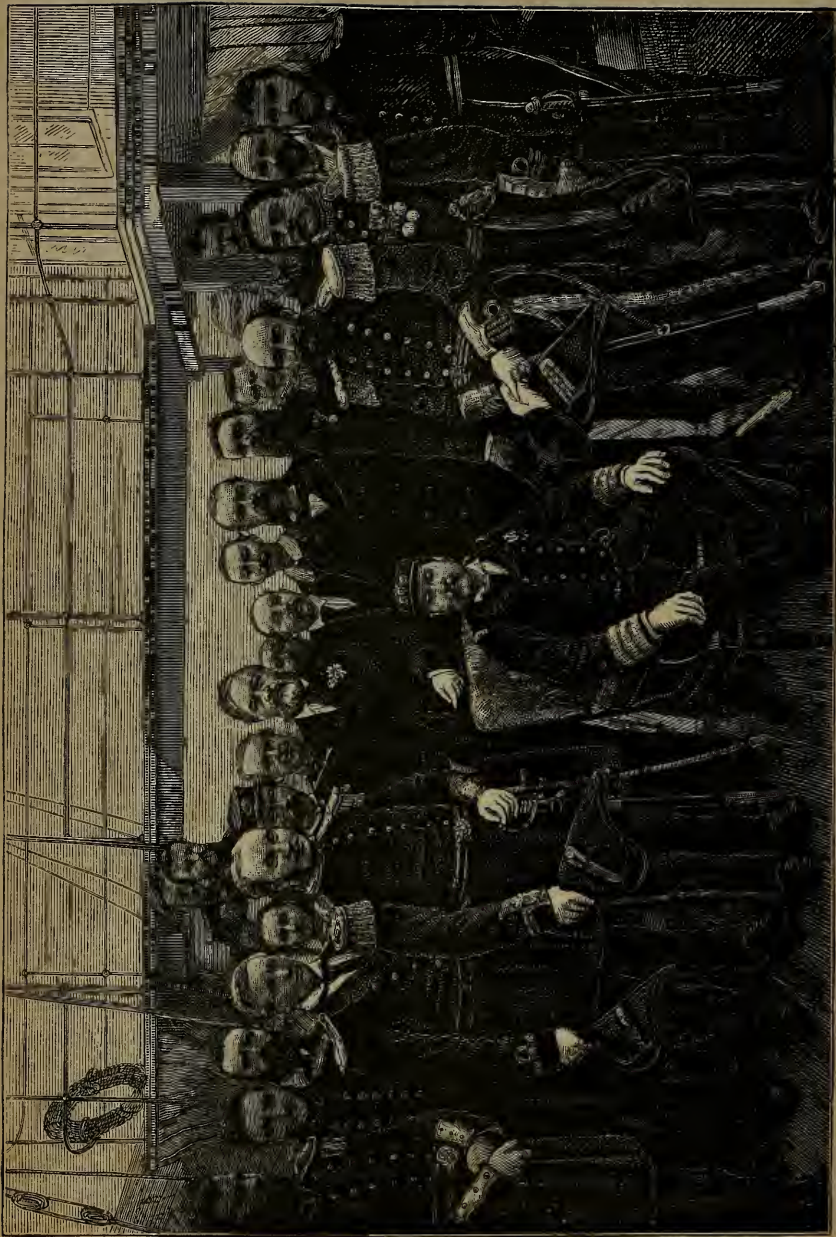




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THE KING OF PORTUGAL ON BOARD THE CHALLENGER.

THE CRUISE
OF HER MAJESTY'S SHIP
"CHALLENGER."

VOYAGES OVER MANY SEAS, SCENES IN
MANY LANDS.

BY ^{William James} W. J. SPRY, R.N.



CAPTAIN GEORGE S. NARES, R.N., F.R.S.

With Map and Illustrations.

NEW YORK:
HARPER & BROTHERS, PUBLISHERS,
FRANKLIN SQUARE.

1877.

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P R E F A C E .

THE important objects for which H.M.S. *Challenger* was placed at the disposal of a scientific staff under the direction of Professor Sir Charles Wyville Thomson, F.R.S., the gratifying results obtained by the full investigation of the bed of the ocean, and the vast amount of information gathered by visits to distant lands very rarely explored, render the cruise of the *Challenger* highly interesting and instructive to the British public.

Under these circumstances, I have been induced by numerous friends to revise my daily journals, and publish in a concise and readable form a continuous narrative of this celebrated voyage.

In this volume I shall not in any way interfere with the scientific results, beyond simply naming them in a cursory and general way, leaving to

Professor Thomson the task of dealing with these subjects, and the application of the information obtained to the furtherance of physical knowledge.

The description of places visited is given in the way that I have viewed them, and under the impressions that filled my mind at the time; but as the geographical aspects of foreign scenes must be similar by whomsoever observed, it is scarcely possible to avoid occasionally using descriptions almost identical with those published on the subject by previous visitors.

The chief interest connected with this narrative will be the vast extent traversed in the pursuit of knowledge, which admits of the combination in this volume of the general outline of the manners and customs of nations and tribes rarely visited, and descriptions of scenery under every condition of temperature, from the fiery Tropics to the ice-bound Antarctic regions: thus combining in the work a fund of information that has been brought together through special aid of the Government, granted to the Committee of the Royal Society, and now dedicated to the public use.

I now respectfully present the narrative of the

cruise of the *Challenger* to my readers, in the hope that, while affording information and instruction, it will prove of sufficient interest to reward its perusal with some pleasantly passed hours.

WILLIAM J. J. SPRY.



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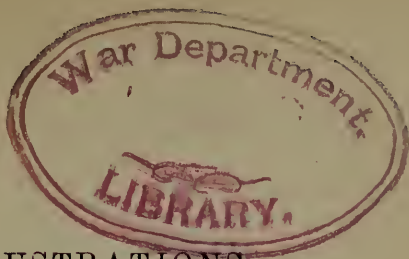
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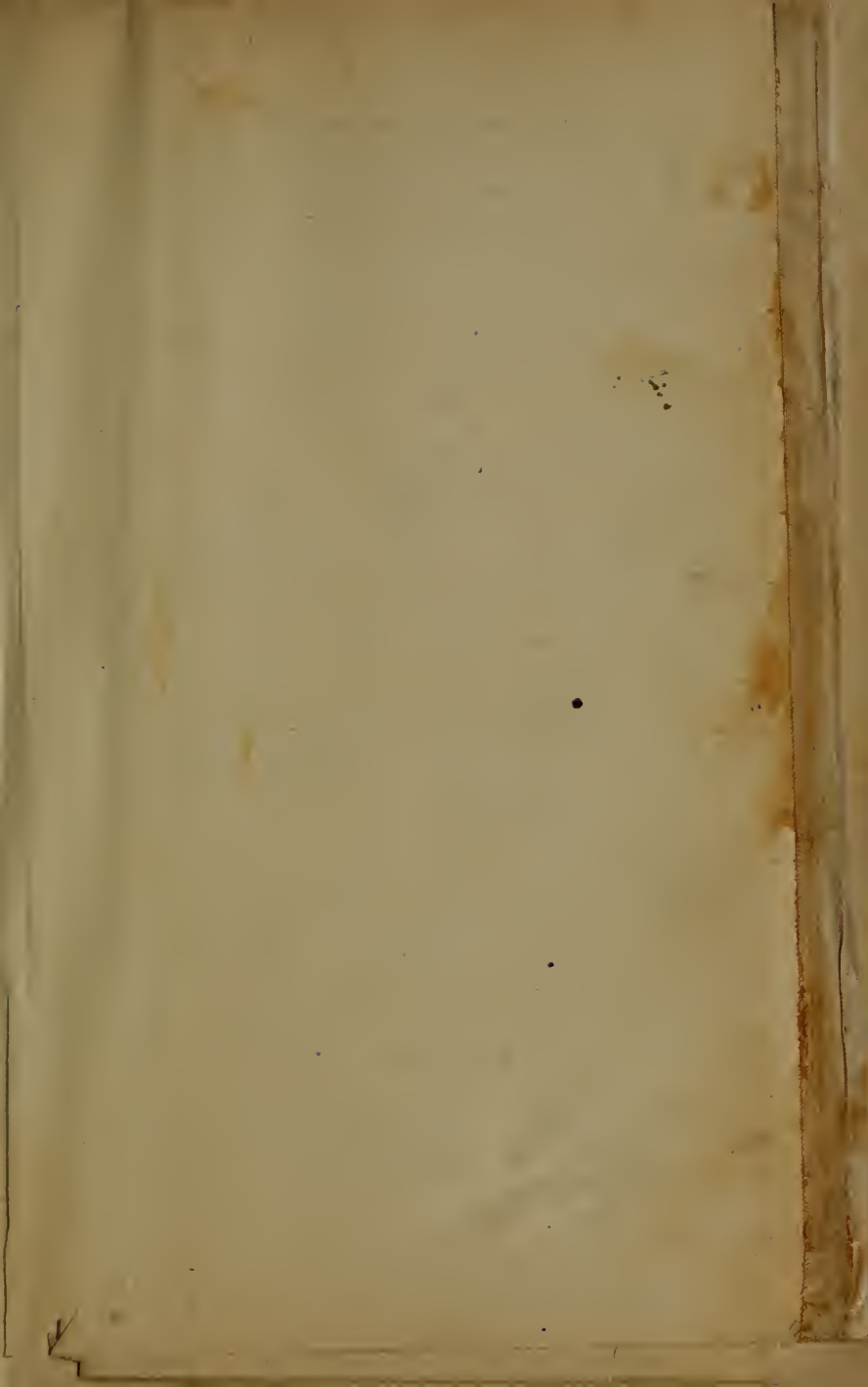
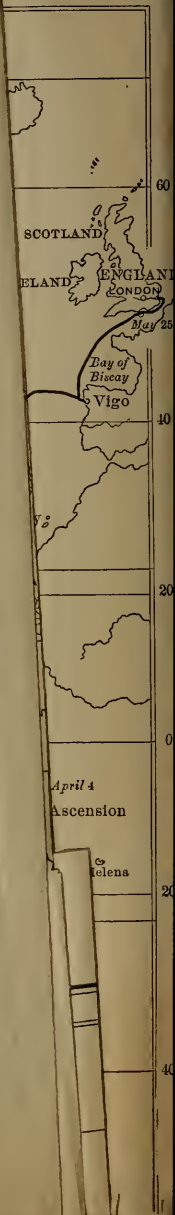




CHART
 SHOWING THE TRACK OF
H. M. S. CHALLENGER
 IN
 1872-3-4-5 & 6.

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SCOTLAND

IRELAND

ENGLAND

LONDON

May 23

Bay of Biscay

Vigo

April 4

Ascension

S. Helena

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40

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CRUISE OF H.M.S. CHALLENGER.

INTRODUCTION.

NOT many years ago, in fact within the memory of the present generation, our knowledge of anything below the ocean's surface was extremely indefinite and obscure. It was even asserted that the specific gravity of the water at considerable depths would be so great that any heavy weight thrown into the sea must be arrested, and remain suspended for ever. It was argued that no animal life could possibly exist in the great depths of the ocean; and only some fifteen years ago doubts were entertained whether some starfish brought up by a line from 1200 fathoms had not attached themselves to the line on its downward or upward course, and the very nature and habits of the animal were so modified as to suit this view.

There can be no doubt that the invention of ocean telegraphy first stimulated the great desire as well as the necessity for a knowledge of the contour of the bed of the ocean. To insure success it was essential to know the configuration and the soundings of

the sea, the shape and character of its bed, the nature of the creatures and plants that haunt its depths, the force and set of its currents, the figure and dimensions of the great ocean basins, and the temperature of the water at various depths.

Interesting as were the results of the various early sounding expeditions, it was not until 1868 that anything like a systematic examination of the ocean's bed was undertaken in connection with natural history and physical geography. In that year the Royal Society succeeded in getting H.M.S. *Lightning* placed at their disposal for some six weeks; and though for so brief a period, the results were such as to give great encouragement for further investigation. Although no great depth of water was obtained in sounding, dredging was effected in 650 fathoms, a greater depth than had hitherto been attempted. The next year (1869) the Council of the Royal Society were successful in securing H.M.S. *Porcupine*, which was fitted out for a more extended exploration of the deep sea; and the experience of the previous year was brought to bear on the improvement of the means for the purpose in view.

The first cruise was between the latitudes of Cape Clear and Galway, on the west coast of Ireland, where a series of soundings and dredgings were effected in 1500 fathoms (more than double that of the previous year), and many creatures of great interest obtained.

The second part of this cruise extended to the

south and west coast of Ireland, where a depth of 2400 fathoms was reached with successful results; and the third part extended over some portion of the survey of the previous year (between the coast of Scotland and the Farøe Islands). On the termination of this voyage (taking into account the time occupied and the extent of the investigations), the cruise of the *Porcupine* was considered to have done more to advance our knowledge of the physical condition of the ocean than had been achieved by any former expedition that ever left our shores.

In 1870 the *Porcupine* was again engaged in the service of the Council of the Royal Society, and proceeded at first in a south-westerly direction towards the farthest point to which the survey extended the year before, and afterwards to the coast of Portugal, and to Gibraltar, where a vast quantity of interesting and important data was obtained. In addition to the sounding and dredging, thermometric observations were constantly taken, proving even more successful than those obtained during the previous voyages. The results showed unsuspected variations in the deep-sea temperature, the existence of a general oceanic circulation, and the presence of life at the greatest depths. The scientific and practical importance of the facts revealed by these short and imperfect inquiries was such as to render their continuance a matter of national concern: so much so that the Council of the Royal Society brought before

the Government a project for extended investigation, which was eventually approved of, and a committee appointed to prepare the plans of operation.

It was suggested that a vessel should be fitted out for a three or four years' cruise, during which time sounding, dredging, thermometric observation, and chemical examination of sea-water should be carried on continuously, with a view to a more perfect knowledge of the physical and biological conditions of the great ocean basins, of the direction and velocity of the great drifts and currents, of the faunæ of the deep water, and of the zoology and botany of those portions of the globe which are at present comparatively unknown.

H.M.S. *Challenger*, a spar-decked corvette of 2000 tons displacement and 400 horse-power, was selected to carry out these recommendations; and the necessary alterations to fit her for the service on which she was to be employed were made in the dockyard at Sheerness. With the exception of two 64-pounders, all the guns on the main deck were removed, so as to obtain the required accommodation. In addition to cabins for the Captain, Commander, and Director of the Scientific Staff, there were spacious compartments for surveying operations and analysing purposes, a laboratory for the chemist, and a studio for the photographer, all fitted with every appliance which skill and science could suggest. On the upper deck stood an 18-horse double-cylinder

engine, with shafting and drums for heaving in the dredging and sounding-lines, extending entirely across the ship; and on the after-part of the deck, besides the usual standard and other compasses, was the Fox dipping-circle, with which it was intended to make an extensive daily series of magnetic observations.

From the Hydrographic Department at the Admiralty a code of instructions was issued, regulating the daily routine to be carried out whenever the weather and other circumstances permitted. The *Challenger*, after visiting Lisbon, Gibraltar, and Madeira, was to proceed across the Atlantic, through the trade-wind region, to the Virgin Islands; thence to Bermuda, onward to the coast of North America; and eastward again to the Azores, and thence to the Canaries, Cape de Verde, and to the equatorial regions—which were to be thoroughly investigated—westward to St. Paul's Rocks, Fernando de Noronha, and to the coast of Brazil. After leaving Bahia, it was desirable that the island of Trinidad, Martin Vaz, and Tristan d'Acunha should be visited on the passage across the South Atlantic to the Cape of Good Hope, which it was expected would be reached at the close of 1873.

From the Cape it was proposed to examine the small groups of islands of Marion and Crozet, and to visit Kerguelen Land; from which the expedition was directed to proceed as far south as safety would permit in the neighbourhood of the Antarctic ice-

barrier, and after a short survey to sail for Melbourne Sydney, and the ports of New Zealand. If time and other circumstances would permit, it was intended again to proceed south, for the purpose of visiting the small islands of Campbell, Macquarie, Auckland, &c.; then again north, sailing to Friendly and Fiji Islands, onward through the Coral Sea; visiting the south coast of New Guinea, passing Torres Straits and the Arafura Sea, calling at Timor and Macassar, thence shaping our course through the Celebes and Lulu Seas to Manilla, which would probably be reached in November 1874.

From Manilla the *Challenger* was directed to sail eastward into the Pacific, calling at those little frequented regions, the Pelew Islands, New Britain, New Ireland, and the Solomon Group, *en route* for Japan.

After leaving Japan, a course was to be taken across the Northern Pacific to Vancouver's Island, and thence southward through the eastern trough of the great ocean to Valparaiso, calling at Easter Island and Sala y Gomez. On leaving Valparaiso, it was proposed to return to the Atlantic through the Straits of Magellan, and by Rio Janeiro and St. Helena to England, which would probably be reached early in 1876. The globe will thus have been circumnavigated, and the great oceans traversed from north to south, and from east to west. How far this programme was carried out will be seen by the following chapters.

War Department
Library



THE CITY OF LISBON, FROM THE TAGUS.

CHAPTER I.

ENGLAND TO LISBON AND GIBRALTAR.

H.M.S. *Challenger* commissioned at Sheerness—Objects of the voyage—Equipment and fittings—Leave Sheerness—The stormy passage—Arrive at Portsmouth—Commencement of the voyage—Leaving England—Weather in the Channel—Across the Bay of Biscay—First sounding and dredging—The results—Land in sight—Enter the Tagus—Anchor off the city of Lisbon—Visit the shore—Sight-seeing—Church at Belem—Churches, gardens, and palaces—Early history of Portugal—Visit of King Luiz to the *Challenger*—Leave Lisbon—Dredging off Cape St. Vincent—First trial with the trawl—Venus's flower-baskets—Description—Trawling near Gibraltar—Obtain specimens of the Umbellularia—Their description—Pass Cape Trafalgar—Rock of Gibraltar in sight—Arrive, and secure alongside the mole—Sights of Gibraltar—Galleries through the rocks—Stalactite caves—Gibraltar as a military fortress—Ceremony of opening and closing the gates—The naval establishment—The town—Its churches—Garrison library—The Alameda—Neutral Ground—Campa and San Roque.

H.M.S. CHALLENGER was placed in commission at Sheerness, on the 15th November 1872, for the

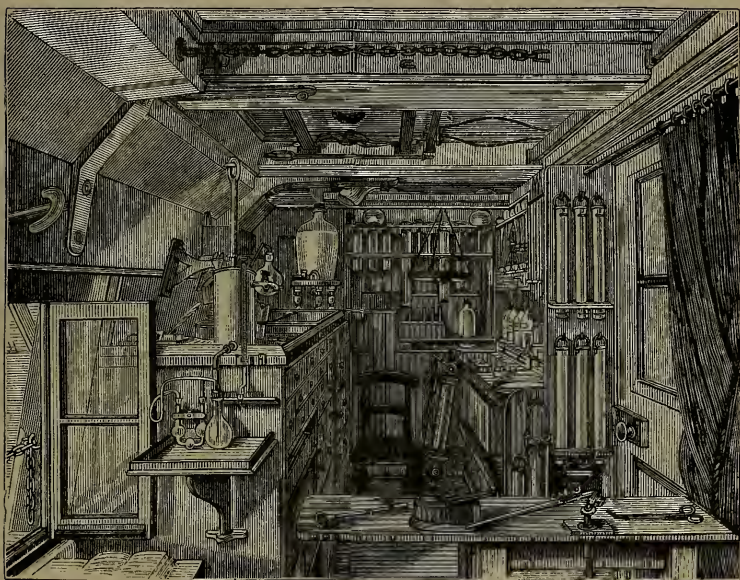
purpose of proceeding upon a voyage of scientific discovery and deep-sea exploration in the Atlantic, Indian, and Pacific Oceans, descending into the Southern or Antarctic Ocean as far as the ice would permit. For some months previous to the date of her commission she had been in the hands of the dockyard officials, undergoing great changes both in equipment and internal accommodation, so as to fit her with every possible means for furthering the great work in hand. For the use of the scientific staff, of which Professor Wyville Thomson was the director, there was built an ample and compact work-room, containing numerous drawers and receptacles fitted with bottles and jars for holding specimens of organic ocean life, and a well-stocked library of professional books in various languages.

Here also were provided numerous instruments for dissection and microscopic observation, long tubes for preserving rare specimens, harpoons, and many ingenious devices for entrapping and securing larger game than the dredge can possibly furnish.

On the opposite side of the deck, and somewhat farther forward, was placed the chemical laboratory for the purpose of analysing and testing the seawater obtained from the different depths: here were ranged retorts, stills, tubes of all sizes, hydrometers, thermometers, blow-pipes—in fact, all the usual paraphernalia found in laboratories; chemicals in drawers, and jars in racks; all secured from accident

from the rolling of the ship by many ingenious devices.

The photographic quarters faced the laboratory, and consisted of a dark room and studio, where were ranged the bottles, chemicals, and apparatus required by the operator.

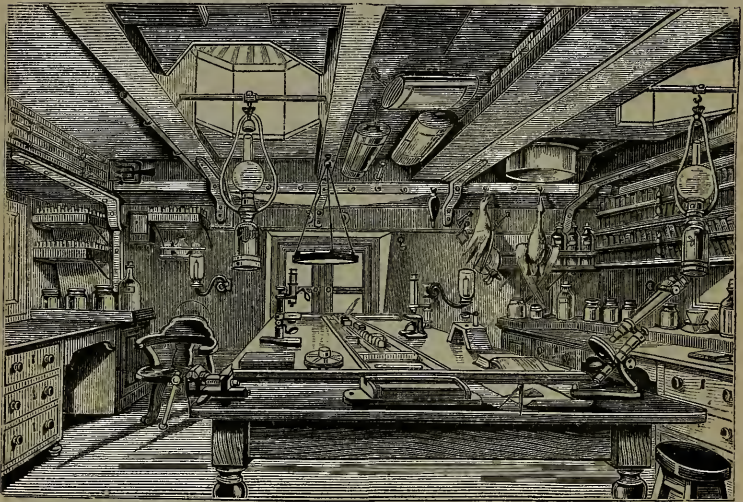


CHEMICAL LABORATORY ON BOARD THE CHALLENGER.

A large aquarium was near at hand; while the water bottles and sounding-machines were secured close by in racks against the ship's side.

On large reels were coils of telegraph insulated wire, for the purpose of obtaining the temperature at different depths by galvanic influence.

Secondly, but not less in importance to the duties of the scientific staff, were those of the naval surveying officers, at the head of whom was Captain G. S. Nares, distinguished as a surveyor for years past. For the use of the officers under his direction there was, opposite the naturalists' department, a spacious chart-room, for the purpose of laying down surveys and con-



NATURALISTS' WORK-ROOM ON BOARD THE CHALLENGER.

structing diagrams and sections of the ocean's bed over which the vessel travelled on her voyage round the world.

The direction of this great expedition was given into hands thoroughly well qualified for the responsibilities imposed upon them.

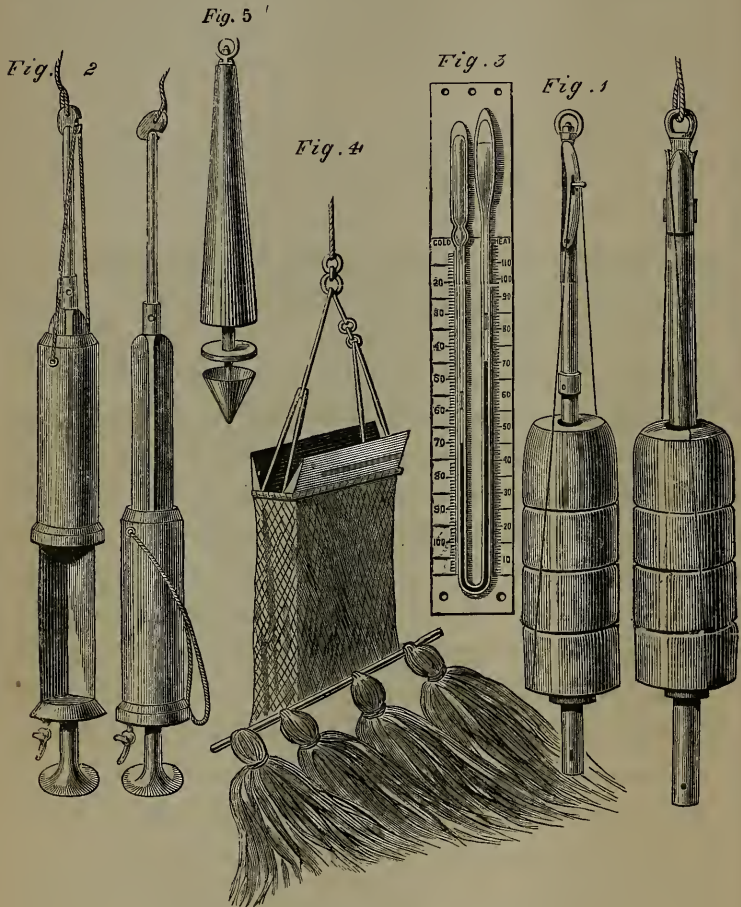
The naval officers were selected, for some special

acquirements, by the Admiralty; and the staff of civilian naturalists and physicists were nominated by a specially appointed committee of the Royal Society, who also furnished instructions and suggestions for the work.

On the 7th December, 1872, after having swung ship for adjustment of compasses and taking magnetic observations, H.M.S. *Challenger* left Sheerness, encountering very stormy weather on her passage to Portsmouth, which was not reached until the 11th; here a fortnight was spent completing supplies. On the 21st December all was pronounced ready, and the most important surveying expedition which had ever sailed from any country left Portsmouth Harbour. As the day advanced, in our progress down Channel, we fell in with miserable, stormy weather, which was our accompaniment for some time. Thus we left our native shores. The sensations were indeed painful; parting from home, with all its pleasing associations, and cherished recollections, had a powerful influence, and gave rise to melancholy impressions, happily relieved by the comforting hope that we should one day be permitted to return to all those so dear to us.

The weather continuing of the same wild and stormy character as we crossed the Bay of Biscay, it was not until the 30th December, nine days after leaving England, that an opportunity presented itself of commencing scientific work; when we were

about 40 miles west of Vigo Bay, our first sounding was obtained at a depth of 1125 fathoms, the



SOUNDING AND DREDGING APPARATUS.

Fig. 1. Sounding machines. Fig. 2. Slip water-bottle. Fig. 3. Deep-sea thermometer.
Fig. 4. The dredge. Fig. 5. Cup sounding lead.

bottom being *Globigerina* ooze. After this the dredge was put over and lowered to the bottom,

where it was allowed to remain some hours, the vessel slowly drifting onward. On hauling in it was found turned upside-down, and in a lovely tangle. A second attempt was made, and a few specimens were brought up, one a rare fish, and some others of scientific value, enough to compensate for the disappointment of the first failure.

Dredging was resumed on the 2nd January, but with no better results, for the dredge fouled the bottom, and eventually the rope parted and some 3000 fathoms were lost.

The next day we steamed in for the land, the weather being much finer as we approached the coast, passing on our way between the rocky islands of the Burlings and Cape Carvoeiro on the main land, sighting the village of Peniche, with its numerous windmills and small houses scattered about, which have a very pleasing effect. We passed sufficiently near to get a capital view of the dark, frowning cliffs which sweep round the sandy beach, named by the residents the Praira Formosa, or Beautiful Beach, from its shelving sands.

Happily our troubles were over for a time. Clearing Cape Roca and the beautiful heights of Cintra, we steamed slowly up the Tagus; past the straggling suburb of Lisbon, with its many-coloured villas scattered over the slopes; past the wonderful castle of Belem, with its elegant proportions and rich

ornaments, recording the skill and the refined taste of the old master masons.

About mid-day we moored in the Tagus, off the capital, and all who desired started for a run on shore. Some went to Cintra; while others spent the time in seeing what was most interesting in the city and its immediate neighbourhood, or in resting after the knocking about experienced in our passage from England.

There are many buildings and places of interest to be seen; perhaps the monastery and church of Belem, of Gothic-Moresque architecture, is worth mentioning; no one could pass it without gazing on the beautiful porch, which is rich beyond description in carvings. Up to the very roof of the church, every pinnacle and buttress, and even the flat portions of the wall, are encrusted with ornaments.

On entering, the interior is of a most charming nature. There seems no excess of ornament, and the delicate shafts of pale grey marble support a wonderfully carved and fretted Gothic roof, with all the effective airiness of Moorish architecture. Service happened to be proceeding during my visit. The church was cool and dim, and the clear sweet voices of the choristers rose and fell along the aisle, and seemed to linger in the roof among the sculptured palm-leaves.

The high altar, with its lighted candles and vases of flowers, and the rich robes of the officiating priests,

formed a warm patch of colour strongly in contrast with the cold simplicity of the grey marble.

The monastery of Santa Maria—commonly called the monastery of St. Jeronimo, from its having been occupied by monks of that order—is in connection with the church, and was founded with it in 1499 by King Manoel the Fortunate, on the spot where Vasco da Gama embarked on his first eastern voyage, in commemoration of the discovery of the Indies.

Church, gardens, and palaces are scattered about, all well worthy of a visit; for there was a time when this country was amongst the foremost in the world. When in the full tide of its prosperous colonisation (A.D. 1500), it was from this port that the great Vasco da Gama sailed to the Cape of Good Hope, which had been previously discovered by Bartholomeu Dias in 1487; and on a second occasion, visited India. Lope Luares Francisco de Almeida followed with ships and men, conquered the Maldives, and established factories in Ceylon, Malacca, Sumatra, when the greater portion of the Eastern Archipelago was in the hands of the Portuguese. Trading relations were opened up with Pegu and Burmah, China and Japan, such as have only recently been granted us. In fact, no flag but theirs could fly along the whole African coast. No ship, without their permission, dared anchor in any harbour from Gibraltar to Abyssinia, from Ormuz to Siam. But in fifty-seven years—that is, at the end of the

reign of King John III., in 1557—began the great change. Misgovernment, tyranny, and the work of the Jesuits and the Inquisition strangled the rising fortune of this little kingdom. From that day up to the present, matters have seemingly been going from bad to worse, and now, stripped of nearly all its colonies, Portugal is indeed but a wreck of what it was in the sixteenth century, when England could not have disputed the possession of an inch of ground with her for a week. England now wears the mantle Portugal in her blindness and bigotry let fall.

Before we left Lisbon, his Majesty King Luiz I., who is known to be very fond of natural history, &c., did us the honour to visit the ship, and remained on board for some considerable time, showing the greatest interest in the captures which had been made on the passage from England.

Other matters were at the same time fully explained by Captain Nares and Professor Thomson, sufficient to enable him to thoroughly comprehend the object of the Expedition, also showing him each department in full working order. After luncheon, and previous to his departure, a group photograph was taken of his Majesty and the officers of the Expedition.

We were detained here until the 12th by a heavy gale from the south-west. On its moderating, we steamed out of the Tagus, and the next day dredged in 470 fathoms off Setubal. The bottom was

of the ordinary grey ooze of the Atlantic. The gale had blown over, and we experienced light easterly and northerly winds, which enabled us to get a few successful hauls with the dredge, and soundings between the coast in the neighbourhood of Lisbon and the deep water to the south-west in the direction of Madeira: the incline was found to slope gently down to 1475 fathoms, with a muddy bottom at 31 miles distant from the shore.

When a little to the south of Cape St. Vincent, it was proposed to try the common trawl, and one with a 15-foot beam was lowered in 600 fathoms; it went down all right, and, after being towed for some hours, was drawn in just as easily as the dredge.

There was no lack of living things, strange-looking fish with their eyes blown nearly out of their head by the expansion of the air in their air-bladders, while entangled amongst the meshes were many starfish and delicate zoophytes shining with a vivid phosphorescent light. On another occasion of using the trawl, an object of very great interest was brought to light, and afforded an opportunity of seeing one of those highly prized and beautiful specimens of the *Euplectella*, or Venus's flower-basket, alive.* It is an object most beautiful in form and structure, consisting of a slightly curved conical tube 8 or 10 inches in height, contracted beneath to a blunt point and expanded above to the width of about

* Professor Thomson, in 'Good Words.'

2 inches. The walls are of the most delicate tissue, recalling spun glass, and resembling finest transparent lace, or rather Shetland wool work. The lower end is surrounded by an upturned fringe of long, lustrous, glassy fibres, and the wide end, after giving off from its edge a fluted lacy frill, is closed by a delicate lid of open network. Hitherto these beautiful objects have only been obtained from the seas of the Philippine Islands, where they live buried in the mud at the depth of 100 fathoms; so those obtained then were considered a most interesting addition to the fauna of Europe.

Our last cast of the trawl before reaching Gibraltar was to the depth of 2125 fathoms; the result was very satisfactory. A number of things came up—starfish mainly, and holothurids; but among them was one species of great interest, historical as well as zoological, the clustered sea-polyp, *Umbellularia Grœnlandica*; twelve gigantic alcyonarian polyps, each with eight long fringed arms terminating in a close cluster on a stem 3 feet high. Two specimens of this fine species were brought from the coast of Greenland early in the last century; somehow these were lost, and for a century the animal was never seen. A year or two since two were taken by the Swedish scientific expedition, and this obtained by us must be considered as the third specimen of this rare marine animal.

On the evening of the 17th January we passed

Cape Trafalgar, and sighted the light of Tarifa. At sunrise the next morning we were close under the Rock of Gibraltar, rising barren grey and gloomy before us. Shortly after we came to anchor, and later in the day proceeded alongside the New Mole to complete with coal, &c.

This remarkable promontory, the Calpe of the ancients, constituted of old, with the opposite Abyla, or Apes' Hill, the boundary of the then known world.

Gibraltar was strongly fortified when it belonged to Spain, but its greatest and grandest works date from the Treaty of Utrecht (1713), when it became attached to England. Stupendous and incomparable are the works which since that period have been executed on it. Excellent and well-kept roads lead to the principal fortifications, which begin at an elevation of only a few hundred yards above the town.

The galleries hewn in the solid rock, forming a kind of casemate, have been constructed at an immense expense of labour and money. Their extent is over a mile in length; and besides these galleries, passages run for miles in the interior of the Rock, affording the garrison a thoroughly protected connection with all points that might be at any time threatened.

The grandest and most imposing of these marvellous excavations are the Queen's Gallery and St.

George's Hall, which, according to carved inscriptions, were mostly begun and completed between the years 1783 and 1789. At the period of our visit (1873), there were about 1800 guns mounted on the different fortifications. From the fortification a narrow and rather steep path leads to the Signal Station, at an elevation of 1300 feet above the level of the sea, where a sergeant of the Royal Artillery is placed in charge. From this point, an excellent view is obtained of the blue waters of the Mediterranean, and the many charming Spanish villages on the western shore of the bay.

On the road down are to be seen some remarkable calcareous caves. That of St. Michael's is situated at a height of 800 feet above sea-level. It contains beautiful stalactite formations, and seems to be of considerable extent. It is somewhat difficult to get about in its intricacies, but one is well repaid for the trouble. On the south-east side of the Rock is another of these caves, dedicated to St. Martin; it is smaller, but the stalactites are of a purer whiteness. Here we discovered a large accumulation of sand, recent shells, and many heaps of bones and teeth of large herbivorous animals which possibly existed here ages ago, when Gibraltar, instead of having its present salubrious climate, was covered with icy peaks and glacial houlders.

Gibraltar has little save its barracks, military storehouses, and fortifications to attract strangers; in fact,

within the gates it may be considered merely a large garrison.

The opening and closing of the gates is daily carried out with a certain amount of ceremony, as if in a state of siege. Immediately after sunrise the sergeant of the guard procures the keys of the gates, which have been deposited at the Governor's the night before, when, accompanied by a guard with rifles and fixed bayonets, he has the gates opened, and the drawbridge lowered; and throughout the day visitors are free to come and go; those from Spanish possessions having a pass which is "viséd."

Every evening, soon after sunset, the ceremony is repeated. The sergeant, accompanied by his escort, carrying a heavy bunch of keys, marches to the various town gates, the bridges are drawn up, the gates closed, bolted, and locked, and from this hour none can enter or leave the town, for the keys are returned to the Governor.

The Naval Yard is a compact and excellent establishment, where defects to the hull and machinery of vessels on this part of the station are well attended to. Stores of all descriptions are to be obtained, and large quantities of coal, some 10,000 or 15,000 tons, are usually on hand.

The town, which is built on terraces on the side of the Rock, gives shelter to some 15,000 souls, consisting of Spaniards, English, Italians, Portuguese, Moors, Turks, Greeks, and Jews; indeed, a mixture of races,

customs, and manners, such as can scarcely be found at any other place in Europe.

There are several churches, chapels, and synagogues, a couple of excellent hotels, and numbers of other houses for refreshment; shops for the sale of Moorish curiosities, Maltese lace and filigree jewellery, cigars and tobacco. Being a free port, there are no custom duties (except on wines and spirits), consequently most things are so cheap as to induce smugglers to carry on an extensive trade with Spain, which persists in continuing to maintain her prohibitory duties on English goods. I must not omit to mention the Garrison Library, nor the kindness and cordiality of the military, who invariably, on the arrival of a man-of-war, take the earliest opportunity of acquainting the officers that during their stay in port they are to consider themselves honorary members. Many a pleasant hour may be passed in this resort, with its thousands of volumes; for, although amongst this vast collection there are many rare and costly works, especially of ancient Spanish literature, all the newest and most important books and magazines of the day are being constantly added. Add to these late newspapers, periodicals, and daily telegrams from England, and some notion may be formed of the value of the Garrison Library at Gibraltar. It was founded in 1793 by Captain Drinkwater, and is one of the finest and most imposing buildings on the Rock.

There are several pleasant walks about the town, but perhaps the best is in the Alameda, or Elliott Garden, situated at the south end; it is prettily laid out, and in commemoration of the heroic defender, General Elliott (afterwards Lord Heathfield), a bronze bust on a column has been erected to his memory. Plants of different sorts—semi-tropical cacti, dwarf palm, Spanish broom, the yellow blossoms of which are mixed with the varied colours of fuchsia, orange, and oleanders—render it a most charming promenade, and during the fine evenings military band performances take place, when it is usually thronged with visitors. Continuing our walk farther south, we passed the dockyard convict establishment, and barracks, and on the lowest terrace, which juts farthest into the sea, came upon the lighthouse on the celebrated Europa Point.

On the north end of the Rock is the sandy neck of land called by the Spaniards “El Istmo,” and by the English the “Neutral Ground.” It runs between the Mediterranean and the Bay, and is about $1\frac{1}{2}$ mile in length and 2700 feet in width. This plain, which is not more than 10 feet above the level of the sea, owes its origin to the formation of a dune in the rocky bed of the ocean. Strong easterly gales seem by degrees to have accumulated the sand on this shallow run of the sea, which formerly separated Gibraltar from Spain. Until quite recently the inhabitants were almost entirely dependent for

water on that collected from rain in tanks. Artesian wells, however, have been sunk on the Neutral Ground, and now yield an extensive supply of excellent, pure water.

On the east side of the Rock, near Catalan Bay, there is a sand formation similar to that on the Neutral Ground; this deposit has attained the enormous height of 1000 feet. There is no road round this side, for a portion of the sand has been excavated at the point where the isthmus joins the Rock, and the water of the bay flows in so as to leave only a narrow low dyke of firm ground.

The adjacent Spanish settlements of Campamiento and San Roque are much resorted to by excursionists from Gibraltar, and during the summer months are selected by numerous families for a prolonged stay. However little pleasure or interest a ride over this arid and sandy plain affords, when once arrived at Campo, the rider enjoys a most charming prospect, as there is probably no other point from which the isolated Rock appears more grand or picturesque than from this neat little village.



PLAZA CONSTITUCIÓN, SANTA CRUZ, TENERIFFE.

CHAPTER II.

GIBRALTAR TO MADEIRA AND TENERIFFE (CANARY ISLANDS).

Leave Gibraltar—Daily sounding and trawling—Sight Por'ò Santo—Its discovery and early history—Arrive and anchor in Funchal Bay, Madeira—Its early history—First impressions—The gardens, buildings, conveyances, dress—Leave Madeira—Pass the Desertas—Cape Anaga—Teneriffe sighted—The Peak—Anchor off Santa Cruz—The buildings and streets—Scenery in the country—Ascent of the Peak—Cruising amongst the group—Sounding and dredging—Ball at the English Consulate—Naval incidents connected with Teneriffe.

WHILE at Gibraltar, a new survey was made of the inner mole, the ship's chronometers rated, and magnetic observations obtained. On 26th January we left the anchorage and proceeded round Europa Point, and as the day was well advanced, hastened on

so as to get through the Straits before dark. After passing the Pillars of Hercules, the wind freshened considerably, and the intention of making a short detour from our course so as to visit Tangiers had to be abandoned. Early next morning we passed the most southerly point of Europe, and as we steamed on, we gradually lost sight of the coast, which was beautifully illuminated by the rising sun, affording us the last glimpse of the Old World.

A westerly course was now shaped to continue the line of soundings we had dropped off Lisbon. Deep water, with a soft oozy bottom, was found to exist, favourable for telegraph cables; and day by day, as the weather moderated, so the dredging and trawling became more successful, and a number of strange new forms of animal life were found; some wondrous formation of sea-urchins and lily-stars, some clustered sea-polyp of singular beauty and of great scientific interest. Thus a week passed, and, on the 2nd February, Porto Santo was sighted—a barren, rocky spot, but, as its name (Holy Port) indicates, viewed by its first tempest-tossed discoverers with thankful hearts, when in their attempt to circumnavigate Africa they were driven out to sea and on the point of perishing.

The island, when first discovered (1416), was, according to some accounts, inhabited, according to others, desolate; however, the voyagers were so delighted with the discovery that it was resolved to dis-

continue the search along the African coast, and to return to Portugal with their present acquisition of knowledge, and with the evidences of their discovery. Prince Henry, who had been the means of fitting out the expedition, was so delighted with the account of this first discovery that he immediately planned a scheme of colonisation. Vessels left Lisbon with a number of labourers fitted out for settling, who had been persuaded to go by tempting inducements, and who carried with them a varied stock of domestic animals, and all kinds of grains and plants suitable for cultivation. This expedition was placed in charge of Bartholomeu Perestrello, who was also appointed governor of the island. Thus was the father-in-law of Columbus engaged in the important pioneer work of discovery. He was the first coloniser and planter in newly discovered western ocean lands.

But Perestrello failed in the cultivation, and after three years abandoned the governorship which had been vested in him. Some short time afterwards, Columbus and his wife Philippa came here to reside, in order to get a living out of the wild property bequeathed to him by his father-in-law. But he gained nothing by it, unless, perhaps, some increase of knowledge, and the birth of his son Diego in Porto Santo.

We remained for a short time sounding and dredging in the vicinity of Porto Santo, which appears, on nearing it, like two islands. As we

passed to the eastward, the southern coast presented a most conspicuous and pleasing aspect, giving an air to the place which probably would hardly be borne out on landing or making a closer acquaintance.

The next morning we were off the anchorage in the Bay of Funchal (Madeira). This island was discovered soon after Porto Santo, and from its dense forests at that time received this Portuguese name for wood. The lovely and fertile island had no doubt a people and name of its own, but they have passed away, and the footsteps of the civilised discoverer have obliterated every trace of the aborigines. The first act of the adventurers was to set fire to the dense forests, which fed a conflagration that was not fairly extinguished for many years; and when the virgin soil of the land was fully exposed, colonisation was successfully established.

This colony of Madeira was the nursery of two notable things of momentous consequence in the history of all subsequently discovered and colonised western countries. One was the introduction into this island of some growing shoots of a plant obtained by Prince Henry in Sicily, but originally brought from South-Eastern Asia, and spoken of by an old Biblical prophet as the "sweet cane from a far country." Here, then, was organised and established the first sugar-cane plantation, and such was its success that after about five years' experience, 60,000

arobas of sugar were sent to Lisbon. This formed only twenty per cent. of the annual produce of the island, and was reserved as the especial revenue of the Military Order of Christ, of which Prince Henry was grand master.

The other notable matter was the labour by which this sugar-cane was so abundantly produced. It was found from the first that Portuguese agriculturists would not voluntarily exile themselves, so recourse was had to the Negroes, who were imported in large numbers from Africa. These Negroes, who had, as we know, been toiling involuntarily ages upon ages in Asia, were now for the first time employed by Europeans in extracting wealth out of the new lands of the West.

On the morning of February 3rd we arrived and anchored in Funchal Bay, just to the south of the Loo Rock, the only place of shelter at this season of the year, the open roadstead affording but little protection against the prevailing winds. The weather was fortunately very fine, and we were enabled to coal in safety. Coming in from the monotonous sea, the first impressions of Funchal are delightful and striking, with its luxuriant gardens smiling with gorgeous flowers, and its mountain-sides cultivated almost to their summits with beautiful plants. Nature exhibits herself here with such varied charms that imagination can scarcely picture a lovelier scene.

I had a ramble on shore through some of the gardens, and although flowers were not exactly in full bloom, yet some of the most beautiful plants were in their highest development. Amongst others were seen sweet-smelling rose-trees, blooming oleanders, aloes more than 30 feet high, the shining green foliage of the camellia, chestnuts, cypress, plane-trees, Brazilian pine, laurels, myrtles, odoriferous magnolias, fuchsias, together with bananas, sugar-cane, coffee shrubs, mangroves, pomegranates, tamarinds, pine-apples, and gigantic dragon-trees. One must travel a long way indeed before meeting with prettier scenery, or a place that will surpass in fragrance and loveliness the floral beauty of this island; and yet it is only within five or six days' run of our cold shores of England.

The product which has made the name of Madeira famous and familiar is its wine, which is now produced in great quantities; this and the cultivation of the sugar-cane form its principal trade.

The public buildings offer little to attract notice; the churches are insignificant, and even the Cathedral, a building in the basilica style, is in no way remarkable otherwise than by the innumerable garlands and flowers, offerings of pious devotees.

The charms of beautiful walks in the most enchanting neighbourhood enhance the pleasantness of the climate of Funchal, so much resorted to by invalids, for within a short distance of the landing-place

are splendid avenues of massive oaks and magnificent plane-trees, forming delightful promenades, with repose and shade, under the dense foliage of their wide-spreading branches.

The existing conveyances are either horses, hammocks, sedan-chairs, or sledges drawn by oxen. No stranger should miss the diversion of travelling down from the Nossa Senhora de Monti, where one has a slide down the mountain-side, above 1800 feet, into the heart of the town, on small double-seated wooden sledges. These curious vehicles are guided in their descent with admirable skill by a couple of natives, and, notwithstanding the velocity with which they rush down the incline, it is very rare that even a slight accident is heard of. These sledging parties, which are inexpensive, constitute the favourite amusement for visitors.

The dress of the natives is extremely simple, and, as the climate is subject to such slight extremes, their winter and summer attire is much the same, and generally consists of a pair of trousers of some light material, a shirt, and linen jacket; shoes are a rare exception. As a head-dress they wear a curiously shaped small cloth cap, terminating in an erect, pointed tail from 5 to 6 inches long. This seems to be a remnant of a turbaned head-covering worn formerly by the inhabitants of the African coast, with whom the early settlers carried on the slave trade.

The women, like the men, are not overburdened

with apparel, and are mostly employed as labourers in the vineyards and gardens.

During the two days of our stay in Funchal the weather was very favourable for coaling, which was satisfactorily finished, and on the 5th February we proceeded out of the bay, and, with a favouring breeze, were soon off the "Desertas," a group of barren rocks about 11 miles S.E. of Madeira. These rocks appear to be only frequented by fishermen, who repair thither for collecting orchil. The northernmost isle is a high pyramidal rock, often taken for a sail, which it much resembles. The weather continuing very favourable, the next day we sounded in 2000 fathoms, and early the following morning the brilliant light on Cape Anaga (Teneriffe) was descried ahead. As daylight dawned, we steamed in for the land, and the high, precipitous rocks, all bleak and bare, here and there broken by deep and rugged clefts, rose in bold outline before us. Somewhat later, as the clouds cleared, the celebrated Peak was in sight, a grand and solitary object towering in seeming desolation; for although there is a certain amount of fertility on its sides, it was not apparent as we approached it. By 7.30 A.M. we anchored off the town of Santa Cruz, Teneriffe. After a visit from the health officers, all were free for a run on shore. There is little at Santa Cruz itself to interest a stranger; the houses are poor structures, the streets narrow, and there are no public buildings with any pretension to taste

or elegance. Nevertheless one is repaid for a stroll in the country, where the scenery is remarkably wild and impressive—deep ravines, from which mountainous rocks rise abruptly void of every trace of vegetation except a few cacti and other hardy plants.

There is a sort of grandeur in this volcanic scenery—in the scorched craters of these enormous rocks, ribbed at the sides, rising into a variety of shapes. Now all is quiet, no traces of life, no appearance of vegetation—all is arid, dry, and parched; while away to the southward can just be discerned a fine picture of woodland scenery, arresting the eye at once by its great contrast, and, as it were, compelling one to admire the extreme beauty afforded by the charming landscape. Here and there were noticed inclosures of cacti, used in rearing the cochineal, which, with the castor-oil plant, appears to be extensively produced for exportation. Our stay at first was only for two days, during which a party of naturalists landed, and made an attempt to ascend the famous Peak (12,180 feet). They had a pleasant time of it, reaching 9000 feet, where they found the temperature of the air at night intensely cold. It was too early in the season for natural history work; still collections geological, botanical, and zoological were made.

While the naturalists were away, the vessel cruised about, and obtained a series of dredgings, serial

temperatures and soundings, between Teneriffe and Palma, and past Gomera and Hierro. Considerable depths were found, varying from 200 to 1700 fathoms; as a rule discovering a dark sandy bottom and dead shells.

Three days had thus been spent when we again anchored off Santa Cruz, and, as we were to leave the next day, H. B. Majesty's Consul issued invitations to a ball in honour of the visit of the *Challenger*. The weather was fine, and a large party started from the ship, arriving at the consulate in good time to find all the available Spanish beauty there to meet us. The ball was a very capital one, but the great drawback was our being unable to converse fluently with our partners when dancing. For all that the eye, whose language is so deep and expressive, the organ which the Spanish ladies cultivate to such perfection, did all. What the heart felt and the tongue could not utter the eye interpreted. The company was not, however, entirely Spanish. The Consul's daughter, and Mrs. Grattan, the American Consul's daughter, and an English lady, married to the Minister of Marine, were there to interpret our most pressing wishes and entertain us with their company.

It was not until the early hours of the following morning that the pleasant gathering broke up, and we all retraced our way to the landing-place to get on board.

The town of Santa Cruz is famous in our naval history. On the 20th April 1657, Admiral Robert Blake attacked and utterly destroyed the Spanish fleet, strongly placed under the batteries, and, aided by a sudden shift of the wind, was able to draw his ships off with comparatively little loss.

It was here also that Nelson (July 24, 1797) undertook his expedition against Teneriffe, which, although unsuccessful and disastrous, displayed great heroism and bravery. The two flags captured on this occasion are retained in the church, and the inhabitants still bear in mind the attack and repulse relating to their capture.

CHAPTER III.

TENERIFFE (CANARY ISLANDS) TO ST. THOMAS (WEST INDIES).

Leaving Teneriffe—Sight of the Peak—Commence section across the Atlantic—Daily soundings and trawlings—The results—Configuration of the bottom—In the Tropics—The officers of the ship—Life on board—Our daily doings—Description of the mode of sounding—The apparatus and appliances used—Taking serial temperatures—Dredging and trawling—Island of Sombrero in sight—Arrive and anchor at St. Thomas.

As the evening of the 14th of February dawned, we left the bay of Santa Cruz, dispensing with steam when well clear of the land. The bright moonlight afforded us a capital view of the Peak, which frowned down in all its grandeur, clearly and sharply defined, and its head hoary with many a winter's snow. A fine favouring breeze was with us all night: at dawn of the following morning the island of Teneriffe was looming far on the distant horizon.

From the present may be said to commence the regular work of the Expedition. A section was now to be carried right across the Atlantic from Teneriffe to Sombrero (a small island forming one of a group of the Virgin Islands), a distance of about 2700 miles; and along this line over twenty stations were fixed on at which it was decided to make careful

observations as to depth, temperature, and nature of the bottom. These stoppages were about 100 miles apart, and each day, when the weather permitted, soundings and dredgings took place. For the first 250 miles the bottom of the ocean was found to be nearly level at a depth of about 2000 fathoms, consisting, for the most part, of the Globigerina ooze of the Atlantic. On proceeding some 50 miles farther to the westward, we sounded in 1500 fathoms, identically on the top of a ridge, where, after dredging for some time, a quantity of dead, hard, white coral, together with several beautiful specimens of sponge attached to its branches, was obtained. From this position soundings made the next day showed that the bottom sank rapidly until reaching a depth of 2700 and 2950 fathoms, from the first of which a few living specimens of starfish, annelids, &c., were obtained in the dredge; but the most remarkable fact was that with the increasing depth there was a gradual change in the character of the bottom.

On the 26th February, in latitude $23^{\circ} 23'$ north, longitude $35^{\circ} 10'$ west, being about 1600 miles from Sombrero Island, we sounded in 3150 fathoms. This was the greatest depth as yet met with, the material obtained from the bottom being quite new to science. For several days after, the dredge continued to bring up a dark chocolate or red clay, scarcely containing a trace of organic matter, and

entirely devoid of animal life. This newly discovered formation going on at the bottom of the sea appeared, as was found afterwards, to extend for some 350 miles, when the depth decreased gradually until 2000 fathoms was obtained, and the dredge brought up animal life. The nature of the bottom changed gradually into the usual Atlantic ooze, altering again in a few days, as the depth increased to 3000 fathoms, when the mud lost all trace of carbonate of lime and resumed its red colour, which continued to within 100 miles of Sombrero. The analysis of this red deposit proved it to be almost a pure clay (a silicate of alumina and the oxide of iron, with a small portion of manganese). From these results it was inferred that the circumstances which lead to the deposition of this bottom were the cause of its being so unfavourable to the development of species; and, although it has been since proved that animal life is possible at *all* depths, it has been found, after reaching, say, 1000 fathoms, that its abundance greatly diminishes. It was in one of these dredgings we were successful in obtaining a beautiful blind crustacea, perfectly transparent, which, although found at such great depths, does not appear to suffer from this peculiarity either in development or colour, nature having supplied claws and feelers to make up for the suppression of eyes, the sense of vision being useless in its normal state of perpetual darkness.

When about two-thirds of the distance between the Canary Islands and the West Indies, we had reached the Tropics, and were fairly in the region of the trade winds, of which we took advantage; still we occasionally "hove-to," for the purpose of sounding and dredging; on its conclusion again standing on our course, with a steady breeze.

And now, while enjoying such pleasant weather, I take the opportunity of introducing my reader to the officers who had been appointed, and who were for the most part our companions through the various incidents of the cruise.

The naval officers had been selected by the Admiralty, in most cases, for some special acquirement; and the staff of civilian naturalists and physicists had been nominated by a specially appointed committee of the Royal Society.

Captain George S. Nares, F.R.S. &c., was appointed in command of the Expedition. His name is familiar to the public from his surveying services, his standard works on seamanship, and, recently from his having been in command of the late Arctic Expedition. From his previous scientific training, he was eminently fitted for the responsibilities imposed upon him. His second was Commander J. F. L. P. Maclear, also well known in the scientific world, and who has seen much service in various parts of the world; on him devolved the entire charge of the magnetic department. Lieutenants Pelham Aldrich,

A. C. Bromley, and G. R. Bethel, were each specially qualified in surveying or magnetic work. Staff Commander Tizard, a surveyor of high reputation, was in charge (under Captain Nares) of the whole of the navigating and hydrographic duties, assisted by Sub-Lieutenants Havagal and Swire. The hygiene was in charge of Staff Surgeons Crosbie and G. Maclean.

The engineering department, on which so much of the success of the Expedition depended, was under the direction of J. H. Ferguson, as chief, assisted by W. J. J. Spry, A. J. Allen, W. A. Howlett, and W. J. Abbott; and the machinery, on the return of the vessel after her long cruise, was as efficient as when she started. Paymaster R. R. Richard, Assistant Paymaster J. Hynes, with Sub-Lieutenants Lord George G. Campbell, A. F. Balfour, A. Channer, and H. E. Harston, were the other officers.

Professor Sir Charles Wyville Thomson, F.R.S. &c., had been selected as director of the civilian scientific staff, and (as has since been proved) none could have been found better qualified to fill the important position. With the practical experience he had already gained in the *Porcupine* and *Lightning*, he was enabled to utilise and work out all the subjects that came within his reach during our more extended cruise. His assistants were H. N. Moseley, M.A., Dr. von Willemöes-Suhm, and J. Murray, who undertook the naturalist and botanical de-

partment. J. Y. Buchanan, M.A., acted as physicist and chemist, and J. J. Wild, as artist and secretary. This staff of specially selected scientists, each distinguished for some particular attainment in his profession, completed the list.

Life on board ship, the varied incidents at sea, all tend to rouse feelings and sensations which are reserved alone for those whose business is on the great waters. To those constituting the scientific staff, the routine, especially of a man-of-war, was entirely different from that they had hitherto enjoyed on shore; and unfortunately their initiation to the ever varying scenes was under most unfavourable circumstances as regards the weather. At first the etiquette and usages of naval every-day life seemed particularly vexatious and annoying; but after a while, when fine weather again set in, and the seasickness had been got over, one and all perceived, to a certain extent, the necessity of order. Scrubbing, washing, and holystoning of the decks, cleaning brass and wood work, mustering at quarters and divisions, are all measures which tend to enforce the discipline so essential to good government.

Existence in the limited space of a ship, which is frequently for months completely isolated from the outer world, is so peculiar and interesting to those unacquainted with the sea that I may be permitted to make a few remarks as to our daily doings.

From the hour of four o'clock in the morning, as

soon as the watch has been mustered, the bustle and activity begin, lasting throughout the day and even to the hour when night reminds one of sleep. Pumps are manned, and water is splashed over decks in all directions; and, although apparently unnecessary at times, yet it is absolutely essential to the preservation of the health and comfort of those on board. By six o'clock the washing is nearly finished, when all hammocks are piped up and stowed; it is now time for breakfast, consisting of cocoa and biscuit. The hands dress in the rig of the day, and all preparations are made for sounding and dredging. Sails are furled, and steam is ready, for it is essential to keep the vessel's head on to the sea during these operations. Before commencing, however, an account of how the soundings and dredgings are obtained, it might be as well to specify the sort of information that is required from us. Formerly the actual depth of the ocean only was required, and in extreme depths it was considered a great feat to be able to bring up a specimen of the bottom. Our requirements and means of obtaining information have so rapidly advanced that we not only obtain the sounding and bring up specimens, but we also ascertain the temperature of the sea at every 100 fathoms, from the surface to the bottom, and at the same time bring up samples of the deep water.

It has been found that in all deep soundings it is absolutely necessary to use steam power. No trust-

worthy results can be obtained from a ship under sail, as even in the calmest weather the heave of the sea, or the surface current, is sufficient to drift the ship in a very short time a considerable distance from the place where the lead was originally let go. It is thus impossible to obtain a perpendicular sounding; besides the time intervals between the 100-fathom marks are upset, these time intervals being the only means of telling when the lead has reached the bottom.

The first thing, therefore, to be done is to shorten and furl all sail, and bring the ship head to wind, regulating the speed in such a manner as to avoid forcing her through the water.

The sounding apparatus is then got ready. A block is placed on the main-yard a little outside the boom iron, and a whip rove through it to trice up the accumulator (Fig. 1). These accumulators are india-rubber bands, $\frac{3}{4}$ inch in diameter and 3 feet in length. They are capable of stretching 17 feet, when they each exert a pressure of 70 lbs. Twenty pairs of these accumulators have been found sufficient for most of the soundings obtained, as they are strong enough to withstand the strain of the weights on the lead line without being too strong to give readily with the motion of the ship; their greatest use being to keep the

FIG. 1.



sudden jerks of the ship's motion from bringing too great a strain on the lead line. At the bottom of the accumulators, which are kept separated from each other by being passed through holes in a

FIG. 2.



circular disk of wood, a 9-inch block is hooked, and through this block the lead line is rove. The end of the line is then secured to the sounding-rod, to which is attached the number of iron weights required to sink it rapidly. A short distance above the rod the slip water-bottle is fastened, and above that a deep-sea thermometer.

Two descriptions of sounding-rods have been in use during the cruise. The one first employed is known as the "Hydra" rod (Fig. 2), and consists of a brass tube $1\frac{1}{3}$ inch in diameter, and 42 inches in length, having at its extreme end a butterfly valve, and at its top a sliding rod 30 inches in length. On the upper part of this rod is a small stud, with a spring reaching to its head (when there is no pressure on it); to this rod the weights are attached, and, by means of the spring, disengaged, when at the bottom, in the following manner.

The sinkers are of cast iron, and average one hundred weight each. They are cylindrical in form, having a hole through the centre; through this hole the rod is

placed, and as many weights are put on as are deemed necessary (generally speaking, one for every thousand fathoms). At the bottom of the last weight a small iron ring is rove on the rod, to which is attached a piece of iron wire about 12 feet in length. The bight of the wire is passed over the projection, and the rod being lifted, the weights rest on the ring, which is supported by the wire sling. The strain of the weights falls on the stud, thus pushing back the spring; and as long as the pressure of the weights continues on the ring at the bottom, the wire remains in its place. When the weight of the sinkers is relaxed, by their reaching and resting on the bottom, the spring pushes the wire off, and the rod, being hauled up by the line, unreeves itself from the weights, leaving them at the bottom.

FIG. 3.



The second sounding-rod (Fig. 3), which was principally used, is the invention of Staff Commander Baillie, R.N., and consists, as in the "Hydra," of a cylindrical rod, of 3 inches in diameter and some 48 inches in length. The iron sinkers are rove on the rod in a similar manner to the former, but the means of disengaging and the safety in lowering are more to be depended on. The bight of the wire supporting the weights is placed over a sliding "ketch." On the rod reach-

ing and resting on the bottom, the "ketch" drops over a conical end, and thus releases the weights, which remain at the bottom. The tube being larger than that of the "Hydra," it brings up a greater quantity of sample from the bottom.

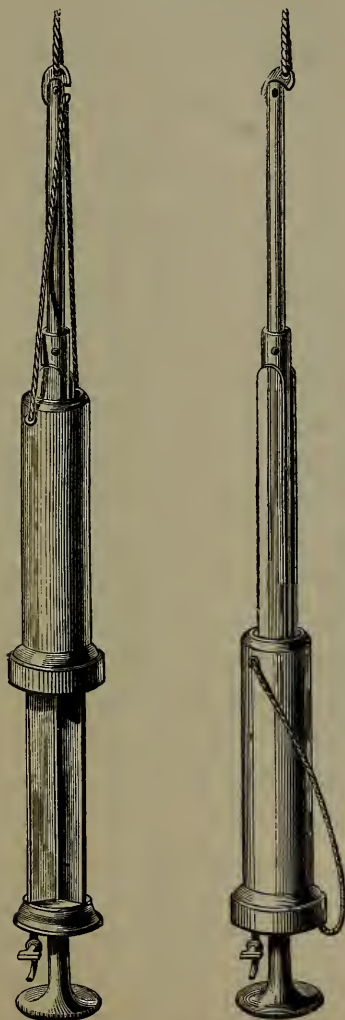
These rods are only employed when the depths are considered to be over 1500 fathoms; for less depths a conical lead weight (Fig. 4) is used, which has fitted to its bottom an iron cylinder, 3 inches in diameter, with butterfly valves at its base for securing samples of the ocean bed.



The line used for sounding is 1 inch in circumference, and is specially prepared for this service (having a breaking strain of 14 cwt.); it is marked at every 25 fathoms, the 25- and 75-fathom marks being white, the 50-fathom marks red, and the 100-fathom marks blue. Worsteds are used to mark the line, and the number of hundreds are distinguished by tucking the worsted under and over the strands of the line, one tuck for each hundred fathoms. This leaves the line perfectly smooth; no additional friction is caused in the water, nor is there any danger of the marks of the line fouling in the blocks through which it passes. The line is kept on reels (3000 fathoms on each) conveniently situated near the sounding-platform, from which it is led through a block to the

winding-engine, then up through the block at the mainyard, and attached to the sounding-rod.

FIG. 5.



The slip water-bottle (Fig. 5) consists of a brass

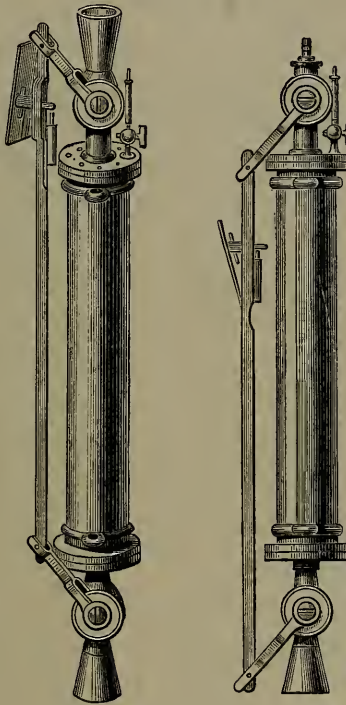
rod with three radiating ribs to strengthen it, and to act as a guide for a brass cylinder which incloses the water. At the bottom, and halfway down the radiating ribs, are two finely ground seatings, and the brass cylinder is so arranged that its upper and lower surfaces fit with great accuracy on these seatings, thus inclosing anything that may happen to be between them. At the top of the rod is a brass tumbler, with a slit in it; to this tumbler is attached a lanyard to fasten the bottle to the sounding line, and over the slit of the tumbler is placed the bight of a piece of small line (the ends of which are secured to the cylinder), by which the cylinder is kept suspended above the seating while the bottle is descending, and being in this position quite clear of the radiating ribs, it allows the water to pass freely through it.

Directly the strain is released on the sounding line above, through the bottle reaching the bottom, the tumbler falls over, pushing off the line that suspends the cylinder, leaving it free to fall on the two seatings, and thus effectually inclosing a specimen of the bottom water. A tap is arranged at the lower end to facilitate the emptying of the bottle when again on board.

Other bottles (Fig. 6), but of different construction, for carrying out similar results were employed with equal success; they consisted usually of a brass tube about 3 inches in diameter and from 2 to 3 feet in length, fitted at either end with stop-cocks connected

to each other by means of a rod on which is a moveable float. When lowered to any desired depth, both cocks being open to allow the column of water to freely pass through, immediately the motion of

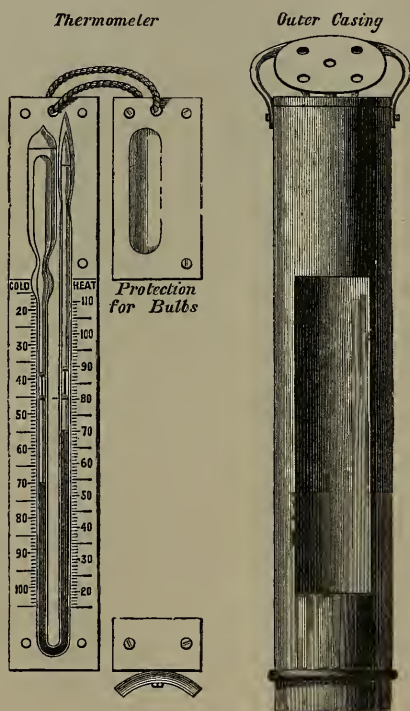
FIG. 6.



lowering is reversed and hoisting commenced, the flat float being pressed on by the weight of water above it, shuts both cocks simultaneously, and so incloses a specimen of the water at that particular depth.

The thermometers (Fig. 7) used to ascertain the temperature at the bottom or at any intermediate depot are self-adjusting maximum and minimum instruments, known as Miller-Casella thermometers, from the names of their inventor and maker, and

FIG. 7.



are so constructed as to resist the pressure of the water at very considerable depths. They consist of a curved tube with a bulb at each end, one of which is filled with creosote, the expansion and contraction of which gives the temperature. The

creosote acts on a small quantity of mercury in the tube, which rises or falls as the creosote expands or contracts.

In each of the tubes above the mercury is a small metallic index, having a hair attached to it, which, pressing against the glass tube, acts as a spring, and keeps the index in its place, so as to be read off and recorded.

It is evident that the bulb of the thermometer would be exposed to the pressure of the water as well as the temperature; to prevent this, an additional bulb is blown outside the bulb of the thermometer; this is partially filled with spirit, which is boiled before it is hermetically closed, so that it contains in addition to the spirit some spirit vapour. The pressure now acts on the outer and not on the inner bulb, which is therefore only affected by temperature. These thermometers are tested by hydraulic pressure, from two to three tons on the square inch, and are considered trustworthy up to 3000 fathoms.

On commencing the operations of sounding, the weighted sounding rod, the water bottle, and the thermometers are suspended to the line, and lowered from the sounding-bridge by reversing the engine for 500 fathoms; the line is then let go and allowed to run out freely. As it runs out, the exact time of each 100-fathom mark entering the water is registered and set down in its appropriate column in a

book provided for that purpose. These intervals gradually increase in duration as more line is run out, the weights having to overcome the friction of the line in the water, which becomes greater with the amount run out. The intervals are found, however, to extend in regular proportion, so that when four minutes are taken up by one interval, the weights have reached the bottom, or a depth of between 2000 or 3000 fathoms has been obtained.

The time intervals having informed us that the weights are at the bottom, the line is brought to the engine, and hove in, gently at first, but faster as the quantity out decreases; care being taken to keep the ship still in her position over the line, as, if allowed to fall off, the line has not only to bear its own friction, and that of the attached rod, water bottle, and thermometers, but also the additional friction of the drift of the ship. Eventually the rod, water bottle, and thermometers reach the surface, the thermometer is carefully read and registered, the water bottle is sent down to the laboratory, where the specific gravity of the water is taken, and the contents of the sounding rod are examined to ascertain the nature of the bottom, after which they are dried and bottled.

The soundings having been obtained, and the line hove in, the next proceeding is to register the temperature of the ocean from the surface to the bottom. This is done by attaching thermometers with equal spaces between them to the sounding line; a cup-lead

(Fig. 8) of 1 cwt. is attached to keep it perpendicular, and immediately above a thermometer is placed; the line is then eased out to the first 100 fathoms, when a second thermometer is secured, and the line lowered to 200 fathoms, a thermometer being placed at each 100-fathom mark until six or eight have been attached and the line run out to the required depth, say to 1500 fathoms; it is now belayed and allowed to remain for a few minutes. The thermometers register the temperatures of the different depths at which they are submerged. The line is now hove in, and as each thermometer reaches the sounding platform, it is removed, and the results are carefully read off. The temperature is then taken from the surface to 700 fathoms in the same manner. Sometimes it is considered necessary to obtain temperatures at every 10 fathoms from the surface to 200 fathoms, and at every 50 fathoms to 600 or 700 fathoms; this, of course, considerably increases the time occupied in obtaining these observations.

FIG. 8.

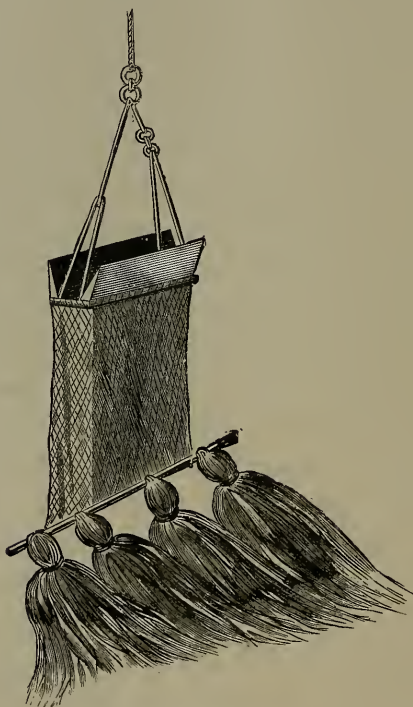


When the whole of the soundings and temperature observations have been obtained between any two places, a plan is drawn showing the section of the bottom and isothermal lines at different depths.

For the purpose of dredging in deep water, three different-sized ropes are supplied, of 2, $2\frac{1}{2}$, and 3 inches in circumference. Each rope is spliced so

as to form one continuous length of 3000 to 4000 fathoms, and is kept coiled away in a large rack, conveniently situated for use. These lines are marked at each 100 fathoms in the same manner as the sounding line.

FIG. 9.



The dredges (Fig. 9) supplied consisted of an iron frame, and were of three sizes, 5, 4, and 3 feet in length, and from 15 to 9 inches in width. The iron frame, to which was secured the bag or net, is intended to skim the surface of the bottom, and the

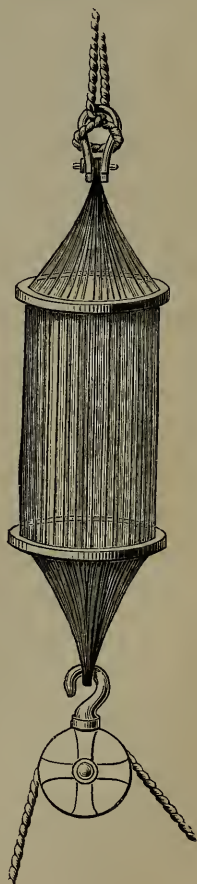
net to catch and retain all that might come in its way; at the bottom of this bag a number of hempen swabs were generally secured so as to sweep along and bring up small animal life, coral, sponges, &c. These dredges after a time were set aside and replaced by the ordinary beam trawl used in shallow water around our own coast.

The operation of dredging or trawling, like that of sounding, is carried on from the mainyard, the dredge rope being rove through an iron block which is attached to the accumulator in the same manner as described for sounding.

For this operation it is necessary to use a much larger accumulator (Fig. 10), consisting of as many as seventy or eighty india-rubber bands, 3 feet in length, capable of stretching to nearly 20 feet when a force of $2\frac{1}{3}$ tons is exerted (that is, equal to the breaking strain of the $2\frac{1}{2}$ -inch rope).

The accumulator is secured to the masthead by means of a long pendant, and hauled out, or eased in, by a tackle at the end of the yard,

FIG. 10.



as may be required. The dredge or trawl being ready to go over, is triced up clear of the platform and hauled out by the tackle until well clear of the vessel's side; the rope is then let go and allowed to run out freely, the ship steaming slowly ahead; from $2\frac{1}{2}$ to 3 hours are usually required to sink the dredge in this manner, when the depth is about 2500 fathoms. When it is once down, which is easily found by experience, the vessel is allowed to drift or steams slowly on for some hours, the accumulator illustrating by the expansion and contraction how the dredge is being dragged over the inequalities of the bottom. Should it foul anything, the strain of the vessel immediately stretches the accumulators to their utmost, the line is at once eased out to prevent it carrying away, and various plans are tried to release it. If all turns out favourable, when it has been on the bottom a sufficient time, the rope is brought to the deck-engine and the dredge hove up. When it appears above the surface, there is usually great excitement amongst the "Philos," who are ever on the alert with forceps, bottles, and jars, to secure the unwary creatures who may by chance have found their way into the net. Such a sight when it is really inboard; here we have no lack of wonderful things, strange-looking fish, delicate alcyonarian zoophytes, sea-urchins, starfish, besides shell, mud, &c.

During the time of sounding and dredging, the ship's company not specially employed on these

operations have been mustered at division, attended prayers, and engaged during the forenoon in their various and requisite duties. At noon, dinner is piped, and although consisting, as it usually does, of either salt junk and duff, or fat, greasy salt pork and pea soup, there are few men healthier than the sailor. Grog-time comes next (when half a gill of rum with two parts of water is supplied to each man), and, with the hour for smoking, constitutes a pleasant break in the day. Duty is resumed again at 1.30, and various drills occupy the afternoon until 4.30, when all hands assemble at their station, with rifle, cutlass, and pistol for inspection by their divisional officer.

The inspection over (we will presume the dredge to be up, and the excitement of the haul subsided), "Hands! make sail," is the pipe. Steam is dispensed with, in a short time the sail is all spread, and with a favouring breeze we are running on our course at an eight-knot speed. Supper is now prepared, consisting of tea and biscuit, after which, until 9, smoking is permitted, hammocks having been piped down at 7.30. The commanding officer usually goes the round of the decks, to ascertain that all is correct, when those off duty are expected to turn-in their hammocks, and so ends the day and its duties.

At 6 P.M. the officers usually dine together, when the incidents of the day, the results of the dredging,

the prospect of the morrow, and other affairs which are sure to turn up, form a lively conversational hour. After dinner the assembly of smokers usually muster on the half-deck, where all sorts of yarns and topics engross the attention till bed-time.

Sunday alone seems to break the monotony and routine of every-day life at sea, when, after divisions and prayers, the remainder of the day is usually spent in reading or sleeping.

In this manner, and notwithstanding the continued sameness, days and months slip by, until we reach port and again anchor; and only when we look back over the work accomplished can we realise the length of time passed at sea.

On the 14th March, just a month after leaving Teneriffe, we reached the island of Sombrero; here we hove-to, and remained sounding and trawling in shallow water for a couple of days, with satisfactory results.

On the morning of the 16th the island of St. Thomas (one of the Virgin group) was in sight; and later in the day we anchored in the outer harbour.



CAMBER AND FLOATING DOCK, BERMUDA.

CHAPTER IV.

ST. THOMAS (WEST INDIES) TO BERMUDA AND HALIFAX (NOVA SCOTIA), AND BACK TO BERMUDA.

At St. Thomas—The town of Charlotte Amalia—Importance of the island—English vessel in distress—Tow her into port—Leave St. Thomas—The first death on board—Soundings—Burial at sea—Bermuda in sight—Sounding round the reefs—St. George's—The narrows—Pretty scenery—Reach the anchorage in Grassy Bay—The Naval Yard—Historical sketch of the Bermudas—Geological and botanical researches—Leave Bermuda—Soundings—The Gulf Stream—Long Island to Nova Scotia—In Halifax harbour—The city and its suburbs—Gold and coal mines—Halifax to Bermuda—In the Camber—The sand glacier—The caves.

THE island of St. Thomas being usually very unhealthy, it was decided to anchor in the outer harbour, or Gregorie Channel. Here we swung ship, rated chronometers, and filled up with coal.

Naturally enough, after being a month at sea, most were anxious for a run on shore. We found the country and scenery pretty; the lofty hills were varied in colour, and appeared to be thickly wooded with a variety of trees, all green and tempting, as far as the eye could reach.

The town, named Charlotte Amalia, has no pretensions to size or elegance. It is, however, most picturesquely situated along the northern shore of the island, backed up by high hills, and having a curious saddle-shaped mountain running through its centre, terminating in two peaks, some 1525 feet in height.

This island, which has in later years been visited with so many calamities, and laid waste from time to time by hurricanes and great revolutions in nature, still holds its position, and will continue to be an important possession, not from its trade or produce, but from its geographical situation. At the present time it is one of the most important ports of call in the West Indies, particularly for the mail service, some ten or twelve different lines reaching here monthly. There can be little doubt that the traffic will increase in proportion as sailing-vessels are superseded by steam.

A pleasant week had passed, several excursions had been made to the adjacent islands of Sombrero and St. John's, where not only dredging and sounding but good shooting were obtained.



VIEW OF ST. THOMAS, WEST INDIES.

Just as we were on the point of leaving, intelligence reached the port of an English vessel (of about 1600 tons) being in need of assistance. Instructions were given from the Consulate, and on the morning of March 23rd we steamed in search of the derelict. After a short time the vessel was discovered at anchor, taken in tow, and brought into harbour. It proved to be an iron ship, named the *Varuna*, of Liverpool. We learnt she left New York in January last, and through falling in with very stormy weather had lost her main and mizen masts, and nearly all her sails, before she was abandoned to her fate.

Eventually it appears she was boarded by another vessel, a prize-crew sent on board, who jury-rigged her, and thus she reached within 15 miles of St. Thomas, where we discovered her.

On the morning of March 24th, we left the anchorage under sail; with the light prevailing winds we made but little progress, and the next day sounded and dredged in shallow water (390 fathoms) off the north coast of Culebra Island (near St. Thomas). During the operation of heaving in the dredge a fatal accident occurred, by the parting of a rope span used for securing the iron leading block for the dredge-rope, which in its flight across the deck struck a seaman, named William Stokes, so severely on the head as to produce concussion of the brain, from which he died in a few hours.

A short time after, when the dredge came up, it was found to contain the usual *Globigerina* ooze, and some specimens of coral and broken shell. On the 26th, being about 85 miles north of St. Thomas, a sounding was made in the great depth of 3875 fathoms; the dredge was lowered, and after some hours it was brought up with a considerable quantity of grey ooze, but no traces of animal life were detected.

After evening quarters, the bell tolled, and all the ship's company assembled to pay their last tribute to their late shipmate. The captain read the beautiful and appropriate service for a burial at sea, and on reaching that portion, "We commit his body to the deep," it was slid out of the port, wrapped in a hammock weighted with shot, into the bright blue tide, to be seen no more until that day when the sea shall give up its dead.

For several days soundings showed an average depth of 2800 fathoms, with a red-clay bottom; this continued until within about 100 miles of Bermuda, when we again came upon the grey ooze.

On the 3rd April land was in sight; and as we approached the Bermudas, which are mere specks on the chart of the wide Atlantic, one is immediately struck with their somewhat dull and sombre aspect; the land nowhere rising to a greater height than 260 feet (where the lighthouse is situated), and by far the greater part not being more than from 25 to 50

feet above the sea-level. We hove-to for the night, and for a portion of the next day were engaged sounding and dredging round the reefs in a depth of 400 fathoms on a coral clay bottom; the results were, as is usually the case in the proximity of coral reefs, extremely poor, the coral sand *débris* being apparently unfavourable to the development of animal life.

On its conclusion, we closed on the land; and as we stopped off St. George's for the pilot to navigate the vessel through the intricate and dangerous narrows between the reefs, it was indeed a pretty sight. Seemingly nothing could have been more romantic than the little harbour stretched out before us: the variety and beauty of the islets scattered about; the clearness of the water; the number of boats and small vessels cruising between the islands, sailing from one cedar-grove to another, made up as charming a picture as could well be imagined.

Proceeding on, as we near the shore, the white houses of Hamilton are seen peeping out from amongst the dark-green foliage; then Clarence Hill, the official residence of the naval Commander-in-Chief, is in sight, overlooking a pretty little bay and landing-place, with the dark cedars and other trees coming close down to the water's edge; Mount Langton, a charming spot, the residence of the Governor, has been passed, and in a short time we

anchor in Grassy Bay. Nature is looking beautiful, and the temperature is genial and pleasant. These islands, situated as they are between the parallels of 32° and 33° north latitude, are about equally distant from the West Indies and the coast of North America, consequently the climate is a mean between the two, partaking neither of the extreme heat of the one nor the excessive cold of the other.

April 5th.—The morning was lovely, and from the anchorage the view in either direction was very beautiful: look where we would, there was a sort of prettiness. The land broken up into little knolls and cays; the sparkling sea running here and there into creeks, bays, and inlets, together with the ever-green foliage of the cedar and oleander, made up a very attractive landscape. Directly in front of us is the Naval Yard, with its jetties and cambers, in which were H. M. ships *Royal Alfred* (flying the flag of the Commander-in-Chief), *Terror*, *Irresistible*, and several small gunboats; later in the day the *Challenger* joined them, so as to facilitate refitting and completing necessary stores.

Close at hand is the great iron floating dock; and stretching away in either direction are extensive stores, factories, and the residences of the officials connected with the establishment.

These islands are said to have been visited nearly 400 years ago by a Spaniard named Juan Bermudez, and on their discovery being reported to Spain, they

were described as the most remote of all the islands yet found in the world. From this date many years seemed to have elapsed without anything being recorded about them, except an occasional wreck, or stories of the old buccaneers, who were said to hold court here after some of their successful raids on the Spanish Main, and tradition even now informs us of untold wealth being buried about amongst the islands. Perhaps the earliest authentic account is that given by one of the crew of the *Sea Adventure*, a vessel that was wrecked off the coast in 1609. It appears this vessel had been fitted out in England to convey the newly appointed Governor, Sir Thomas Gates, together with Admiral Sir George Somers and other officials, to the recently formed colony of Virginia; meeting with a dreadful storm, and suffering great privations, their vessel was run on shore, and became a complete wreck. The islands were found to be uninhabited, although there were evident traces of earlier visitors, for hogs were found to be very numerous, having probably been set adrift by them. Fish and turtle were also abundant; and, finding the climate so pleasant and the land so productive, a year passed before any attempt was made to get away; by which time they had managed to build a small vessel, and in May 1610 they set sail for their original destination.

On reaching Virginia, they found the colony so badly off for the necessaries of life that Sir George

Somers and a party of volunteers started for Bermuda to obtain supplies; and during this trip Sir George died, near the site of the present town of St. George, where there is a monument erected to his memory.

From reports reaching England about this time (1612), a chartered company was formed, colonisation commenced, and soon after the first party of settlers arrived, under the charge of Mr. Richard More as Governor. From this date Bermuda became a British colony, with representative government and a legislative assembly.

As time passed on, its importance as a naval and military station became apparent, and large sums of money were expended on fortifications and improvements. Of late years the islands have become well known as the site of extensive convict establishments; but these, like all the other outlying penal settlements, have been broken up, and the convicts sent back to our own shores again.

At the present time the imports and exports are but small; and although possessing such a fine climate, its agricultural produce is limited (perhaps from a dearth of labour), for only about one-tenth of its area is cultivated, and this is only in isolated patches, where arrowroot and early crops of vegetables are produced for the American markets.

Here a fortnight was spent in scientific pursuits. The dredging around the reefs and the several deep-

sea soundings taken in their neighbourhood prove Bermuda to be a solitary peak, rising abruptly from a base of only 120 miles in diameter.

The geological structure of this island was most carefully studied; results showing them to be only one kind of rock, a grey limestone, which with but few exceptions was found to be of a soft, crumbling nature, yet capable of being employed for building purposes.

The botanists paid a good deal of attention to the flora of the island, for the charming walks through the avenues and forests were additional inducements to persevere in this study.

We left Bermuda on the 21st April. On clearing the Narrows, soundings commenced around the reefs in over 2000 fathoms; bottom of coral clay. Search was made for a reported patch, which was found on the 23rd, about 13 miles south-west of the island, with 32 fathoms of water on it, and a bottom of pebbles and stones. Here we anchored for one night, and the next day shaped a north-westerly course so as to carry a line of soundings to Sandy Hook.

The weather on the whole was as favourable as could have been expected at this season of the year. For a few days it was squally, when in the vicinity of the Gulf Stream, but when fairly across this belt, fine agreeable weather again greeted us.

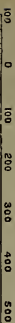
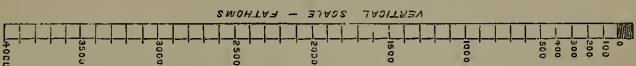
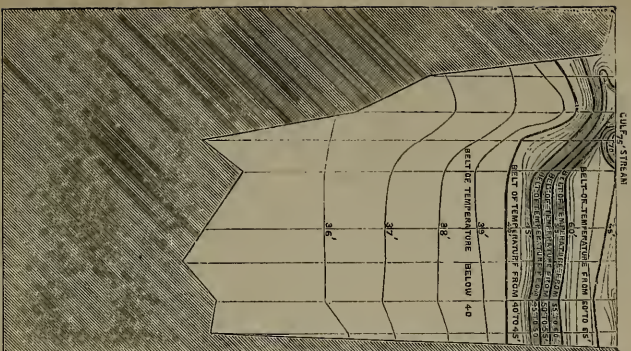
The soundings obtained showed the bottom to be fairly level, at an average depth of 2600 fathoms to

within 200 miles of Sandy Hook, when it shallowed to 1700 fathoms.

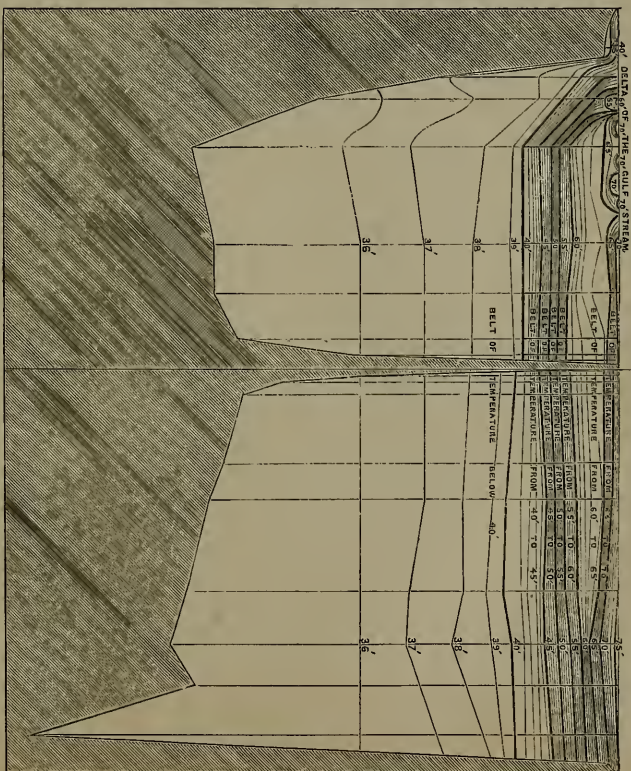
The soundings taken in crossing and near the Gulf Stream were of very great interest. On each side the depths were found to be respectively 2400 and 1700 fathoms, grey ooze bottom; while in the stream itself the line ran out over 2600 fathoms without reaching the bottom. This sounding, however, was considered doubtful, their being a strong wind and current at the time dragging the line out of the perpendicular. The stream was found to be about 60 miles broad, which was easily detected by the 8° difference of temperature on entering and leaving.

This influential current, little as it may be appreciated in a general way, is of the greatest importance to those countries whose waters are influenced by its flow. It takes its rise in the Gulf of Mexico, though it might be regarded as a continuation of the equatorial current which flows from the western coast of Africa across the Atlantic, absorbing the sun's rays as it advances, and storing away the warmth for future use. It then passes into the Mexican Gulf, where its waters are raised to the high temperature of 86° , and then sweeps through the pass of Florida, skirting the shores of North America, until it takes that remarkable curve off Nova Scotia and Newfoundland which throws its waters across the Atlantic, towards the coast of Europe.

New York to Bermuda



Hatifax to Bermuda



HORIZONTAL SCALE - MILES.

OCEANIC SECTIONS.

One branch curves downward, and flits past the Azores, the other glides northward in the direction of the British Isles, and the Polar Sea.

Its length, if reckoned from its Mexican head to the Azores, is upwards of 3000 miles, and its average velocity is about 40 miles a day.

The great function of this stream is that of a bearer of heat, setting out at a temperature of 86° , losing not more than from 10° to 15° in its progress. It thus reaches our coast and ameliorates the climate, for in point of latitude England corresponds with Labrador. All are familiar with the fact that in the latter regions the winters are exceedingly severe and protracted, and the vegetation poor and stunted. Had our shores been without this warming influence, and the British Isles compelled to subsist on their own geographical allowance of heat, we should have been left in the same condition.

We were within 100 miles of Long Island, when our course was shaped so as to pass south and west of the little George Bank, and so on to Halifax. In this run several dredgings and soundings were obtained in average depths of 1350 fathoms, the bottom yielding chiefly grey ooze, and the course of the Gulf Stream was again crossed. On the 8th May, when about 90 miles south of Halifax, we sounded in 75 fathoms on Le Have Bank. On the morning of the 9th May, the outline of the coast of Nova Scotia was before us, and later in the day we entered between the head-

lands of the magnificent harbour of Halifax, which is so well sheltered by McNab's Island, lying at its mouth, that it affords security and safe anchorage to vessels of any magnitude.

This island is covered with extensive foliage and vegetation, all bright and green, and, with the pretty white lighthouse at its western extremity, can scarcely be surpassed for pictorial effect. Steaming on, we next pass St. George's Island, which seems to lie in the very heart of the harbour, and is well and strongly fortified. A short distance farther and we reach our destination, alongside the wharf of the Naval Yard, for the purpose of completing stores.

This colony, the history of which dates back to July 1749, was founded at the instigation of the Earl of Halifax, at that time President of the Board of Trade and Plantations.

The city, with its suburbs, extends, for over two miles in length, along the slope of a hill on the western side of a very fine harbour. To the tourist it presents varied and numerous attractions.

Its charming situation, its safe harbour and splendid scenery, are not to be surpassed on this side of the Atlantic. The sea runs up into various little bays and coves indenting the land in many directions, giving a variety of charming aspects to the entire scene, and finally ending in Bedford Basin, a broad sheet of water covering an area of nine square

miles, its banks rich in all sorts of charming foliage, where cluster numerous pretty villa residences of the wealthy families.

The appearance of the city on first landing is not very prepossessing, but on reaching its centre, there are seen good broad streets, well built upon, with shops and stores of large dimensions, where all the luxuries and requirements of life are to be obtained. Amongst these, Granville and Hollis Streets take the pre-eminence, containing as they do the best of the shops, and most of the principal public buildings, such as the new Post Office, House of Assembly, Public Library, &c., besides club-houses and banks, all worthy of note for the beauty of their architecture ; in addition to which may be enumerated Government House, Dalhousie College, Wellington Barracks, Hospital, and Admiralty House, all fine buildings of their class.

It is the seat of two Bishops, the Anglican Bishop of Nova Scotia, and the Roman Catholic Archbishop of Halifax. There are over thirty churches and chapels, some of them very handsome structures, including almost all important denominations ; and for charitable institutions, Halifax is said to outnumber any other city of its size in the Provinces. Among them are asylums for insane, deaf and dumb, the blind, besides some twenty others, where all sorts and conditions of men and women can receive aid and assistance in time of need.

There are in the city seven or eight banks, Masonic Hall, and clubs; there are several gold-mining and joint-stock companies, news-rooms, public libraries, museums, and other institutions, of all of which the Halifax people are very proud; and well they may be.

The Naval Yard, which covers an area of fourteen acres, is at present principally used as a depot for stores; its value as a naval station is considerable, and was fully known as long ago as 1793, in the wars of those days, and even later, when it became the rendezvous of our West India squadron, and received all its prizes. Attached to it is the Naval Hospital, which should not be overlooked, for here many a poor, stricken fellow is brought up from the West Indies with fever, to recover by the aid of this healthy invigorating climate.

The famous Citadel, situated on the crest of the hill overlooking the town, is said to be, after Quebec, the strongest in the Dominion. From here we have a fine panoramic stretch of scenery; the picturesque abounds everywhere, and from every point there is some glimpse of nature to charm, whether it be mountain, valley, island, or lake. From this standpoint we can obtain a peep of the north-west "Arm," with the number of pretty little islands scattered over its length and breadth. The nature of the land about here, with its green slopes running close

down to the water's edge, has greatly assisted, with the many charming villas erected in the midst of the ever-green foliage, in combining art and taste, giving such charms to the surrounding scene the most enthusiastic admirer of nature could scarcely desire more.

Then there is the eastern shore and town of Dartmouth, which has to be reached by steam-ferry. Here are many pleasant walks, and during the winter seasons its inland lakes are gay with crowds of skaters.

The public gardens, covering an area of nearly twenty acres, deserve more than a passing mention; for their loveliness and beauty can be appreciated by the ordinary observer as well as the learned.

Picnicking is one of the favourite amusements of our Haligonian cousins, which they appear to heartily enjoy: during the season everybody goes picnicking, from the government official to the poorest member of the community, in one or other of the many beautiful little bays or coves in the harbour.

Then, with such facilities as the harbour possesses, all sorts of boating and yachting and fishing are in high favour. Capital regattas are frequently held, and the clubs usually make good shows as regards number, built, management, and speed.

Halifax is the port of call of nine lines of steamers; and in the course of a short time, when the great inter-colonial railway shall be completed, it will give easy access to all the markets of Canada and the United States, and become the great winter terminus of the Dominion.

During our stay, as we lay alongside the Naval Yard, every facility was afforded our Halifax friends to visit the ship. Many availed themselves of the opportunity, and evinced the greatest desire to see and examine the many submarine wonders that had up to this date been collected.

The members of the Halifax Institute of Natural Science mustered in strong numbers, and appeared to take a special interest in the work already accomplished.

The blind crustacean zoophytes, the varieties of rare and new forms of corals and sponges, were well scanned; while for the geologists, amongst other things attracting their attention, was a large boulder, which had been brought up in the dredge some 300 miles south of the coast. This was carefully examined, and eventually recognised as a piece of Shelburne granite, which perhaps was carried off to sea in long past ages, on an iceberg detached from the coast glacier of Nova Scotia, and deposited where we had found it, to be again recovered after such a lapse of time, and to help the solution of the glacial theory, according to which, at one time, ice held

Nova Scotia in as close an embrace as it does Iceland and Greenland at the present.

The weather had not been of the best; cold winds, with occasional snow and rain, greeted us during the time at our disposal here; yet we would fain have made a longer stay amongst such kind friends, of whom it is a pleasure to speak. There was a goodness and cordiality with their hospitality and warm-heartedness that can never be forgotten by those who know them.

On the 19th May, we steamed out of the harbour, and before nightfall the coast was out of sight. On clearing the land a section was commenced in almost a straight line to Bermuda. The serial temperatures taken during the passage were extremely instructive and important, showing, as they do, that a belt of warm water of a temperature of 65° , and nearly 400 fathoms in thickness, extends from the eastern margin of the Gulf Stream to within a short distance of the West Indies, encircling the Bermudas, and actually raising the average temperature of its superficial water above that of the corresponding layer some 650 miles further south. It also proved that the cold surface current running to the southward along the American coast merely lowered the temperature of the intermediate strata, the bottom water not being in the least affected by it. In fact, the results of the temperature observations already obtained seem to indicate that the cold water

at the bottom of the Atlantic is obtained from Antarctic sources. Nine important stations had been examined on our way, showing an average depth of 2500 fathoms.

Late on the evening of the 28th we observed the light on Gibbs Hill, Hamilton, sparkling brightly ahead. Hove-to for the night, and for the next two days continued sounding and dredging round the reefs. Swung ship both for magnetic and azimuth correction, after which stood in for the Narrows, got the pilot on board, and a few hours later we were alongside the jetty of the Naval Yard, where we found H. M. ships *Terror*, *Sirius*, *Minstrel*, *Fly*, and *Britomart*. Here we remained for ten days refitting and completing stores, and during this interval many scientific excursions were made about the islands. To the geologist, particularly, the examination and phenomena of the sand glacier were exceedingly interesting. It appears that the fine coral *débris* which surrounds the shore is caught at certain exposed parts of the coast by the prevailing winds, and so blown into heaps more than 30 feet in height. We were informed that on some parts of the southern shore, where deep valleys once existed, level plains are now to be seen. And this is still going on, overwhelming gardens, houses, and plantations in its way, and but few attempts appear to be made to stay its progress.

In some places where these great heaps of sand

had accumulated and hardened by the action of rain and other processes (by which this coral sand is converted into limestone), were to be seen rocks of the most irregular and fantastic shape, forming many of those remarkable caves which are, in most cases, covered with luxuriant vegetation, and add so much to the interest of these islands.



NATIVES OF SANTIAGO, CAPE DE VERDE ISLANDS.

CHAPTER V.

BERMUDA TO THE AZORES, CAPE DE VERDE, ST. PAUL'S ROCKS, FERNANDO NORONHA, BAHIA, TRISTAN D'ACUNHA, AND THE CAPE OF GOOD HOPE.

Leave Bermuda—Sounding round the reefs—Commence another section across the Atlantic to the Azores—Anchor off Horta, Fayal—Fayal to St. Michael's—The gardens—Foliage scenery—Lake of the Seven Cities—Public buildings and streets—Leave the Azores—Arrive at Madeira—Short stay there in consequence of epidemic—Section commenced across the Atlantic to the coast of Africa—

Palma, one of the Canary Islands, in sight—Sounding and dredging—Cape de Verde Islands in sight—Anchor of Porto Grande—Survey the anchorage—The town and adjacent scenery—Leave for Santiago—Anchor off Porto Praya—The town—Its natives—Dredging for pink coral—Proceed towards the African coast—Course altered for St. Paul's Rocks—The rocks in sight—Made fast by a hawser—Crossing the Line—The old customs—The Southern constellations—Arrive at Fernando Noronha—Disappointment at not being able to land for collecting specimens—Sounding and dredging—Cape Antonio in sight—Anchor off Bahia—The city—Excursions in the country—Brazilian scenery—Foliage and vegetable products—Case of yellow fever—Leave Bahia—Section commenced to Cape of Good Hope—Island of Trinidad—Passage across the South Atlantic—The drift nets—Incidents of the voyage—Sea-birds—The soundings—Pick up the “westerlies”—Tristan d'Acunha in sight—The settlement of Edinburgh—Squally weather—Visit the Inaccessible Island—The brothers Stoltenhoff: their story—Table Mountain, Cape of Good Hope, in sight—Anchor in Simon's Bay—Placed in quarantine.

ON the morning of June 12th we proceeded from the Camber, and anchored for a short time off St. George's. During the two following days we remained in the vicinity of the reefs, before taking our final departure from Bermuda, when it was decided to make another section across the Atlantic to the Azores. Seventeen stations were decided on, and during the passage we had most favourable weather for carrying out the proposed programme.

The soundings showed that almost a level plateau existed, with a bottom of grey ooze, and an average depth of 2600 fathoms. The dredge frequently brought up many creatures of the greatest interest, and current observations were most successfully carried out.

On the 1st July anchored off the town of Horta, in the island of Fayal, but on ascertaining from the health officer that a small-pox epidemic had broken out, it was deemed prudent not to land, and therefore on the next day proceeded for St. Michael's, which was reached on the 4th; finding it healthy, it was determined to remain for a few days.

These islands, known as the Azores, lie in the midst of the Atlantic, occupying a line of about 300 miles from N.N.W. to E.S.E., and are peculiarly remarkable for the incessant gales to which they are subject throughout the year, and on this account, joined to that of being destitute of any port that can offer a safe retreat and shelter to vessels, they have hitherto been held somewhat in dread and avoided by the trader.

The whole range, it is evident, is of submarine volcanic formation, symptoms of which are manifest to the geologist at almost every step. Their general aspect is certainly very picturesque, presenting, as they do, a series of scattered conical hills, which are in most cases extinct volcanoes, the sides of which are now beautifully clothed with verdant heaths and shrubs. Nature appears to have been very bountiful in bestowing on it all the advantages that a fine atmosphere and a pure air can impart.

In the private gardens in the immediate vicinity of the town are to be seen all the rare productions of flowers and shrubs that usually constitute our European conservatories, tastefully mingled with orna-

mental trees and plants of the Tropics. The great variety of palms, of cacti, dragon-trees, aloes, and others, blended with the orange, lemon, fig tree, and lime, produce a most pleasing effect; even the beauty of our own familiar flowers seems improved, and they grow to an enormous size.

Sugar-cane at one time was produced to a large extent; but the demand appears to have declined, and, in consequence, the cultivation of grain, oranges, lemons, and the vine has been substituted: the produce of these is an extensive and profitable source of revenue.

During our stay, exploring parties visited many places of interest some few miles inland, especially the Lake of the Seven Cities, on their way passing through gullies, chasms, and long deep ravines, that evidently have been formed by torrents rushing from the mountains to the sea, all of which are now, by the bounteous aid of Nature, covered with luxuriant foliage and charming shrubs.

The Azores abound with a great variety of mineral springs of the most valuable qualities and temperatures, which might be rendered a source of wealth to the inhabitants if the condition of the country and the accommodations of life were such as to induce visitors to resort thither to profit by their beneficial effects.

The public buildings are of but little interest. The streets are narrow, as in most southern climates, principally for the purpose of excluding the rays of

the sun. Every house, of high or low degree, appears to have its latticed windows and balconies, behind which the ladies of the household seem to pass a large proportion of the day, gazing out on the passers-by.

In the course of a few years the breakwater will probably be completed; it is being carried out for some distance, and will be sufficient to shelter all the shipping that visit the port during the fruit season, which commences in November and ends in May, during which period it is usually very bad weather.

On the evening of July 9th we left the anchorage under steam, and proceeded to the offing, when the ship was swung for magnetic and azimuth corrections. On their conclusion, a course was shaped for Madeira, which was reached on the 15th. Here, as at Fayal, we were informed by the health officer that small-pox was very prevalent; it was therefore decided to have very little intercourse, and no communication with the shore was permitted. The island scenery, as viewed from the ship, is certainly very charming, and one cannot help enjoying the beautiful prospect stretching out before us. As there appeared to be no prospect of landing, it was decided to proceed on our way; accordingly, on the morning of the 18th July, we left, and commenced to make a section along the west coast of Africa. The weather on the whole was very fine, and, with a capital breeze in our favour, good progress was

made: still it did not deter our stopping daily a few hours for sounding and dredging purposes, depth being found from 1125 to 2400 fathoms. Palma, one of the Canary Islands, was sighted on the 19th, and sounding and dredging carried on in its vicinity. On one occasion we alighted apparently near the same spot dredged in the February previous, bringing up in the dredge some of the dead hard coral and volcanic sand, as on the former occasion.

Thus the time passed pleasantly enough. We had found deep water day after day close up to the island of Antonio (Cape de Verde), which was sighted on the 26th; the soundings now got less, and showed that this island was connected by a ridge with St. Vincent, only 52 fathoms of water being found in some places on it. On the morning of July 27th we anchored off Porto Grande, St. Vincent, and remained until the 5th August. During the stay a survey was made of the anchorage, and the vessel filled up with coal.

What a contrast in the scenery between this place and Madeira! Here are barren rocks, and not the faintest indication of vegetation to be seen in any direction, although its formation, there can be no doubt, is precisely similar.

The town, if it can be so named, consists of a few straggling houses and the stores of Messrs. Millar and Co., the coal contractors, situated along the shore, while, stretching away behind, are several high, rough, and jagged peaks and mountains, afford-

ing a fine background for the barren and uninteresting coast scenery. Scarcely any supplies were to be obtained here. We left on the 5th of August, and the next day reached Santiago, another island of the same group. Here we had somewhat better success, and a fair supply of fruit and vegetables was obtained.

Porto Praya is prettily situated, at least it appears so from the sea, on an elevated piece of land at the extreme end of an open roadstead, which is well protected from the prevailing winds: still there is generally a long Atlantic swell setting in, which makes landing unpleasant and difficult.

Visiting the shore on one occasion under a very hot sun, the walk to the town was found exceedingly fatiguing. The roads were deep with sand, and the views obtained on reaching it anything but enticing; and any idea previously formed in its favour was soon dispelled.

The houses, with but few exceptions, are poor specimens of habitations, usually built of stone, one story high. The interiors present only a few articles of absolute necessity; of home comfort or cleanliness, in our sense of the word, they seem to have no idea.

The population appears to be made up of an intermixture of descendants from Portuguese settlers and negroes from the adjacent coast, who cultivate little patches of land in the valleys, where are produced a few varieties of tropical fruits for the market.

It had been reported that a species of pink coral

was found on this coast ; but the result of our dredging was not very successful. A few specimens were, however, obtained, similar to the red from the Mediterranean, but no pink.

After three days, we started on the 9th of August,



ST. PAUL'S ROCKS.

and continued our section towards the coast of Africa. It was now the rainy season, and each day as we neared the Equator we felt its disagreeable effects. We ran on under the favourable influence of the trade-winds, taking a line of soundings as far as latitude 3° north, when we were just off Cape Palmas,

on the west coast of Africa. The south-east trades now compelled us to alter course, and we stood to the westward so as to reach St. Paul's Rocks, nearly 900 miles distant. The Guinea current had been investigated; and it was found we had fallen in with the Equatorial current, which continued with us until we were near the coast of Brazil. The dredgings obtained were particularly rich and interesting, and the frequent soundings showed we had been sailing over an average depth of 2200 fathoms.

On the 27th August land was reported, and as we neared St. Paul's Rocks, so the little pinnacles in the midst of the ocean became clearer and clearer. There was deep water close to; so we secured to the lee-side by means of a large hawser.

The rocks are situated in $0^{\circ} 58'$ north latitude, and $29^{\circ} 15'$ west longitude. They are 540 miles from the coast of South America, and 350 from Fernando Noronha. The highest point is only about 60 feet above the level of the sea. In moderately fine weather a landing can usually be effected. Hundreds of sea-birds frequent them; but there was not a single plant or moss to be found, nor any fresh water to be obtained.

During the two days of our stay the rocks were alive with surveyors, naturalists, and others. Fish was to be obtained in abundance. A thorough geological examination was made, with a view to test the practicability of erecting a lighthouse, as a monu-



MR. DAVIS'S DOORS ABOVE MOUNT RAINIER

ment to the memory of the late Captain Maury, United States Navy—who was the father of deep-sea exploration, and who has rendered such important aid to navigation. However, from our observations the decision was altogether unfavourable.

On the morning of 29th August hawsers were cast off, and we steamed round the rocks, taking soundings and current observations; and on the next day crossed the Equator in longitude $30^{\circ} 18'$ west. The disagreeable practice of shaving, &c., those who for the first time “cross the Line” was not permitted, although there were many who were anxious to join in the usual sport. This old-fashioned custom, which the present age seems inclined to get rid of, is gradually falling into disuse, and but few ships' companies now pay that homage on entering Neptune's dominions as they were wont to. So the invisible belt was crossed; and as the night advanced the more striking became the aspect of the Southern Constellations. The sparkling light of the North Star had for some time past been growing fainter, and at length disappeared altogether. On the other hand, the Southern Cross, and other stars with which we were not so familiar, had taken their places; and each night, as we moved farther south, for a time we felt a difficulty in recognising our new acquaintances.

Though the Line had been crossed at a more westerly point than usual, on the 1st September we

were enabled to sight the island of Fernando Noronha; and later in the day came to anchor in 35 fathoms. The captain landed, and paid his respects to the Commandant, explaining the object of our visit, asking permission to survey round the island, and to explore the interior for botanical and zoological specimens. This was readily granted; but on the morrow, just as the various parties had started, a message arrived withdrawing the permission previously given; the commandant stating that he could not, without the sanction of his government, take upon himself the responsibility of allowing any investigation, or of collecting a single insect or plant.

This group consists of two islands and several rocks, exposed to the whole swell of the Atlantic, and the surf breaks constantly and heavily on its shores. The islands are strange specimens of volcanic formation, needle-like rocks, sugar-loafed pinnacles, and overhanging cliffs.

The central peak is named the Pyramid, and is about 1000 feet above the level of the sea, the upper part of which seems to overhang the base. The islands appear to be well wooded. Trees abound on the higher parts of the land, with wondrous creepers clustering among their branches. Of fruit, the principal seem to be bananas and melons. At the present time it is used as a penal settlement by the Brazilian government, giving shelter to some 1500 to 2000 prisoners. A fort,



DEAR DE EDDENANDU YODOVIA, SOCIETY, PER AMERICA

strong in appearance, is garrisoned by a company of soldiers. It is situated about 300 miles from Pernambuco, from which place a vessel periodically calls with provisions.

The naturalists particularly regretted to let slip the opportunity of instituting a comparison of the vegetation and its organisation with that on the mainland of South America. As it was, however, in the first landing a few specimens were secured; and the little that was seen was sufficient to clear up any uncertainty hitherto existing as to its geological structure, which was decidedly volcanic.

As nothing farther could be done, it was decided to leave on the 3rd. For some 20 miles round the island the soundings showed a rocky bottom of 800 fathoms; outside which, in a south-westerly direction, a depth of over 2000 fathoms was found, proving that a deep channel exists between this group and the Rocas.

For the following ten days the weather continued unsettled and squally. Still, very frequent soundings and dredgings were onward in depths varying from 800 to 2275 fathoms. On the morning of 14th September, Cape Antonio was in sight, 15 to 20 miles distant. This forms the eastern side of the entrance to Bahia; it is covered with trees, and the lighthouse and flag-staff on its extreme point stand prominently to the front.

On rounding the cape, the entrance to Bahia de

Todos Santos lies immediately in front, with the fine town stretching away on its eastern side. The bay is full of shipping, and extends for over 20 miles northward. There are several islands at its head, and sundry rivers run into its waters. Later in the day we anchored off the Public Gardens, from which point a capital view of the city is to be had. It consists of a higher and lower town. The higher portion includes the suburbs of Victoria and Bomfra, and has several fine streets and stately houses, where the officials and principal merchants reside. The lower portion is devoted to commerce, and contains shops and warehouses for the sale of inland produce and foreign goods. There is a Naval Arsenal, but apparently of very little pretensions to size or utility. The public buildings are of no importance, except the cathedral, which is built of marble, and is said to be the handsomest of its kind in Brazil.

During our fourteen days' stay here, numerous excursions were made both by rail and river, for through the courtesy of the directors of the respective companies free tickets were placed at the disposal of the officers. This afforded special opportunities for seeing the country for some miles' radius. A short distance beyond the city the land for miles appears to be covered with forests of charming trees, of all shapes, sizes, and unknown names; while nestling around their green borders are plantations and little farms, giving the scene a most picturesque effect.

The botanist, naturalist, and even the ordinary observer of nature, who for the first time wanders through a Brazilian forest, cannot fail to realise sensations of the utmost delight at the lavish beauty met with; all this Providence has bestowed, in an extraordinary degree, attesting the illimitable power and beneficence of the Creator. All those interesting objects that nature loves to blend may be found here. The beauty of the trees, enhanced by innumerable vine-creepers, parasites, and orchids, shrouding every trunk and festooning every path, the luxuriance of vegetation, the elegance of the ferns, grasses, and flowers, tend to awaken in the observer a sense of his own littleness, and to force him, even in spite of himself, to acknowledge the Power that formed them.

The number of vegetable products found here is almost beyond belief. Coffee, cocoa, tea, all sorts of fruit, scents and spices, sarsaparilla, quinine, Tonquin beans, indigo, india-rubber, bread-fruit, the beautiful cashew-nut, gay-coloured apples and plants, gums, seeds, and leaves, of infinite variety and great value, everywhere abound.

Such are among the elements of scenery met with; but to paint its effect is a hopeless endeavour.

Thus the time at our disposal soon passed. Leave had been granted to the ship's company, who enjoyed themselves after a fashion in this expensive locality. A theatrical entertainment on board the

U.S. flag-ship *Lancaster*, and a match with the Bahia Cricket Club, all tended to make our stay agreeable, which at length was cut short by the appearance of a case of yellow fever. The sufferer was landed, and on the 25th September we sailed to secure against the spread of the disease by seeking a colder climate.

A section was now commenced across the Atlantic to the Cape of Good Hope. When clear of the land, sail was made, and with a pleasant breeze we raced on into cooler and healthier latitudes. It had been intended to sight and make a short stay off the little island of Trinidad, a rocky and barren spot, surrounded with a dangerous shore of almost unapproachable, sharp, rugged rock, over which generally a rough and turbulent surf breaks, affording security to innumerable sea-birds, for whose refuge it seems expressly formed.

Owing, however, to unfavourable winds and other causes, we were unable to get nearer than 300 miles; so our course was altered for Tristan d'Acunha. During the passage the usual programme of sounding and trawling was carried out when opportunities offered. The ocean seems teeming with animated organisms. The drift nets, which are always trailing behind us, get filled in a short time with immense numbers of little living creatures, pretty-looking red and blue cockles, sea-nettle, and various other inhabitants of the deep, many of the most minute size and delicate form and tint.

In the work-room was disclosed, by aid of the microscope, to the observer, an entirely new world in the economy of nature as displayed in animal life from the surface of the sea.

During the passage many events took place which, although trivial in themselves, contributed to render the voyage less tedious and monotonous. Occasionally we spoke or sighted a vessel, or fell in with a barnacle-covered fragment of timber, which was secured and overhauled for the sake of any living creatures adhering to its sides. But what seemed to impart an extra interest to our every-day life, when clear of the Tropics, was the vast number of sea-birds constantly accompanying us, probably attracted by the numerous fragments of provisions thrown overboard.

Cape pigeons, those prettily marked birds about the size of doves, the majestic albatross, stormy petrels of all sizes, follow on in motley groups, never seeming to weary in their search for food. These birds appear to possess a remarkable capacity for remembering the exact time when they are likely to get a feed, for day after day, soon after noon, the vicinity of the vessel was usually animated with their shrill shrieking and fighting with each other for the dainty morsels thrown overboard.

The soundings appeared to indicate that a bank with about 2000 fathoms of water on it connects the Tristan Islands with the coast of South America. The dredgings were not quite so productive as had

been previously the case. On the 6th October, in lat. 30° south, we picked up the commencement of the "westerlies," and by their influence we made short work of the 900 miles still separating us from the islands. On the morning of the 15th land was in sight, a little speck at first rising up dark and rugged out of the sea, growing larger and larger as we neared, terminating at length in a huge conical peak some 8000 feet in height covered with snow.

It seems surprising that people can be found to leave associations and friends, and isolate themselves in such an out-of-the-way place as this, more remote from other inhabited places than any other settlement on the face of the globe. At the time of our visit the population consisted of some twenty families, numbering eighty-four in all. Soon after our anchoring a boat came off with seventeen of the islanders. Amongst them was Peter Green, their governor, from whom it was ascertained that they had plenty of cattle and vegetables for sale. This was welcome news, for fresh provisions are always acceptable after being a long time at sea. They however proved, as was found out later, that they were not above trying to make a good bargain out of us, and consequently spoiled the market for themselves.

We had approached the land as near as safety permitted; the weather promising to be fine, opportunities were taken to land. Soon after leaving the

vessel, an extensive belt of sea-weed was found encircling the island, forming a natural breakwater, and so preventing the violence of the heavy Atlantic surf breaking, as it otherwise would, along the shore.

Before reaching the land, all, more or less, got a wetting, as the rollers break along the beach, but after a scramble all landed right enough, and made a tour of the settlement, which is named Edinburgh, in compliment to Prince Alfred, who visited here in 1867, when in command of the *Galatea*.

About fifteen houses are seen scattered over an open space on the north side of the island. There are several enclosures where potatoes and other vegetables are grown, and the islanders possess, in common, some four or five hundred head of cattle and a plentiful supply of poultry and pigs.

As the day advanced, the weather changed to wind and rain, and it was with some difficulty all got on board in safety.

During the visit to the shore a story was told of two Germans, who had been living at the well-named Inaccessible Island 30 miles farther south, who had voluntarily exiled themselves with the hope of obtaining seal skins, but lately nothing had been heard of them, and it was supposed they had perished. Throughout the night the vessel was steamed across the channel, and on the following morning the land was closed, but nothing indicating life was at first seen.

A boat's crew, however, landed, and in a very short time the would-be Robinson Crusoes were discovered near a little grass hut they called their home. Not much pressing was necessary to induce them to come on board, when, after a good breakfast, they were able to tell their own story, which was as follows:—

THE STORY OF FREDERICK STOLTENHOFF (THE ELDER).*

Born in Moscow, of German parents, cloth dyers by trade, in 1846, at the outbreak of the Franco-German war, I was employed as a clerk in a merchant's office at Aix-la-Chapelle. I was called on by the government to serve with the German army, being attached to the 15th division of the second army, and by the following Christmas I reached the position of second lieutenant. After taking parts in the siege of Metz and Thionville, the battalion I served in was detached south to join General Werder's army. At the finish of the campaign I was discharged and returned home.

In June 1871, my younger brother, Gustav, returned home from Tristan d'Acunha, where he landed with the crew of a St. John's (Newfoundland) vessel, the *Beacon Light*, which had been lost by fire about 300 miles to the north-west of Tristan. The crew were taken from the island by the *Northfleet* (the ship afterwards sunk off Dungeness), and carried to Aden, from whence Gustav, having joined an English steamer, came to Germany.

My brother's account of the life at Tristan, and his desire to return there, led me to join him in a venture to the island, not with a view to remaining there by settling, but to endeavour to realise a sum by seal-hunting and barter.

* For this story I am indebted to R. R. Richards, Esq., Paymaster, who wrote it at Stoltenhoff's dictation.

With this view, after making preparations, we left Southampton for St. Helena in the English steamer *Northam*, in August 1871, and were landed there the following month. On the 6th November we left St. Helena in an American whaler, the *Java*, Capter Manter, hailing from New Bedford, bound on a cruise in the South Atlantic. We shipped as passengers, and were to have been landed at Tristan. During the passage across, the captain's account of the settlers at the island, and the probable reception we should meet with from them, was in direct opposition to my brother's description of the place and people, after a stay of eighteen days only. Captain Manter described Inaccessible Island as a fertile place with a valley running up from the beach on the west side; and that the island itself and the next (Nightingale) were the seats of a seal and sea-elephant fishery. His knowledge was derived, so he said, from several visits to Inaccessible Island, where he had landed and seen both pigs and goats. Eventually my brother and I decided to try our fortunes at Inaccessible Island, and we were landed there by the whaler's boats on 27th November 1871. We had with us a whale boat (old), bought at St. Helena, with mast, sail, and oars, two hundred pounds of rice, two hundred pounds of flour, one hundred pounds of biscuit, twenty pounds of coffee, ten pounds of tea, thirty pounds of sugar, one barrel of coarse salt (afterwards washed away), thirty pounds of block salt, and a small quantity of pepper, eight pounds of tobacco, fourteen empty barrels for oil, five bottles of hollands, six bottles of Cape wine, six bottles of vinegar, some Epsom salts (the only medicine). We each had two blankets, some shoes and boots, and our ordinary clothes. The captain of the whaler sold us a lantern and a bottle of oil; but we had no candles. For lighting purposes we had six dozen boxes of Bryant and May's matches. We also had a wheelbarrow, two spades, a shovel, two pickaxes, kettle, frying-pan, two saucepans, and eating

utensils. For arms, we were in possession of a short Enfield muzzle-loading rifle, an old German fowling-piece, two pounds and a half of powder (and to this the mate of the whaler added one pound of blasting powder), two hundred bullets, and sufficient lead with which we made one hundred bullets more; four sheath knives (such as are used by sailors), a saw, a few nails, hammer, two chisels, some twine, two or three gimlets, a door, three spars for a roof, a glazed sash for a window, and two iron buckets. Our clothes were in chests; and we brought covers which were easily filled with birds' feathers, and made good beds. On the 27th November 1871, we came ashore on the west side of the island, the whaler leaving in a quarter of an hour's time, after giving us a few potatoes for seed—and we had brought with us seeds of nearly all the common garden vegetables. A bitch and three pups accompanied us.

My brother at once started in search of goats or pigs, climbing, by the aid of the tussack grass, the side of the cliff to the top of the island. He was too tired to return that night, and failed to shoot any game. The next day he rejoined me, and we built a hut for shelter. The whaler crew had hauled our boat up for us. After a day's rest we both in company went after game, and shot a pig, and saw but failed to get near any goats. Four days after landing we received a visit from sixteen men, in two boats, from Tristan d'Acunha—which island was cleared of men with the exception of two. The sealing season had set in, and this was their yearly visit, hastened after learning from the captain of the *Java* that we had landed and were in possession of four boxes and letters from St. Helena for the islanders. The *Java*, after leaving us, had been becalmed off Tristan, and during the night a boat had come off to her to procure supplies. The captain of the *Java*, so the men told me, refused to barter with them, being so short a time from port.

As soon as our goods were housed, it was our intention to

take advantage of the first southerly wind and fine weather to visit Tristan, and deliver the four boxes, letters, and messages from the relatives of the islanders living at St. Helena. The two boats landed at the north side of Inaccessible Island, and the men came round in their boats to meet us. Their stay, it being late in the afternoon, extended over an hour only, and during this time they behaved very well towards us, and offered assistance, teaching us how to build huts from the tussack grass. The next morning we received another visit from a dozen of them who had been in search of goats and crossed the island by land. These men helped us to build a small hut. They also explained that the position we had taken was bad, and advised us to shift to the north side of the island. Bad weather prevented any further intercourse for a couple of days; after which my brother and I crossed the hills to the north side and were shown the road down the cliff by one of the party, and the position of our future home. We returned to our first position the next day. Up to this time the Tristan people thought that we were going to return to their island with them, and showed friendly feelings towards us. Our goods were fetched to the north side by one of their boats during their ten days' stay, and we ourselves lived there with them for two days. Being anxious to obtain a cow, a heifer, and a young bull, I made arrangements with Green to bring them over, if possible, and this he agreed to do about Christmas. After a stay of nine or ten days the Tristan men left for their island; they had procured only one seal.

This brings us to the commencement of December 1871. We at once set about building a house, cleared some ground, planted our seed and potatoes, and made preparation for staying some time on the island. It was summer, with fine weather as a rule; a splendid supply of water fell down the side of a mountain, within a hundred yards of our hut, and firewood was easily procured in the wood alongside of us.

The seals were landing in different spots, it being the pupping season, and we were able to procure nineteen; the skins were afterwards sold, and we were not able to make any quantity of oil. Three sea-elephants were ashore on the north side when the men from Tristan landed, but they were not captured. Our first house failed to stand the rain, the pitch of the roof being too little. This necessitated its being pulled down, and we shifted our quarters a little nearer the waterfall, our water supply. Up to this time, although hard work was necessary, we had experienced no hardship; but our supplies of rice, flour, and biscuits, were rapidly disappearing. Working on the beach every day we were unable to climb the cliff in search of pigs or goats, and thus supplement our first supply of provisions. The middle of January saw the end of the regular sealing season. In seal-hunting around the island our whale-boat, which was too heavy for two men to handle, was damaged in landing in the surf; but was yet serviceable by aid of constant bailing. We had seen nothing of our neighbours; and only a few ships passed within sight of the island, without stopping. In the beginning of April 1872, the tussack by which we had ascended the cliff close to the house caught fire, whilst we were clearing the ground below by burning, and all the tussack on the north side was destroyed. Our means of reaching game being thus cut off, and winter approaching, it became imperative to begin laying in provisions. With this view we cut the whale-boat in halves, and, discarding the worst portion, succeeded in making a smaller boat, which would float in fine weather. To this specimen of naval architecture we gave the name of *Sea Cart!* By aid of the boat a visit was made to the west side of the island, whence we could climb to the plateau; and shooting two goats we salted them down. A fat pig also assisted our store, by furnishing a bucket of fat for frying potatoes; the carcase of the pig was too heavy for our boat when laden with other

supplies. The meat of the wild goats we found to be most delicate and finely flavoured. In November 1871 the number of goats we counted to be twenty-three, chiefly rams. Of these, three were shot by the Tristan people, six were shot by us, and fourteen remained during the winter. The number of wild pigs was great; the boars, although of different sizes, standing in some cases as high as a sheep. Their food, other than roots and grass, is furnished in endless quantity by the birds and their eggs, of which an immense number are consumed by them. The meat of the boar is rank and uneatable; that of the sows wholesome and good. On 14th May 1872 (by our reckoning) an English ship came in sight; we lighted a fire and attracted the attention of her crew. The *Sea Cart* was not in a condition to go off to the vessel, and the look of the surf on the beach prevented the captain from attempting to land; and to our regret and disappointment the vessel made sail again and passed on. At Tristan d'Acunha her master reported that he had seen two people and a large square-sterned black boat on the beach, but that no one came off. Had we been able to communicate with this vessel, it was not our intention to leave the island if we could have obtained supplies. The winter set in in June, the month following; but was never very severe, although we experienced a lot of rain, and heavy gales generally from the north-west. It never froze on the level of the sea; but during a strong gale from the south-east the *Sea Cart* was washed off the beach and broken up. In May our first and only crop of potatoes obtained that year was dug, and during the following months some of the other vegetables were fit for food. Unable to reach the plateau, after the loss of the boat, our store of provisions was soon so reduced, although husbanded with care, that we were obliged to diminish our allowance daily to a quantity just sufficient to maintain life; and at the middle of August we were little better than skeletons. The male penguins,

forming part of a rookery about a mile from our hut, had landed at the end of July; and in the middle of August, when it became almost a necessity to resort to killing them for sustenance, the females came ashore, laid their eggs a fortnight later on the nests already formed or built by their lords, and we were only too glad to avail ourselves of this supply of food. The day previous to the penguins laying we had eaten our last potato, and were without any supply of provisions whatever. The only other birds within our reach were the night-birds, and a few thrushes and canaries; of these the thrushes only were fit for food. In the first week of September 1872 we were glad enough to sight a French bark, which hove-to off our beach, and whose captain landed after seeing our signals. We shipped in her our nineteen seal skins; and in return for a lot of eggs, her captain gave us about sixty pounds of biscuits and a couple of pounds of tobacco. Fearing the weather, the captain of this vessel did not land again, and we could not obtain any further supply. The bark was bound to the East Indies, and had she arrived a fortnight sooner both my brother and myself would certainly have been most glad to quit our habitation. A fortnight on a diet of eggs *ad libitum* had so far restored our strength that we decided yet to remain. During the next month our food consisted of eggs and biscuits from the French vessel. In October 1872, on the 20th, a schooner (fore-and-aft) was seen standing in towards the island. She proved to be the *Themis*, a schooner making sealing voyages amongst the islands in the South Atlantic, from the Cape of Good Hope. A gale of wind drove her to sea for two days, when she returned and communicated, landing six men and boys in a boat from Tristan d'Acunha. The captain of the schooner, who landed with them, was civil, and offered me some salt pork and biscuits; we accepted about thirty pounds of the former and a small quantity of

the latter. The schooner sailed the same day. Both of us were anxious to take passage in her, and intended to have done so on her return in a few weeks' time, when her captain stated he would revisit the island. The interim was to have been spent in trapping seal, the season for which had commenced. Indeed, the next day we obtained the finest skin of our collection. Although civil in making us a present of pork and biscuits, to which was added two pounds of tobacco, the captain of the *Themis* declined to barter except for seal skins, and of these we were unfortunately not possessed. The men of Tristan had come over, they stated, to see what we were doing; but they had not availed themselves of the opportunity by the schooner of sending the cattle promised; and they excused themselves in different ways for not having brought them in their own boats. Several small articles were appropriated by our visitors during their stay of half a day, when they returned to the schooner and left the island. No goats or pigs were shot by them, and they promised another visit in a fortnight. During the next few days we worked hard to catch seals, with which to pay our passage to the Cape on the return of the *Themis*. The *Themis* never returned, and we were doomed to disappointment. At the end of October our supply of penguin eggs failed, and we were compelled to seek another source of subsistence. On the 10th November, our supply of biscuit and pork being exhausted, and the weather being very calm and fine, my brother and I swam around the nearest point to the eastward, with our blankets, the rifle, and a spare suit of clothes—the latter, with our powder, matches, and kettle in one of the oil casks. Stopping the night at the foot of the cliff, the next morning we both mounted by aid of the tussack grass to the plateau, and went over to the west side, and descended to the vicinity of our first abode. Here we built a hut, and, having shot a pig, enjoyed a feast of fresh meat. The next day I shot a goat,

on which, with the meat of six others subsequently killed by me, we lived till the 10th December. The goats I found had increased to nineteen during the winter. Returning on the 10th December to our house, we arrived at the conclusion that our stay on the island would be prolonged, and repaired our thatch, weeded the garden, gathered the early potatoes, planted, and put things in order.

I have omitted to state that in fine weather, in summer, we fished from our boat with good success, and after her loss, from a rock to which we waded at low water, and thus changed our diet. In winter time the occasions on which it was possible to fish did not exceed three or four times; the weather and surf preventing our reaching the rock, and the fish avoided the beach during heavy seas.

Whilst on the west side during this month, we were visited by an American whaler (schooner), which sent in two boats to fish, and from her we procured five pounds of tobacco, three shirts, twenty-five pounds of flour, and six or seven pounds of molasses, in return for six small seal skins. The *Themis* was expected, or we should have gone away in this schooner. On the 19th December we were aroused by firing and shouting, to find our Tristan neighbours once more among us. They had spent nine days on the west side of the island, had procured forty seals and one sea-elephant; and two seals from Nightingale Island, where they had spent a couple of days. One of our casks on the west side they had taken to stow blubber in, and we received a small quantity of flour in exchange. After staying half an hour, they left, telling us that the *Themis* would visit Tristan the following month, and afterwards Inaccessible Island. Although anxious to leave, I was not desirous, except as a last resource, to go to Tristan; and buoyed up by the hope, again revived, of an early visit from the *Themis*, my brother and I remained on the island. This was the last communication with us until the arrival of the

Challenger, ten months afterwards. The Tristan men, during their nine days' stay, had shot eight of the remaining twelve goats, and expressed their regret openly that they had not been able to shoot the other four.

The *Themis* we saw at Tristan in January, but no visit was paid to us.

About the 22nd January I swam round the point again, mounted the cliff, and succeeded in shooting four pigs. From these two buckets of fat were filled. I saw the four goats, but refrained from shooting them. The hams of the pigs I threw over the cliff to my brother. On this occasion I remained eight days on the hills, paying a visit to the hut on the west side every night to sleep. At this time the albatrosses and sea-birds were laying on the top of the island, and their eggs formed a portion of my food. The young sea-birds were also palatable.

On the 1st February, the day after I rejoined my brother, a boat came across from Tristan, landed on the west side, and her crew shot or took away the only remaining four goats; for what reason it is difficult to say, as there is an abundance of food of every description, including sheep, at Tristan. Their object appeared to us to be to drive us from the island. After a detention of a day, by bad weather, the boat returned to Tristan without communicating with us; indeed, they endeavoured to avoid being seen, or so it appeared to us, who were in a measure unable to communicate with them. February passed quietly; we were living on potatoes and vegetables from our clearings, mixed with fat.

In March, our fat and potatoes being expended, another visit around the point was made by both of us in company. We discovered the loss of the goats; but shot several pigs, and lived on the west side for a fortnight. During this time, on our excursions to the top of the island, we built on the summit a small hut of tussack grass, large enough to

hold one. The petrels had landed in November, and their young in April formed a capital addition to our food. It was now decided that I should remain at the top to secure a supply of pig's fat sufficient for the winter, whilst my brother lived below, and collected in a barrel the fat thrown down to him by me. After killing a pig, the hide with the fat attached was rolled up, secured by pieces of hide, and thrown over the cliff. The want of salt prevented us salting down the meat. Tobacco now failed us, and its want was much felt, both of us being heavy smokers.

My brother, on separating from me to live below, had taken three young pigs which we had managed to catch, by running them down. Secured to our barrel they were towed round the point and safely landed, although nearly drowned *en route*. These were placed in an inclosure and carefully tended,* being kept for a possible dearth during winter. The pigs being small, it was possible, by means of a rope, to lower them down the most difficult places, and carry them down the easier ones. My sojourn on the top of the island came to an end with the last days of April. Returning to my brother, we lived on petrels and potatoes until the end of May. A supply of two live pigs which I had brought down with me met a watery grave in my endeavour to weather the point with them in tow. I was fortunate enough, notwithstanding the surf, to get ashore without serious injury.

Finding the supply of potatoes insufficient for the winter, on 8th June I again visited the top of the island, remaining there until the 18th August. Before parting company from my brother, we decided to shift quarters for the winter a little farther from the waterfall, and succeeded in building a house, which stood during the bad weather, and in which we were living until quitting the island.

* The pigs were fed on grass and green stuff generally, and penguin eggs when in season.

The month of June I spent in our hut at the top, that of July in a cave—the latter the better habitation during cold weather. I saw my brother nearly every day, and unless prevented by a high wind or high surf, we could hold a sort of conversation. Gustav, whilst below, saw a large iron ship, filled with people, pass within a mile of the hut. This happened during the first lull after a heavy gale, with thick weather. When seen, the crew were employed making sail to clear the island.

During this winter we suffered no great privation, always having enough to eat, although consisting of pig's flesh only. Of flour, rice, potatoes, or vegetables, I was destitute. I had a little tea; no tobacco. My brother was no better off. As soon as the penguins began to lay, we set to work, collecting their eggs, and were living on them, chiefly fried in pig's fat, when the *Challenger* hove in sight. At this time I had left my rifle, with about fifty rounds of ammunition, in the cave. Although the piece had burst in two places, it was still in a sufficiently good condition to shoot a pig. The fowling-piece burst, and was of little use except as blow-pipe to freshen up the fire. Our knives we had lost amongst the high grass, and the saw furnished steel enough for half a dozen knives in their place. We placed the saw in a fire, and cut off the knives with our chisel, hardening the iron, then placed it in a handle, and it was ready for use. Our clothes were still in wearable order; boots and shoes we were in want of, although mocassins had taken their place. The medicine, providentially, had not been required; neither of us was sick a day. Eight or nine pounds of coffee was still left, and about one pound of tea; four bottles of vinegar remained, but their contents were spoiled. When together, the days on which we were confined to our hut by rain passed heavily. Our library consisting of only eight books and an atlas, its contents are well known by us both.

When met by the *Challenger*, our time reckoning was one day wrong. This error, I suspect, occurred soon after our landing.

The dogs left us for the penguin rookery, in spite of our efforts to secure them with ropes near the hut. They killed a large number of penguins, and became very wild and savage, paying no attention to us. One of them appearing mad, we shot all three.

To mount to the top of the island on the west side was comparatively easy; the tussack grass was not necessary to aid the climber, the ascent being made easier by the existence of two or three ledges, on which a rest could be procured whilst walking along their extent. The lowest ledge might have been about twenty acres, the higher ones decreasing into mere shelves. The top of the island, over which we could roam for game, was about four miles in diameter, almost round; but the ground was much cut up by ravines and valleys. The whole top was covered with a poor sort of grass and sedge, and trees blown down by the winter gales; the sheltered spots only being wooded by live timber, and that of a small description.

Close to the ridge, on the north side, there was a long valley, through which the water of the cascade ran, and here was situated my hut. The cave was on a ledge lower down, on the north-east side.

To mount to the ridge on the east side, after swimming the point, great exertion and caution were necessary. Without the aid of the tussack grass it would have been impossible to mount; and even with this an hour and a half's hard work with hands and feet, and at times teeth, was required. The height of the ridge was about 1200 feet.

On the north side, the beach to which we were confined was about a mile in extreme length, and from 300 yards on the right to 200 yards on the left broad. Our hut was on the left,

the narrowest part; but this was chosen on account of the nearness of the water.

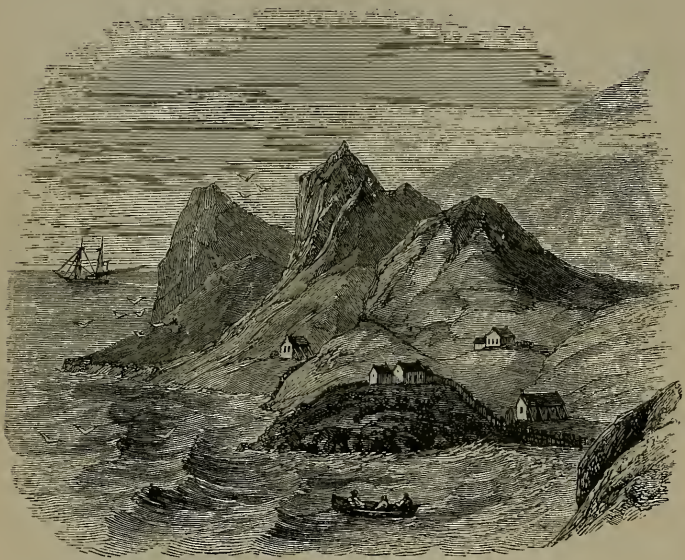
We remained during the day off the island, sounding, dredging, and completing a running survey, the brothers Stoltenhoff accompanying us to the Cape on our leaving, which we did on the 19th October. The strong westerlies caused the weather to be of such a boisterous character that but few soundings were able to be obtained on this section; however, what was observed proved the existence of a deeper channel than was found on the west side by at least 600 fathoms, the temperature remaining about the same (33°).

On the 28th October the land was reported, and soon the famous Table Mountain of the Cape was visible from the deck; the thirty-three days of our passage had now seemingly quickly passed, and we were still able to easily recall the many incidents at Bahia, and the varied scenes occurring in the 3000 miles just traversed over.

And now as we near the African shore, with its outline of peculiar shape, our hopes and thoughts fly back to other lands, on the one hand thankful for successes so far, and on the other full of hope for the future. It was late in the day before we were fairly in for sounding; serials and current observations had to be taken off the Cape of Storms.

Therefore it was about 4 P.M. when we anchored in Simon's Bay, within half a mile of the shore, where

Simon's Town is situated. In consequence of the case of yellow fever while at Bahia, two days' quarantine was imposed, after which all were free for a run on shore.



VIEW OF TRISTAN D'ACHUNHA.

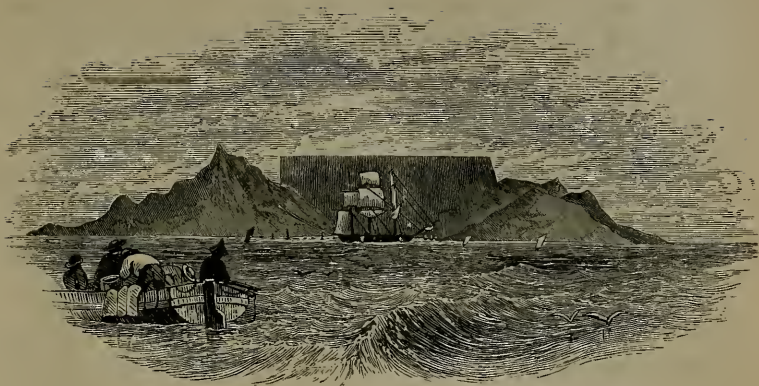


TABLE MOUNTAIN, CAPE OF GOOD HOPE.

CHAPTER VI.

SIMON'S BAY, CAPE OF GOOD HOPE, TO MARION AND CROZET ISLANDS, TO KERGUELEN LAND AND THE HEARD ISLANDS, THE ANTARCTIC REGIONS, AND TO MELBOURNE, AUSTRALIA.

Simon's Town—Visit to Cape Town—Discovery of diamonds—From Simon's Bay to Table Bay round the Cape of Storms—Anchor in Table Bay—The *Challenger's* ball—Return ball by the residents—Return to Simon's Bay—Leave the Cape—The Agulhas current—The "roaring forties"—Christmas Day 1873—Sight and land on Marion Island—Vast number of albatross and other sea-birds—Prince Edward's Island—Sight of the Crozet Islands—Passage to Kerguelen Land—Arrival at and description of the island—Leave Christmas Harbour—The scenery—Anchor in Betsy Cove—From thence to Royal Sound—Three Island Bay—Greenland Harbour—Cascade Reach—Hopeful Bay—Rhodes Harbour—The seal fisheries—Return to Christmas Harbour—Penguin rookeries—The Arch Rock—Leaving Kerguelen for the south—The Heard Islands—Description of the land—Leave the Heard Islands—The first Antarctic iceberg—In the icy regions—The icebergs and pack ice—Birds—Cross the Antarctic Circle—Early explorers of these inhospitable regions—Wilkes' Termination Land—The Aurora Australis—An Antarctic gale—Enter the pack—No signs of land—Leave the pack—Dredging—A second gale—Shape our course

for Australia—Trawling—The weather—The last iceberg—Passage to Australia—Land in sight—Arrive and anchor in Hobson's Bay, Victoria.

THERE can scarcely be a landscape more gloomy and desolate than the sterile rocky mountain and white sandy plains which inclose Simon's Bay. Coming from the coast of Brazil, and the beautiful garden scenery of St. Michael's, with its luxuriant verdure, the contrast becomes doubly unpleasing and cheerless. The town consists of about a couple of hundred of square white-washed houses, which are scattered along the beach, with scarcely a single tree in the neighbourhood for shelter, backed up with lofty, steep, bare hills of sandstone. The Naval Yard occupies a prominent position, and is of great service to the vessels employed on this station; here repairs are efficiently performed, and stores of all descriptions are to be obtained.

The Naval Hospital is a capital airy and well-ventilated establishment; this, together with the residence of the Commodore, and two or three churches and chapels, constitutes all the buildings with any pretensions to size.

Shortly after our arrival, parties were made up for visiting Cape Town, and having secured seats in the car which runs daily to Wynberg, we started one fine morning from Simon's Town. The road ran along the seashore for some distance, which, before reaching, appeared to consist of nothing but sand

and rock, but on nearer acquaintance showed up many pretty little spots, with here and there banks of charming flowers.

After an hour's drive we reached the little village of Cork Bay, whose inhabitants appear to get their living by fishing, for there were vast numbers of the finny tribe spread out in all directions to dry. Here all surrounding nature seemed fishy, the strong effluvia permeating everything, even to the trees, foliage, and flowers.

From here the road leaves the coast, and proceeds in almost a straight line over the plains which unite the Cape with the continent. The high land seemingly now recedes, and as we ride on, the scenes become more and more charming; the range of hills with the celebrated Table Mountain, Devil's Peak, Lion's Rump, &c., is visible, beautifully tinged in varied colours, while on the left we are passing Constantia, with its renowned vineyards. On we go, the road still leading through a park-like country, with charming plantations of pines and oaks on either hand, interspersed with elegant villas and stately mansions. Having now arrived at Wynberg, we complete the rest of the journey to Cape Town by rail, and, on approaching our destination, obtain glimpses of beautiful landscapes, Table Bay, with its shipping, and the gigantic rocky wall of the Table Mountains, rising nearly perpendicular to an altitude of 3500 feet. On arrival we found convenient and

comfortable quarters at the Masonic Hotel in Plein Street, facing a large square planted with pines. Remaining here for several days, we had opportunities of seeing the town. It is destitute of any imposing buildings; even the metropolitan cathedral and the other churches are very plain. * * * The Museum deserves more than a passing mention; it contains a very good collection of natural history and other interesting curiosities; also the South African Public Library, the Literary, Scientific, and Mechanics' Institutions, besides many other establishments and societies for religious, benevolent, and industrial purposes, attesting the public spirit and enterprise of the inhabitants. The Botanical Gardens are a most agreeable resort; they are well cared for, and tastily and prettily laid out, containing many rare, interesting, and useful plants from all quarters of the globe.

There is scarcely anything remaining to indicate that Cape Town was founded by the Dutch, and were it not for the yellow Malay faces, with their gaudy head-covering or umbrella-shaped hats, and the tawny Mestizos, who remind us of the aboriginal inhabitants, and give a complete foreign colouring, one might easily fancy we are in an old English provincial town. Generally speaking, any one arriving here with preconceived notions of finding himself amongst Hottentots and Bushmen, or in a state of society differing materially from that of

Europe, will soon find that he has been entirely mistaken, for they are only to be met with after a troublesome long journey into the inhospitable interior.

There can be no doubt that when the English took possession (in 1815) they found that a firm foundation had been laid by the Dutch a hundred and fifty years before, but the real progress of the country, and the development of its natural resources, date only from the commencement of British rule. * * *

Within the past few years great impetus has been given to trade by the discovery of diamonds in the colony. But the means at present available for reaching the Fields are both difficult and dangerous; they are more than 600 miles in the interior, and from Zoutkloof to Saltpans Drift (386 miles) the road is over the Karroo Desert, which during the dry season presents considerable difficulties to travellers. Yet the wagons which start weekly are generally filled, notwithstanding the very high prices charged.

It appears that the first diamond was found by some children who had been gathering agates and other pebbles in the bed of the Orange River. This stone (weighing $21\frac{3}{16}$ carats) attracted the attention of an inland trader, and was sent by him to Dr. Atherstone, of Graham's Town, by whom it was pronounced an unmistakable diamond of the first water. Systematic search was then made, which resulted in the finding of numerous small diamonds

on the surface. About twelve months after the first one was found, the Star of South Africa, of $83\frac{1}{2}$ carats, was discovered near the Orange River by a Griqua shepherd. This caused the search to be carried on with redoubled energy. The soil on the banks of the Vaal River was dug, washed, and sorted by Captain Rolleston and party, without success for a time; but after nearly three months' persevering labour the first diamond was found in the gravel on the 7th January 1870. Within two months the party had collected some hundreds of sparkling gems. Since then, the Diamond Fields have attracted many thousands, and still continue to draw adventurers.

The area over which diamonds have already been found is very extensive, and how much farther it may extend cannot even be conjectured. Sufficient diamondiferous country is already known to provide many years' employment for a large population. Diamond-digging is certain to become a permanent industry, though, to insure its becoming a profitable one, it will be necessary to work on a different plan to that at present adopted. Larger areas of ground must be obtainable, capital will need to be employed, and such appliances devised as will perform the maximum of work with the least amount of labour. Companies worked by skilful and intelligent managers, if backed with moderate capital, are almost certain of success.

The first diamonds found at Du Toit's Pan and Bultfontein were picked out from the mud plaster covering the walls of an outbuilding at Bultfontein in 1869. Shortly afterwards several Kafirs were employed to look over the land for them. They succeeded in finding a great many small ones on the surface of the sandy soil. After searching on the surface, digging and sifting the surface soil was undertaken; next, the lime tufa was bored into, and now large "paddocks" are sunk to a depth of over twenty feet in the decomposed igneous rock.

There is a tradition among the Bushmen that in former times their forefathers made journeys to the banks of the Vaal River to procure a small white substance with which they bored holes in the perforated stones used by them to add weight to their digging sticks. Possibly this white substance was diamond, as the material out of which the digging implements were formed was often intensely hard. These perforated stones were afterwards handed down from father to son as heirlooms.

After completing stores, and having refitted ship, we steamed round the famous Cape of Storms for Table Bay. The forty miles run was soon accomplished, and the anchors let go about a couple of miles from the shore. It was intended we should have gone in the dock basin, so as to have given the inhabitants of the town free run on board, but the dock master was afraid of our size, and the damage

we might probably have caused to his jetty and bollards, if a south-easter should come on, which seemed very likely at this season; so we had to be visited at this distance, with all the inconveniences of again reaching the shore.

A ball was given during our stay in the Commercial Buildings. Our guests told us that nothing so perfect and complete had ever been held before. Concerning the decorations, they were particularly enthusiastic, for there were, as novelties, trophies of dredging and sounding apparatus, with flags, flowers, and evergreens, giving certainly a very pleasing effect. Suffice it to say, all passed off most agreeably. The following night the citizens of Cape Town gave a return ball in the same building, when everything was done by them to insure success, and, without any flattery, nothing could have exceeded the completeness of the arrangements or the hospitality of the givers. * * * The next day the ship was swung in the Bay for magnetic corrections, after which we proceeded to Simon's Bay to complete stores and refitment. This was finished by the 16th December, and the next day we steamed out of Simon's Bay for our Antarctic cruise.

The weather was beautifully fine, and as Cape Point was passed, and the high land of the Table Mountains receded from our sight, a southerly course was shaped; and on the 19th, 80 miles to the southward of the Cape, we entered the Agulhas

current, the breadth of which was found to be about 250 miles, and the temperature of the surrounding sea was influenced to a depth of at least 400 fathoms. It was intended to have made a close examination of this enormous body of heated water, which is derived from similar sources as the Gulf Stream of the Atlantic, and exercises such great influence on the climate of the Cape and its adjacent seas.

The heated water of the Indian Ocean, forced to the westward by the north-east monsoon and south-east trade-winds, has only one outlet, the sea south of the Cape. On arriving there, it is met, and stopped, by the cold Atlantic easterly drift current, produced by the continuous westerly winds of the higher latitudes, which is sufficiently powerful to turn it aside and absorb it. It is then driven to the south-east and eastward, the two bodies of water intermixing. This drift also prevents any branch of the warm current passing to the northward round the Cape.

The strong winds now met with prevented a closer examination, but from the observations made it appears that the water in Table Bay, derived from the South Atlantic, is usually 10° colder than that in Simon's Bay, 30 miles to the southward, which is derived from the Indian Ocean. But on the approach of a north-west wind the Atlantic water drives the Indian water out of Simon's Bay, and occupies its place. Thus the water of the bay is liable to sudden changes of temperature to the extent of 10° or 12° .

The usual westerly winds and boisterous weather of the "roaring forties" were experienced as the ship ran quickly on for Prince Edward and Marion Islands, lying 1100 miles to the south-east of the Cape, only one sounding in 1600 fathoms being obtained to the westward of them. Christmas Day was spent in these latitudes, with anything but seasonable weather; temperature of air being from 38° to 43° .

On the 25th land was seen, and the next day, weather being much clearer, a landing was effected on Marion Island. One of the cutters, after a long pull through extensive fields of kelp (forming a natural breakwater to the long swell rolling in along the beach), reached the shore. A regular landing-place was not to be expected; however, by dint of jumping from rock to rock, a method far more agreeable and better suited to penguins than to steady-going philosophers, a footing was accomplished on the firm soil.

What a scene of wild desolation and solitude met their gaze! Around nothing but huge blocks of rough and rugged rock rolled about by the breakers, slippery with half-dry algæ. Still onward was the order, and it was found on reaching the higher land there was but little else than a wide boggy swamp.

The slopes of the hills are used by the prion and other petrels as breeding warrens. The whole of the wet, sodden flat lands was studded with large white albatrosses sitting on their nests. These mag-

nificent birds covered the ground in great numbers. It was evidently the commencement of the breeding season, as few eggs were obtainable. These splendid birds, weighing 20 lbs., and measuring from 11 to 12 feet from tip to tip of wing, seen to such advantage while in their glory at sea as they sweep so gracefully through the air, are altogether out of their element on shore. In order to rise again after settling on the land, they are obliged to run some distance before they obtain sufficient velocity for the air to get under their wings and allow them to feel themselves masters of the situation. Three descriptions of penguins were found on the island, in considerable numbers—the king, a black and white, and a small yellow-crested one. Their breeding season was nearly over; but there were still some eggs unhatched. A flock of pretty white birds, only found in these seas, about the size of a large pigeon, was met with here. While the naturalists were on shore, the vessel was engaged sounding and dredging in the channel which separates Marion from Prince Edward Island, in from 75 to 100 fathoms, with good results. It was intended, on the following day, to land on Prince Edward Island, but from the unfavourable appearance of the weather the idea was reluctantly given up. After having accurately fixed their position, we bore away for the Crozets, distant 600 miles. The former islands were discovered so long ago as 1772 by M. Marion de Fresne, who was in command of a

French surveying expedition. In the haze which surrounded them at that time he thought he had discovered the Southern Continent, as they seemed to be some miles in extent, with hills rising in double and triple ranges, the summits of which were covered with snow. About five years after this Captain Cook sailed through this same channel, and not knowing of their previous discovery, named them Prince Edward Islands, in compliment to the Duke of Kent. From this date but very little was known or written about the islands until Sir J. C. Ross visited them in April 1840. Sealing schooners have called here from time to time from the Cape, but of late without any success.

On the 31st December, after a succession of strong north-westerly winds, the first of the Crozet group of islands was seen; but the weather prevented any hope which might have been indulged in of effecting a landing; however, the islands, six in number, were all seen, and their correct position ascertained. It is over one hundred years ago that they were discovered and reported. Possessing no interest in a geographical point of view, and having no resources, they are therefore more to be avoided than approached. Very little is known about them, for Sir J. C. Ross's expedition was unable to land in 1843, and now the *Challenger's* was equally unfortunate. Later in the day the lofty mountain of East Island was seen through the haze, and on it clearing we had

a good view of this perfect mountain mass of volcanic land, with its bold and precipitous shores and projecting rocks, which seem to have been formed by the unceasing action of the waves cutting away the softer parts. We stood up between the channel separating East and Possession Islands, the largest of the group, but saw no indication of tree or shrub. It was intended to make a short stay in America Bay, but the strong north-west wind prevented our reaching it before dark, and encountering a heavy cross sea, it was not considered safe to venture nearer. A dense fog now setting in, and a heavy gale of wind springing up, it was evident we were to be disappointed; so we stood off to sea, and the opportunity of again closing the land was not afforded.

Favoured by a strong north-westerly breeze, we advanced rapidly under sail towards Kerguelen Land; on our way passing several patches of floating seaweed. We were daily accompanied by many of the great albatrosses and the large dark petrels, and still more numerous by several varieties of speckled Cape pigeons. These birds added a degree of cheerfulness to our solitary wanderings, contrasting strongly with the dreary and unvarying stillness we experienced while passing through the equatorial regions, where not a single sea-bird is to be seen, except in the immediate vicinity of the few scattered islets and rocks. The strong breeze continued, and, with a heavy north-westerly swell assisting, on the

6th January land was reported: at first a small islet, known as Blight's Cap, and afterwards the black, rough-looking coast of Kerguelen Land (or the Island of Desolation). Thick weather prevented approach to the land until the next day, when it cleared sufficiently to run into port, when the anchor was let go in 18 fathoms, in Christmas Harbour.

In this harbour Captain Cook, when in command of the expedition sent out to explore the South Seas, anchored his two vessels, the *Resolution* and *Discovery*, on Christmas Day 1777, and, although not the actual discoverer of the island, his were the first vessels to anchor in any of its numerous harbours.

This inhospitable island and its surrounding group are very little known, although discovered over one hundred years ago by Lieutenant Kerguelen, who had been sent out from France on a voyage of discovery to determine the existence of the great Southern Continent, which the philosophers of that time considered was necessary to maintain the balance of the earth. It was on January 13th, 1772, that it was first seen, amidst fog and rain, when, in consequence of the tempestuous weather, landing was out of the question, and only a very cursory view was obtained of the land, when he was again driven to sea, and, on reaching France, gave such an exaggerated account of his discovery that he was sent out again the following year; and it is from his second visit that our present knowledge of the group is chiefly



CHRISTMAS HARBOUR, KERGUELEN LAND.

derived. Although Cook and Ross afterwards visited here, and added certain information, still the chart is very vague, except in the delineation of the east side of the island, which is very much cut up by fiords, forming a chain of magnificent, well-sheltered harbours. It is thirty years ago that Ross anchored his vessels, the *Erebus* and *Terror*, in Christmas Harbour, which he describes as being nearly a mile wide at its entrance, between Cape François on the north, and Arch Point on the south, on which side is a small bay, that increases the breadth for nearly half the depth of the inlet, when it suddenly contracts to less than one-third of a mile, and thence gradually diminishes to the head of the bay, which terminates in a level beach of dark sand, extending across for a distance of 1200 feet. Here we pitched our magnetic tent for observation. The shores on each side are steep, and rise in a succession of terraces to the height of more than 1000 feet; the highest hill being on the north side, which attains an elevation of 1350 feet, and from its form received the name of Table Mountain. * * * The weather being favourable, it was determined to make a running survey of the west coast.

Jan. 8th.—Steamed out of Christmas Harbour, on a course S.S.E., along the coast, surveying and sounding as we go. The land is made up of rough sterile rocks; the shore indented with bays and rivulets. The vegetation that exists is composed of

mossy grass, mixed with a dirty brown plant; while on the higher land were patches of perpetual snow. Later in the day anchored in Betsy Cove, and remained for eight days, during which time many excursions inland were made for collecting specimens, botanical and zoological. One evening we were surprised by the arrival of an American sealing schooner, from the captain of which much information was obtained relative to this inhospitable coast. We sailed on the 17th, and, before clearing the land, encountered a strong head-wind, which speedily worked itself up to a heavy gale. Under sail alone we rolled and pitched about in the turbulent sea like a plaything, causing woeful destruction to furniture and crockery, while the masts and ropes creaked and groaned, producing a perfect medley of sights and sounds. The next day it moderated sufficiently to close on the land, and later we anchored in Royal Sound, the deepest bay on the south coast. The scenery was very lovely, with a labyrinth of islets interspersed over upwards of twenty miles of nearly land-locked waters, sheltered on the south by the Wyville Thomson range, containing a fine volcanic peak, 3160 feet high, rising as an enormous cone in the midst of a surrounding circlet of sugar-loaf peaks, each dwarfed only by the parent mountain; on the west by Mount Tizard, and the towering snow-clad summit of Mount Ross, rising 6200 feet in one continuous slope from the sea; while on the north ex-

tended the Crozier range, 3250 feet in height. * * * After leaving Betsy Cove, we successively visited Three Island Bay, Royal Sound, Greenland Harbour, Cascade Reach, Hopeful Bay, Rhodes Harbour. Thus three weeks passed in exploring the various shores and inlets, in order to ascertain the position where the finest weather might be expected at which to establish an observatory for the astronomers who intend (if our report should be favourable) to visit here in December next to observe the transit of Venus. From observations, the results seem to be in favour of establishing a station here, for out of the twenty-five days of our stay sights might have been obtained at least on ten.

Jan. 29th. — We anchored yesterday in Rhodes Harbour, in company with two sealing schooners, the *Betsy Jane* and the *Rossel King*, which had been fortunate in capturing twenty-two fur-seals, which they were willing to sell at 40s. each in the rough state. The manner in which the seal-fishery is carried on in the surrounding seas is both extravagant and destructive, for at the time of the discovery of this island it swarmed with sea-elephants, whales and fur-seals. On this becoming known, it soon became a favourite cruising ground for those engaged in the "trade." This led, in an incredibly short space of time, to the reduction of all these species to a mere remnant; and in a few years their utter extinction is sure to follow, for it can hardly be expected to be

otherwise. The men, engaged in such arduous avocations as they are in these wild and inhospitable regions, must be expected to make all they can, and they care for none who come after them, but kill old and young as they fall across them in their cruises. The same might be said of the whales and sea-elephants.

On parting company with the schooners, we proceeded through Aldrich Channel; the scenery very fine—high snow-clad peaks and ranges of lofty hills in all directions. When through the channel, Blight's Cap and the Cloudy Isles were once more in sight. Here we stopped, and a few hours were spent in dredging off the Arch Rock, with very good results; after this, steamed into Christmas Harbour and anchored.

The next day parties were away for surveying and other services. The number of birds found here is surprising. Although I had often heard of the great numbers met with on uninhabited islands, I was scarcely prepared to see them in such vast multitudes, particularly the penguins, for the whole sides of the rugged hills and ledges of rock were literally covered with them. They averaged from 10 to 20 inches in height, with white breasts and nearly black backs. The king bird and another species have four or five yellow feathers, from 3 to 5 inches long, adorning each side of their heads in graceful plumes. They stand erect in rows, which gives them

a novel and curious appearance; and the noise from these rookeries was deafening. Besides these birds, we were enabled to secure specimens of twenty other varieties.

Probably there is no place under the same parallel of latitude in either hemisphere which affords so scanty a field for the naturalist as this barren spot. Remote, and comparatively bare of vegetation, still there are several interesting points connected with its botany. Though now destitute of even a shrub, the abundance of fossil remains proves that many parts were for successive ages clothed with trees, which were probably destroyed by frequent overflowings of volcanic matter, of which the remains found and the numerous beds of coal afford abundant proof; since that period it appears to have remained in a state of almost entire vegetable destitution. The end of January found us in Christmas Harbour (the northern extremity of the island), the tranquil waters of which were quite a relief after the knocking about we experienced during the past month; but everything was now ready for sea, and later in the day anchor was weighed, and under sail we beat out, with a fine fresh breeze, passing close along Terror Reef, over which the sea was breaking with sufficient force to indicate its danger, and affording a capital sight of the celebrated "Arch Rock," an oblong block, 150 feet high, of bedded volcanic formation, like a piece of ordinary masonry, with a

curiously shaped arch, about 100 feet wide, worn through the middle of it. On getting clear, a southerly course was shaped along the land.

Feb. 1st.—With a capital breeze we proceed on our course, rapidly passing the land and some of our familiar landmarks of the preceding three weeks—Mount Ross, Mount Campbell, Wyville Thomson, and Crozier ranges, all snow-topped and glistening in the morning sun. At noon we were off Cape George, and an hour later we had reached the most southern extremity of this isle of desolation, which was named Cape Challenger. A fair wind had sprung up, and away we went farther south to the Heard Islands. On our passage, sounded and dredged frequently; bottom from 200 to 400 fathoms. We crossed the track of the Australian clippers running by the great circle route, and it was in one of these vessels that Captain Heard, in 1853, first saw the islands we are bound to. For three days very light winds, with fog and rain, were experienced. This, added to the risk of meeting icebergs, during the misty and dark nights, made it anything but cheerful, for it is very questionable if these islands are correctly laid down on the charts.

Feb. 5th.—The fog continued, and for two or three days previous, the cry of the penguin, and several patches of sea-weed, gave indications we were not far from land. The next morning during a lift in the fog it was seen right ahead, which we closed

under sail, and found to be a cluster of black, inhospitable, precipitous cliffs; Meyer's Rock and Macdonald Islets having quite a singular appearance. A thick fog again concealed them from us, but having bearings we proceeded until they appeared through the haze at less than five miles distant, and we were enabled to run along their eastern side, which presented truly a rough and rugged scene. These islands, some 400 or 500 feet high, were perfectly inaccessible, not presenting a point along their rugged shores where it was possible to land. We passed on, and another 20 miles disclosed a very remarkable headland, which we found out afterwards was known as Rogers' Head. As the roadstead was approached, the squalls came down with great violence, threatening to blow us to sea again; but having steam at command, we were able to hold our way, and eventually reached the anchorage in Corinthian Bay (or Whisky Bay of the whalers, so named from the quantities of that spirit said to be consumed by them on the arrival of their store-ship with supplies for the year). All the places previously visited, however inhospitable, really seemed paradise compared with this wretched mountain of ice rising from a base of black lava cinder. This largest island, off which we are at anchor, is said to have its mountainous peak some 7000 feet high: we had no means, however, of judging, for the top was never free from cloud and mist during our stay. Here

we had our first glimpse of really Antarctic scenery, for picturesque glaciers descended to the sea on all its sides. Explorers landed and discovered a party of sealers located here, "living" in a couple of dirty huts sunk in the ground for warmth and protection from the winds, which frequently blow with violence through a deep ravine. There are some forty or fifty men distributed about the island in small detachments, each party having a defined beat where they watch for the sea-elephants coming on shore. What a miserable affair a sealer's life evidently must be, hard and monotonous, living in those desolate regions, completely isolated from the world! Here they remain for three years at a time, when, if they are lucky, they return home, with perhaps 50*l.* or 60*l.* in their pockets. This is probably spent in a couple of months, and they again return to their voluntary exile and live on penguins, young albatrosses, and sea-birds' eggs for another period. The roads (?) in every direction were swampy and exceedingly unpleasant; wading through the snow and slush, the miserable huts were reached, looking lonely and desolate, the shore for some distance being strewn with bones and fragments, the remains of sea-elephants, &c. Several excursions were planned during our short stay to visit the glaciers and the penguin rookeries, for these birds seemed to be in myriads, covering every ledge and precipice presenting a footing.

All those prearranged plans were, however, frustrated, for during the night the barometer fell, and the weather put on a very threatening appearance. The anxious circumstances now under which we were placed on this inhospitable coast caused a move to be made at a very early hour the following morning, at which time it was snowing very heavily as we proceeded to sea. Before well clear of the land (for we had endeavoured to make a rough running survey), the expected gale burst upon us; still it was a fair wind, and the ship ran on pleasantly towards the Antarctic ice until the middle of the night, when the sea and wind increased to such an extent that we had to heave-to. But it was not of long duration, and as daylight came, the weather moderated, and under a bright sun and clear sky, with a favourable breeze, we sped on at a rate of 9 or 10 knots an hour to the southward, causing us to forget the few miserable days spent at and near the Heard Islands. During the next three days, we pushed on under sail, the weather continuing very squally, with rain and frequent snow-storms, the temperature of the air being down to 33°.

Feb. 11th.—This morning at an early hour we encountered the first Antarctic iceberg, bearing E.S.E. to our course. On passing within a few miles, it was from observation considered to be three-fourths of a mile long and 200 feet in height. We are now in latitude 60° 52' south, longitude 80° 20' west,

dredging and sounding frequently with good results. From this time the icebergs became very numerous, and great was the excitement on board as we passed these novel sights. The rich cobalt blue tints blending into the white of the ice produced a very fine effect. The weather was very fine, and each day now we continued to meet icebergs of all shapes and sizes, some apparently much worn by the sea into cavities and great fissures, as if they were ready to split asunder; others of tabular form, with heavy surf breaking up their perpendicular sides. Sailing on, we pass much loose ice, evidently fragments of broken-up icebergs; and a beautiful white petrel, *Procellaria glacius*, was seen for the first time. From this we were led to believe we were in the vicinity of large masses of ice, for it is known that these birds never wander far from the main pack.

Feb. 13th.—The weather became hazy, with occasional snow-storms. Many large icebergs in sight, some of which are of magnificent dimensions, nearly a mile in length, and from 150 to 200 feet in height, with sides perfectly smooth as if they had been chiselled; others again exhibited lofty pinnacles, with sides and ends of many-coloured tints, leading into deep caverns open to the swell of the sea. At noon to-day we were within 120 miles of the Antarctic Circle. Continuing our course until midnight, we found ourselves in a fog, close to an extensive area of brash ice, extending far away in a

south-east direction. Fortunately at the time the wind allowed us to back out again, and we hove-to for daylight, when a beautiful sight was presented, for we were close to the edge of the pack, which from the masthead appeared to be perfectly solid, without any opening in either direction. The north-west wind of the previous day had apparently forced all this mass together. Some hours were spent dredging in 1675 fathoms (bottom greenish mud). A small number of starfish, some small shrimps, and a few curious crustacea and diatomaceæ were obtained. After dredging, we stood on a westerly course under sail. The novelty of being surrounded with icebergs (for they were now so numerous that we had to alter course occasionally so as to clear them), and having on one side of the horizon a boundless field of ice, with calm weather, and a totally new set of sea-birds, amongst which was the elegant, pure white little petrel (which became more numerous), gave us intense delight. Experiments were now carried out relative to the temperature of the sea. At the surface it was found to be 30° , and at a depth of 1600 fathoms 26° . Snow and sleet came on, accompanied with an easterly breeze, and the temperature of the air fell to 28° .

Feb. 15th.—The day was dull and cold, temperature of air down to 28° ; wind light and sea calm, so made but little progress under sail. There are several large “bergs” in sight, and an extensive

field of pack ice extending from the south-west. A line of eight bergs and low masses of ice extends from north to south-west. About 9 P.M., in the twilight, had a fine sight in passing close to an immense iceberg, with its strange and curious form, reflecting very brilliant blue rays in every variety of shade. A magnificent sunset caused the horizon to be illuminated with bright red streaks up to 10.30 P.M. by refraction from the ice.

Feb. 16th.—The weather was remarkably fine, such as is but seldom experienced in these high latitudes—bright sun and blue sky, with but little wind; so had recourse to steam, passing some magnificent icebergs, extending in all directions and in every conceivable shape and form; for the most part having flat tops covered with snow, glistening in the sun, with smooth, inaccessible sides, beautifully tinted with every shade of blue and green. It was about 1.30 P.M. when we crossed the barrier of the Antarctic Circle (latitude $66^{\circ} 30'$ south), in longitude 78° east, situated about 1400 miles from the South Pole. The sight was indeed a grand one as we threaded our way through the pack ice and up through avenues of vast bergs, over a course never before taken by explorers; all this left an impression of those icy desolate regions that can never be forgotten. It seems most difficult to attempt a description, for all I could say would convey but little of the reality to the imagination of one who has not been similarly situated. Pro-

ceeding on to latitude $66^{\circ} 40'$ south, the course was altered, and the horizon scanned in all directions for land; the weather was unusually clear, so that we should certainly have seen it had any existed within a considerable distance: none however was visible. The Circle was recrossed, and we proceeded east along the margin of the great pack. The icebergs had now become so numerous that it was not unusual to be able to count over one hundred and fifty from the deck, and many of them appeared to be miles in length.

The next day was very squally, haze extending all round the horizon, and frequent snow-storms occurred, we steering east for Wilkes' Termination Land, which was supposed to be 440 miles distant. This land, which was believed to exist, and which appeared on all early charts of the world as the "Terra Australis Incognita," was considered necessary to counterbalance the land known to exist around the North Pole; but such men as Cook, Weddell, Bellinghausen, Kerguelen, and others, searched these inhospitable latitudes in vain for it. Many years passed without anything farther being done towards its discovery. However, it seems that the subject was revived in 1831 by Captain Biscoe reporting having seen land; and a few years later another whaling captain (Kemp) gave forth a similar statement; both these discoveries being between 65° and 67° south, and longitude 59° and

67° east. In 1839 Captain Balleny reported land in latitude 66° 44', longitude 163° east. D'Urville, with his vessels of the French expedition, discovered (?) Adelia Land and the Claria Coast (?) about the same time. And in 1840, Captain Wilkes, in command of the United States exploring expedition, gave forth to the world his discovery of the Antarctic Continent, which he describes as follows:—
“ In latitude 64° 31' south, longitude 93° east, we made what was believed to be land to the south and west, at least so far as ‘terra firma’ can be distinguished when everything is covered with snow. Soundings were obtained in 320 fathoms, which confirmed all our previous doubts, for on later observation a dark object, resembling a mountain in the distance, was seen, and many other indications presented themselves confirming it. Advancing to the westward, the indications of the approach to land were becoming too plain to admit of a doubt. The constant and increasing noise of the penguins and seals, the dark and discoloured aspect of the ocean, strongly impressed us with the belief that a positive result would arise in the event of a possibility to advance a few miles farther to the southward.” *

This, to a certain extent, they thought conclusive, and fully believed that an extensive continent existed within the icy barrier, extending perhaps for nearly 1000 miles near the Antarctic Circle, between the

* ‘United States Exploring Expedition.’

Balleny Islands and Enderby Land; but this region of vast mountains has such a barrier of impenetrable ice encircling the Pole that there appears but little probability of ever penetrating. The supposed existence of this continent was, to a certain extent, proved to be erroneous by Sir James C. Ross's expedition the following year sailing over two of the positions assigned to it. For another point of this continent (?) we are now shaping a course.

Feb. 18th.—The coldest weather yet experienced; temperature of air down to $23\frac{1}{2}^{\circ}$. All the forenoon, we sail through vast fields of ice, and large numbers of bergs are in sight in all directions. Some of these great perpendicular masses overtopped our mast-heads by many feet. In many places, where there happened to be a break, we could see the upper surface, which appeared quite smooth, and conveyed to the mind the idea of an immense plain of frosted silver. Following in our track were great numbers of sea-birds—albatrosses, petrels, Cape pigeons, terns, night hawks, &c. As the day advanced, we rounded the northern extremity of the pack, and stood east, intending to run on this course for about 250 miles. During the evening a beautiful view was had of the Aurora Australis extending across the zenith, of a bright yellow colour, its edges tinged with purple, exhibiting at times vivid flashes of a bright pink colour. A strong light appeared behind the dark cloud, and afterwards pink yellow, and green

colours were traced along its edges. Bright streams of light frequently darted upward from the clouds to the zenith, forming coronæ, and exhibiting brilliant flashes of all the prismatic colours. Several whales and numerous sea-birds were in sight.

Feb. 19th.—From the great quantities of ice found drifting along our course, it appears evident we are not far from extensive fields, and as many as eighty magnificent icebergs were in sight at one time; thus for days we sail on a straight course, bounded with ice islands from a quarter of a mile to five miles in length. The question naturally arises, how and where are these masses formed? * That they are commenced on the land seems to be considered conclusive from the fact that earth and stones are frequently seen on them. After a time they are probably detached from their original place of formation by some violent storm, and the prevailing winds drive them to the north and west, where they are met with in every stage. Those that had been recently detached were easily detected by their beautiful stratified appearance, while others of older date had lost their original form by the sea constantly washing over them. There is a great variety of opinions as to the time required for the formation of these immense masses of ice, for those met with farthest south, and seemingly showing but little signs of decay, averaged 200 to 250 feet in height above the water. The

* 'United States Exploring Expedition.'

depth below the surface is supposed to be three times that above. Some of these masses were at least 900 feet in thickness. Assuming the fall of snow to average an inch daily, or 30 feet each year, it would require thirty years to form one of these blocks, which are found floating here in such numbers.

Their specific gravity varies very much, as might naturally be expected; for while some are of a porous and snowy texture, others are in a great measure composed of blue flinty ice. This difference is occasioned by the latter becoming saturated with water from the rain and fogs, which afterwards freezes. * * *

Feb. 23rd.—Clear blue sky and bright sun, weather calm and pleasant; steaming amongst vast numbers of magnificent icebergs, some like fairy palaces of alabaster, with numerous caverns and arches through which the sea dashed its spray. The evening was beautifully fine, and a very brilliant sunset illuminated the horizon, shedding golden rays which were again refracted from the pack. We are now within 20 miles of the position assigned by Wilkes as land, but with a clear horizon none was visible.

Feb. 24th.—This morning, instead of being able to approach the pack, we were in a fearful gale of wind, with a heavy and constant fall of snow which completely hid the surrounding dangers from us; for being in the vicinity of such vast numbers of bergs

rendered our position very perilous. Steam was at command in four boilers; it was as much as the engines at full speed could do to keep station, and in a position considered safe from the ice. The barometer fell to 28·9, and the wind rose to a force of 10; soon there was a heavy and turbulent sea. As the darkness of the night closed, the wind moderated; still it was a very critical time, and all felt glad when daylight arrived, as we were then enabled to shape a course for the pack under sail. From the direction the wind had been blowing, the ice at its edge was scattered and sufficiently open to allow us to push on to within 15 miles of the supposed Wilkes' Termination Land; although, having a clear horizon, no indication of it could be seen, we sailed for two or three hours, picking our way among blocks of loose ice, varying in size from 5 or 6 feet to 60 feet across, and which no doubt are kept separate by the continual motion of the long swell. Their depth below the surface did not appear to exceed 20 feet. The greater part was washed into all sorts of fantastic forms, and showed evidences of decay and the length of time they had been in the water. In addition to this, hundreds of icebergs could be seen from the masthead. Having now gone as far as practicable in an undefended ship, course was altered, and once more we reached clear water. The weather was getting very unsettled; it was therefore deemed useless to remain in proximity to so much

ice, as a strong southerly breeze had sprung up, and squally weather set in, of which advantage was taken; as it was considered that any further stay in these icy regions would not only be attended with peril to the vessel, but would cause a delay in time, which was required for other services, and having nearly 3000 miles to sail to our next port (Melbourne), course was altered to the northward, and throughout the remainder of the day good progress was made.

Feb. 26th.—Hove-to this morning for dredging from a depth of 1300 fathoms. The wind and sea, however, gave evidence we were in for another blow before leaving these regions, lest we should think too lightly of the dangers of ice navigation. The dredge was quickly hauled in before it had reached the bottom. We then steamed under the lee of a large iceberg, which somehow or other we ran into, carrying away our jib-boom and head-gear. Some little excitement now prevailed, for the weather had become so thick with the falling snow that we could scarcely see 100 yards' distance. Steam was ready, and the ship hove-to, drifting to leeward before the storm, with the certainty, as we were perfectly surrounded by icebergs, of sooner or later coming across the path of one of them. In the afternoon, during the worst part of the gale, one of these great ice islands was seen looming through the mist, close to, and directly to leeward of us. With the engines going at full speed, the ship just

managed to clear it. After this we endeavoured to use our enemy as a breakwater; but the violence of the gale caused a difficulty in bringing the vessel head to wind, so there was no other course but to continue our drift. As the evening advanced, the weather cleared, and during a momentary lull in the storm, while passing to leeward of another great iceberg, the ship was brought round on the other tack. The passage between the two icebergs proved to be clear of danger, and the night was spent in drifting backwards and forwards from one to the other, the steam enabling the ship to hold her own. It was altogether a fearful and perilous night.

Feb. 27th.—Daylight was hailed with much thankfulness; the gale still blowing its utmost. However, such fierce squalls are never of long duration in these latitudes. Most providentially the weather, as the day advanced, seemed to subside; and as there had been no mishap, we had much to be thankful for in being preserved from the dangers and perils of the past twenty-four hours. Later in the day sail was made, and we again proceeded on our course. Next noon we were in latitude $62^{\circ} 2'$ south, longitude $97^{\circ} 6'$ east, and about 2215 miles from Cape Otway, Victoria, Australia. Before the strong favouring gale good progress was made, every one heartily glad to take leave of the desolate icy regions, after our late experience of what a gale really was in the Antarctic.

On the 4th March, in latitude $53^{\circ} 17'$ south, longi-

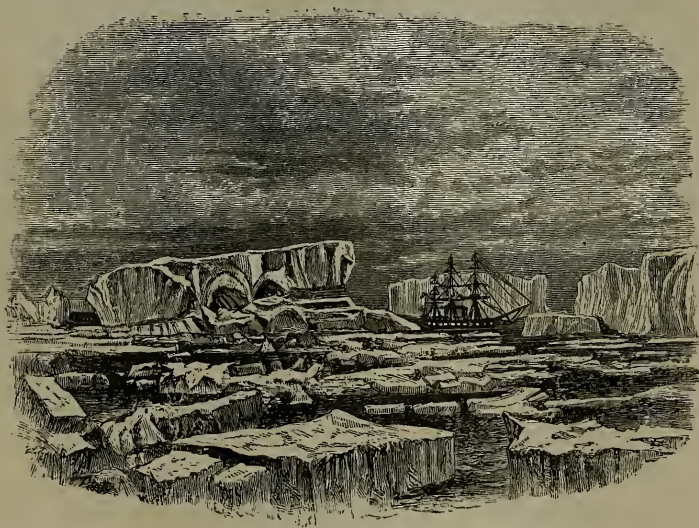
tude $109^{\circ} 23'$ east, we passed our last iceberg, but the sea water remained sufficiently cold for them to float about in it for some time without melting until we attained the 50th parallel of latitude. Whenever the weather permitted, we sounded and trawled with good results. Upon investigating the proceeds, it was found to consist of nearly the same fauna as that discovered farther north.

On the 13th March, 400 miles from Cape Otway, an extremely interesting haul with the trawl was obtained in 2600 fathoms; 600 to 700 fathoms deeper than we had met with since leaving the Cape. The bottom proved to be of the same kind of dark brown mud.

The weather continued variable as we proceeded north, one day squally, the next calm, with heavy rain and fog; and not until reaching latitude $44^{\circ} 30'$ south did fine weather really greet us; then, with a favourable westerly breeze, good progress was daily made, and on the evening of March 16th land was in sight, the first for forty days. Cape Otway, Australia's south-western point, was ahead, and the bright light glimmering in the darkness of the night. A short distance farther, and we are reminded that our voyage will soon be at an end. Next day crossed the bar, and passed Port Phillip's headland; shortly after Hobson's Bay was reached, and we anchored in the harbour of one of the finest colonial cities England possesses.

Numbers of influential citizens immediately boarded us, offering every assistance, and a cordial welcome to Australian waters.

The city is some four or five miles from the anchorage; but on reaching the shore, we found railway communication near at hand; so there was no difficulty in reaching town, for which, through the courtesy of the railway authorities, free passes were supplied.



THE CHALLENGER AMONGST THE ICE IN THE ANTARCTIC REGIONS.



DREDGING ON THE PARAMATTA RIVER, SYDNEY.

CHAPTER VII.

MELBOURNE (VICTORIA) TO SYDNEY (NEW SOUTH WALES) AND WELLINGTON (NEW ZEALAND).

Melbourne—The city and suburbs—Visit to Ballarat—The city—Its gold mines—Melbourne to Sydney—First sight of Sydney Heads—Arrive at Sydney, New South Wales—Anchor in Farm Cove—Sydney Harbour—Picnic on Mount Victoria—Zigzag on the Great Western Railway—The Blue Mountains, and Valley of the Nepean—The city—Paramatta River—Rhodes—The dredging picnic—Entertainments during our stay—Early history of the colony—Leave Sydney—The stormy weather—Return and anchor in Watson's Bay—Sydney to New Zealand—Daily soundings—Rough weather—Anchor for shelter in Port Hardy and Queen Charlotte Sound—Man washed overboard and drowned—Sight Palliser Heads—Anchor off Wellington—Port Nicholson.

VICTORIA is the wealthiest of all England's colonial possessions; her trade exceeds thirty-two millions

per annum, with a yearly revenue of four millions and a half, which is greater than that of Denmark or Portugal, and several other monarchies of Europe.

Melbourne has made a name for itself, and is undoubtedly the capital, not only of Victoria, but of all Australia; and though only just forty years have elapsed since the first white man landed on its site, it has already, with its suburbs, 240,000 inhabitants: in other words, it may be classed as the ninth city in the British Empire, exceeding as it does in population such ancient cities as Bristol and Edinburgh.

It is adorned with fine public buildings, and possesses all the comfort and luxuries of a European capital. Its internal appearance is certainly very fine: the streets are all straight, and are arranged at right angles to each other.

East and west are Great Flinders Street and Collins Street, which is the high-street of the city; then there are Swanson and Bourke Streets, each filled with handsome business premises, banks, theatres, opera-houses, churches. In fact, it is impossible for any one (particularly strangers coming in from the monotonous sea) to walk its length and breadth without being struck by its grandeur and dimensions.

The public buildings, warehouses, and private residences are remarkable for their extent and archi-

tectural beauty, imparting a most stylish appearance to the city.

This most truly wonderful country, with its enormous wealth, is enabled to devote annually nearly one-third of its revenue raised by taxation to aid public instruction; a fact, I believe, without parallel elsewhere. Grants are annually made to public schools, universities, libraries, picture-galleries, and museums, to schools of art and mining, and to various literary and scientific institutions.

The universities and colleges are found with talented professors on their staff in the varied branches of science. Museums and national galleries are filled with interesting specimens of local and world-wide fame, and paintings of the highest merit; the free libraries, with thousands of volumes on their shelves, are open to all comers. How proud, then, are the residents of this Greater Britain of their institutions; and well they are justified in their pride.

The Botanic Gardens, well stocked with all that is beautiful in flowers, plants, ferns, and lovely trees, are of themselves a perfect paradise of science to those interested in botanical studies.

The suburbs, including Richmond, Brighton, and St. Kilda, are very lovely spots: the foliage, the charming villa residences, with glimpses here and there of the bright blue sea, all tend to complete this pretty picture; while away in varied directions

are the public gardens, or Reserves, as they are named, affording green walks and shady retreats, and mainly assisting to bring much of the health, and some of the pleasures, to those whose business may keep them in town.

Such is this truly wondrous place—a city which has risen to its present proud position as if by magic; but it is only another evidence of the energy and perseverance of the English race.

While in Victoria, I had opportunities of seeing much of interest, and to join in many pleasant excursions in the suburbs; amongst others was a trip by rail to Ballarat. On leaving the Spencer Street Railway Station, after a run of somewhat over 100 miles, the destination was reached, which since the gold fever of 1853 has been metamorphosed from a few canvas tents to an extensive and beautiful city. From the discovery of the riches of Golden Point—the first opening of those famous “jewellers’ shops”—the progress of Ballarat has been steadily onward.

At the present time there are about one hundred and twenty streets, some of them containing handsome buildings; there are forty or fifty schools full of scholars; hospitals, asylums, a town-hall, and police-courts; several banks, mechanics’ institute, two or three theatres, gasworks, foundries, machine-works, flour-mills; and a fine commodious market has been built; reserves, and an

extensive Botanic Garden, have been laid out for the pleasures of the people. The merchants have their Chamber of Commerce; the mechanics, their Literary Institution; the farmers, their Agricultural Society; and those interested in mining, their school and colleges. But the rate of progress has not been confined to the limits of the city, for thousands of acres all round are under cultivation for agricultural purposes, where many of those who spent their early colonial days mining are now, after their toil, content to settle down in the bliss of having a farm of their own, and of sitting under their own vine and fig-tree.

Opportunities were afforded for visiting some of the famous gold-mines in the immediate neighbourhood, one of which, belonging to the Black Hill Mining Company, situated at the foot of the hill which gives the company its name, on the banks of the river Yarrowee, was particularly interesting: here is a most complete and novel set of machinery. The steam-engine, a horizontal one, of 100 horse-power, is placed in the centre of the works, and drives six batteries of ten stamps each. The quartz is supplied to the stampers by a self-feeding apparatus, when it is reduced sufficiently fine to pass through wire gratings, at the back and front of the machine, having one hundred and twenty holes to the square inch.

A small quantity of mercury is put into each stamp-box twice a day. The crushed quartz is then carried

through the grating by a stream of water into ripple troughs containing mercury, extending along both sides of the battery, and thence over some twenty-four feet of blanketing; the material collected by this process is conveyed into revolving barrels, with half its weight of quicksilver, sufficient for proper amalgamation. Heat is then applied, the mercury evaporated, and from the residue is collected the gold, which is afterwards taken to the bank or assay-house. The working manager was very communicative, and from him I ascertained that the mine occupied the principal portion of the Black Hill, and contains about forty acres. Tunnels, nine feet high by seven wide, had been excavated at different levels, amounting in length to over 3000 feet; these tunnels are connected at several points with the open workings at the top of the hill.

Mining operations were in a depressed state at the time of my visit, but a few years before they were crushing here their 2000 tons of quartz per week, yielding, on an average, about fifty grains of gold per ton of quartz. * * * From here drove for a couple of miles, reaching the scene of the Winter's Freehold Mining Company; and having an introduction from Mr. J. Morrison, the manager, there was no difficulty in seeing everything of interest. At first I was struck by the appearance of the surroundings, from which I was led to imagine (from the tumble-down appearance, &c., of every-

thing) that it was not the rule amongst mining companies to waste money in needless buildings, or useless ornamentation—the test of success being in their handsome dividends. I intended going down this mine, but time did not permit, so had to be content with a walk over the surface. The workings are from 300 to 400 feet deep; four layers of bluestone, varying from 5 to 25 feet in thickness, were cut through. The machinery consists of two engines of 25 horse-power, one used for pumping and winding, and the other for puddling. At the time of my visit very few hands were employed, the funds of the company having run low, and the results of their findings being very small; but I ascertained that when fairly under weigh, work was carried on in three shifts day and night. The cuttings, or wash-dirt, is sent up the shaft in iron buckets, then by means of the steam-driven puddling machines the useless is separated from the good: a stream of water is now let into the head of a long wooden trough, in which a ribbed false bottom and movable cross-bars are placed; the puddled stuff is wheeled to the head of this trough in barrows, thrown in, and worked backwards and forwards until the whole is thoroughly disintegrated; the large stones passing over the false bottom, while the heavy gold, falling through, is caught on the cross-bars, the smaller gravel passing to the bottom, when it is collected by

Chinamen and trucked to the waste heap. Several hours are consumed in this washing process; and I was informed that some years ago they used to net about 120 ounces of gold a day: then the gold used to be lifted out in bucketfuls, for final washing and weighing, before removal to the bank. The process is efficient, though it seemed to be rude, and the time spent in sight-seeing here was one of rare interest and curiosity.

Tunnels have been cut in various directions in search of the precious metals. * * * When these golden deposits had their origin, and when the great successive layers of bluestone were thrown over them, are amongst those lost incidents in the history of creation concerning which science can do no more than speculate. The extent to which these great quartz boulders have been rolled, shows that they had been carried a very much greater distance than the ranges to which we ascribe their origin; or that they were shaken to and fro in some great convulsive struggle of nature, such as the earth has not experienced since man came upon it from the hands of the Creator. Four successive layers of basaltic rock have overrun at long intervals and buried the golden stream of an ancient world; and so changed has the crust of the earth become since the last of these great seas of molten rock passed over the land that the craters from whence they issued have themselves become lost. The stories

of these waves of fire and smoking floods are epics of the grandest order. And now, after long ages, in these calm and settled days, when our earth is unshaken by the war of the fierce elements, she holds these rich treasures in her bosom, and we probe our way through the thick rocks and recover from the beds of these ancient streams the precious metal hidden there, perhaps, when the first great fiat went forth, and the waters were parted from the land, and out of chaos a new planet sprung into being, at the command of God. * * *

After returning to the city from my mining excursion, I called on Mr. Bardwell, with whom I drove round the suburbs, visiting Buninyong, a mining and agricultural district containing 1981 inhabitants, and passing through Sebastopol, a mining village containing some 6000 inhabitants, where in all directions are to be seen evidences of the past—numberless mounds and deserted claims, now being reworked by persevering Chinese, who succeed occasionally in obtaining a few ounces of gold from amongst the *débris*. Driving back, we passed through the new Public Gardens, and on reaching the city, I left by the 7.15 train for Melbourne, arriving there after a four hours' run, and then by rail to Sandridge.

During our stay various entertainments were arranged for the benefit of the "Challengers." Eventually it was with great regret we found that we must be on the move again.

April 1st.—This morning, under steam, proceeded out of Hobson's Bay. The once famous city of Geelong, prettily situated on the western arm of Port Phillip, then St. Leonard's, Queenscliff, and Lonsdale, are respectively seen. Steaming for some 40 miles through the inland sea, we pass between the two narrow promontories of Point Nepean and Lonsdale, and entering Bass's Straits, Wilson's Promontory, the most southern part of Australia, is before us. Having a pleasant breeze, steam is dispensed with, and, under sail, good progress was made along the land. Passing Cape Howe, the coast line appeared steep, rocky, and covered with monotonous forests of gum-trees; but as we drew nearer, the grandeur and size of the cliffs and heights became more and more apparent. On their tops could be seen little specks of white houses dotted over bright green downs. Sounding and trawling occasionally, Twofold Bay is passed, with villages nestling along its shores. Closing on the land, we stopped off Montague Island, swung ship for magnetic corrections, and, after dredging, proceeded for Sydney Harbour. Those who had been on this station before, were eagerly questioned by the uninitiated, as to the distance we had still to go, as each successive bay or headland was passed. All those whose duty permitted were on deck watching the progress; but what seemed to arrest our attention was the apparently impregnable wall of high land stretching away on either side; but we were

told there existed an opening in this wall, leading into a beautiful, commodious, and, in fact, the most perfect harbour in the world; but were it not for the fact of the vessel heading direct for this seeming barrier no one would have believed it contained such an opening. Passing each successive bay, we began to get a closer view of the land; and as we drew nearer the houses and villa residences on the cliffs showed our proximity to some large town. And now the Sydney Heads, with the entrance between them, were clearly discernible, through which we passed soon after mid-day. The South Head, on our left hand, bears on its top a square tower, built by the late Benjamin Boyd when he founded a township, at the end of the bay; and on a mast near flags were being hoisted signalling our arrival, which was speedily flashed by telegraph to Sydney. The North Head, on the right, is a bold precipitous rock rising perpendicularly from the sea more than 300 feet. After progressing for about a mile, another lighthouse was passed, named the Hornby Light, which was erected on the inner South Head after the wreck of the emigrant ship *Dunbar*; this light marks unmistakably the true entrance into the harbour. We rounded the point and entered the waters of Port Jackson. The lovely view presented, with the handsome villas standing amongst trees and gardens along the shore, was enchanting, while the number of yachts,

boats, and steamers cruising about (for it was Easter Monday and high holiday), and the weather being beautifully fine, combined to make it one of the prettiest scenes possible to imagine. We were now seven miles up the harbour, and had passed Fort Macquarie, Darling Point, and Garden Island. A short distance farther, and we are reminded that our voyage is ended—the anchor is let go in Farm Cove. Bumboats, shore-boats, washerwomen, dealers in all sorts of wares are swarming off soliciting orders. Here we found H.M.S. *Dido* and the German frigate *Arcona*. The fine view afforded from the anchorage, with its charming surroundings, was very enjoyable. Away to our left is a pretty little bay, its shores surmounted by a rough-hewn seat known as Lady Macquarie's Chair; while, stretching to the right, are the beautiful park-like reserves of the Botanical Gardens; still farther is the inclosure, at the top of which stands Government House, with grounds sloping down to the sea, in a position of great beauty. This castellated building of freestone has an air of magnificence about it such as should belong to the residence of the governor of so important a colony. * * *

On first landing in Sydney Cove, one cannot help being struck with the many fine buildings rising in all directions, including wool stores of five and six stories, the Custom House, and numerous hotels. Stretching round here is Circular Quay, having an

available length of 3100 feet, where are numerous large vessels awaiting and unloading cargoes.

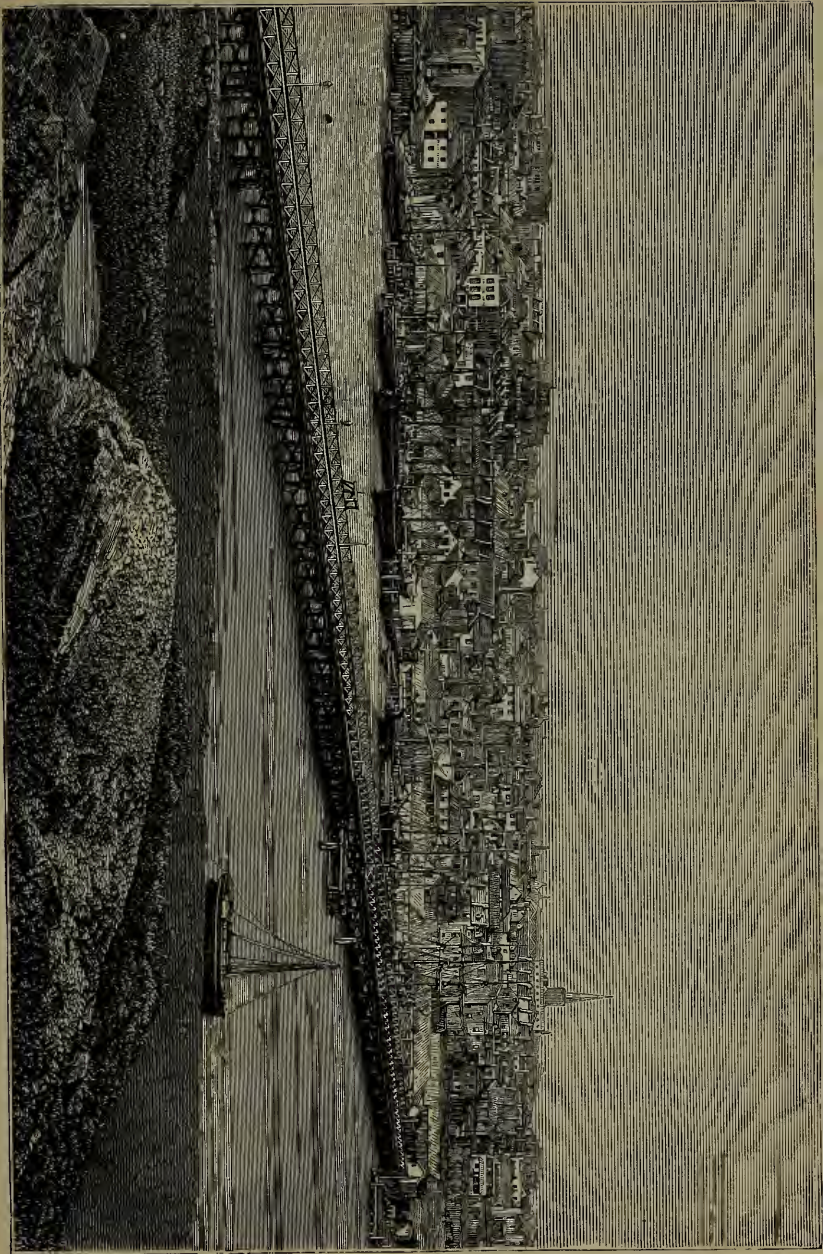
I despair of being able to convey to the reader my own impression of the beauty of Sydney Harbour. I can call to mind no other place with such lovely glimpses of nature—nothing equal to it. Many beautiful scenes are to be met with in our own British Isles, but they dwarf into insignificance in comparison with this magnificent land-locked expanse of water and scenery spread out before us, extending in bays, coves, and rivers for some twenty miles inland, ramifying in every direction; its bold and rocky shores presenting a succession of picturesque and beautiful landscapes, in which every nook and headland is studded with elegant villas and snug cottages, surrounded with park-like grounds and gardens, full of orange-trees, bananas, and numberless semi-tropical plants, unfamiliar to the eye of the newly arrived stranger.

Endless facilities are afforded for all kinds of yachting, boating, and fishing, which are in high favour. Capital regattas and races are frequently held. The two Yacht Clubs make a very good show as regards numbers, built, management, and speed, though in tonnage they rarely exceed 40 or 50 tons. The harbour is usually safe for boating parties, though southerly bursters and other sudden squalls are often fraught with risk to the inexperienced.

The eastern shore of Darling Harbour, which skirts

the western side of the city, has its frontage entirely occupied with wharfs and quays. Here all the inter-colonial steam companies have their stations; while ferry-boats run in all directions to the north shore, to Balmain, St. Leonard's, and higher, to the township of Pyrmont, and so for some eight miles up the lovely Paramatta River, passing Cockatoo Island, where is situated the government dry-dock, in which we were on the 20th April successfully placed, and had sundry repairs, &c. The dock is 400 feet long, with 20 feet depth of water over the sill. Workshops are provided, with an extensive plant of modern machinery, so as to be enabled to undertake any repairs to the vessels on the station.

I have no recollection of seeing in any early work on this colony reference to the charming scenery of Sydney Harbour, or the many navigable rivers which are near it; nor is much said of the glorious ranges of the Australian Alps. But there are scenes of nature here at hand as lovely as are to be met with in any part of the world. A few days after our arrival, invitations were sent by the members of the Government to a picnic on Mount Victoria, in company with the officers of the German frigate *Arcona*. A special train started at 7 o'clock from the City Station on the Great Western line, with a very large party of us; and as an escort were the Hon. Samuel Lloyd, Treasurer, Hon. Saul Samuel, Postmaster-General, the Minister of



SYDNEY, FROM PYRMONT, DARLING HARBOUR.

Works, and others. By 9 o'clock we had reached Penrith, the line passing through orangeries, vineyards, and homesteads. Shortly after it was decided to stop at a convenient siding for breakfast. Proceeding onward after this, we began to ascend the Blue Mountains, which rise abruptly on the west side of the valley of the Nepean. The ascent is made by a zigzag on gradients, the steepest of which is 1 in 30. The line, on reaching the summit of Lapstone Hill, follows a winding course on the main range; and for 60 miles it pursues its tortuous way along the top of mountain ridges, until gaining an elevation of 3758 feet. Near the Clarence tunnel, on both sides of the line, is a vast expanse of mountain scenery, covered with forest timber, presenting a view indescribably wild and grand. The route which the railway takes is the only passable track over the mountains, the sides of which are covered with many varieties of the Eucalyptus (gum-tree), besides a profusion of flowering shrubs. Having now reached the zigzag, by which the line is taken along the face of a precipitous cliff, we descend into the Lithgow Valley. This zigzag is the greatest achievement of railway engineering in Australia, and it challenges admiration for its handsome appearance, as well as for the stupendous character of the undertaking. This portion of the line, over which we had travelled, cost in construction from 20,000*l.* to 25,000*l.* per mile. After an extensive survey, this

point was fixed upon as the least difficult for making the descent, but so rugged was the place then that those engaged upon the survey of the land had to be lowered down the cliffs with ropes, to enable them to measure and peg out the line. Two or three gorges on the route are spanned by viaducts built of white freestone, and one projecting rock is pierced by a tunnel. It was altogether a most enjoyable trip, and after spending a short time in the vale, which is over ninety miles from Sydney, we retraced our way to Mount Victoria, where a most excellent lunch had been prepared. Ample justice was done to the good things provided, and after a few speeches the train was once more in motion, and we were speeding on towards Sydney, where we arrived at 7.30 P.M.

The town is of itself both pleasant and interesting. The ground on which it is built undulates considerably, giving it a most picturesque effect, although perhaps interfering somewhat with the appearance of regularity; in the business part of the city are George Street and Pitt Street, the shop-windows of which would remind one of London or Liverpool, were it not for the verandahs which stretch across the pathway in front of each house. The other streets are all named after the old governors — such as Macquarie, King, Blyth, Hunter, and Philip. Amongst these, Macquarie Street is the most important, containing the Houses of Parliament, the Treasury Buildings, the entrance to Government

House, the residence of the Naval Commodore, the Mint, and the old Hospital ; but none of these buildings present any features in design worthy of attention, being all of old date ; the buildings, however, erected within the last ten or fifteen years have really some architectural pretensions. Its fine banking-houses, mercantile establishments, and handsome public edifices give the town an aspect bespeaking substantial wealth, advancing cultivation, and enterprise. The portion near to the quays contains many of the best buildings for commercial purposes. The majority of the banks are on the west side of George Street, and these, with the extensive blocks of spacious and handsome warehouses in their neighbourhood, give a distinctive character to that section of the city. In Pitt Street are three more banks ; and here is situated the Exchange, a large stone-built erection, with columned front of the Corinthian order. The new Post Office, in the centre of the city, now on the eve of completion, is a building of exquisite proportion, noble in its general outline and sumptuous in detail. It occupies a space between George Street and Pitt Street. Another great building in course of erection is the Town Hall, the foundation-stone of which was laid by Prince Alfred when here in the *Galatea*. The Museum, on the eastern side of the city, is a massive building, with a bold Roman front. But the finest specimen of architecture Sydney displays is the University, a noble stone building in

the Perpendicular style, extending some 400 feet in length, situated on the top of a neighbouring eminence, forming a conspicuous and handsome feature in the Sydney landscape. The principal courts of justice are in King Street and at Darlinghurst. The first-mentioned, where the civil business is transacted, is a large rectangular building of brickwork, with arcaded front, decorated with Doric architecture. The Court-house at Darlinghurst, for criminal trials, is a fine stone building of the Doric order. In the rear is the gaol, occupying a large area, and built with spacious wards radiating from the centre. The private buildings or residences in the neighbourhood of Sydney are of a superior character, and are generally in the vicinity of beautiful recreation grounds. The fashionable quarter, *par excellence*, is the east end of the city, the suburban localities stretching thence along the shore. Here are most of those splendid mansions of which glimpses are caught from the harbour, which they overlook; while to the south rises the important town of Woolloomoolloo, which has become almost as large as Sydney, and much more fashionable. Beyond this we reach Elizabeth Bay and Rose Bay, Double Bay and Rush Cutter's Bay, where cluster various villa residences of the wealthy families. Look where one will from the city to Darling Point, and even farther along the coast, there are more fine houses, many of which have been erected at great

cost, and which for extent, tastefulness of internal decoration, and beauty of their grounds and gardens, are perhaps unequalled by any private residences on this side of the Equator. Notably I might mention those of Mrs. Carfra (Double Bay), J. Jackson, Esq. (Darling Point), Hon. T. Holt (The Warren, Cook's River), &c., each of which I had the pleasure of visiting. Of churches, &c., I believe there are upwards of one hundred and twenty in the city and suburbs, all more or less of imposing architectural pretensions. The cathedral church of St. Andrew, in George Street, is a Gothic building, occupying a fine site in the most elevated part of the district, but it is comparatively small in dimensions, being 160 feet long by 62 feet in breadth. The Roman Catholic community are building a large Gothic cathedral on the site of one that was burnt down a few years ago.

The Public Gardens, where I spent many pleasant hours, deserve more than a passing mention. They appear to be singularly aided by nature for charming scenes, which have been most cleverly taken advantage of to augment the effect of art. The delightful results are probably heightened by the beautiful views afforded over cliffs, from under branching palms, out of long avenues of stately trees, of the bright blue sea glistening in the sun. Beyond this rises the rocky tree-covered north shore, with villas peeping out here and there, in strong contrast to

the dark hulls of the *Pearl*, *Challenger*, *Dido*, and other vessels snugly moored in Farm Cove. Passing through the Gardens, we emerge into the Domain, a charming expanse of park-land of 138 acres, of which Sydney has indeed cause to be proud. Every variety requisite to produce picturesque views is here obtained. The landscape effect, through the disposition of the groups and avenues of trees, makes it a most charming promenade. Near the main entrance as we leave is an excellent bronze statue of Sir Richard Bourke, erected a few years ago. Facing this is the Public Library. We are again in Macquarie Street, through which we pass, and continuing our walk a short distance farther, we are at the entrance to Hyde Park, where is a bronze statue erected in memory of the late Prince Consort. This park is a beautiful plateau of 40 acres, and as it is nearly in the centre of the city, is a favourite resort of the citizens. It has a fine avenue half a mile long, and is nearly surrounded by plantations and clumps of trees, affording a grateful and pleasant shade. On the south-eastern side a monument to Captain Cook is being erected in a position which commands a splendid view down the harbour.

More recently formed reserves are Prince Alfred Park, in which stands the Exhibition Building, erected in 1870 for the Inter-Colonial Exhibition held that year, which was the centenary anniversary of the

discovery of the eastern coast of Australia by Captain Cook; so it was a festal time for the colony; and the result of the exposition of Australian industry was a thorough success. Every year the Agricultural Society hold their exhibitions here; and in this building the Society gave their annual ball, at which many of the "Challengers" had the pleasure of attending, as also those given by the officers of H.M.S. *Pearl* and the Hon. John Campbell.

Belmore Park and a tract of 500 acres of land on the south-east side named Moore Park are the other recently formed reserves.

I must not omit to mention the Masonic Hall, as it was here the *Challenger's* ball was given, proving a thorough success, and giving the greatest satisfaction to our large company. * * *

Before closing my sketch of Sydney, I must return once more to the beauties of Farm Cove, and the pleasant times spent there. * * *

Beyond our anchorage the harbour wanders indefinitely into all sorts and sizes of pretty bays and arms of the sea, the longest being that which finally ends in the Paramatta River, up which small steam-boats run hourly. The scenery on its shores is very charming; passing rugged islands and cliffs and rocky tree-covered shores, dotted here and there with pretty villa residences. It was on its banks that I spent some of the most pleasing of my days in the colony. At about seven miles' run is situated "Rhodes,"

the residence of Mrs. T. Walker and family, who, one and all, for kindness and hospitality, stand unrivalled. Theirs is a charming villa, surrounded with lovely gardens, orangeries, and pretty walks, overlooking the bright and picturesque river. It seems impossible to describe the scenery as it should be. Many talented writers have written of this place and that as beautiful or grand, and by their descriptions have induced great numbers to visit the scenes so praised; but as I possess no such power, the task would be hopeless, were I even to attempt it, or try to make others understand the nature of the beauty of this place.

A few miles farther on the river is another charming retreat, "Yarralla," the seat of T. Walker, Esq., a mansion replete with every luxury, having extensive grounds to match, all laid out with great care, where the varied and beautiful combination of trees, shrubs, and flowers peculiar to all climates makes the picture one of perfection. During my stay amidst such lovely scenes, I could not fail to enjoy the treat; and I deeply regretted it could not be of longer duration, for the end of May had arrived, and our time in Australia was drawing to a close, when those ties of friendship would be severed. Still, although time and distance may separate, there is a certain amount of satisfaction in looking back on the days spent here with feelings of pleasure; and I cannot refrain from saying, both of Sydney and Mel-

bourne, that as regards those with whom I was on terms of friendship, their goodness, cordiality, and noble generosity, combined with that hospitality which makes a friend's house one's home can never be forgotten. * * *

We had now been here (at Sydney) some sixty days; and before finally leaving it was decided to give a dredging picnic. This was to have a number of friends on board, and take them out into deep water, so as to let them see some of the mysteries of dredging and sounding.

The day decided on arrived, and a large party, chiefly consisting of gentlemen more or less interested in scientific pursuits and maritime affairs availed themselves of the opportunity of having a cruise. On passing through the Heads and getting into deep water away from the land, we steered for a short distance east, and then for a while E.S.E. The ship's head was then turned in a northerly direction towards Broken Bay, and when about four miles distant, soundings were taken in 40 fathoms, and specimens of water brought up from various depths. The dredge was lowered, and on being drawn up, little or nothing appeared to have been secured; but small as the first haul was, it encouraged other attempts being made, and a move was made farther from the land, when several hauls of dredge and trawl were again taken, with satisfactory results.

Many of the specimens of marine zoology were vastly interesting, and in some cases quite new.

On each occasion as the trawl appeared above the surface of the water the interest of our visitors was very great; the silent eagerness of the experienced naturalist and the feverish exultation of the amateur conchologist as they pounced upon the newly discovered specimens formed quite a lively scene, in which the opinions of those learned in such matters were often very amusingly expressed.

After mid-day we steamed in towards Long Bay, where a dredge was lost through getting entangled amongst the rocks, and another shared the same fate soon after between Coogee Bay and Bondi, the ground here being very unsuitable for our operations; still, other trials were made, and altogether the results were considered very satisfactory. On its conclusion we returned to the anchorage, and took in moorings off Fort Dennison, at the entrance to the Circular Quay, all our visitors, before leaving, expressing that they had spent a most delightful and pleasant day.

A farewell party was afterwards given to our lady friends, at which there was dancing and other pleasures suitable to the occasion in the society of those it had been our good fortune during the past two months to have met frequently at similar entertainments on shore.

It passed off well, and gave great satisfaction to

all concerned, every one regretting that we were so soon to part.

June 7th.—We leave to-morrow, and I feel assured no one can visit here without being at once struck with the singular beauty of the harbour and the surrounding scenery; and I shall not easily forget the feeling of regret with which my mind dwelt on the thoughts that I was bidding it a long, long farewell.

It was a lovely evening; not a single breath disturbed the glassy surface of the silent water; and yet how eloquently that silence spoke to the heart! And as I leant over the vessel's side, filled with all those nameless feelings which such an hour is so well fitted to call forth, I felt, notwithstanding all the temptations of promised adventure, the full bitterness of the price we have to pay for its excitements.

That we had been great favourites, and had made many friends during our stay, was very evident, and there can be no doubt that the *Challenger's* visit will long remain in the recollection of our Australian cousins.

It is worth remarking that the traveller, on reaching these shores, should remember it was here at Sydney where our Australian Empire was commenced, amidst dangers and difficulties of which those in England at the present time think very little.

Captain Cook landed in Botany Bay, which is a few miles south of Sydney Harbour, in 1770, and took possession of the land on behalf of the British Crown.* But Captain Cook was by no means the first to find Australia, for some hundred of years before this a Portuguese navigator is said to have landed. After this the Dutch appear to have seen a great deal of not only the coast, but the various islands, which were then named Terra Australis. Indeed, they did so much, and were so energetic in their voyages, that they were quite justified in calling the continent New Holland.

It seems now to us very strange that a people so enterprising, and at that time so prone to get and to keep territory, should have lost their hold on this great Terra Australis.

It appears that they defeated their own object by their own secrecy and selfishness. They published no records of their voyages, neither made any charts of the newly discovered continent, fearing that their discoveries, or these great possessions, should become too well known to other explorers. Consequently, even amongst themselves the doings of their sailors were unknown and unappreciated, and no national desire was created for the possession of the land.

It seems a Frenchman was the next who anchored off Cape Leewin—the south-eastern corner of the

* Trollope's 'Australia and New Zealand.'

continent; this was in 1640. After this some forty years elapsed, when William Dampier landed on the western coast, and was, as far as we know, the first Englishman to put his foot on the soil of our great dependency. For nearly a century now, it seems, English, French, and Dutch, with intermittent energies, endeavoured to become masters of New Holland. It was not until some seventeen years after Cook had really taken possession (in 1787) that Commodore Phillips, the first Australian governor, was despatched from England with the view of forming a penal settlement at Botany Bay; but soon after his arrival he found that locality altogether unfitted for the purpose. Then he sailed northward, entered Port Jackson (as he first called it), and created the colony of New South Wales, from whence have sprung all our Australian colonies.

This (June 8th) might be said to have brought our visit to a close. Unfortunately, it was a rough and boisterous morning; so the plan that had been in contemplation by some of our friends to accompany the vessel outside the Heads was frustrated. Instead, however, of their presence on board, the white signals of waving handkerchiefs from the shore showed that they were near at hand, and, with all their good wishes, about 11 A.M. we steamed out from the anchorage, receiving quite an ovation on passing the *Pearl* and *Dido*, by the ships' companies manning the rigging and cheering heartily,

while the bands were playing appropriate and inspiring airs.

The weather had moderated as we reached the mid-channel, passing round Fort Dennison, Bradley, and through the Heads.

On clearing the harbour we found a rough and troubled sea; so in sight of the land we rolled about most unpleasantly all night.

June 9th.—A gale of wind and heavy and rolling seas prevented any sounding or dredging being undertaken; and, as the day advanced, it was found necessary to return to port once more, anchoring within Sydney Heads, in Watson's Bay; remaining here until the weather moderated, which was not until the 12th, when a second attempt was made. Immediately on getting well clear of the land, soundings were commenced, and bottom was found at 85 fathoms. Eight or ten miles farther it was found to deepen to 120 fathoms; about the same distance, again, it had deepened to 290 fathoms. The next day's soundings indicated 1200 fathoms, the bottom showing sand and mud. Course was now altered nearer the shore until in a depth of 400 fathoms, when dredging operations recommenced, but nothing of any importance was obtained.

A heavy gale now sprung up, and we got into deeper water, the next sounding giving 2100 fathoms, with a bottom of mud. In this rough and tempestuous weather the following day observations were

again resumed, and showed a depth of 2550 fathoms; and the next, 2600 fathoms; the temperature at this depth being 33° , and at the surface 64° .

From this date the soundings commenced getting less, showing 1975 fathoms. A day or two after this it was 1100 fathoms; the temperature rising to 36° . These indications of shallower water were not without cause, for now unexpectedly we came into 400, 300, and at last only 275 fathoms. This was about 200 miles from the land. The question of the nature of the bottom at this part, where the land was being neared, was especially interesting and important. Results showing that the bottom was of a hard, stony kind, probably rock, which became more marked the nearer we got to the shore; while the temperature had now risen to 38° , giving additional evidence of a decrease in the depth of the water.

Placed in the very track of storms, and open to the sweep of seas from every quarter, exposed to waves that run from pole to pole, the shores of New Zealand are famed for surf and swell, and so we had found it up to the time that Cape Farewell was sighted, when the wind freshened considerably and increased in force, blowing violently from the south-east, with a very heavy sea, and it was decided to take shelter in Port Hardy (an inlet in the north of D'Urville Island); and none too soon, only just in time to escape the fury of the gale, which lasted

all the next day, compelling us to remain until it had moderated, when another attempt was made; but after accomplishing about twenty miles (in eight hours), the gale still blowing furiously, it was found necessary to again seek shelter—this time under Long Island, in Queen Charlotte's Sound, where we anchored for the night. At daylight next morning we made a successful run across Cook's Straits, and, fortunately, having a strong tide in our favour, it enabled us to beat up under steam and sail. When about ten miles off the anchorage, we were visited with an unlooked-for calamity. Edward Winton, A.B., who was standing in the forechains heaving the lead, was washed overboard by the heavy sea. He was not missed for some minutes, when the engines were stopped and the vessel immediately rounded to, but no trace of him could be seen; he must have gone down at once in the turbulent sea running at the time. The gloom which the loss of one of our small party occasioned was felt by every one on board. On nearing port, we were glad to escape the long rolling seas that seemed to surge up from the Antarctic. Our observation showed that not only was the intervening ocean we had just passed over wild and stormy, but that New Zealand invariably presents a rough and rugged coast, backed by towering mountains, with frightful chasms and tremendous cliffs surrounding them on every side. Experiencing such unfavourable weather, it prevented much use of

the dredge; still the few hauls obtained, although producing many interesting and rare specimens, indicated that the bottom in this locality is, for some reason, more scantily supplied with animal life than many other more favoured regions.

On the 28th June we sighted the Heads with their frowning cliffs, where the bold bluff, coming sheer down 3000 feet, receives the full shock of the South Seas. This was an introduction to the wild and grand scenery of New Zealand. Our troubles were over for a while, for within a few hours we were in smooth water, running up the great sea-lake of Port Nicholson towards long lines of vessels lying at the Queen's Wharf, behind which stretched away the houses, &c., comprising the City of Wellington: off here we came to anchor.





NATIVES OF TONGATABU, FRIENDLY ISLANDS.

CHAPTER VIII.

WELLINGTON (NEW ZEALAND) TO FRIENDLY AND FIJI ISLANDS, TO THE NEW HEBRIDES GROUP, AND TO SOMERSET, CAPE YORK (QUEENSLAND, AUSTRALIA).

At Wellington—Results of the soundings—Formation of the bottom—Description of the city—Australia and New Zealand—Leave Wellington—Squally weather—Sight the Kermadec Islands—Sounding and trawling—The Friendly Islands—Eoa—Tongatabu—Anchor off Nukalofa—Tonga—The village: its natives—Tapa: its manufacture—Captain Croker's attack on Bea, and the result—Foliage and scenery—Leave Tongatabu—Passage to Fiji—Off Matuki—Anchor in Ngola Bay, Kandavu—Kandavu to Levuka—Anchor off Levuka—Return to Kandavu—Natives of the New Hebrides

on board for passage to Api—Survey Ngola Bay—The scenery—Tattooing—Meke Meke—Leave Fiji for the New Hebrides—Off Api—The natives land—The landing, and what was seen—Sounding and dredging—On our way again—In the Coral Sea—Off the Louisiade Archipelago—Raine Island—The Barrier Reefs—Anchor off Bird Island—Arrive at Somerset, Cape York, Queensland.

THE special object of our visit was to ascertain the oceanic section between Sydney and Wellington. The information obtained removes the last elements of uncertainty in the matter of submarine telegraphy between Australia and New Zealand, for during some time past the governments of the respective colonies have been negotiating on this subject. The soundings show that the depths increase gradually after leaving Sydney, but that the extreme deepness does not vary much for some hundreds of miles in mid-ocean, the water again decreasing as the coast of New Zealand is approached. For the greater part of the way across, the bottom was found to be very favourable for the repose of a light cable, it being composed of mud and sand. It is only when the shores of this coast are nearly reached that the bottom becomes of a somewhat doubtful character; a stronger cable will therefore be required for the shore end. In all probability, now that these correct data have been ascertained, we shall find very shortly that New Zealand, like the Australian colonies, will be in instantaneous communication with Europe and America.

Wellington, which since 1864 has been the capital

of New Zealand, the residence of the Governor (Sir James Ferguson), and seat of the Legislative Assembly, is but a small straggling city containing between 8000 and 9000 inhabitants. It is built almost exclusively of wood, the use of which has been found necessary, from the frequency of earthquakes. The position it occupies—lying high up in a bay—gives it a somewhat pretty appearance, surrounded as it is by mountainous land. To us, just coming from Sydney with all its gaieties, Wellington seemed a poor, dull place, especially at this season of the year. Possibly it brightens up a little when the Legislative Assembly is sitting. Auckland was the capital from 1840 to the date when this was chosen, which was not on account of its commercial prosperity, but because it was more centrally situated for political purposes. Had the weather been fine during our stay, there were several interesting spots round Wellington that might have been visited; for within two or three miles are the remains of an old forest; while up the valley of the Hutt is still a Maori village, to which a line of railway runs; and the Horokiwi valley, a beautiful glen 40 miles out of town, is well worth seeing. Near at hand are the Botanical Gardens, neatly laid out, and possessing great advantages in the position of the land and the shapes of the surrounding hills.

Perhaps no two countries in the world, within such a short distance of each other, are so wholly dis-

tinct as Australia and New Zealand. Here the natives are Polynesian, similar to most of those found in the South Sea Islands, while Australia's aborigines are of the negro type. The scenery and climate also are equally distinct. New Zealand is of volcanic origin: hence high mountainous cliffs surround it on almost every side; a chain of mountains runs through the length of both islands from north to south; hot springs abound, often close to glaciers and eternal snows; earthquakes are common, and active volcanoes are not unknown. The climate is damp and stormy, and the land is covered with tangled masses of jungle and tree-fern. In addition to all this, even the very fossils are dissimilar, as are the fauna and flora. Australia (South and West) possesses a semi-tropical climate, for there is as great a variety between Sydney and the inland towns as between the midland counties of England and the moors of Scotland. Although tropical plants grow in the gardens of Sydney, a short run by rail is sufficient to reach a climate where British fruits, flowers, and grasses are cultivated with great success.

Here we remained, in this proverbially wet port, for ten days, and at length left somewhat suddenly on the afternoon of the 6th July, although it was blowing very fiercely from the north-west at the time. We had hardly cleared the Heads of Port Nicholson when a dense fog, accompanied with heavy rain, set

in, causing us to let go the anchor in Worser Bay, where we remained for the night.

The next morning the weather had moderated sufficiently for us to make a start. On getting through Cook's Straits, we made sail, and did a little sounding and dredging, but after a few days out, a gale drove us fast to the northward, and so prevented our completing the section, which had been so much desired; as the similarity of the flora of New Zealand to that of its neighbouring lands indicates that they were at one time joined, and that New Zealand was part of a large continent embracing the islands to the south and east of it, and also the Kermadec group and Norfolk and Lord Howe's Islands, near the Australian shore. If the weather had been favourable, a few soundings would have helped to settle this interesting question.

On the 13th we passed within a short distance of a dangerous reef, indicated as Esperanza Rock, and at daylight the next morning land was seen, and proved to be the islands comprising the Kermadec group. They were first reported by Admiral d'Entrecasteaux, who saw them on March 15, 1793. This cluster of rocky islets, from their hidden reefs, &c., is to be avoided rather than approached. The largest, Sunday Island, is not more than 12 miles in circumference: its highest point is 1627 feet above the level of the sea, presenting a rugged and steep appearance. Until recently an American family was

living here, earning a very precarious livelihood by supplying the whalers which happened to call with poultry and vegetables, but the frequency of earthquakes, and a sudden eruption of the volcano, forced them to abandon it. At present it is understood that no one is living on the island. The others, named Curtis and Macaulay, are not more than 800 feet above the sea, and only from one to three miles in extent. We dredged here with great success from a depth of 700 fathoms, the rich ground yielding some very fine sponges, pentacrinus, asterias, and other stalked starfish, and many varieties of deep-sea fish, and other things of interest. The weather continued of a very squally character. On the 17th we sounded, and somewhat unexpectedly came on a depth of 2850 fathoms, the deepest water found since leaving the Atlantic. The bottom was composed of red clay, without the least trace of carbonate of lime, which is usually found in deep water. At daylight on the 19th land was in sight, and as we proceeded, we were soon almost surrounded with islands and small rocks, some only giving indication of their position by the surf breaking over them: many are not more than 30 or 40 feet above the surface, but in most cases are covered with dense vegetation. Eoa Island was passed at 11, and by noon we came to anchor off Tongatabu, the principal island in the Friendly group.

We were soon surrounded with canoes and natives, who were indeed fine fellows, of a light brown complexion. These people have been described as the flower of the Polynesian race, and those alongside seemed worthy of the title.

Only a short stay was made at this interesting group of the Western Pacific, as it was necessary to get on our way, so as to meet the favourable monsoons in the Chinese seas. But, short as it was, every opportunity was taken of seeing the surrounding country.

The town of Nukalofa, off which we anchored, is prettily situated in a bread-fruit and cocoa-nut grove, which gives it a pleasing shady appearance, and yet is sufficiently open to admit the cool refreshing breezes of the trade-wind. Facing the sea are the government offices, the residence of the king, the governor, &c., while the native houses are prettily situated in a valley at the back. The houses are lightly constructed of bamboo and palm leaves, and are, for the most part, surrounded with little inclosures, shut in by fences made of cocoa-nut fibre and leaves, shaded by bread-fruit and other varieties of tropical trees of luxuriant foliage.

We had frequent opportunities of seeing the king, who, since embracing Christianity, has taken the name of George Tabu; he and his queen, Charlotte, expressed a wish during our stay to have their portraits taken. This was attended to, and for the

occasion their Majesties were got up in regal attire : George I., in naval uniform coat, with four gold lace stripes surmounted with a crown, and laced trousers ; while Queen Charlotte was attired in a light muslin costume of European make.

His Majesty is a tall, hale old gentleman, at least eighty years of age, who doubtless during his early days saw much fighting, and was probably mixed up with most stirring affairs in his native land ; for, in a conversation with his secretary, or Prime Minister (who is an American gentleman), we were informed that during his younger days he had the reputation of being a distinguished warrior. But since embracing Christianity, he has continued to devote himself to the business of State and the improvement of his subjects.

The Tongans have by some travellers been styled the Anglo-Saxons of the South Seas. They are a fine race, tall, robust, and of a lighter complexion than the inhabitants of the adjacent isles ; they have little or no beard, their noses are somewhat flat with wide nostrils, yet many of the men and women might pass for handsome types. The women follow the fashion of the men, cutting their hair very short, and staining it with chinam, which gives it a reddish tinge.

The dress of both sexes is made of similar material, but is differently arranged. The fabric (*tapa*) is made from the bark of a tree extensively cultivated through-

out the islands, and is beaten out with a wooden mallet about a foot long and two or three inches thick. The bark is at first soaked for a couple of days in water, and is usually so prepared in strips of from 2 to 3 feet in length, and from 1 to 3 inches in width; it is then laid on a beam about 10 feet long, and about 1 foot in breadth and thickness, supported at each end, a few inches from the ground, on a couple of stones, so as to allow a certain amount of vibration. Two or three women generally sit at the same work: each places her strip of bark transversely on the beam, and while beating with her right hand, with her left she moves it to and fro, so that every part becomes alike. The grooved sides of the mallet are used first, the finishing touches being given with the smooth side. In the course of half an hour it is brought to a sufficient degree of thinness. Piece after piece is thus made, and eventually stuck together. Many I saw were from 40 to 50 yards long by 20 wide. It is then printed on with a dye obtained by scraping the soft bark of the cocoa-tree, or the tooi-tooï-tree, which gives, on being pressed, a reddish-brown liquid. The stamps used are made in various devices for ornamenting the native cloth. While they are at work, a very pleasing effect is produced, when the air is calm, by the beating of the tapa: some sound near at hand, others in the distance, but all with singular regularity, the whole producing a remarkable and agreeable sound.

The wearing of this native cloth, and, consequently, the manufacture of it, are ordered to be discontinued in three years' time, after which period calico is to be worn. This mandate has been given in the hope of developing the cultivation of cotton, and by so doing enriching the islands; but probably it will be difficult to induce the natives to give up their old usages and customs.

Before leaving I had an opportunity of visiting the native church, which is prettily situated on the top of the highest hill. It is a neat-looking building, consisting of a nave and two aisles: the frame-work of the roof is cocoa-nut tree, supported on columns of hard wood, and thatched with palm leaves. About a dozen windows on each side light the building. Benches are provided to seat about eight hundred. There is a fine pulpit, and a good-sized organ, which was well played by one of the natives. The sermon was preached by a Tongan, and the singing was very good.

Public schools are giving most satisfactory results, and a large proportion of the rising generation can both read and write.

Near the church door is a monumental stone, which has recently been erected to the memory of Captain Croker, R.N., of H.M.S. *Favourite*, who was killed by the natives in an attack on Bea, in June 1840. Its history, as told in the school-books here, is that "the natives of Bea continuing their

heathen practices, and resisting all the efforts of the missionaries to change their evil ways, the king, who was a zealous convert about this time, sought the assistance of the captain of an English man-of-war then in port to chastise these idolaters, and so help convert them by the aid of the sword." Captain Croker landed; taking two field-pieces with him and a number of blue-jackets and marines. The village is about five miles from the anchorage, and it seems that on their arrival they found that the natives had fortified it with an earth embankment. The assault was led by Captain Croker, it is said, with sword in one hand and Bible in the other. However, very early in the engagement, he received a mortal wound from an arrow, several of his followers were killed or wounded, and the cannon captured; the English retreating, without at all assisting the mission. The old king remembers all this, and has caused the monument to be erected.

These islands are all of coral formation, and surrounded with extensive reefs extending away to the northward. The luxuriance of the foliage is not surpassed anywhere within the Tropics. Although but little attention seems to be given to cultivation, yams, sweet potato, banana, cocoa-nut, bread-fruit, sugar-cane, shaddock, and limes are produced plentifully, and find a ready sale with whale-ships and other vessels visiting the port.

On the 22nd July we got under weigh, and, passing without the reefs, stood away to the westward. It was blowing somewhat squally, and in the darkness of the night it was by no means pleasant running over unknown and uncertain ground.

At daylight on the 24th we found ourselves in the midst of a number of beautiful islands all girt with white circling reefs. Each island had its own peculiar beauty, covered as it was with luxuriant vegetation. About mid-day we stopped off Matuki, which is one of the southernmost of the Fiji group. A large party landed with rifles, and got excellent sport in the forests, while the vessel cruised backwards and forwards dredging, and some excellent hauls were made. Among other things a fine nautilus was brought to the surface, and the opportunity was thus given of seeing this beautiful creature alive in its native element. The old popular idea that this animal lived on the surface, and floated along, using its shell as a boat while it was being propelled by its own sails and oars, is altogether fabulous, for it is now proved that the creature lives at or near the bottom, using its shell, with the curved side uppermost, as a protection, and that it never comes to the surface except after death. When the exploring party returned, we again proceeded on our way, and on the following day arrived (July 25th) at Kandavu. After a couple of days here, we left for Levuka, a run of 120 miles, amongst most

charming scenery, numbers of islands being scattered about, each possessing some peculiar charm. But the eye, as well as the mind, felt greater satisfaction as we approached the Island of Ovalau, which, on nearing, had more the appearances of civilisation about it than the others. It is also the highest, most broken, and most picturesque. On the 28th, we were off the harbour, which is surrounded with detached coral reefs, over which the surf was breaking in white foam : passing through an opening only 800 or 900 feet wide, we reached the anchorage, with its shallow, clear, and still water, affording as great a contrast as possible to the dark turbulent waves outside. The town is much larger than one would at first imagine : a row of stores, hotels, &c., occupies a position fronting the beach, while many of the better class of residences are situated on the side of the hill. In various directions beautiful walks stretch away through peaceful valleys, surrounded with dense groves of bread-fruit and cocoa-nut trees.

Nature seems to have been very bountiful in distributing her vegetable treasures to these islands, and annexation by the English Government seems to be the one great thing to be desired,* for colonial produce, properly so called, such as sugar, coffee, tamarinds, tobacco, and cotton, &c., may be expected in considerable quantities as soon as the settlers

* Since this was written, it has become a British colony.

have had time to devote attention to their cultivation.

This archipelago is one of the largest and most beautiful in the Pacific Ocean, lying due north of New Zealand, and to the east of New Guinea. We owe its discovery to Tasman, who sighted the group on the 6th February 1643. Some additional interest is just now attached to these islands from the desire of the chiefs to cede the sovereignty to Great Britain. The inducements and reasons offered in support of their cession are—their importance to commerce, which would be developed in the archipelago, their rich production, the growth of cotton, and the opportunity for the formation of a naval depot and port of call for the trans-oceanic mail service between San Francisco and Australia.

From Levuka we returned to Kandavu, and here remained sufficiently long to make a survey of the anchorage (Ngola Bay). As yet it cannot boast of the pretension of even a village. A few houses are scattered along the beach, which probably before long will assume a more important aspect. Kandavu is the south-westernmost of the Fiji Islands, and, except around its highest mountains, cultivation or its traces can be seen in all directions. It is about 25 miles long, and throughout its whole length is high and precipitous. The island is well covered with timber resembling the New Zealand kauri pine, and most of the large canoes used amongst

the islands are built here. The harbour is well protected by a reef, through which are several passages. Very little appears to be known of the coast, so an accurate survey is much needed, and on this we were partially engaged during our stay.

A walk in the interior was very enjoyable, although requiring great exertion from the rough roads: the pedestrian having here, perhaps, to toil up an almost perpendicular rise of 15 or 20 feet, then to cross a narrow ridge, followed by a descent into a deep valley, all clothed with tangled vines and shrubs. Walking was occasionally all the more awkward from the number of roots and the slippery mud; again, rivulets were met with, from which water continually bubbled across our path, and hurried headlong down the ravine. The scene that presented itself was truly beautiful; the picturesque valleys of the adjacent islands lay in full view beneath, exhibiting here and there spots of cultivated ground, with groves of cocoa-nut and bread-fruit trees; while in all directions were native houses, perched on apparently inaccessible cliffs overlooking small domains, and the several peaks rising in sight all cut and broken in the most grotesque manner: in the distance the various islands in the group, and the fantastic needle-shaped peak of Vanua Levu were distinctly to be seen. The detached reefs could be traced for miles by the water breaking over them, until they were lost

in the haze. I called on my way at many of the natives' houses, and was always received with marked hospitality. In one place the inmates had recently had their hair dressed for some coming festival; it had been washed in lime-water, so as to make it frizzed, and then dyed in various colours and arranged in different ways. Several days must have been spent in getting these extraordinary head-dresses into shape; and for fear of again disarranging them they are content to sleep on a pillow made of a length of bamboo, on two short cross-legs, so constructed that no European could rest his head for five minutes without suffering dreadful pain.

It is all very well to talk about the ease of living in a state of nature, but the inconveniences to which savages put themselves in order to gratify their vanity are quite as great as, if not greater than, those forced upon us by the fashions and dictates of our society. Think of the agonies of tattooing. What would the natives give to escape them, if society would let them? But the stern laws of fashion, even here, allow of no exception. The practice seems to be confined to the women, the operation being performed by members of their own sex, and applied solely to the corners of the mouth, and to those parts of the body covered by the scanty clothing. The process is generally tedious and painful. The skin is punctured by an instrument made of bone, or by the

spines of the shaddock-tree; whilst the dye injected into the punctures is obtained chiefly from the candle-nut. No reason is given for the adoption of this custom beyond its being commanded by God. Neglect of this divine commandment is believed to be severely punished after death.

The walk back to the shore, although another route was chosen, was just as rough as the one taken in the morning. At times we had to climb nearly perpendicular rocks, to creep under low bowers formed of reeds and brushwood, to wade through streams and rivulets, or tramp over swampy ground, the whole being very tiring. Clothes were torn by brambles, and hands and face were cut by sharp-edged leaves of shrubs and grasses.

On reaching the settlement, we found that great preparations were in progress for giving us a grand Meke Meke at night in honour of our visit. After dinner a party was made up, and about eight o'clock we landed and were received by the Governor of Kandavu and some of his officials. There were about two or three hundred of the natives assembled, dressed out in their best finery; their faces hideously painted black, their bodies bright with red and blue paint, and pretty well besmeared with cocoa-nut oil. The greater part of the men, and women too, wore only the *sulu*, with strips of *tapa*, or dried banana-leaves, dyed in different colours, hung round their

loins, or suspended across their shoulders like scarves; others were similarly decorated with the green leaves of a strongly scented weed and dried grass. At a given signal all were in readiness, armed with clubs, spears, and battle-axes, which were fantastically decorated with coloured paint; while from their large war-fans, of which a goodly number were displayed, floated long streamers of *tapa*, as delicate and white as the finest muslin. The music was produced by an extensive orchestra, from instruments made of hollow bamboo, which were beaten by short sticks or by striking the ground, and excellent time was kept by singing and shouting. The dancers worked themselves up to a pitch of excitement, making the most violent gesticulations, and waving their arms about frantically; and this scene, being illuminated by the fitful glare of numbers of torches, was one of a most interesting character. On its completion, all returned to the ship well pleased.

The natives are a fine race, and doubtless possess many good qualities; formerly they were pre-eminently bloodthirsty, ferocious, and cruel. Cannibalism was then indulged in to an incredible extent; and this not from mere satisfaction of revenge, but to satisfy appetite, friend, relation, or foe equally affording food to the most powerful. These degrading features, however, are rapidly passing away, under the influences of the Christianising

efforts of the missionaries, who have been engaged amongst them since 1835.

Our stay at Kandavu occupied over a week; and on finishing the survey of the harbour there was nothing further to detain us; so on the morning of 10th August steam was up, and a course shaped through the barrier of reefs encircling the island. When clear, the vessel was swung for magnetic and azimuth corrections; after which she proceeded for the islands of the New Hebrides, a group about 500 miles distant. The run was not marked by any particular incident, but it was in every respect pleasant and agreeable. The south-east trades wafted us well on our way, and sounding and dredging were very frequent, and showed that the Fijis and New Hebrides are joined by a bank with from 1300 to 1400 fathoms' depth of water on it. Other depths showed from 2000 to 2600 fathoms; and on nearly every occasion some new and interesting creature was brought up, thus adding more and more to the already vast collection on board.

On the evening of the 17th we sighted some of the eastern islands of the New Hebrides, passing very near to Mai or Three Hill Islands, and a small cluster known as the Shepherd group.

The next day we were off the island of Api, where it was intended to land; for before leaving Fiji, a number of labour hands, who had com-

pleted their engagements, were embarked for passage to their homes on this island, which was reported to be one of the most savage of the group. While they were on board, they were quiet and tractable, and relished their allowance of provisions greatly. Boats left the ship, taking all those desirous of visiting the shore, and some of the natives with them, as an introduction. As the land was approached, a tolerably fine beach was observed, backed with mountainous land covered with luxuriant vegetation. Our passengers were much alarmed at the idea of not being able to land exactly at their own part of the island, and it was with great difficulty that the boats found a convenient place. When a landing was at length effected, a large number of natives hove in sight: amongst them were two bearing palm-branches, supposed to indicate their friendly intentions, but the rest of the crowd had clubs, spears, bows, and arrows. They had none of their women or children with them, and that is not usually a good sign. The natives are very dark, almost approaching to black, and are considered as belonging to the Papuan race. They are described as hostile and treacherous in all their intercourse with the white man; therefore, although their manners seemed favourable, they were not to be trusted, and it was not considered advisable to ramble beyond the beach, or out of sight of the boats and the armed crew. In consequence, none of the villages or houses

were seen. The missionaries report the islanders as being amongst the worst they have to deal with in the South Pacific; those who have been labouring amongst them during the past few years have been treacherously killed and eaten.

The remainder of the natives we had brought with us from Fiji were afterwards landed: some had been absent for three years, employed on Captain Hill's cotton-plantation at Ramby, and had received as payment some 5*l.* or 6*l.* worth of goods. Besides other things, such as calico, a looking-glass, and small trifles, were two Tower muskets, powder, shot, bullets, caps, and a bullet-mould. The hatchets and knives were of the usual useless kind, manufactured expressly for the South Sea Island trade, and which turn at the first blow. The influence of the labour men in civilising their friends must be considerable. Men who have worked side by side on the same plantation are, on their return home, unlikely to continue the hereditary quarrels, which they must recognise as the cause of the desolation of their island. They remain at home generally but a very short time; life, with plenty of good food, even when accompanied with compulsory labour, being preferable to the nearly destitute state of existence to which they have been reduced, in consequence of their family feuds having destroyed most of the plantations.

We found that nothing could be done here,

although, from the fact of this group, comparatively speaking, being but little known, an extensive and careful survey is much needed. It was considered, however, unsafe to remain long amongst such people, and on the boats returning, it was decided to proceed for Torres Straits, distant 1500 miles, and having a capital breeze after us, the land was soon out of sight. During the stay off the island frequent casts of the trawl were made in 50 fathoms, but there was nothing of interest obtained.

On the 21st we sounded in 2325 fathoms, and on the 24th in 2450 fathoms. We were now off the Louisiade Archipelago, and might fairly be said to have entered the Coral Sea—a most expressive and appropriate name for this dangerous part of the Pacific. Frequent soundings showed a depth varying from 2000 to 2500 fathoms as we proceeded on for Raine Island, which was sighted on the 30th. This coral reef is nearly a mile long and about a quarter of a mile wide, showing some 10 feet above the level of the sea. It is an important guide for making the route through Torres Straits, and a beacon was erected on it some thirty years ago. Stretching away from here in a north-west direction are the Great Barrier Reefs; which are probably the grandest and most extraordinary coralline structures existing in any part of the world. A turbulent sea is constantly rolling and causing a very heavy surf to break over the numberless islets and reefs

with which the Coral Sea is studded; and which, therefore, makes this passage very dangerous, notwithstanding all the recent surveys which have been made.

We anchored in shallow water off Raine Island, a low reef covered with scanty vegetation. On landing, sea-birds were found to exist in vast numbers, rising and hovering above us in clouds thick enough to darken the air. Each description appeared to keep its own selected breeding-place, the nests being on the bare sandy ground, with little or no attempt at building, except on the part of the pretty black and white tern, which prefer to build on the low scrub, slightly raised from the ground. The next day we proceeded towards Bird Islands, where we anchored for the night. They are three low, wooded islets, situated on the margin of a circular coral reef. There were no natives seen either here or on Sir Charles Hardy Islands, which we afterwards passed. On the 1st September we arrived at Somerset, Cape York, the north-east point of Australia. The barren, sandy appearance of the coast, seen through the thick mist which, apparently, always accompanies the trade-wind, as we ran quickly past, gave anything but pleasing or hopeful first impressions; and this feeling each day's stay at this solitary outpost only served to intensify. The Colonial Government support the small settlement, and the monthly mail between the colony and

Singapore makes it a port of call; it is besides of some importance as a station for the numerous small vessels engaged in the productive and increasing pearl fishery, which is carried on in the shallow waters of Torres Straits, and gives employment to a great number of South Sea Islanders as divers and boatmen.



STREET ARCHITECTURE, DOBBO, ARRU ISLANDS.

CHAPTER IX.

CAPE YORK (AUSTRALIA) TO THE ARRU AND KII ISLANDS, TO BANDA AMBOYNA, AND TERNATE (MOLUCCA ISLANDS).

The settlement at Cape York—The aboriginal Australians—Foliage and birds—Leave Somerset—Pass through Endeavour Straits—Off Hammond Island—Ceremonies relating to the dead—Australian graves—Off Booby Island—The Post Office—Passage to the Arru Islands—Anchor off Dobbo—Visit of the Dutch officials—The settlement—Its natives—Forest scenery—Birds of paradise—Leave Dobbo—Passage to the Kii Islands—Anchor off Kii Doulan—The forests—Beautiful birds and insects—Boat-building—The village and natives—Leave the Kii Islands—Pretty scenery—The Molucca Islands—Anchor off Banda—Gunong Api—Banda Neira—Nutmeg plantations—Animals and birds found—Banda to Amboyna—At Amboyna—The city—Get a supply of coal—Chinese burial-places—The harbour—Arrival of the mail-steamer—Leave Amboyna—Cross the Equator (second time)—Pass the Islands of Bachian and Tawali—Tidore and Ternate in sight—The charming

scenery—Anchor off Ternate—The village—Club-house—Sultan's Palace—Mohammedan mosque—Visit the spice plantations—Trees and fruits—Ball at Government House.

THE half-dozen houses forming the settlement are readily seen from the anchorage; but we looked in vain for the town with its several streets, as shown on the charts. There is only one small store in the place. The remaining dwelling-houses are those left behind by the detachment of Royal Marines, when they gave up the place to the Queensland Government in 1867. One is now occupied by the agents of the London Missionary Society, as a training establishment in connection with the mission they are successfully working at Port Moresby, New Guinea. The Colonial Government have for some time been endeavouring to establish a settlement here, but the soil is found to be very poor, and the climate anything but healthy; the chances, too, of frequent skirmishes with the savage natives from the adjacent islands make it far from a desirable locality for settling. I frequently landed, and had opportunities of seeing the country in the immediate vicinity. It appears to consist of low, wooded hills, valleys, and plains of great extent; the coast line, when not consisting of rocky headlands, being either a sandy beach or swamps fringed with mangroves. On the plains, characteristic of the poor soil, the first objects to attract attention are the enormous pinnacled ant-hills of

red clay and sand scattered profusely about on each grassy slope. These singular structures, some of which were 10 or 12 feet in height, seemed of great strength and toughness: on breaking off a piece, they appeared to be honeycombed inside, the numerous galleries being then displayed. The ants themselves are of a pale brown colour, and about a quarter of an inch in length.

In my wanderings I came across some of the aborigines, houseless and homeless. They are poor wretched specimens, the lowest in the scale of humanity: their dwellings, if such they can be called, being formed by a few bushes, behind which they creep for shelter; dependent from day to day on what they can pick up for food, not even having arrived at the first and simplest form of civilisation; and, in like manner, destitute of all traces of religion, except, perhaps, a faint symptom of belief in a good and an evil spirit.

These people differ but very little from those of other parts of Australia. The septum of the nose is invariably perforated, and one of the front teeth usually knocked out. No clothing is at any time worn, and their ornaments are scanty. Their utensils are few in number, consisting merely of a few baskets made from the stems of a rush-like plant; while for drinking and cooking a large shell is used. Their weapons are clubs and spears, and throwing-sticks, with which they propel small spear-

like arrows. I spent some time amongst them, and gave them a few trifling presents, but could obtain little information; for their intellectual capacities appeared very low, and they showed but little interest or curiosity in the visits that had been paid them. Their food usually consists of a fruit resembling a large yellow plum, mealy and insipid, and a species of mangrove. At low water the women generally disperse in search of shell-fish on the mud flats, or amongst the mangrove swamps; and the men occasionally fish either with the spear or hook and line.

The dull and sombre vegetation of Australia spreads all over Cape York and the immediate adjacent islands. Wide forests of large but ragged-stemmed gum-trees, with their almost leafless and quite shadeless branches, are the principal characteristics of this vegetation; here and there are gullies with jungles of more umbrageous foliage, and a few ragged stunted palms. Across the Straits, on its northern shore, the contrast is very great, for travellers tell us not a gum-tree is to be seen, but that the woods are close and lofty, and afford the deepest and most refreshing shade, and are often matted into impenetrable thickets by creepers and undergrowth, and adorned with varied foliage, such as cocoa-nut, plantain, bamboo, and other plants, not only useful but also beautiful.

Birds were plentiful, and very interesting, and I

now saw for the first time many new species which are quite distinct from those previously met with. White and black cockatoos were abundant, and their loud screams, conspicuous colour, and pretty yellow crests rendered them a very important feature in the landscape. Besides these were white pigeons, beautiful coloured parrots and lories, thrushes, leatherheads, the gorgeous rifle bird, and some thirty or forty others. Amongst this strange lot were the mound-makers (*Megapodius Gouldii*), which are found here and in the surrounding islands. They are allied to the gallinaceous birds, but differing from them and from all others in never sitting on their eggs, which they bury in mounds of sand and rubbish, and leave to be hatched by the sun or by fermentation. Several of these birds were shot by our party, and all seemed to be characterised by very large feet and long curved claws, which probably enable them to scratch together all kinds of rubbish, dead leaves, sticks, stones, earth, rotten wood, &c., until they form a large mound, often 6 feet high and 12 feet across, in the middle of which they bury their eggs, which are of a brick-red colour, about the size of a swan's. A number of birds are supposed to join in making these mounds, and lay their eggs together; so that sometimes as many as forty or fifty are found on one mound. These nests are met with in the densest parts of the forests, and at first we were quite puzzled as to who could have gathered together these heaps of

rubbish in such out-of-the-way places ; for it would seem the wildest romance to believe that it could have been done by birds that are not much larger than the ordinary turkey.

Sept. 8th.—This morning left the anchorage, steaming through Endeavour Straits, and so had our last sight of Australia. Later in the day we hove-to off Hammond Island. Several landed, all well-armed with rifles, &c., so as to be prepared for any treachery of the natives ; but they kept out of sight, and we walked about unmolested through the woods, collecting botanical specimens and shooting the few birds that were seen. While roaming about near the beach, we saw some of the natives' graves, and were informed that they have some peculiar ceremonies relating to the disposal of their dead. After death it seems the remains are kept with the tribe until decomposition sets in, when the bones are carefully removed, painted red, and wrapped in bark ; they are then, with some ceremony, deposited in the grave, which consists of a mound of sand around which a trench is dug. A stout post is fixed upright at each of the four corners, and the sides are usually ornamented with large shells, skulls, and bones of the dugong. Evidences were not wanting here that a camp of the natives had been but recently broken up ; and as the day advanced, it was decided to return on board, for the vessel had anchored a few miles off, after having had an afternoon's dredging.

Sept. 9th.—At an early hour this morning proceeded under weigh, and after a few hours' run hove-to off Booby Island, where a party landed for shooting and to look up the post-office, a rough log shanty in which is kept a record book; for it seems to be a rule with vessels to heave-to here, after the dangers of Torres Straits are passed, and leave their names and letters to be forwarded by the first vessel. There were no letters for any of our party, but one directed to the first visitor, describing a sunken rock not laid down on the charts.

On the boats returning, we proceeded on our way for the Arru Islands. For some eight days we cruised on a north-westerly course, having frequent successful dredgings and trawlings. On the 15th, after passing a small detached coral reef, course was altered as requisite for the island we were bound to. The group extends from north to south about 100 miles. Its eastern limits, however, are but imperfectly known. The islands seem low and swampy, but, from being well-wooded, have the appearance of being much higher than they really are. On first sight, they appear as one continuous low island, but on nearing, intricate channels are found winding amongst them, through which set strong tidal currents.

Sept. 16th.—We stood along the land all night, and early on the morning of the 16th were off the entrance of Dobbo Harbour, situated between the two islands of Wamma and Wokan, and during the fore-

noon anchored off a low sandy spit. Immediately after we were visited by the Malay officials in their gay and pretty state dresses, their prahs being decorated with numerous flags, and their approach announced by the sound of the tom-tom and shouts of the rowers. Others who came on board afterwards looked and seemed remarkably awkward and out of their element, probably because they felt dressed up for the important occasion; for every one, it seems, holding a government appointment (under the Dutch) *must* appear in a black suit when paying official visits. It was with the utmost difficulty we kept from laughing when it was expected we should look very solemn at their reception, for some of our visitors appeared in costumes apparently of the last century, in long-tailed coats which trailed on the ground, for which they had never been measured, or with sleeves so long that the tips of their fingers could scarcely be seen. But their hats were the treat to see, for each sported a chimney-pot of some distant age, which was, in some cases, three or four sizes too large for the wearer, and to make a fit, a large pad of paper or rag had been introduced. After fulfilling their mission on board, they were glad to hurry away, and could be seen stripping off their official dress on their way to the shore.

These islands are situated on the south-west coast of New Guinea, quite out of the track of all European trade, and are inhabited by black mop-headed

savages. We anchored off the trading settlement of Dobbo, which the Malays and Chinese annually visit for procuring the birds of paradise, &c. We landed on the beach, along which a luxuriant grove of cocoa-nut trees extended for more than a mile. Under their shade were the houses, arranged with much regularity, so as to form one wide street, from which narrow alleys branched off on each side.

The people who thronged the shore were of a dark brown colour, many with large mop-like heads of hair; besides a few Papuans, Malays, and Chinese.

From what could be seen of the natives, they appeared to be a strange race; with an intelligent expression of countenance. Their dress consisted of a cloth round their waist, reaching to their knees; their arms and ankles were decorated with rings made of wood, shell, beads, or coloured glass. The lobes of their ears were perforated with large holes, from which enormous earrings were suspended, sometimes two and three in each ear. They wore necklaces and finger-rings; and all appeared to have a band of plaited grass tight round the arm, to which they attached a bunch of hair or bright-coloured feathers, by way of ornament: this seemed to complete their ordinary decorations.

At the southern extremity of the landing-place the sandbank merges into the beach of the island, and is backed by a luxuriant growth of lofty forest

trees. Though at first sight it seems a most strange place to build a village on, it has many advantages by being fully exposed to the sea-breeze in three directions, and is usually very healthy in consequence.

The houses are all built after one pattern, being merely large rude sheds supported on rough and slender posts; no walls, but the floor raised to within a few feet of the eaves; the roofs neatly thatched with palm leaves, and formed with a very steep pitch, projecting considerably beyond the lower side, surmounted at the gables by large wooden horns, from which long strings of shells hang down, giving the village quite a picturesque appearance. This is the style of architecture usually adopted. Inside there are partition walls of thatch forming little sleeping-places, to accommodate the two or three separate families that usually live under one roof. A few mats, baskets, and cooking utensils, purchased from the traders, constitute the whole of their furniture: spears and bows are their weapons. A *sarong* or mat forms the clothing of the women, a waist-cloth that of the men. The women, except in their extreme youth, are by no means pretty. Their strongly marked features are very unfeminine, and hard work, privations, and very early marriage soon destroy whatever beauty they might ever have possessed. Their toilet is very simple, consisting solely of a mat of plaited grass, or strips of palm-leaves worn tight

round the body, and reaching from the hips to the knees. This is the universal dress, except in a few cases where the Malay *sarong* has come into use. Their hair is frizzled, and tied in a bunch at the back of the head.

The forest scenery possesses a brilliant and varied vegetation; the beautiful *Causurina* tree, luxuriant groves of cocoa-nut, and palms of graceful forms were seen everywhere, while climbing ratans formed entangled festoons from almost every forest tree. Here the lovely bird of paradise, and scores of others with gorgeous plumage, flew in and out amidst the bright green foliage, forming a magnificent sight.

From an early hour in the morning the forests are all alive with lories, parroquets, and cockatoos, whose shrill screams and cries resound through the woods; while numerous smaller birds, many of the most lovely form and colour, chirruped and whistled all the day long.

In and amongst this beautiful forest scenery we remained for a week, while daily excursions were made to the other islands of the group, and large numbers of very beautiful birds obtained, including many varieties of the rich-plumed birds of paradise. So gorgeous and beautiful are some of these (the king-bird) that the natives name them God's birds.

All were sorry to leave these fascinating shores, for the many pleasant cruises in the steam-pinnace up the rivers and to the adjacent islands, together

with the good sport in the forests, made the time pass very agreeably ; but on the 23rd September we were off again, steaming along the land, which appeared very lovely and fertile, rising abruptly from the ocean, with its green hills piled gracefully together, presenting a mass of evergreen vegetation most inviting to the eye. Flying fish were very numerous ; they appear to be a smaller species than those of the Atlantic, and more active and elegant in their motion. As they skim along the surface, they turn on their sides, so as to fully display their beautiful fins, taking a flight of more than one hundred yards, rising and falling in a most graceful manner. At a little distance they exactly resemble swallows, and no one who sees them can doubt that they really *do* fly, not merely descend in an oblique direction from the height they gain by their first spring.

As the day advanced, we were close to Great Kii, and we came to anchor late in the evening off the village. Canoes were soon alongside, and it required but little persuasion to induce some of their occupants to come on board, where we were for some time enlivened with their dances. Next morning, moved on our way and anchored off the village of Kii Doulan.

The island is long and narrow ; it appears to be everywhere covered with luxuriant forests, and in its bays and inlets the sand is of dazzling whiteness, resulting from the decomposition of the coralline lime-

stone, of which it is entirely composed. In all the little swampy inlets and valleys sago-trees abound, and these supply the main subsistence of the natives. The forests afford abundance of timber, though not probably more so than other islands, and, from some unknown causes, these remote savages have made boat-building their study, in which art they pre-eminently excel. Their canoes and prahs are beautifully formed, broad and low in the centre, rising at each end, where they terminate in high pointed peaks, more or less carved, and ornamented with shells and waving plumes of cassowary's hair. They are not hollowed out of a tree, but are regularly built of planks running from end to end, accurately fitted together without a nail or particle of iron being used, the planks being dowelled together with wooden pegs, as a cooper fastens the head of a cask, and the whole afterwards strengthened by timbers, lashed with split rattan to solid cleats left for the purpose in each plank.

The village had a pretty appearance as seen from the anchorage ; but on landing the illusion was soon dispelled. There seems to be but little care or cleanliness in or around the houses ; but a ramble through the beautiful forests, hunting for plants and insects, many of which were altogether unknown, was very enjoyable.

Sept. 26th.—Left the anchorage this morning, and proceeded amongst a group of beautifully wooded

islands, many of which were either unknown or incorrectly laid down on the charts ; so a running survey was made of this archipelago. Three days of most pleasant cruising followed, during which frequent soundings and trawlings were onward, and on the 29th September the volcanic group of Banda was in sight, covered with an unusually dense and brilliant green vegetation, indicating that we had passed beyond the range of the hot dry winds from the plains of Central Australia.

As we proceed, on passing the shores of Great Banda, composed seemingly of a series of perpendicular crags from 200 to 300 feet high, covered with luxuriant vegetation hanging down in festoons of bright green unfading verdure to the water's edge, a beautiful sheet of water is disclosed, like an inland lake, showing up the northern shores, covered with dense matted masses of foliage, while scattered about ahead are two or three small islands, with the swell chafing their abrupt sides as they rise out of the bright blue sea, which is only ruffled here and there by light breezes, or flecked by shadows from the fleecy clouds that slowly cross the sky.

Banda is a lovely little spot, its three islands inclosing a secure harbour, from which no outlet is visible, and with waters so transparent that living corals, and even the minutest objects, are plainly seen on the volcanic sand at a depth of seven or eight fathoms.

We anchored within the circle formed by these

islands, between Great Banda and Banda Neira, at the foot of Gunong Api, or Burning Mountain, a conical active volcano 2300 feet high. Banda Neira is in full view before us. It is composed of hills, which gradually rise in a succession of ridges to the height of about 500 feet, covered with beautiful vegetation to the very top. On one of these prominent positions is Fort Belgica, with bastions surmounted by circular towers, resembling some old feudal castle, from which flies the Dutch flag. Its walls are white and dazzling in the bright sunlight, and beneath is a broad, neatly clipped glaxis, forming a beautiful green descending lawn. At the foot of this hill is Fort Nassau, which was built by the Dutch when they first arrived, in 1609. On either hand, along the shore, extend the chief villages of Neira, with rows of pretty shady trees on the *bund*, or front street, bordering the bay; while at some little distance behind the beach are spice plantations and large groves of cocoa-nut trees. In front of our anchorage the town stretches along, consisting of scattered houses, with not much signs of regularity. One or two roads run up the valley, where are pleasant groves of orange, tamarind, nutmeg, bamboo, banana, and other stately tropical trees and plants, lending their shade and beauty to the scene, which, with the white walls and red-tiled roofs of the houses, together with the many strange faces and still stranger dresses, formed a great contrast to

anything we had hitherto seen. These natives are apparently a very mixed race, and probably three-fourths are made up of Malay, Papuan, Arab, Portuguese, and Dutch. The first two form the larger portion of the inhabitants, but the dark skins and the more or less frizzly hair of the Papuans appear to predominate.

During our stay here the Governor (or Resident, as he is styled) made up a party to visit the nutmeg plantations on Great Banda. Our steam-pinnace was in requisition, and a most enjoyable trip it was, for, on reaching the landing, horses were provided to take the party the remaining eight miles to the gardens. And what a treat presented itself, for there are few cultivated plants more beautiful than nutmeg-trees. They are handsomely shaped, growing to a height of 20 or 30 feet, with bright glossy leaves, and bearing small yellowish flowers. The trees were now in full bloom, and in a few weeks the fruit would be ready for picking. It grows in size and colour somewhat like a peach, but rather oval; it is of a tough, fleshy consistence, and as it ripens splits open, showing the dark-brown nut within, surrounded with the crimson mace, forming a very beautiful object. The nutmeg trade was for a number of years a strict monopoly; recently the monopoly has been given up. The indignation at one time expressed against the Dutch for destroying all the nutmeg and clove trees on the many islands then covered with those valuable

spices, in order to restrict the cultivation to the two or three that they were able to watch over, showed a narrowmindedness in the government of that time which has since happily passed away. After spending some hours here, we returned to the vessel, well pleased with the day's recreation.

Shooting parties left for the interior, as it was reported that the forests contained deer, pig, and a species of cuscus, but none were met with. Of birds, the naturalists collected some seven or eight species; the most remarkable being a fine and handsome fruit-pigeon, which feeds upon the nutmegs, or rather on the mace, and as we strolled through the forests, its loud booming note was continually heard.

Oct. 2nd.—Our stay was limited to three days, when we proceeded on our way. The sea was beautifully calm, and the bright sun and clear sky threw a flood of golden light over all. The distance was only 115 miles, and we were now approaching Amboyna, the most important of the Spice Islands, where we arrived and anchored on the 4th October. Amboyna is the name both of the island and its chief city—in fact, it is regarded as the capital of the Moluccas.

The island consists of two peninsulas, so nearly divided by inlets of the sea as to leave only a sandy isthmus about a mile wide near the eastern extremity. The western inlet is several miles long, and forms a fine harbour, on the southern side of

which is situated the town, backed up by high hills rising abruptly from the sea. Along the shore are many little bays, where coasting-vessels and prahs were seen at anchor. Viewed from the anchorage the city has a pleasing appearance, its streets being broad, straight, and well-shaded, with numbers of roads set out at right angles to each other, bordered by hedges of flowering shrubs, and inclosing country-houses and huts embosomed in palm and fruit trees; and, with the high land forming the background, there are few places more enjoyable for a morning or evening stroll than the sandy roads and shady lanes in the suburbs of this ancient city.

Landing on the mole in front of Fort Nieuw Victoria, we passed through this old stronghold out into the pretty lawn beyond, which is surrounded by officials' and merchants' residences. Nor must I omit to mention the Societat, or Club-house, which occupies a prominent position just opposite the fort. It appears that every place of any pretension to size in Netherland India has one or two of these pleasant resorts, where newspapers and periodicals are received, and all the social Europeans gather in the cool of the evening to enjoy each other's society, or smoke and drink their favourite gin-and-bitters. Through the courtesy of the Resident, invitations were extended to the "Challengers" during their stay in port, and thus opportunities were afforded

of passing a pleasant evening, especially when the band played.

The Dutch Government have a large coal depot here. One day we proceeded farther up the harbour for the purpose of taking in a supply, lying alongside a jetty during the operation; it was, however, a slow and tedious process, for no inducement could make the coolies get in anything like a reasonable quantity per day. It was a pretty place, and as we had the additional facilities of lying alongside a pier, many excursions were taken. All along the beach are small groves of cocoa-nut palms, which furnish food and shade to the natives dwelling in their huts beneath. Away at the back are the favourite burial-places of the Chinese, whose tombs are curious horseshoe-shaped inclosures, their white walls making very conspicuous objects on the hillside; while scattered far and near are numerous little plantations filled with small trees which have a bright green foliage. These are the gardens of clove-trees, which have made this island so famous throughout the world. On the completion of the coaling we returned to our first anchorage off the town. The passage down the harbour afforded one of the most astonishing and beautiful sights to behold. The bottom was absolutely hidden by a continuous series of coral, sponges, actiniæ, and other marine productions of varied forms and brilliant colours; the waters were clear as crystal, and the depth varying from

eight to ten fathoms. All along the uneven bottom were rocks and stones, offering a variety of stations for the growth of these animal forests. It was a sight to gaze on for hours, and no description can do justice to its surpassing beauty and interest. It had generally been considered that this coast was particularly rich in all kinds of marine productions, such as corals, shells, and fish, but the results of our dredging outside the harbour did not in any way prove such to be the case, to our great disappointment. During our stay the mail-steamer arrived; this seemed to be almost the only chance to break the dull monotony of a residence in this enervating climate, unless an earthquake happens, which affords a grand opportunity for something to talk about to new arrivals.

Life at Amboyna, and at almost every other place of the Dutch possessions, at the best is dull. Once or twice a month the Resident gives a reception, when all the Europeans and most of the Mestizos come and dance till late; and as there are some seven or eight hundred people in the city, and the larger portion are usually invited and attend, it is frequently a brilliant affair.

We had been here six days when it was determined to make a move from the anchorage. Accordingly, all was ready, and on the morning of the 10th October we were again under weigh, steaming through beautiful calm seas, with numerous islands

of varied form and size in sight, sounding and dredging daily with most satisfactory results. On the evening of the 13th we crossed the Equator, and on the next day passed the islands of Bachian and Tawali, which are great volcanic masses heaved up into ridges about 1000 feet in height, and separated by a long, narrow strait abounding in the grandest scenery. Here on Bachian the clove-tree grows wild. North of this island is Makian, an old volcano; in fact, we were just now surrounded with extinct craters. The next day (14th) we passed through the channel separating Tidore, with its high, prominent peak, from that of Ternate, and late in the evening anchored in the well-sheltered bay, off the village of Ternate, situated at the eastern declivity of a volcanic mountain 5000 feet high. This is one of four or five conical volcanoes, which skirt the west coast of the large and almost unknown island of Gilolo. The town is concealed from view until close up to the anchorage, when it is seen stretching along the shore at the very base of the mountain. Its situation is fine, and there are grand views on every side. Opposite is the rugged promontory and fine volcanic cone of Tidore; to the east is the long, mountainous coast of Gilolo; while immediately behind the town rises the huge mountain, sloping easily at first, and covered with a thick grove of fruit-trees, but soon becoming steeper, and furrowed with deep gullies

almost to the summit, whence issue faint wreaths of smoke. The scene looked calm and beautiful, although beneath are hidden fires, which occasionally burst forth in streams of lava, but more frequently make their existence known by earthquakes, which have on several occasions devastated the town. It was in 1840 that the last great eruption took place, and destroyed everything within reach, inflicting a loss of something like 100,000*l.*; but after a while the present town sprang up on the ruins, and now contains about nine or ten thousand inhabitants.

Near the landing-place is the residence of the Resident, or Governor, a large roomy bungalow, prettily situated, and surrounded with beautiful foliage, and close at hand are the Societat, or Club-house, and the residences of the Europeans. Like all Dutch cities in the East, it is divided into *kampongs*, or quarters, the southern being occupied by Europeans, and the northern by Chinese and Arabs. Near the latter is Fort Orange, built by the Portuguese in 1607, in an open space facing the beach, and beyond this the native town extends for about a mile to the north-east. The road leads to the palace of the Sultan of Ternate, which is a small building in the European style, standing on a terrace facing a wide and beautiful lawn reaching down to the sea. The rajahs who at one time reigned over the savage and cruel pirates who infested these isles

are now reduced to a state of vassalage, and are but regal slaves, whose pomp and state are maintained by the dollars of the Dutch. The villages close at hand consist of a number of bamboo-built houses, nicely sheltered with cocoa-nut and banana trees, and picturesquely situated on a little projecting point almost surrounded by the bright blue sea.

On my way back to the European quarter I heard the booming of the drum from the large mosque close at hand, calling all the faithful to assemble to return thanks to the Prophet at the close of the departing day. I went into the building, which is a square, pagoda-like structure with several roofs, one above the other, and each being a little smaller than the one beneath it. A wall surrounds the building, inside which was a large well, or pool, where all the faithful performed their ablutions before proceeding into the sanctuary. After getting within the inclosure, an inclined terrace of steps led to the entrance door, where boots had to be removed, and I entered barefooted the sacred precincts amongst the worshippers, who were kneeling in front of a recess, or niche, and a gaily painted and decorated dais, or throne; but I could learn nothing as to the objects in view, and the whole of the religious ceremony appeared to consist of the repetition of a certain number of prayers or passages from the Koran, on the termination of which all seemed to disperse highly pleased. Before we left Ter-

nate, the Resident made up a party for the purpose of visiting the spice plantations. Landing at an early hour, we found a walk through the charming avenues most enjoyable. The whole surface of the land is covered with various kinds of stately trees, interspersed here and there with neat little inclosures and huts of the natives. It must be remembered that we were in the Tropics, where the wild luxuriance of nature runs riot, for the natural vegetation of the hedges and hillsides overpowers in picturesque effect all the artificial productions of man. Wending our way along paths where the line of vision is very limited from the dense foliage, we occasionally got, on reaching a clearing, alternate peeps into wooded valleys and fertile plains, and glimpses of the bright blue sea beyond, backed by hills and bordered with low, wooded shores, on the surface of which were numerous coasting vessels, boats, and canoes, whose white sails looked bright in the morning sun. Still continuing our walk along shady pathways, and admiring each successive view, we reached the plantations. Delight itself, however, would be but a weak term to express the feelings even of the most ordinary observer of nature here. The lovely sago-palm, with its great bunches of fruit; the fascinating betel-nut, tall and tapering; the luxuriant profusion of pepper, cinnamon, cocoa, nutmeg, and clove trees, with numberless others producing durians, mangustans, lansets, and mangoes,

whose wide-spreading branches and bright green foliage are offered to the hand of industry for fulfilling the varied purposes of life, whether useful or ornamental—all gave to the general aspect a picturesque beauty only to be met with amongst these lovely islands.

It was soon time to retrace our steps, yet I could not help stopping again and again to gaze on these scenes, and to endeavour to fix on my mind an impression which at the time I knew I should wholly or partially lose. The form of the beautiful nutmeg fruit and other spice-producing trees, the sago-palm, or betel, may possibly remain clear and separate, but the thousand and one beauties that unite them into a perfect scene must surely fade away.

It was past noon when we again reached Government House; and now each of our party strolled away, either to the Club or for a farther walk in the country, so as to pass the time until the evening, when a reception in honour of the "Challengers" was held at Government House, finishing up with a ball.

All the rank and beauty of Ternate were of course there to meet us, besides the officers from a small Dutch war-ship in port. The company was a medley of nationalities. There were Arabs in jaunty turbans and long, flowing bernouses; curious-looking Chinese in silks and long tails; Malays, with close-shaven crowns and richly brocaded jackets; and sober, quiet-looking Dutchmen in evening dress. Nor

must I omit to mention the one resident Englishman (Mr. Edwards) and his family. The ladies were, with few exceptions, all Mestizos, got up in silks and muslins, and looking their best. The *Challenger's* band attended, but the company preferred dancing to their own plaintive tunes, produced from a fife and a couple of fiddles. Thus pleasantly passed a few hours; and from the kind consideration and hospitality of our host and hostess, memories will long remain of the ball at Ternate.



NATIVES OF THE PHILIPPINE ISLANDS.

CHAPTER X.

TERNATE (MOLUCCA ISLANDS) TO SAMBOANGAN, ILOILO, AND MANILLA (PHILIPPINE ISLANDS), AND TO HONG KONG (CHINA).

Leave Ternate—Mindanao, Philippine Islands, in sight—Anchor off Samboangan—The village—Hospitality of the Spanish officials—Dance of the Malagahi Indians—Leave Mindanao, and anchor off Panay—The town of Iloilo—Leave for Luzon—Anchor in Manilla Harbour—The city—Cigar factories, &c.—Leave Manilla—Passage to Hong Kong, China—Arrive and anchor in Hong Kong Harbour—The city—Its residents, shops, theatres—Their temples and religion—Joss, the mystery—Captain Nares leaves for England to take the Arctic command—Loss to the expedition by his leaving—Arrival of the English mail.

ON the morning of the 17th October we left Ternate, greatly to the regret of our hospitable friends.

Steaming on with fine weather across the Molucca passage into the Celebes Sea, the scenery in every direction was very lovely, the lofty, high volcanic land affording more than ordinary interest as we occasionally stopped off the steep shores for trawling.

Crossing the Celebes Sea on the 23rd, the high land of Mindanao, covered with bright green foliage to the very top, was before us. Stopping again for soundings, it was nine o'clock on a bright moonlight night when we anchored off the village of Samboangan. After the Spanish officials had boarded us, and visits of ceremony exchanged, those so desirous were free for a run on shore.

The next day, early in the morning, as the sun rose, the picture from the deck was very charming. The little village before us was almost concealed from view by the varied foliage stretching from end to end, backed up with high land cultivated nearly to the summit; while in the fertile plains below the waving palms and the bright green stalks of the rice stood out in pleasing relief.

As is usually the case on landing at these villages, Samboangan lost much of the charm apparent from the anchorage; but the country and roads were found prettily decorated with thick and many-tinted foliage; tall bamboos shaking their feathery heads aloft, the cocoa-nut still loftier; palms of various sorts; the plantains and bananas, the huge green leaves of which give such richness to atropical land-

scape, and the many-coloured bright flowers, and trailers hanging over banks of rivers that flow into the sea.

With the proverbial kindness and courtesy of the Spanish officials, a pleasing entertainment was arranged for us during the only evening of our stay. On landing it was found that the upper room of the large house of the Captain of the Port had been prepared for the occasion, and was pretty well filled with a number of Moros Indians from Malagahi (the hill tribes), who were busily preparing to give us a national dance. The musicians were mostly women, who played with drum-sticks on gongs of various sizes, arranged in sets of ten or twelve in number, and on instruments formed of long metallic bars and strips of bamboo on strings stretched across frames, besides flutes, drums, and a curious two-stringed fiddle. The variety of sounds produced was both harmonious and pleasing. When all was ready, at a given signal, the dancers sprang to their feet, and soon we had a sight not easily forgotten.

The performers, principally girls, were dressed in bright and gorgeous costumes, in silk, satin, and gold embroidery, with rings, armlets and jewellery. Their pleasing and easy motion, the graceful attitudes and movements of their body and arms, had a novel effect, and on its conclusion we could be no other than highly pleased with the treat. There was a large attendance of Spanish officials, both of the navy and

army, who did their utmost in providing many good things for our enjoyment and comfort.

Being anxious to push on, so as to reach Hong Kong before the change of the monsoons, early the next morning we were under weigh, passing through the Sulu Sea, reaching the Island of Panay, and anchoring off the town of Iloilo on the 28th.

The approach to the port is by a narrow channel between a sandbank and the Island of Guimaras, and we anchored very near the shore. A few straggling houses are all that is seen of the town, which has no pretensions to size or beauty; one portion of it lies so low that its streets are usually, at high-water, submerged, the houses being built on high piles. The roads in the suburbs are pretty, and many Indian houses are seen, where most of the women are employed making that extremely beautiful fabric, the *pina*, which is prepared from the leaves of the pineapple. The white and delicate threads, being separated from the leaves, are sorted with great care, and woven into a very delicate material resembling very fine muslin. Such are the patience and care required in its make that sometimes not more than half an inch is made in a day.

After taking in coal, we left, on the morning of the 31st, for Manilla. The 350 miles were soon got over, and, after trawling on two or three occasions, on the 4th November we sighted the lighthouse at

the entrance of the magnificent harbour of Manilla, and some hours' steaming brought us to the anchorage, at about a couple of miles from the shore.

Soon after we were visited by the various officials, and opportunities were given for landing. The business portion of the city is prettily laid out with numbers of long and handsome streets, extensive stores and warehouses, affording employment to hundreds of coolies and others, who are seen rushing about with bales and packages, loading or unloading vessels in the river. Among the interesting sights of Manilla are the cigar factories. There was no difficulty in obtaining a permit from the chief of the administration to see them. We were informed that in the one visited four thousand women and half that number of men were employed, while in the neighbourhood as many as nine thousand women and seven thousand men find employment in producing cigars. As we entered the building, our ears were almost deafened by the chattering produced and noise made by some hundreds of women seated on the floors, each provided with a small wood mallet, with which she hammered the tobacco leaves on blocks to polish them for the outside of the cigars. In other rooms they were employed in rolling them up into their proper shape, finishing off, and otherwise preparing them for the market.

Tobacco being a strict monopoly of the government, it is entirely in charge of a military adminis-

tration, and during the harvest, we were informed by the officials who accompanied us, the greatest care and supervision are necessary to prevent the best leaves of the crop being carried off by the employés. After the gathering in from the plantations the leaves are at first placed in heaps under cover to ferment, then sorted according to size and quality and allowed to dry; finally reaching the manufactory, where they are made into cigars as we saw them.

The city is situated in a rich and fertile district, in the midst of magnificent scenery, splendid alike in form and colour, but, like every town in these islands, has one great enemy to dread—earthquake, which has from time to time made frightful ravages in this city, evidences of which are seen at the present time in the ruins of churches, cathedrals, and public buildings.

On the 11th November our visit came to an end, and we proceeded out of the harbour under steam. Before clearing the land, we had all the prospects of a rough passage before us. At the best of times the China Seas are anything but calm, but now we had the full force of the monsoon against us; and the wild cross waves breaking on our bows tossed us about with great violence, to the destruction of crockery and furniture, until nearing the coast, when it moderated sufficiently for us to have a few hauls with the trawl with satisfactory results. The 16th November, Vic-

toria Peak (Hong Kong) was seen, and a few hours later we were threading our way through a very maze of boats and shipping until reaching the anchorage off the Naval Yard. Soon we were surrounded by a host of sampans and junks, whose noisy occupants were each seeking the honour of being appointed the *Challenger's* bumboat.

Few places are more interesting to the traveller from Europe than this city, furnishing as it does such a change of scenery, manners, and customs, so widely different from anything he has probably seen before.

The harbour is crowded with men-of-war and trading vessels of many nationalities, while hundreds of junks, sampans, and fishing-boats, full of life and movement, contribute in making the scene one of great attraction. Not more than half a century has elapsed since England took possession of this island, at which time it was little less than a bare uninviting rock, affording a haunt and home for pirates and desperadoes, who were the terror of these seas. What a change has been brought about in this brief period! Now it is a great centre of trade and commerce, and vessels come from Bombay, Calcutta, and Singapore, laden with the choicest products from these lands for transshipment to England, America, or our colonial possessions, receiving in return tribute from those distant countries, in exchange for teas, silk, opium, and other requirements. It is

already one of the most flourishing of our colonies in the East, and destined to still further extension and greater importance. It has become the postal terminus of the many lines of mail-steamers that arrive weekly from Europe and America, and now, with submarine telegraph, is in instant communication with every place of importance.

Victoria, the chief town, is situated along the northern shore of the island, with its magnificent harbour stretching out in front, and backed up with mountainous land, culminating in Peak Victoria, 1200 feet above the level of the sea, and stretching along the length and breadth of the city, shutting out the invigorating breeze for half the year, and causing it to be one of the most unhealthy of our colonial possessions. It is laid out with fine streets, and its hillside is crowded with villa residences of the wealthy traders and merchants.

The Chinese population, who are ever alive when an opening occurs for trade, have come here in swarms from the main-land, and made this once almost barren rock their home, building a town of their own, which skirts the bay and scrambles upward and onward over the hill behind.

The cathedral, Government House, clubs, and public buildings are splendid specimens of architecture, and thus exemplify the energy and industry of the Anglo-Saxon race. What other race would think of placing house and home in such a locality?

The summers are usually hot, and the town unhealthy; still manifold precautions and sanitary measures have done much of late to diminish the amount of sickness. As it is, however, great numbers are invalided home from the vessels employed on this station, while others find rest in six feet of earth in the Happy Valley, where a Protestant cemetery is situated.

Warehouses and stores, for supplying every requisite and luxury of life, are numerous. The houses of business along the Queen's Road would do credit to many an European town, and the naval yard is complete with every requirement for refitting vessels employed on this part of the station.

On reaching the shore, a walk through the Chinese quarter is most interesting. The houses and shops are most curiously constructed, and just as strangely fitted up; not one, however small or poor, but has its domestic altar, its Joss, and other quaint and curious arrangements known only to these peculiarly strange people. Look where we will, there are evidences of the untiring industry and enterprise of these surprising sons of Shem. Up every alley, and in every street, we see crowds of little yellow faces, and stumble against the brokers or merchants hurrying on to their business, clad in the universal blue jean jumper and trousers, cotton socks, and shoes of worked silk, with thick wood soles; some with, and others without

hats: the shaven face and pigtail so typifying the class that to note a difference between Sun Shing or Wang Heng is sometimes most embarrassing. The dress of the women differs but little from that of the men. The curious, built-up style the married ladies have of wearing their hair gives them a strange appearance; while the younger lasses allow theirs to hang down their back in tresses, or wear it bound tightly over their foreheads, and secured *au chignon*. Their cheeks are tinted bright pink, and with their neat little feet, and clean and loose clothing, they make a very pretty picture. By far the most conspicuous of the various kinds of people, and those which most attract the stranger's attention, are the Chinese, although great numbers of other nationalities are to be seen; and, when once the business of the day has begun, the din and traffic are enormous; for crowds of men, of all creeds and colours, Jew, pagan, and Christian, Buddhist and Parsee, Chinese, Japanese, and European, fill the streets, while gangs of coolies chant to keep step, as they press on beneath their heavy burdens. The merchants, whose places of business lie along the Queen's Road, are so similar in appearance that a description of one will apply to all. He is generally a fat, round-faced man, with an important and business-like look, wearing the same style of clothing as the meanest coolie (but of finer material), and is always clean and neat, and his long tail, tipped with red or blue silk, hangs down to his heels.

The Chinese never depart in the least from their national dress, which is, indeed, impossible to improve on for a tropical climate, whether as regards comfort or appearance. The loosely hanging trousers and neat white half-shirt, half-jacket are exactly what a dress should be in these latitudes.

Continuing the walk along the Queen's Road, hundreds of small shops are passed where are seen the most marvellous and miscellaneous collection of "curios" possible. The shopkeepers are, as a rule, very good-natured, and will show one everything they have, not appearing to trouble whether a purchase is made or not. They always ask for their goods about twice as much as they are willing to take. If you buy a few things from them, they will invariably speak to you afterwards every time you pass the shop, asking you to walk in and sit down to rest, or to take a cup of tea or some chow-chow; and you wonder how they manage to get a living where so many sell the same kind of article.

Farther on are to be seen carpenters busy at packing-cases, cabinet-makers hammering away at camphor-wood chests, brass-workers clattering away making bowls or gongs; while at every step are met sellers of water, vegetables, fish, soup, fruit, &c., with as many cries, and just as unintelligible, as those of London. Others carry a portable cooking apparatus on a pole, balanced by a table at the other end, and

serve up a meal of shell-fish, rice, and vegetables for a few cash; while coolies, boatmen, and others, waiting to be hired, are everywhere to be met with.

Here are dentists, letter-writers, fortune-tellers, and hawkers of odds and ends, in all directions; while the barbers have plenty to do shaving heads and cleaning ears; water-carriers, bearers of sedan-chairs, coming and going in all directions, dressed in their peculiar national costume, with their long tails either wound about their heads or trailing down behind. The streets of Hong Kong offer a thousand reflections to those who have never been brought in contact with the celestial race.

The restaurants, grog-shops, tea-houses, and gambling saloons are very numerous, and under strict surveillance of the police; but what usually at first arrests the attention of the stranger are the numerous little niches along the street sacred to Joss, where at certain hours are burnt strips of coloured paper and scented sticks, for some mysterious rite known only to those strange people. To see them at their chow-chow is of itself a treat, for it is all done openly in their shops; they have no glass fronts to them, as we are accustomed to see in most European cities. They have the character of being most patient in poverty, and if ill-luck befalls them, they will live on rice alone and suffer without murmuring. A disorderly Chinaman is rare, and a lazy one scarcely exists; so long as he has strength to use his hands,

he needs no support from anybody. Europeans often complain of want of work, but a Chinaman never does; he always manages to find something to do; consequently, beggars are but seldom met with amongst them.

All Chinamen can read, write, and cipher with facility. It is a curious sight to see book-keepers in the stores tallying up their accounts on a machine like a gridiron, with buttons strung on its bars, the different rows representing units, tens, hundreds, and thousands. With all the shopkeepers the value of the slightest article purchased is calculated in this way in dollars and cents with great rapidity. The studs are pushed about from place to place as fast as a musical performer's fingers travel over the keys of a piano.

The theatres, or (as they English it) the sing-song houses, are amongst their principal amusements, and exhibit the peculiar traits and character of these strange people. Being possessed of a language which may be termed the very music of speech, from its capabilities of modulation, great things might be expected; but the vocal music seemed to us of an extraordinary character, little resembling any description of sounds with which we were at all familiar. Pitched in the highest falsetto tone, the voice of the singer flies from note to note in the most singular manner, producing a very unearthly noise, which has no relation to any conceivable progression

of human sounds. Nor is their instrumental accompaniment any better. The musicians are on the same stage with the actors, with gongs, horns, and cymbals. Melody there is none. They blow and beat, and beat and blow, varying the monotony of the sound by frequent and successive crashes. The plot of the drama, whether tragedy or comedy, it is impossible to understand. It seems to have no proper beginning or end, but to go on from day to day in a succession of battles and love-makings, until the patience of the audience is exhausted.

After leaving the theatre, we reach the native quarter, and passing through "Curio" Street, the first thing to arrest our attention being the busy, untiring industry of the Chinese in their little shops, where sandal-wood boxes, ivory turning and carvings, lacquer-ware, tortoise-shell and bronze goods, silks, and embroidery are laid out in tempting array.

Continuing on through long lengths of streets, we pass corn and rice mills, dye-houses, blacksmiths, carpenters, umbrella and lantern makers, bootmakers, tailors, and barbers, shops with gaudy swinging sign-boards—the several characters noting the name and style of the firm.

Some of the narrowest parts of the road we find quite a difficulty in passing, from the crowds of purchasers and vendors of fish and pork and vegetables and endless other articles of food, whose stalls and tables occupy the side walks in front of the

shops. Jostling on amongst this busy scene, we hear the constant "Ah ho!" of the palankeen-bearer, causing us fresh confusion at every step. At length we turn down a small side-street, where are gambling-houses, money-changers, Joss temples, samshu and sing-song houses, from which are heard the screaming of song and the twanging of the stringed lute.

We enter a temple, whose outside is adorned with gilding and lacquer, and quaint designs of birds, animals, and unreal monsters.

They have a religion of some sort, as Wang Heng (a very intelligent Chinese with whom I was acquainted) assured me, with churches and endowments as in England; that is to say, they have the system, but not the faith. I had supposed all along that the curiously constructed temples, sacred to Joss, had more or less of a religious character about them, but I was now undeceived. My habit on passing these edifices was to call in and see what was going on, and one day I found out that Joss was nothing more than a fortune-teller, after the manner of the Oracle of Delphos.

When inside the temple, we see the figure of Joss placed on high, with ornaments of peacocks' feathers, whilst long streamers of coloured ribbon, pictures, and flowers, presents of tea, oil, or opium, lighted tapers in coloured wax, joss sticks burning slowly, and sending their perfume around, heaps of joss paper

smouldering in trays, bamboo boxes, with bundles of small sticks, on the end of which are inscribed certain cabalistic characters, surround the figure. At certain hours in the morning the temple becomes sacred. It is the hour of divination. Any one now about to undertake a journey or make a purchase, and desirous of knowing if he will arrive in safety or make a profitable investment, comes to Joss. He pays his obeisance by profoundly bowing and salaaming, then lights a certain number of matches or tapers, and makes a present; after a while, when it is thought Joss is conciliated, the suppliant takes the box of marked sticks, and, after shaking them about, selects half a dozen and passes them to the priest, or Sheong-ti (son of heaven), in attendance, who refers to the book of mysteries, and there reads the will of Joss. If he is warned of misfortune, he forbears the journey, or declines the bargain, and waits for a more fortunate day. If Joss advises otherwise, and a good profit is the result, the happy merchant makes a substantial present. Joss is therefore (as will be seen) a fortune-teller, and nothing more, and Sheong-ti is only a sensible, cunning fellow, who prefers to live by the credulity of his neighbour rather than by the labour of his hands.

Buddhist temples literally swarm over China. The officiating priests are consequently very numerous. The gods they worship are the three precious

Buddhas—the past, present, and future. These images are usually of gilded wood, represented half naked, with woolly hair, in a sitting position: one holding the mundane egg in its lap, one adorned with the sacred thread, and one engaged with its finger upraised, as though instructing mankind.

In front of these three images are usually three smaller ones, representing the goddess of mercy, the god of war, and one described as the protectress of seamen. A high table for candles and incense stands before these images, and in the centre of the building is a large metal cauldron for burning coloured paper, while near at hand are the great bell and drum which are sounded to arouse the attention of the god when any important persons arrive: these things, with a few cushions and mats on which the worshippers kneel, make up the furniture of a Buddhist temple.

These people have no Sabbaths, nor periodical seasons of rest; the only cessation from their daily toil is the Feast of the New Year, when they generally have a week's holiday.

During the stay here, Captain G. S. Nares received telegrams from the Admiralty, offering him the command of the Arctic Expedition, fitting out in England. This was a great blow to us all, for he had acquired the full confidence and regard of those who were associated with him, and it was considered on all hands a most unfortunate event that he should be

removed from the head of our expedition, which had hitherto worked so well, and produced such valuable practical results, under his direction. Still we could not help recognising the importance of having one of his experience in command of the Arctic Expedition, which will have the best possible chance of coming to a successful issue under his guidance.

On the 10th December he left (accompanied by Lieut. Aldrich*) in the mail-steamer for England, taking all our hearty good wishes; "and may God bless him and his endeavours," we all fervently echo. Captain F. T. Thomson, who was on the station in command of the *Modeste*, is appointed to take Captain Nares' place, and all we have to hope is that the remainder of the cruise will go on as successfully as it has hitherto done.

Jan. 6th, 1875.—At length the seven weeks have passed; the mail is in, after some grumbling at it being a few days late; for now if the gun announcing its arrival does not fire within the forty-two days, everybody begins to complain—fewer days nearly than a century ago it required weeks.

* Who was succeeded by Lieut. A. Carpenter.



INDIAN VILLAGE ON THE BANKS OF THE RIVER PASIG, MANILLA.

CHAPTER XI.

HONG KONG (CHINA) TO MANILLA, ZEBU, CAMIGUIN, AND SAMBOANGA
(PHILIPPINE ISLANDS), AND TO HUMBOLDT BAY (NEW GUINEA).

Leave Hong Kong—Passage to Manilla—Sight a derelict—Tow her into Manilla—Scenery on the road and river—Leave Manilla—Passage through San Bernadino Straits—Numerous islands in sight—Arrive at Zebu—The town—Dredging for Euplectellas off the island of Mactan—Our success—Leave Zebu—Passage to Camiguin—The new volcano—Its effect on the surrounding country—Anchor off the village of Abajo—Proceed along the west coast—Anchor off Samboanga—The scenery—Visit the island of Basilan—Get a supply of coal—Leave the Philippine Islands—A course shaped for Greenwich Island—New route to and from Australia to China—Unfavourable weather—Sounding and dredging—Cross the Equator (third time)—Course altered for New Guinea—Land in sight—The scenery and prospects of exploration—Anchor in Humboldt Bay, New Guinea.

THE morning of January 6 all was ready, and after receiving a great number of visitors, all bidding us

good-bye and a pleasant cruise, at noon a move was made from the anchorage, the bands in the various vessels playing the farewell tunes, for there were a goodly number in port of English, French, Russian, Austrian, and Prussian nationalities.

And now farewell to China, as we steam out through the Lye-moon Pass, and long before night-fall the long, low coast was out of sight.

The passage from Hong Kong to Manilla was, as is usual at this time of the year, a most disagreeable one. On the morning of the 8th January the wind fell somewhat, and soundings were obtained, showing a depth of 2100 fathoms, with a bottom of pale grey ooze. A series of temperatures was taken at intervals of 50 fathoms down to 400 fathoms, and 100 fathoms down to 1000 fathoms.

This station was just about the middle of the China Sea, so that the serial observations were somewhat interesting. At 900 fathoms the temperature was 36° Fahr., and this was maintained to the bottom; so that a layer of water 1200 fathoms in thickness, at a uniform temperature of 36° , occupies the basin of the China Sea. From these results I believe the conclusion arrived at was that this sea is cut off by a barrier, which rises to a height of between 800 and 900 fathoms below the surface, and so is prevented from communicating with the Antarctic basin.

On the morning of the 10th the weather had

moderated, when a vessel apparently in distress was observed on the horizon. Our course was altered, and as we neared the stranger, grand visions of prize-money or salvage flitted through our brain; but on closing it was found to be a miserable old brig of some 50 or 60 tons, without either masts, cargo, or anything else, all having been cleared out before being abandoned. Still we took her in tow, passing along the west coast of Luzon, its bold outlines and rugged volcanic ranges, covered with luxuriant tropical vegetation, in full view.

The next day, January 11th, we entered the harbour of Manilla. Soon after anchoring we were visited by the various officials, and by representatives from the Spanish, Russian, and Prussian vessels in port. One of our own vessels was also here, H.M.S. *Elk*, homeward bound from the China station. Just before we left Hong Kong, Admiral Shadwell had received a telegram from England announcing the proclamation of Don Alfonso as King of Spain, and we were the first to bring the news to the Philippines. It was difficult at first for the Spanish colonists to really credit the news, coming on them so unexpectedly. It caused no excitement, nor were there any steps taken by the authorities to make it public.

The city of Manilla (proper) is surrounded by ramparts, and has running through it a broad river, navigable for ten miles, up which we went in the

steam-pinnacle till reaching the landing-place, near the office of the Captain of the Port, on the right bank of the stream. Everybody rides here, and numbers of light and handy vehicles are always at hand waiting for hire. Driving through Binonda, the commercial capital, we find the bulk of the business people, full of life and activity, the cigar factories of themselves giving employment to thousands of men, women, and girls—the scenery from either bank of the river particularly fine, whether amid the wharves, warehouses, and busy population on the right, or the churches, convents, and public walks on the left. In all directions, particularly on the left bank and its neighbourhood, we seldom meet with a carriage or a traveller seeking to enjoy the beauty of the fine scenery of river, road, or villages. One could almost imagine, and expect to find, skiffs and pleasure-boats without number on the river, and yachts and other craft in the bay, ministering to the enjoyment, and adding to the pleasures, and easing off the monotony, of life; but there are none. By me, the country villages, the beautiful tropical vegetation, the banks of the rivers, and the streams adorned with scenery so picturesque and pleasing, will not be easily forgotten. Almost every house in these Indian villages has a pretty little garden, with bamboos, plantains, and cocoa-nut trees, and some have a greater variety of fruit. Nature has decorated them with spontaneous flowers, which hang

from the branches or fences, or creep up around the simple dwellings.

While here, the English residents made our stay as agreeable as possible. There was a dance at the Consulate, and this with two or three cricket-matches soon brought the time round to say farewell to Manilla.

We left Manilla on the evening of the 14th January, and on the 15th passed down San Bernadino Straits, with land fully in sight on both sides: on the left, the island of Luzon, with the fine volcano of Taal, many high volcanic peaks richly wooded to the top, and low intervening volcanic ridges, partially cleared, with here and there pretty groups of cottages, and patches of yellowish grass or bright green sugar-cane; on the right, the islands of Cabra and Lubang, and then the long stretch of coast of the wild island of Mindanao, showing little cultivation, but said to be full of deer and other game, and to be inhabited by a dangerous race of "Moros," as the Spaniards call all dark men beyond the pale of Western or Eastern civilisation.

About noon on the 16th we passed through the narrows among the islands, and into a little closed sea, about 70 miles long and 35 miles wide, extending from the north point of the island of Tablas to the strait between the north-east angle of Panay and the south-west point of Masbate. It is bounded on the north-west by Tablas; on the north-east by Romplou

and Sabuyan ; on the south-west and south by Panay ; and on the south-east and east by Pulanduta Point, in Masbate. As this, which we may call for convenience the Panay Sea, seemed likely to be one of the inclosed basins, presenting peculiarities in the distribution of temperature, we stopped to take serial soundings and to dredge. From a depth of 150 fathoms, to the bottom at 700 fathoms, the temperature was 51.7° Fahr.; while at the surface it was 80° Fahr. The other temperatures obtained were about intermediate between those in the China Seas on the one side and the Zebu Sea on the other, leaving it uncertain whether the cleft in the barrier, to the depth of 150 fathoms, is between Tablas and Panay or between Romplon and Sabuyan.

Early on the morning of the 18th we were close under the east coast of the island of Zebu, apparently the finest of the Philippines, and we steamed along the coast all the forenoon. A ridge of hills with a rugged crest rises almost from the shore, and behind this there is a second and somewhat higher range. The first range is cleared nearly to the top, and above the clearings there is a belt of trees running to the ridge and fringing it against the sky or against the foliage of the more distant range. Where glimpses can be had into the valleys as we pass, it seems to be well cultivated. The sugar-cane gives, as usual, the brightest green patches, and the lower slopes are covered with groves of the Manilla hemp

plant, but we were rather too far off to make out the other objects of cultivation. The beach is of pure white coral sand, and above it are almost continuous groves of cocoa-nut trees, with here and there groups of native huts—pretty, light, basket-like dwellings, mounted on wooden piles 10 or 12 feet high.

About noon we entered the strait between the ill-starred little island of Matan, where Magalhaens met his death, and Zebu, and had a distant view of the monument erected by Queen Isabella II. to his memory. In the afternoon we anchored off the town of Zebu, an active business place, with a population of about 35,000. There are a few roomy and handsome houses, but for the most part it consists of a lot of tumble-down shanties and rickety old buildings, with a great show of poverty and but little riches. The chief articles of trade are Manilla hemp and sugar; coffee is also grown, and tobacco in considerable quantities. Coal of very fair quality has been found, and would form a lucrative article for exportation; but the great difficulty at this place, as in the rest of these islands, is the scarcity of labour. The natives will not work. The banana, the cocoa-nut, and the bamboo supply them with all they require of food and shelter; and the additional luxury of a little rice, and dried fish to flavour it, is purchased at the price of half a day's labour in the week. The soil is, however, evidently productive to a marvellous extent; and the same redundancy which

almost relieves the natives from the necessity of work supplies the merchant with valuable products with little effort or outlay.

One special object which we had in selecting the town of Zebu as one of our places of call was to make out, if possible, something of the habits and mode of life of the beautiful sponge, the "Venus's flower-basket," which is said to be obtained only at one spot off the island of Mactan, close to Zebu. A party of Indians used to this work were engaged, and accompanied our "Philos" in the steam-pinnace to the fishing-ground. They brought with them some curious and ingeniously contrived instruments with which they bring the sponges up: two long strips of bamboo, meeting at an angle of about 45 degrees, to the outer edges of which are secured some forty or fifty large fish-hooks, with their barbs set forward towards the angle. The whole affair is strengthened with an elaborate system of stays, and weighted with stones, so as to sink it to the required depth. When all is ready, it is put overboard, and with a tow-line dragged slowly over the bottom. After about an hour has elapsed, it is hauled in, and several Euplectellas are found entangled amongst the hooks. They have a very different appearance at first from the cones of glassy network that they afterwards present when cleaned. The silver beard is clogged with the dark-grey mud in which they live, buried to about one-third of their height, and the network of the

remainder of the tube is covered with a quantity of yellow gelatinous matter, which greatly diminishes their beauty ; however, this coating is easily removed by washing and bleaching processes. These dredgings were repeated afterwards with great success, multitudes of these "Regaderas," as the Spaniards call them, being obtained, besides several other sponges of the same group, some of very graceful forms, and quite new to science.

After coaling it was decided to leave, which we did on the 24th January, passing down the channel between Zebu and Bohol. Before leaving our anchorage, a very interesting account had been given of an active volcano in the small island of Camiguin, near the coast of Mindanao. As it was but little out of our way, it was decided to visit it, chiefly with a view to ascertain whether the immediate neighbourhood of volcanic action had any influence on the temperature or other conditions of the sea-water.

About noon on the 25th we were midway between the southern point of Bohol and the high, imposing island of Siquijor ; the splendid mountain-range of Cuernos, in the island of Negros, closing in the view to the westward, with its dense forest and bright green vegetation reaching down to the sea. To the east we could see, at a distance of 50 or 60 miles, the island of Camiguin, its volcano giving out both smoke and steam. From this distance the top of the volcano seemed just on a level with the water, the

most prominent part of the island being an older volcano, which rises up behind the active cone to a height of upwards of 5000 feet.

Being in shallow water (375 fathoms) the opportunity was taken to trawl, and eventually a multitude of very small sea-urchins, and other specimens of great interest, were brought up.

On the morning of the 26th we gradually approached the island, and at noon we were close under the volcano, when parties of naturalists landed to explore, and the vessel proceeded on and came to anchor off the little village of Abajo, a few miles distant. It seems, early in the year 1871, this island was visited with several violent earthquakes, which resulted in the first eruption from this volcano; from this date the accumulation of the mountain has been going on gradually, and apparently with little violence. The general colour of the cone is a rich chocolate brown; it has now reached some 2000 feet in height, and its base has gradually extended until it entirely covers the town of Camiguin, formerly the largest on the island (with a population of 10,000 inhabitants). Now only a few ruined walls remain of this town, which was formerly on one of the most fertile and prosperous of the smaller islands of this archipelago. Since the eruptions the island has become almost desolate; only a few hundred inhabitants remain; most of the houses are in ruins, and the paddy-fields and groves of flax are deserted and

overgrown with a second jungle. For miles on either side of the volcano the trees are blighted, and vegetation is destroyed by the sulphureous exhalations. Temperatures were taken in 185 fathoms, close to the foot of the mountain; but that shown, 57° , was in no way other than usual at similar depths in these seas.

From Camiguin we proceeded along the west coast of Mindanao to Samboanga, a distance of 250 miles (occasionally sounding and dredging), where we arrived on the 29th January. The scenery is very pretty. Indian houses were visible through the plantain-trees and cocoa-nut groves; and scattered here and there amidst the woodland of the coast were storehouses, barracks, and a large fortification, with the yellow and scarlet flag of Spain flying, advising us that we were near the seat of government. At the landing-place is a convenient wooden pier, with a lighthouse on it, which is carried out for some distance in the harbour. From the appearance of the town, I should think that it is not likely to become a port of much importance: there seems but little capital invested, and the trading establishments are on a small scale. The few stores seem to be occupied by Chinese, who supply all the wants the population appear to have.

In the immediate neighbourhood of the town the roads are in tolerably good order, and the country is rich in all the varieties of tropical vegetation; but

the interior of the island is not well known, for the Spanish authority appears to be confined to a narrow strip of land along the coast; and as the Spaniards allow the wild Malay tribes to be governed by their own rajahs, very little is done towards civilising them, or opening up its resources, which (if report be true) include gold, silver, and quicksilver mines. One day we proceeded to the island of Basilan, some 20 miles distant, and took in a supply of coal from the government depot, and then returned to our late anchorage, swung ship for magnetic and azimuth corrections, and finally left on the 5th of February.

The winds were light, and for the most part unfavourable for reaching Greenwich Island, which it was desirable to sight, so as to fix the correct position of this rock. Recently a new route from Australia to China and Japan has been advocated, including in its track a course somewhat near the position assigned to this island. A vessel leaving Sydney, after reaching 20° south latitude, would make for Teste Island, the weathermost of the Louisiade group, to the west of the enormous reefs stretching to the eastward for about 200 miles. The discoveries made by H.M.S. *Basilisk* have opened up this course; for the surveys by that vessel show that, immediately to the east of Teste Island, the reefs sink from the surface to a depth of 10 or 12 fathoms. From there a run of 40 or 50 miles brings the vessel to Goshen

Straits, when all risk ceases, and the open sea is gained. The weather for some days was dull, gloomy, and squally, with showers of very heavy rain, so that but little progress could be made to the eastward; frequent soundings and occasional dredgings were made from an average depth of 2000 fathoms, with but scanty results.

Finding the prospect of being able to reach Greenwich Island getting more and more improbable, it was decided on the 21st February to shape a course for New Guinea; and later in the day we crossed the Equator for the fourth time. In the afternoon of the 23rd we sighted Mount Cyclops, in New Guinea; this is a high serrated ridge, rising 6000 feet from the level of the sea, and covered with dense tropical forests up to its summit. Shortly after, Cape Caillie and Cape Bonpland came into view; they are two rocky bluffs which mark the entrance into Humboldt Bay, so named by Dumont d'Urville, who, in command of the *Astrolabe*, visited this part of Papua in August 1827; the only other vessel recorded is the Dutch war-steamer *Etna*, which anchored here in 1858. Opposite to Mount Cyclops rises Mount Bourgainville, over 4000 feet high, most lovely and fertile, springing abruptly from the ocean, with its green heights piled gracefully together, presenting a mass of evergreen vegetation most inviting to the eye. This was our first view of the shores of New Guinea, and all gazed with profound interest at

what seemed the portal (as it were) to the most unknown and, up to this date, the least explored region of the earth. It is well known that but few Europeans (if any) had ever trodden the shores we gazed upon, the exploration of which appeared so flattering to the imagination, so likely to be fruitful in interesting results, whether to the naturalist, the ethnologist, or the surveyor, and altogether so well calculated to gratify the enlightened curiosity of an adventurous explorer, that all were in high spirits at the apparent prospect of getting into the interior of New Guinea, for its plants, birds, animals, and inhabitants would be entirely a new study; so speculation ran high on what the next few days would bring to light as we neared the anchorage.

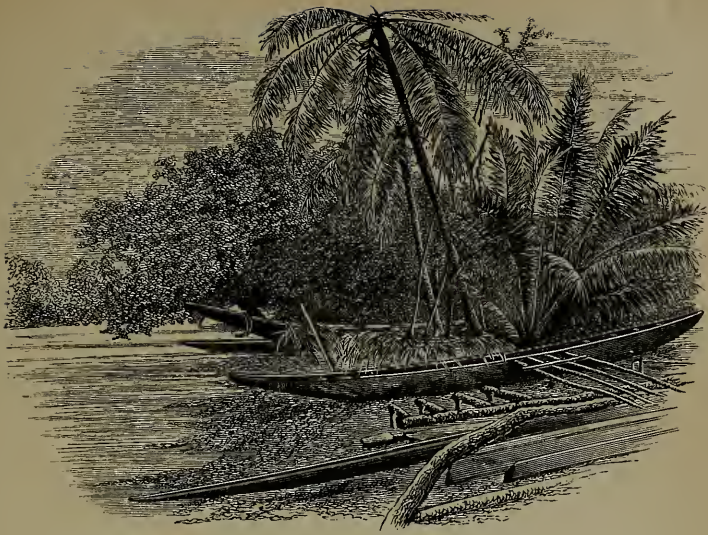
The obstacles which hitherto have been said to bar access to the interior of this continent are fevers, impenetrable forests, and swarms of hostile cannibals; but experience has since contradicted more or less these discouraging reports.

The fevers will be found restricted to certain localities; the cannibals may, by judicious treatment, not prove so bad as represented; and the difficulties of locomotion may be overcome by exploring the great rivers which are known to reach the coast from the interior.

For several days past we had noticed numerous trunks of trees, brought down probably by the river Amboruth, which forms the delta terminating in

Point d'Urville, and is supposed to drain the northern slopes of the Charles Louis Mountains. It was dark as we anchored off Cape Bonpland, and at first the only signs of natives were the numerous lights, which formed a kind of illumination all round the shores of the bay.

After a while some voices were heard, and by the light of lanterns a canoe was seen alongside, manned by a few dark forms clad only in their ornaments, consisting of white cockatoo feathers stuck in their woolly hair, or wreaths of bright scarlet flowers.



THE LANDING-PLACE ON WILD ISLAND, ADMIRALTY ISLANDS.

CHAPTER XII.

HUMBOLDT BAY (NEW GUINEA) TO NARES HARBOUR (ADMIRALTY ISLANDS), AND TO YOKOHAMA (JAPAN).

In Humboldt Bay—Natives alongside—Impressive appearance of the savages—Attempted landing frustrated—Hostility of the natives—Their villages, canoes, &c.—Leave the coast of New Guinea—Admiralty Islands in sight—Anchor in Nares Harbour—Natives alongside—Bartering—Landing at Wild Island—The natives at home—Description of the islands—Survey of the group—Leave the Admiralty Islands—Course shaped for the Ladrone Islands—Deepest sounding for the cruise—Unsuccessful in reaching either Ladrone or Caroline Islands—The Japan Islands in sight—Enter the Bay of Yedo—Beautiful scenes—Anchor off Yokohama.

THE next morning at daylight showed that we were in a most interesting and beautiful bay. The ship was surrounded by about eighty canoes, each

manned by half a dozen savages, armed with bows, arrows, spears, and stone hatchets. It was decided to shift our position for one farther up the bay; and as the screw made its first revolution, the astonished natives pointed their arrows at it, as if they expected some enemy to rise from the foaming waters. Slowly we steamed on our way, followed by all the canoes on starboard and port sides doing their utmost to keep pace with us.

At this moment the scene before us was probably the most novel and most impressive of all that had been witnessed in the course of the expedition. Above a sunny sky, swept by a morning breeze; in the background the hilly shores of the bay, covered with the most luxuriant foliage, the trees crowding down to the water's edge, and dipping their boughs into the white breakers; around us a moving mass of dark brown figures, some decked with leaves, flowers, and birds' feathers, others in enormous frizzled wigs and all the savage glory of war-paint, breastplates, bows, and arrows—all joining in a monotonous chant, in unison with the sound of the conch-shell; in the centre the *Challenger*, at this moment the only representative of Western civilisation in this rarely visited region—a period of two thousand years of progress separating us from the people we had come to see. It was intended to remain near the shore off one of the villages, but no safe anchorage could be found; the bottom seemed



VILLAGE IN HUMBOLDT BAY, NEW GUINEA.

to be composed of loose stone and masses of coral rock ; so after all we had to anchor in mid-channel in 40 fathoms. The canoes remained around us, and a lively trade soon sprang up between the ship's company and the savages. To one unfamiliar with the South Sea trade it was rather a surprising spectacle to see an armful of weapons, belts, necklaces, and earrings, the result of many days' patient labour, exchanged for a few pieces of rusty hoop-iron or a string of beads. Bartering thus went on all day ; and when the natives saw some of the trade gear with which we were supplied, it was surprising how their cupidity was excited, and their evident willingness to part with anything and everything they possessed for small hatchets, knives, beads, or iron. The noise and scrambling alongside while this trading was going on baffles all description ; for, besides the usual talking and shouting, they had a singular habit of directing attention to their finery by a loud, sharp-sounding *ss, ss!*—a kind of hissing sound equivalent to "Look at this!" In their bargaining they were generally very honest, passing up the articles selected on the end of their fishing-spear, receiving in exchange the pieces of hoop-iron, which seemed to be much prized by them ; at the same time showing great eagerness to obtain the small hatchets and long knives, but seemingly attaching little value to calico or handkerchiefs, although a gaudy pattern or bright colour was sure to attract their attention.

As soon as we anchored, all our boats were got out, as it was intended to spend a week here and make a survey of the bay; and great were the preparations amongst the naturalists and others at the prospect of exploring the beautiful forests, &c., stretched out around us, where altogether everything was likely to be new.

On the first of the boats approaching the shore, it was closed upon by a number of savages in their canoes, and all that could be stolen they laid hands on. A second boat was similarly treated, and they evidently opposed any landing being made with hostile demonstrations, bending their bows and intimating their intention to shoot if we persisted in the attempt. Very judiciously we gave way, although all were fully armed, and the boats returned to the ship, every one feeling disappointed at the result.

Later in the day another attempt was made to land at a village on the other side of the bay; and as the shore was approached, a few natives, who appeared on the platform (which connects their different huts), assumed a threatening attitude at first, but as the party neared, they seemed convinced of their peaceful intentions, and allowed a landing to take place on the beach. A large crowd soon collected around us, and followed in our track through the village. The natives met with have a dark brown skin; they are rather short, but otherwise well-formed, with woolly hair usually stained with

a red powder, good foreheads, eyebrows slightly contracted, broad flat noses, with wide nostrils, generally adorned with a pair of boar's tusks, which give them a very fierce appearance; thick lips, retreating chin, and sometimes a little beard and whiskers. The ornaments worn by them were very numerous, besides which they seemed to be very fond of decorating their person with flowers and strong-scented plants. In what might be considered full dress (?), with their face and body painted (the most common fashion was a broad streak down the forehead and a circle round each eye, with daubs of paint round the mouth, and some over the entire body, rendering them inexpressibly hideous in our sight), they were often decorated with belts and breastplates made of the bones of the cassowary and dog, together with long streamers of pandanus leaf. They wear bushy wigs of frizzled hair, dyed in various colours; bracelets and armlets of woven grass, and necklaces of shell, black seed, and dog's teeth.

Nearly every one was armed with bows and arrows. The bow is made of a tough, black, close-grained wood, the string being of bamboo. Their arrows consist of a head of cocoa-nut wood or bamboo, tipped into a light reed, and secured by a neat cane-plaiting. They are variously barbed on the edges, and some are so constructed as to break off in the wound and remain there.

Unlike the men, who were entirely naked, the women wear a sort of apron, about a foot square, made apparently of the pandanus leaf, divided into long grass-like shreds; their hair is cut short. Of personal ornaments, they had none; this seems to be almost the exclusive privilege of the men.

They would not permit us to look into their huts; so no idea could be formed of what they were like. The village consisted of some dozen or twenty houses, built on a platform on slender posts standing in the water, and connected with the mainland by a sort of bridge. They have tall tapering roofs, covered with palm leaves. As it was not considered safe to venture far (for they are known to be a treacherous race), after a few hours, the pinnace returned to the ship, still followed by a flotilla of canoes, with the lively and excitable natives trying to keep pace. The canoes, usually from 20 to 30 feet in length, are made from the trunk of a tree hollowed out like a long trough, roundly pointed at each end, not more than 18 inches wide; the sides bulge out below, and fall in again at the top, leaving only some 8 or 9 inches between the gunwales. The bow and stern are alike, and usually carved in various devices, some resembling birds, snakes, or other familiar objects. A long outrigger is attached, and on the portion of framing supporting these outriggers are planks or long bamboos, forming a small stage, which will accommodate two or more persons,





and on which articles for barter are stowed. The paddles have spear-shaped blades, measuring about 6 feet in length; some of very neat description, with blade and handle carved with some fanciful device.

As nothing farther could be done here, stean was in requisition, and before night set in we were fairly off, and out of sight of land. For a week we shaped an easterly course for the Admiralty Islands, sighting Boissy Islands, and on the 28th one of the Schouten Islands, and a few days later the Hermit group. Frequent soundings and dredgings were undertaken with good results, from an average depth of 2000 fathoms. The morning of the 3rd March turned out cloudy and wet. As the day advanced and the horizon cleared, three small islets were seen, which, according to D'Entrecasteaux's chart, lie off the north-west extremity of the Admiralty Islands. Shortly afterwards two other small islands came into view, all situated apparently on the same coral reef. As we approached, several canoes were seen under sail, crossing the line of breakers; and as they passed alongside, the natives made signs of amity by holding up their arms. On nearing the anchorage we found ourselves in the midst of a number of beautiful islands, all girt with white encircling reefs. Each seemed to have its own peculiar beauty; but the eye as well as the mind felt more satisfaction in resting on what was afterwards named Wild Island, where a fine beach was seen, protected from the heavy swell

by extensive coral reefs, and affording a convenient landing. The whole island was clad in a thick forest of tropical vegetation. Having reached a convenient anchorage (which was afterwards named Nares Harbour), the beautiful view before us, and the smoke rising from the native huts between the trees completed a perfect landscape.

Next morning at sunrise we beheld a repetition of the scene witnessed in Humboldt Bay. The ship was surrounded with natives, all eager to trade, and the noise made by their combined voices was deafening. The principle articles of exchange were tortoise-shell spears, stone knives, axes, earrings, bracelets, ornaments worn from the nose, circular plates of white shell, some finely carved bowls, and models of canoes, &c. Hoop-iron and trade-gear (small hatchets, calico, beads, and knives) formed the medium of exchange. To describe the scene alongside is altogether impossible. We soon discovered that there would be no difficulty in establishing a good understanding with these people, and almost immediately a landing was effected, all being armed so as to be on the guard against any treachery; for these islanders are of the same race as those inhabiting the Solomon group, and travellers speak of them as hostile and treacherous. Of their being cannibals, there can be no doubt; so at our first intercourse great caution was certainly necessary. After a while, however, when we had got somewhat familiar, and numerous

presents had been given to the chiefs, there was no obstacle in the way, and we were free to wander through the village, and even enter their houses and see their women and children.

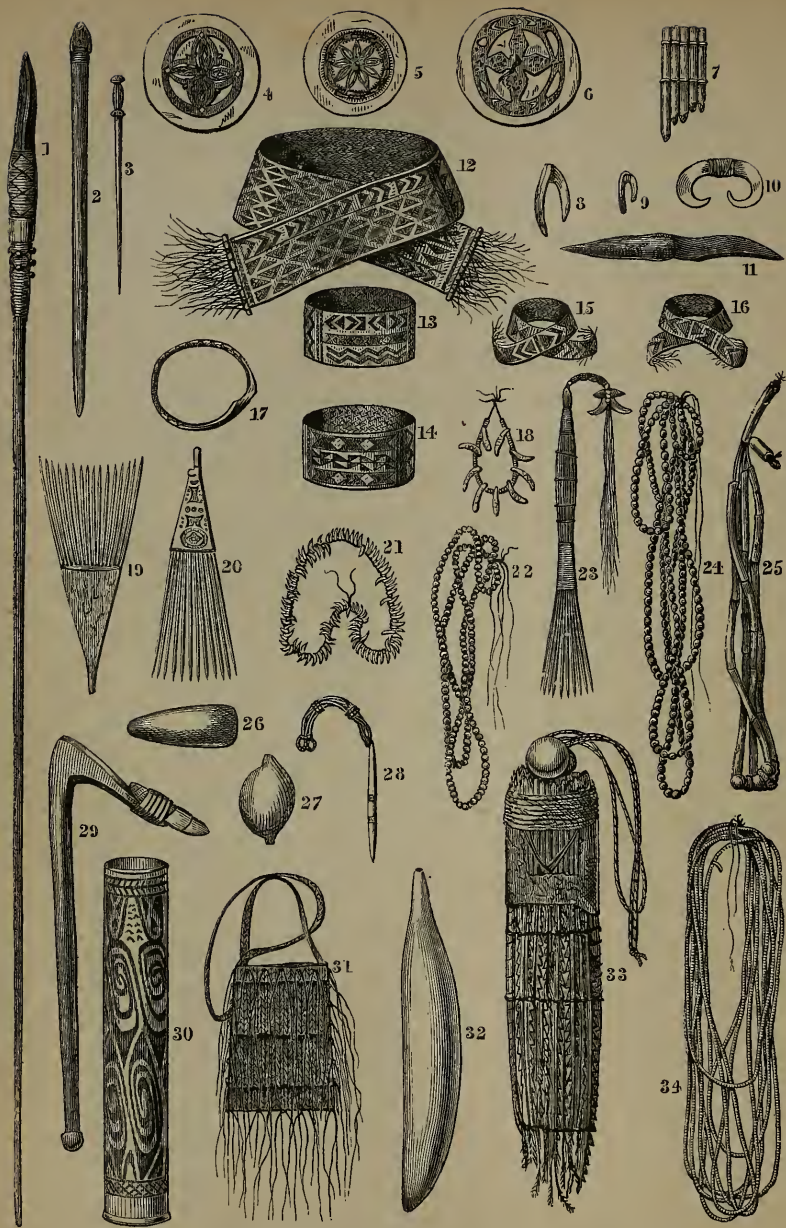
The village consisted of a large number of huts, built of logs of wood, covered with a solid thatch of palm-leaves, with a fence of the former material surrounding every three or four. The paths and open spaces through the settlement were strewn with white sand, and inside the fence were seen some attempts at ornamental gardening, several bright flowering shrubs being selected.

The natives are somewhat darker (a kind of sooty brown) than those met with in Humboldt Bay. The expression of their faces was decidedly intelligent, and sometimes very pleasing. We noticed no signs of bows or arrows amongst them; their only weapon of defence being a spear, which they make of obsidian, a hard volcanic glass. This is split into the required shape, and fixed to the head of the shaft with fibre coated with gum.

Their clothing is very simple; the women wearing a broad belt round their waist, to which are suspended leaves and grasses reaching to their knees, and the men nothing but a large white shell (*Ovulum ovum*). They have bracelets and armlets, made of plaited grass and fibre, and belts of similar material. Some had bracelets of large sea shells (grinding out the middle and rounding the edges); and ornaments

of similar character were hung round their neck and in their ears, which in some cases were dragged down to such an extent that the lower tips of the lobes were within a few inches of resting on their shoulders. The septum of the nose was pierced, and from it was suspended a number of teeth of the dog, or cuscus, strung on a fibre (hanging in front of their mouth), or a long piece of bone was reeved through from side to side. Human arm-bones, covered with feathers, &c., of the cassowary, hung down their backs. They were in most cases painted over the body, with pigments probably made from pounded charcoal, mixed with cocoa-nut oil, or lime made from burnt shell.

The particular vanity of these people, especially the men, was their hair, which was usually frizzled up into mop-like shape, or tied in some fantastic style on the top of the head, and coloured with a red clay and oil. Nearly all carried in their hair a comb projecting in front or on one side, usually made of wood, about a foot in length, with six very long, slightly diverging, needle-shaped teeth; the handle usually decorated with feathers and long streamers. Both sexes had their shoulders and arms roughly tattooed. They appeared to be much astonished at our white complexion, which they at first took for the effect of white paint; nor were they satisfied on this point for some time (not until they had actually felt and seen closely). This would almost confirm the supposition



ORNAMENTS OF DRESS, AND WEAPONS, USED BY THE NATIVES OF NEW GUINEA AND THE ADMIRALTY ISLANDS.

(For description, see opposite page.)

that these people had never previously seen any white men. They are, as I remarked before, very fond of using paint as a means of personal adornment; black, red, and white being their favourite colours, with which they also paint their canoes, door-posts, weapons, wooden bowls, and idols. There was not the least indication of any advance made towards civilisation; yet, with all this, they show a certain amount of intellectual development and feeling for art, decorating their canoes, houses, weapons, and almost every domestic utensil, with elaborate carving and painting. In all our researches and wanderings over the islands we saw no signs of graves, nor could we ascertain with any degree of certainty how they disposed of their dead. From signs they made, such

Description of Illustrations facing this page.

- Figs. 1, 2. Obsidian pointed spears (Admiralty Islands).
 Fig. 3. Hair ornament (Admiralty Islands).
 Figs. 4, 5, 6. Ornaments of shell and tortoise shell worn on the forehead (Admiralty Islands).
 Fig. 7. Musical instrument (Admiralty Islands).
 Figs. 8, 9. Fish hooks made of shell (Admiralty Islands).
 Fig. 10. Bone ornaments worn through the septum of the nose (New Guinea).
 Fig. 11. Knife made of obsidian (Admiralty Islands).
 Fig. 12. Plaited grass belt (Admiralty Islands).
 Figs. 13, 14. Armlets of plaited grass (Admiralty Islands).
 Figs. 15, 16. Plaited grass anklets (Admiralty Islands).
 Fig. 17. Shell bracelet (Admiralty Islands).
 Fig. 18. Nose ornament made from dog and cuscus teeth (Admiralty Islands).
 Figs. 19, 20. Combs (Admiralty Islands).
 Fig. 21. Necklace of dogs' teeth (Admiralty Islands).
 Figs. 22, 24, 25. Necklaces of bone, shell, and berries (New Guinea).
 Fig. 23. Comb (New Guinea).
 Fig. 26. Head of stone hatchet (New Guinea).
 Fig. 27. Shell, full-dress of a man (Admiralty Islands).
 Fig. 28. Bone nose ornament (Admiralty Islands).
 Fig. 29. Shell adze (Admiralty Islands).
 Figs. 30, 32. Chinam holders (Admiralty Islands).
 Fig. 31. Grass bag (Admiralty Islands).
 Fig. 33. Ornaments of human bone and cassowary feathers (Admiralty Islands).
 Fig. 34. Waist-belt made of small shells (Admiralty Islands).

as placing a large earthen vessel on the fire, and indicating that they cut off parts of the body, place in the vessel, and afterwards eat them, our suspicions were aroused that they honour the memory of their friends and relations by eating them. At all events, they had no objection to sell human skulls, of which several were procured, and no sacrifice seemed too great for them if they could only get hold of that priceless material—iron hoop.

We have no record of any visit of Europeans to these islands since that of D'Entrecasteaux, in 1792, who did not land, and could not prevail on any of the natives to visit his vessel. But from the first we seemed to have established a good understanding, and our stay was sufficiently long to render us familiar with the faces of our daily visitors. Their conduct seemed always cheerful and friendly, and they had no objection to come on board, and submit to the processes of being photographed, weighed, and measured.

Thus a week passed. The bay, reefs, and islands were surveyed and named, and many a pleasant day's sport had on Pigeon Island, where there were numberless birds and pretty tropical scenery. The survey and magnetic experiments being completed, on the 10th March we steamed out of Nares Harbour, not without regret at leaving these interesting savages; and before sunset they and their beautiful islands had sunk below the horizon.

Leaving the Admiralty Islands on the 10th March, a course was shaped for Yokohama, with the intention of reaching Guam, one of the Ladrone Islands. We lost the trades in lat. 17° north, and after that had a succession of easterly, north-easterly, and baffling winds, from every point of the compass except where it was wanted, thus preventing our visiting either the Carolines or Ladrone, which were passed some 100 miles to leeward. On the 23rd March, in lat. $11^{\circ} 24'$ north, and long. $143^{\circ} 16'$ east, bottom was touched at 4475 fathoms, the deepest successful sounding made during the whole cruise. Specimens from that depth showed a dark volcanic sand, mixed with manganese. In consequence of the enormous pressure at that depth (some five tons on the square inch) most of the thermometers were crushed. However, one stood the test, and showed a temperature of 33.9° , the surface temperature being 80° . Three other attempts were made to determine the temperature of water at these great depths, but in every instance the instruments came to the surface in a damaged condition.

We were clear of the Tropics on the 1st April, but in consequence of the continued light winds, and repeated soundings and dredgings, the thirty-two days at sea passed somewhat wearily and monotonously. Three months from Hong Kong; but the longest voyage, like the longest lane, must come to an end at last.

April 11th.—Early this morning the light on Kawanon Saki, at the entrance of Yedo Bay, was seen shining brilliantly, and as the day advanced, wind fell light, steam was got up, and we proceeded on towards the anchorage. Island after island comes in view as the bay is entered; many of most picturesque form, with numerous fishing villages scattered along the coast. As we move on, places of great interest are passed: Yokosuka, and soon Kanagawa, then Treaty Point, and Mandarin Bluff, &c., each place having a little history of its own in connection with the early days of the Europeans in Japan.

Yokohama is now before us, with the sacred mountain Fuji-yama, the snow on its high peak looking like frosted silver as it stretches away in the distance, pointing, cone-like, high into the clouds, and far above the elevation of the blue mountains that surround it. On reaching the harbour, and at anchor, the reward begins. It happened to be a fine day on our arrival, the sun was shining brightly, and the few passing clouds cast fleeting shadows on the fine panorama of hills which form the background, producing one of the most pleasing landscapes possible to see. Even to ordinary observers of the picturesque, there was much to compensate for the long, wearisome, monotonous voyage. Many ranges of hills, in graceful lines, carry the eye far into the distance; while the beauty of the shore, with its luxuriant foliage, is aided by cloud and sunshine, which give a most

perfect effect, clothing all the mountain sides with purple and russet hues, giving a mantle of rich and ever changing colour to all the headlands and distant ranges. Junks and boats, with their picturesque sails, and war-vessels of different nationalities, are never wanting to give life and movement to the whole.

There must be something essentially pleasant in new sensations and novelties in almost every form, since not only do we give ourselves much trouble to acquire them, but generally find gratification when they are secured. No travelling in Europe can rob Japan of its peculiar claims to admiration under this head, for nothing in the West resembles a thousand things that meet the eye. It must ofte have been remarked how books or photographs fail to enable any one completely to realise a new country and people. Once amongst them, it is discovered immediately that the ideal is something very different from the actual embodiment. This is essentially true of people, towns, and streets, and the effect of costumes, differing widely from those to which the eye has been accustomed. Certainly, as regards the first view of Japan, there are special items, in the figure, physiognomy, costume, and customs of the people, for which even I was not prepared, although I had so recently seen much of the Chinese.



TOMB OF WILL ADAMS AND HIS WIFE, NEAR YOKOSUKA, JAPAN.

CHAPTER XIII.

JAPAN.

Yokohama—The Cemetery—Walks in the environs—Visit Tokio (or Yedo), the eastern capital—Railway from Yokohama to Yedo—Jinirikisha—Sojourn at Shiba—The suburbs of Yedo—The streets and people—"Curio" shops—Lacquer-ware—Street scenes—The great temple of Asakusa—Japanese wrestlers—Leave Yokohama for Yokosuka—The imperial arsenal—*Challenger* in dock—Secluded temple near Yokosuka—Will Adams and wife's tomb—Visit Kamakura—The shrine of Daibutsu, the great god of Japan—The tea-houses—Leave for Yokohama—Yokohama to Kobe—The rough passage—Take shelter in Oosima—Arrive at Kobe—Anchor in Osaka Bay—Hiogo, Kobe, and Osaka—Railway to Osaka—Its people and streets—The great temple of Tonage—Cruise in the inland sea—The fine and picturesque scenery—Return to Kobe—Passage to Yokohama—Dredging picnic in Yedo Bay—The results.

THE first landing in a new country is generally a moment of some excitement even to the oldest

traveller, for the numberless objects of interest to be seen at almost every step fill the mind with admiration; and although it would really take months to see all (in Japan) in detail, yet it is well known that, to the sightseer, a great deal may be crowded into a short space of time; and so one was enabled to realise something of this country and people.

I landed on the 12th April at Yokohama, a town which has within the past few years risen from a small fishing village to a place of great importance, possessing numerous fine buildings, such as a large town-hall, custom-house, imperial post-office, and residences for officials and foreign consuls, telegraph offices, banks, several churches, a railway station, race-course, and public gardens; also wide streets, both in the foreign concession and Japanese quarter, with business houses of various kinds; streets lighted with gas; and, if so many Japanese were not met with, it would not be difficult to imagine oneself in some European town.

There are special points of interest to the stranger at every step in Yokohama, whether in passing through the native quarter, where the silk, bronze, lacquer, porcelain, and curiosity shops are located, or a pleasant walk over the Bluff—either will give one a good idea of the topography of Yokohama; while a ride by the new road around Mississippi Bay and through the village of Negishi affords fine scenes and

accurate, if not fascinating, pictures of ordinary Japanese life and character.

The cemetery in Yokohama should by all means be visited : the tombs and epitaphs give a vivid picture of the stormy days and dangerous times in the early settlement of Yokohama, when it was unsafe to venture outside the settlement ; for the Japanese *rônin*—a creature as cowardly as murderous, since he always struck from behind—was ever ready to cut down the unwary foreigner.

The most imposing tomb in the cemetery, near the entrance, is that of a murdered Russian officer. The bodies of two Dutch captains, killed in Benten, Yokohama ; Major Baldwin and Lieut. Bird, hewn down near Kamakura ; Mr. Richardson, hacked to pieces near Kawasaki ; and eleven French soldiers, shot in cold blood near Osaka, are buried in this place. Several other tombs, each possessing an historic interest, are here ; in fact, there are few places more worthy of a visit by the stranger, or more profoundly interesting to a student of the early days of the foreigner in Japan.

Piers and cambers run out, and the bay is full of shipping of many nationalities ; but by far the greater number fly the national flag of Japan, for the country possesses several war-vessels and a large coasting fleet, manned and officered entirely by Japanese.

Walking into the country, we find shady lanes and trim hedges, with glimpses of wooded hill and

cultivated valley at intervals, which render the place so beautiful that they might be transplanted to England without any violence to the harmony of our own scenery; for here many of our familiar plants flourish, and everywhere our common fern may be seen, and ivy covering the walls, while by the wayside the thistle is not wanting to complete the picture.

The visit to the capital, Tokio, was a most interesting treat. The progress already made by the Japanese in establishing railways removes all difficulties in reaching our destination. The seventeen miles between Yokohama and Shinbashi are run over in somewhat less than an hour, although we stop at three or four stations on our way; passing some pretty scenery through garden-bordered streets, and the open country, with rice and wheat fields everywhere, indicating, unmistakably, signs of skilled and careful agriculture. After reaching the city I made my way to Shiba, travelling in the new vehicle of Japan (the jinirikisha) to the residence of Mr. Harding, R.N., instructor in steam at the Imperial Naval University, with whom I was to stay for a few days. Merely telling my conductor, "Shiba ni iki nasai," off he ran along handsome roads, passing continuous rows of shops, which are open to the streets like stalls at a fancy fair, and which contained all those articles seemingly in common request among the people. Umbrella, fan, and shoe stores abound, also eatables

in any quantity; then basket and lacquer work, earthenware, toys, and glass ornaments. However, passing on so rapidly, it was not more than a cursory glance that could be obtained of the novelties displayed. Hundreds of similar vehicles to the one I was in were passing in all directions; while the number of foot-passengers, all apparently happy and contented, gave the scene an air of life and animation.

Leaving the streets for the suburbs, showy little cottages, each surrounded by gardens laid out with tasteful neatness and artistic skill, are passed; and so through shady lanes, bordered by hedges with rich and waving foliage, until reaching the inclosure where my vehicle stops. "Ikura ka," I was taught to say, and I found I had been riding all this distance for an *ichi-bu*. My friend was in waiting to receive me, and we entered the building he occupies, which had at one time been attached to a large temple near at hand, and for which this part of Yedo is famous. The house appears to have been built in the position it occupies with a view to the charming prospect it commands. It has broad verandahs running round it, every door and partition sliding backwards and forwards in grooves, instead of opening and shutting in our ordinary way.

Entering by the doorway, and passing through a spacious hall, matted according to the government regulation, which prescribes that every mat manufactured throughout the empire shall be of one size,

we reach the spacious rooms, the walls and panels of which were ornamented with paintings of various animals and figures—tortoises, cranes, dragons, and wondrous unreal monsters. All the furniture, light, neat, and airy, with lacquer-ware, china, and bronzes, gave the entire aspect of the place one of seductive repose. Opening out from the verandah was a well-cultivated garden, where most that was lovely in nature was to be seen: choice flowers and shrubs; ponds in which were gold and silver fish, ever ready to exhibit their lovely tints, amidst water-lilies and other beautiful aquatic plants. This, then, was to be my home for the next few days. During my stay I made the most of the time at my disposal in sight-seeing, and under the guidance of my host many a pleasant trip was arranged. We did not confine ourselves to exploring the city alone, although the sights to be seen there were of the greatest interest, but cruised for some miles round, where are snug little villages with fertile fields highly cultivated, combining to form scenes of beauty and abundance that can scarcely be conceived.

On one occasion, after passing the imperial residence, we ascended one of the highest points of the fortifications in the rear of the castle, from which a fine panoramic view was obtained of the vast city, with its two millions and a half of inhabitants, occupying an area equal to, if not greater than, London. Looking in any direction, the view was

one of beauty. Everywhere are picturesque scenes ; hill and dale, clothed with brilliant vegetation of sparkling green. Up the hillside temples tower over the more modest houses of the people, and pretty pleasure villas peep forth from the flowers and verdure of the tea-gardens.

After leaving this, the aristocratic quarter of the city, we went on, passing through streets which seemed interminable, where shops containing miscellaneous assortments of goods suited to the wants of the population were to be seen. At last, when somewhat clear of the crowded thoroughfares, we found ourselves traversing pleasant suburban lanes, occasionally passing spacious inclosures, at one time the homes of powerful princes or daimios, some of which are said to have afforded accommodation to as many as ten thousand retainers within their walls.

I was filled with feelings of astonishment and delight as we passed through fragrant avenues of peach, cherry, and plum trees in full bloom, over arched bridges spanning the bright blue river that flows through the heart of the city ; getting here and there glimpses of the exquisite taste displayed in the gardens and cottages along the roadside. No model estate in England can produce structures in any way comparable with those which adorn the suburbs of Yedo. These charming little *châteaux*, raising their thatched roofs amid numberless fruit-trees and creepers, were usually surrounded by flower-

beds and artificial rockeries, laid out with exquisite taste. Frequently we met men, children, and beautiful girls, amiable, winning, and full of gentleness, in light and gauzy costumes; their hair tastefully drawn from off their forehead, and fastened with gold or silver pins in graceful knots on the crown. All seemed happy, talking, laughing, and smiling—their greetings and salutations assailed us wherever we went.

Here and there, at the end of long avenues, were to be seen gorgeous temples embosomed amongst giant camphor and cedar trees; standing about at their entrances were lazy-looking priests with shaven crowns, in robes of silk and transparent material. Sauntering up the shady walk, we ascend the steps and enter the sacred edifice dedicated to Buddha. The priest, for a few *tempôts*, shows us all that is of interest.

The floors are matted, the pillars lacquered and richly gilded. A large shrine, with a gilt image in its recess, gold and porcelain vases, lighted candles and tapers, surrounded by a forest of artificial flowers, at once attract our attention. In the rear are the imperial mausoleums, where lay the remains of Tycoons of centuries past. Before leaving, we are reminded of the collecting boxes in various parts of the building, where the pious worshipper fails not to contribute a few "cash," not as an act of charity, but to provide the means by which the priest may be enabled to feed the hungry demons.

The extensive grounds surrounding the edifice are beautifully laid out with refreshing groves of laurel, citron, and peach trees; miniature bridges span little streams and fish-ponds, and the number of huge candelabra in stone and bronze present a most imposing appearance. Away in the distance are wooded hills, with spreading pines and sombre yew-trees, giving it an air of sheltered repose and secluded rusticity.

As we got farther in the country, the cottages became more scattered, but the scenes presented were equally agreeable, reminding us frequently of the lanes in Devonshire and some of the fairest portions of the Isle of Wight.

At frequent and short distances along the road were little stalls with fruit and tea, the universal beverage, always hot and ready, to quench the thirst of the weary pedestrian.

At length we suddenly came upon a little village embosomed in a wood. Here we stopped for refreshment at one of the tea-houses situated on the edge of a stream, the balconies of the upper room overhanging the water. Entering, we find, through the absence of chairs, sofas, and other requisites we consider essential to our comfort, that, if we would rest, we must seat ourselves, *à la* Japanese, on the clean matting; and joining a party of Japanese ladies and gentlemen, with whom my friend was acquainted, we soon became on the most excellent terms. Re-

freshments had been ordered, and we were invited to join; but my alarm was great when I saw what was spread before us—lacquer bowls, containing such odd mixtures: fish, raw and cooked; rice, seaweed and soy; slices of strange-looking materials, whether flesh or fowl, it was difficult to say; vegetables and saki. These dishes the pretty girls in attendance seemed delighted, with roguish fun, to press on us, apparently for the amusement our wry faces afforded them. It was a hazardous attempt at first, but, after all, some of the dishes were palatable enough.

By way of dessert, oranges, apples, pears, and sweets were brought in; so there was no difficulty in satisfying our hunger.

Pipes, tea, and saki were afterwards served by our fair attendants, and after the long walk we were glad to stretch on the soft matting for repose, while imbibing the pleasant-flavoured tea, and inhaling through a short pipe the fragrant tobacco of Japan.

Afterwards the dancers, the Geisha girls, with sam-i-sen, lute, and tom-toms, came tripping in; but they elicited from their musical instruments such discordant sounds that we were glad to take refuge in the balcony, from which point nothing could have been more picturesque than the landscape presented; the hillsides, dotted with temples and tea-houses, combining to form a scene of beauty that we could not fail to enjoy.

As the evening was closing on us, we took leave of our friends at the tea-house, and retraced our way back to Shiba in a jinirikisha.

A tour through the business quarter of the city is of great interest, for at every step something new is to be seen. The streets are always filled with vast numbers of people, and run on for miles. The shops are filled with goods to suit every requirement: some are rich in specimens of Japanese ingenuity and perfection of work in lacquer, porcelain, basket-work, and bronze, fancy silks, and embroideries spread out in every tempting form.

Like every visitor, I had come with the intention of getting some of the many beautiful things in cabinets and lacquer ware for which Japan is so famed, but the variety on view is beyond my powers of description, for we see lacquer trays, oblong, round, and oval, of beautiful design and wonderfully cheap; boxes and cabinets, with every kind of gold tracery and design, some with birds and trees in raised gold and bronze relief, as rich as well as can be, of all prices, from one dollar to five hundred. Besides these were cabinets of many woods, inlaid, some of infinite ingenuity and perfection of form, opening out into a multiplicity of drawers and trays, of finished workmanship, embossed in silver and gold, such as could not fail to win the most fastidious of mortals.

The silk stores and book-shops are equally attrac-

tive. The carvings in wood and ivory, of groups and animals, are in the best style of art. Figures and vases in bronze are artistic and marvellous in their make. China and porcelain from Kiota, Satsuma, and Nagasaki, beautiful and delicate, with a thousand other articles, are laid out in tempting array, puzzling the visitor to decide what to select. One can walk on for miles and see a repetition of shops of this description. Wherever we go, the city is full of life and excitement, with a swarming population.

The street vendor, with his ambulatory stock over his shoulder on a bamboo pole, or pitched down at the corner of a street, is surrounded with a varied assortment of odds and ends. The acrobat and conjurer amuse extensive audiences collected round them. The story-teller, with his wondrous tales (after the style of the familiar 'Arabian Nights'), delights an attentive crowd. Hundreds of officials (army, navy, and civil service), all in European costume, are decorated with gold lace, gilt buttons, and other insignia of rank; even the police and soldiers are after our own familiar models. Jinirikisha men, coolies, and porters dragging carts laden with goods, all help to swell the tide of human life.

Continuing my way, I paid a visit to numerous temples, and in describing the one at Asakusa, which is situated in one of the most populous quarters of the city, I shall nearly convey an idea of the whole.

This is one of the largest and most celebrated in Tokio. On reaching the locality, we pass on through long avenues crowded with men, women, and children. Here, on either hand, are stalls filled with nicknacks of all descriptions, with refreshments, and troughs containing sacred water, with numberless sacred towels flying like so many flags. As we approach the Holy of Holies, a large bronze figure of Buddha is in view, and we pass on to the building, gorgeously decorated in gold and lacquer work, with elaborate and ornamental carved roofs and pillars. The sacred shrine to which the multitude come to pray is protected by a large frame of wire netting. A curious practice seems in force with the hundreds who pay their devotions here: they purchase from the priest in attendance small squares of paper, on which are inscribed certain hieroglyphics; these they chew for a time, and then throw as pellets at the grating (which is consequently covered with the results). And the precision with which these pellets strike the grating, or go through the mesh, determines certain inferences as to good or bad luck.

Near at hand are large buildings devoted to various exhibitions, all more or less for the benefit of the temple (in a pecuniary sense). I went to one, and saw the wrestlers. This is one of *the* sights of Japan. There were some ten thousand visitors present, and some twenty or thirty performers.

They were men of tall stature and of immense weight. A circular mound some 10 or 12 feet in diameter, on a raised platform in the middle of the building, is the place selected for the performance. On a given signal two of the number present themselves and commence the contest. They eye each other for a while, as if watching a chance to catch their antagonist off his guard, stamping the ground as if with impatience. At length they close together, a struggle ensues, the result of which is that one is forced off the mound; so the contest ends. This was repeated hour after hour, and the audience generally, as they also do in their theatres, come prepared to make a day of it; for waiters with rice, fish, and other eatables, and saki, are constantly in attendance to minister to the wants of the spectators.

The streets are full of life and movement. People are wending their way home, or to the bathing-house, which, strongly lighted up, shows through its lattice bars crowds of both sexes enjoying the luxury of the bath. The tea-houses are filling, and the plaintive sounds from the sam-i-sen are heard from many of the upper stories. Gaily painted and figured lanterns are flitting to and fro, and light up somewhat dimly the shops and roads, for the gas is not as yet laid on all over the city, and the law still remains in force that everyone after dark

shall carry a lighted lantern on which his name is painted.

While here in Japanese waters the opportunity was taken to have the vessel docked, for at Yokosuka, a run of 17 miles from the anchorage (Yokohama), is situated the government arsenal, where some two thousand Japanese workmen are employed, under the superintendence of French officers. Here they have already built two vessels for the Imperial Government, and at the present time there is a large paddle-wheel vessel well on towards completion as a royal yacht for the Mikado, and engines on the most approved compound principle, with high-pressure tubular boilers, are also being prepared. All honour to this nation, which, after living an isolated life for centuries from the rest of the world, has now gone ahead in such an earnest manner, leaving all that any other Eastern nation has attempted far behind. In going over the workshops, which are well supplied with every modern appliance of machinery for successfully carrying out extensive engineering work, we find that steam hammers, forges, lathes, and other appliances in the fitting, smiths', and boiler shops are in full swing; so a stranger cannot fail to be struck with the singular combination of energy and perseverance of these wonderful people, who within the past few years have thus almost by themselves laid the foundation of a steam navy, and taken quite naturally to a modern science which was

to them altogether unknown, notwithstanding the difficulties encountered at every step. A branch of the Imperial Naval College at Yedo is situated here, where the students of marine engineering have the advantage of studying the practical as well as the theoretical part of their profession. This department is under the immediate direction of T. S. Gissing, Esq., Chief Engineer, R.N.; and by his judicious system, and the facilities given to these young men, the progress they make is really surprising. The University, of which this is a branch, is situated at Tokio, with F. W. Sutton, Esq. (Chief Engineer, R.N.), as director, and W. J. Harding, Esq. (Engineer, R.N.), as assistant.

The docks are excellent specimens of work. The longest is 395 feet, in which the *Challenger* was placed, and remained for a week, undergoing certain repairs to the rudder, &c. The second dock is of smaller dimensions, and had the strange-looking vessel which the government purchased some years ago from the United States (then known as the steam ram *Stonewall*) under repairs. Basins and jetties made the arsenal quite complete. The harbour is spacious, perfectly landlocked, and easy of access. At the right of the entrance to Yokosuka is one of the small temples, built in a glorious cluster of rare old trees, under the shade of their branches. In this temple is retained one of those forms of worship which have come down from a time which it is

impossible even to guess at—a worship founded on the veneration due to the origin of life. Formerly the shrine was richly embellished with votive offerings in stone, wood, and paper of all sizes and colours; but visitors from time to time have carried off the principal ones, leaving almost a barren house with only a few rudely carved offerings.

Near at hand, on the top of a high hill, in the village of Hemi-Mura, are situated the grave and tomb of Will Adams (who was the first Englishman to visit Japan) and his Japanese wife. A large monument marks that of Adams, a smaller one that of his wife. Adams was an English pilot, who left Holland in one of a fleet of vessels bound on a trading voyage to Japan in 1607. After many vicissitudes and great sufferings by the crews, only the vessel in which Adams was reached its destination. The crew were treated at first with great cruelty by the Japanese, but afterwards with leniency and kindness. Adams, having a knowledge of mathematics and shipbuilding, ingratiated himself with the Shôgun, who promoted him to a high position, and he lived in Yedo, beloved by the people, for many years. Not being permitted to leave Japan, he took to himself a Japanese wife. Adams himself chose this spot for his resting-place; and the people living in Anjin chô (Pilot Street), Tokio, defrayed the expense of the tombs and lanterns at the grave, and now celebrate an annual festival in honour of him on the 15th June.

From this position the scenery is very fine. The undulating hills, between which we get glimpses of the open country beyond, where the rice-fields, surrounded with trim hedges, and the wheat-fields of brightest green carpet the uplands, and the clear blue waters of the bay stretching before us complete the charming picture.

In all seasons of the year verdure and beauty of no common character clothe the hills, broken into a hundred winding vales for many miles around. After seven miles' walking through pleasant fields with trimly kept hedges, passing cheerful country-houses, we reach Kamakura, which lies in a valley inclosed by hills. Almost every spot of ground in and around here is classic to the Japanese, the great bulk of the vast store of Japanese histories and historical romance having their chief scenes laid in or near Kamakura. However, very little now remains of its whilom greatness. The chief place of interest to visitors is the Shintô temple of Hachiman. This temple stands on a plateau reached by sixty steps. In the courtyard inclosing the buildings are compartments in which are displayed some very valuable and interesting relics. About a mile from here is the village of Hasemura, near which stands the famous bronze figure of Buddha, called in Japanese Dai-butsu; the approach to it is through a very beautiful avenue of evergreens.

The immense casting, although not in one piece, is

so cleverly jointed as almost to avoid detection. It stands upwards of 50 feet in height. Its interior is hollow, and forms a temple, where are numerous gilt idols, chiefly images of Kunanon, with prayers and vows of worshippers, written on papers twisted together. A priest in attendance disposes of historical books and photographs of this great divinity.

The tea-houses in the vicinity are enjoyable places. There is always something or other to amuse visitors, either gardens with beautiful flowers or an agreeable view of the surrounding country, so as to tempt the traveller to enter and enjoy himself. The eatables, consisting of cakes and various sorts of fish and vegetables, and often sweetmeats, are usually far more agreeable to the eye than to the taste. Tea is the universal drink, but it is not in accordance with European flavour, tasting somewhat like an infusion of wood ashes; yet the Japanese consider it far more wholesome than that which we are accustomed to use. A favourite drink is also made from the peach blossom, which is even worse in flavour than the tea; for the flowers, after picking, are kept in salt, and, when required, a slight infusion is made; these, with saki, a spirit distilled from rice (which the Japanese are very fond of), constitute nearly all their refreshments.

Docking and refitting having been completed, we returned to the anchorage off Yokohama, and on the 10th May left for Hiogo. After passing through

the Uraga Channel (where a day was spent in sounding and dredging in 350 fathoms, with very satisfactory results), and getting clear of the coast, there was every indication of squally weather; and soon after we came in for the full force of the north-west monsoon, which with squalls, drenching rain, and a rough and turbulent sea, made the passage very unpleasant.

Our utmost endeavours were used to get round Siwo Misaki, but it seemed almost hopeless attempting to steam against the strong wind and heavy seas. Eventually it was decided to run into the well-sheltered harbour of Oosima. The weather, as soon as we were sheltered under the land, brightened up; and the entrance was not devoid of beauty, as island after island came into view. We passed a peculiar cluster of rocks forming a portion of the harbour at the south-east entrance of the Kii Channel, the Japanese name of which is Ishi Bashi, or Stone Bridge. Two pretty little fishing villages (Hasingui and Kusimota) are here situated, lying at the foot of a range of hills.

During the night the weather moderated, and early the next day we left the anchorage, steamed round the extreme south point of Nipon (Siwo Misaki), and entered the Kii Channel. It was a clear and beautiful morning, but a mist lay along the horizon, which, however, as the day advanced, cleared, and at length the high land of the coast was

in sight. All were eagerly watching the beautiful scenery which from time to time presented itself, until at length we anchored off Kobe, in the Bay of Osaka. On either side were towering peaks covered with vegetation to their very summits, and shady groves, among which appeared temples, and pretty cottages, not altogether unlike those seen in Switzerland; while stretching along the bund before us is the foreign concession, with its hotels, clubs, and consular residences, its regular terraces and streets of prim stucco-fronted houses and villas, forming as great a contrast as possible to the surrounding scene.

It was high holiday during a portion of our stay here; everybody *en fête*. Opportunities were therefore presented to us of seeing some of the religious ceremonies and processions for which Japan is so famous. The streets were gaily decorated with flags and festoons of brightly coloured lanterns; little chapels, gilded and varnished, dedicated to local deities, and quaintly carved cars filled with musicians, whose drums and gongs sounded in harsh and discordant clashes, were carried by coolies on bamboo poles; vehicles drawn by girls and boys, gaily dressed, in which were local celebrities, priests and others; ladies and courtesans followed in palanquins, amidst a host of banners. These processions were kept up for several days, and the festivities continued until late in the evening, when the city was

illuminated with lanterns. Occasionally there was a halt made in front of the house of some magnate, when addresses were given, followed by theatrical representations and dancing.

The Japanese hold that one of the best means to propitiate the divinities is to be happy, and not seek to annoy them with incessant prayers and supplications, feeling assured that their gods take pleasure in seeing every one enjoying innocent recreation.

I was, of course, very eager to learn all I could about the country and people, but there was so much of interest, and such a short time to inspect it, that I was frequently almost in despair. These people have for centuries kept aloof from other nations, and retained their manners, customs, and ideas unchanged; these seemed so peculiar to us that it was with some anticipations of pleasure I made one of a party to visit the most important resident of this port, Moumagami, who is brother to the great high-priest of Honganji Kyota. Arriving in due course at his residence, which was situated on the side of a hill, we entered the vestibule, where were several attendants, who saluted us in their national style, which was by passing their hands down the knee and leg, at the same time giving a strong inhalation, indicative of pleasure. Our arrival was now announced to Moumagami, who came forward and welcomed us.

Close at hand a new temple had been reared, and was now to be dedicated to the service of Buddha, in whose honour theatricals and dances were onward. The entertainments presented were so peculiar, and so beautiful were the dresses and decorations worn by those taking part in it, that we could not fail to enjoy the spectacle thoroughly.

The ladies of the household, Noriko and Satshiko, two of our host's sisters, and other friends were present, to whom the strangers were introduced.

They were very pretty women. One in particular I may mention, whose jet black hair, ornamented with amber and tortoiseshell combs, was bound up into thick masses at the back of the head with flowers and ribbons, and further decorated with a number of gold and silver arrows, and similar ornaments. Her costume was very beautiful—pale grey crape, embroidered with gold and silver, and a profusion of flowers. It was lined with a bright blue silk quilting, which formed a train on the ground. Only a part, however, was visible, as the silken belt round the waist allowed it to open only very slightly. Over this she wore a broad sash of dark colour, embroidered in gold, and tied in a very large knot behind. This was the obi. The sleeves were long, and reached nearly to the ground. All the colours of the dresses worn by the company harmonised so beautifully that, although there was a most brilliant collection of tints, the aspect was most pleasing. The Japanese in-

variably show exquisite taste in the arrangement of colours.

Tea, sweets, and saki were served in diminutive china cups, and before we left, attendants brought in, and placed before each, gold and lacquer bowls with chopsticks. Chicken and vegetables, duck and sweet jelly, fish and seaweed, were passed round.

At first we found some difficulty in using the chopsticks, which amused our fair friends very much ; nor could we help laughing ourselves at our awkward attempts. Then pipes and tobacco were in requisition, the ladies joining ; and although their pipes are small, and the tobacco used is of a delicate description, I should infer from what I saw that they are great smokers.

It was near sunset as we took our leave, the ladies bowing low and speaking a few words in their native language, which we understood to be all sorts of good wishes for our future success, the host accompanying us to the porch, bidding us farewell.

We had spent a most agreeable and entertaining day, the kindness, hospitality, and general good temper of our host and hostess leaving a very pleasant impression.

The view from this point was very fine, embracing the far-off hills of the opposite shore, the island of Awadji, at the entrance of the inland sea, the river to Osaka, and an ever moving mass of white sails of

junks and boats; while stretching out below us lay the richly cultivated plain, dotted with white roofs, amongst the bright colours of the cornfields and the sober olive of the surrounding foliage.

During our stay we visited Osaka, which is about 30 miles from Hiogo. There is a railway between the two, and trains run frequently during the day. The trip is most enjoyable. Nearly the whole way lay along slopes and through villages, valleys intervening between the sea and mountain ranges. An hour's run and Osaka is reached. This is one of the five imperial cities, and is most pleasantly situated in a fruitful plain near a navigable river, which is spanned by upwards of a hundred bridges, many of extraordinary beauty of design.

The streets are, as in all Japanese towns, very narrow; still they are regular, and cut each other at right angles. The internal arrangements of the shops are simple and uniform, though somewhat modified according to the business of the occupants; still there is a great sameness in every town.

The buildings are not of a very imposing character, with the exception of the temples, many of which are splendid specimens of art, rich in gold and lacquer work; particularly the one at Tonagee, with its grand and stately pagoda, from the top of which a fine view is obtained all over the city.

A week was spent at Kobe, and on the 25th May we left for a cruise through the inland sea.

It seems impossible to do justice to the beauty of the scenery here; talented writers have attempted the description, but the best have failed, and to my mind fall far short of the beautiful reality. Assuredly I cannot paint its loveliness adequately by any words of mine.

Amidst this beautiful scenery we remained for a week, occasionally dredging, but not with much success. At the close of each day we anchored off some pretty little village, and then made our way on again early in the morning, until reaching Matsu-hama, which is about halfway through, when our course was altered so as to return to Hiogo. There appears to be an extensive traffic, from the vast number of junks and coasting-steamers daily met with, and swarms of fishing-boats seem to abound everywhere, making quite a lively scene. All this, with the marvellous richness and fertility of the innumerable islands, leaves nothing to be desired. On the 29th we reached Hiogo, and once more anchored in Osaka Bay.

On the morning of June 2 we left Osaka Bay for Yokohama, where we arrived and anchored on the 5th. Swung ship for magnetic and azimuth corrections; coaled, and filled up with stores and provisions for a long voyage. Before finally leaving Yokohama, a large number of the European residents, together with many of the members of the imperial government from Tokio, Sir Harry Parkes (British

Minister) and Lady Parkes, many of the American, French, and Japanese naval officers, accepted invitations to take a trip for a few miles in the Bay of Yedo, for the purpose of witnessing the operations of sounding, dredging, and trawling for specimens of marine zoology.

The weather at first was most unfavourable (wind and heavy rain). However, it eventually cleared, and a large party of ladies were amongst the number of visitors. About noon we steamed out from the anchorage, and when an offing of some four or five miles had been gained, preparations were made for the first operation, which was sounding. The depth was found to be 120 fathoms. The trawl was lowered. The processes were watched with seemingly great interest by the guests on board, and after a short interval had elapsed, the trawl was drawn up by the deck engine. The anxious crowd gathered on the bridge, and as fathom after fathom of the line came in, the eager throng held their breath in expectation of what was coming. They were, however, not kept long in suspense. First appeared the shackle, then the trawl itself, with a few specimens of life from the bottom, including fish of various kinds, shells, stones, and mud. Water-bottles were lowered, and specimens obtained from various depths. The mode of taking serial temperatures was illustrated.

After this lively scene, in which the different

opinions of the learned in such matters were often amusingly expressed to their lady friends, it was time to adjourn for lunch, which afterwards finished up with a dance ; so on the whole we had a most enjoyable time. It was after five before the vessel returned to her anchorage.



WOMEN ON HORSEBACK, HONOLULU, SANDWICH ISLANDS.

CHAPTER XIV.

APAN TO THE SANDWICH ISLANDS.

Leave Yokohama—Soundings of the U.S. ship *Tuscarora*—Our course—Passing the meridian of 180° —Two Sundays in one week—Sandwich Islands in sight—Anchor in Honolulu Harbour—The city—Its streets—Business habits—American influence—The king—Hawaiian Government—Parliament—Taxation—The Nuanu valley—Pretty scenes—Villa and other residences—The Pali—Horsemanship—Visit to the fish-market—The natives—Public buildings—Parliament House—Hawaiian hotel—The churches—Queen's Hospital—Court House—Iolani Palace—Levéé at the palace—King Kalakua and suite visit the *Challenger*—Leave the Island of Oahu—Squally passage to Hawaii—Arrive and anchor in Hilo Bay—Volcanoes of Mauna Kea and Mauna Loa—The charming scenery—The Rainbow Falls—Bathing-places—Visit to the crater of Kilauea—Scenes on the road—The Halfway House—Reach the crater—The first sight of the great cauldron—The Volcano Hotel—Mauna Loa—Return to Hilo.

JUNE 16th.—'This morning terminated our stay in Japanese waters. At noon all was ready, and soon

after we were steaming out from the anchorage, the weather bright and clear, and everything promising a pleasant and speedy run to the Sandwich Islands.

Last year (1874) the United States Government despatched the steam-vessel *Tuscarora* on a deep-sea sounding cruise between San Francisco, the Sandwich Islands, and the coast of Japan, with instructions on their return route to complete a line of soundings from Yokohama, extending in a great circle to the north, passing along the islands of the Aleutian group, and so towards Puget Sound, with a view of finding a practicable cable route across.

The course therefore selected by us was one intermediate between these two (through the parallel of 35° north latitude) until reaching 155° west longitude.

The voyage at first promised to be pleasant and speedy, but ere many days had passed, we found that we were to be delayed (except in one or two cases) by light and contrary winds; still, the fine weather was eminently favourable for sounding and trawling; while, on the other hand, the want of a breeze made the voyage long and monotonous. No such extraordinary depths were found on the course selected by us as those reported by the American expedition, their deepest being 4655 fathoms, while ours was 3900 fathoms; the average being under 3000, with a bottom of red clay and brown

mud. Very little of interest occurred from day to day, and the results of the trawling and additions to the natural history collection were very scanty.

The principal occurrence of the voyage that made an impression was the passage of the meridian of 180° , which took place at noon on the 3rd July; and we now entered on west longitude. Accordingly, a day had to be "dropped" out of our reckoning, and Sunday, 4th July, was continued for two days, so as to prevent our returning to England with our log and journal one day ahead of the calendar. It requires but little explanation as to the necessity of this alteration. However, while on this topic, I may refer to the dismay of the early Catholic navigators when they found that they had been keeping irregular fast-days. Thus, when Magalhaens made his first voyage round the world (September 1519 to July 1522), he found, on his return, that he was a day behind his countrymen, having sailed from east to west round Cape Horn. The idea of having lost a day of their lives puzzled them very much, but what disquieted the minds of these pious navigators still more was the fact that they had been observing their saints' days erroneously, and had actually eaten meat when they ought to have fasted.

The proof of the sphericity of the earth is thus clearly shown, and the improvements in navigation have pointed out that a day must necessarily be lost in a course steered from east to west; while, on

the other hand, a day is gained by sailing from west to east. In short, the mode of reckoning time amongst the South Sea Islands depends solely upon whether they have been approached in the first instance from the west or the east by the navigator who introduces amongst them the Christian calendar.

On the 22nd July, in lat. $29^{\circ} 1'$ north, long. $154^{\circ} 43'$ west, we reached the commencement of the north-east trades. The weather was very fine. The deep blue sky above, and the calm beauty of the long, full moonlight nights exercised a beneficial influence on all hands, and now day after day the sea-birds—those constant attendants—gradually began to cease flitting round the ship as we approached the Equator.

July 27th.—This morning land was reported, and although at first some twenty miles distant, yet in the clear atmosphere could be seen a group of grey, barren peaks, rising verdureless out of the quiet, lonely sea. Everybody was soon on deck to have a look at the land after the 4500 miles of watery solitude, and the sight was indeed a welcome one.

As we neared it, lofty peaks, brown and red, sun-scorched and wind-bleached, showing here and there traces of their fiery origin, were in view. Nearer yet, and the detail of the land began to make itself manifest: first the line of beach, marked by a long line of surf, and then the waving cocoa-nut trees, with the imposing promontory of Diamond Head

terminating the wavy line of palms; then the Punchbowl Hill, a very perfect extinct crater, bright and brilliant in the sunshine. By noon we were close to the coral reef where lay at anchor the U.S. flag-ship *Pensacola*, rolling about in the long swell. After waiting a short time, the pilot came alongside, and we steamed into the harbour. The surf ran high as we passed through the narrow channel and entered the quiet and placid haven of rest, where we anchored very near the shore. We were speedily surrounded with boats and canoes, with enterprising tradesmen for orders, or natives for the washing.

All along the shore were the neat wood and grass houses and huts of the natives, and away in either direction was the city of Honolulu, hidden behind palms, bread-fruit, bananas, and other trees, with the public buildings and church spires just showing above all.

The city is built on a narrow strip of land very little above the level of the sea, and at the foot of a number of volcanic hills, which rise almost perpendicularly behind, clad in refreshing green, and cleft by deep, cool, chasm-like valleys. This island (Oahu), though neither the largest nor the most fertile of the group, was originally selected, from its geographical position, as the seat of the Hawaiian Government.

It is now ninety-seven years ago that these islands were first discovered by Captain Cook, and as late as 1830 the city of Honolulu consisted of only a few grass

huts, &c. At the present time, although by no means an imposing city, it gives house and home to some 15,000 inhabitants, and is spread over a sandy plain extending from east to west, with wide streets containing hotels and business houses, giving the place a very different appearance to what might have been expected in a Polynesian town.

The streets and avenues are shaded with palms, bread-fruit, and other pleasant trees. The retail stores are owned principally by Americans and Chinese, and a very fair amount of business appears to be done. There are ice manufactories, foundries, and factories; a steam laundry employing about thirty hands, and capable of turning out forty to fifty thousand pieces in a week, belonging to Mr. W. M. Wallace, who, for perseverance, industry, and thorough business habits, I should say was unequalled in the island. There are half a dozen newspapers published, two of which are monthly, and four weekly. There are free libraries and reading-rooms, fire-engine companies, Masonic, Odd Fellows', and Good Templars' lodges, theatres, and other amusements, so as to keep pace with the times.

The stamp of social life is unmistakably American. The currency, the hotels, and private companies are all types of the Great Republic. The principal business done has hitherto been with America, the great majority of Hawaiian citizens and public men have been Americans, the government and constitu-

tion have been largely framed by the aid of American influence, and though the independence of the Hawaiian Government is secured at present by a tripartite treaty between England, America, and France, the destiny of the Sandwich Islands will probably be what its geographical position would indicate—annexation to the United States.

His Hawaiian Majesty Kalakua is a monarchical ruler, with a paraphernalia of sovereignty as imposing in design, if not in execution, as that of Great Britain itself. Each of the eight islands that are inhabited is governed by a viceroy, under the king. Then there are privy councillors, ministers of state, and other high functionaries, the Legislative Assembly consisting of forty-five members, thirty of whom are elected by the people and fifteen appointed by the king, who hold their seats for life. In addition to all this there are a host of dignitaries with mysterious names and functions taken most faithfully from the models of European courts. The Hawaiian ministry does not hold office at the will of a majority of Parliament, as with us, but as long as the king pleases, irrespective of what Parliament may think. The public money is supposed not to be expended even by the king without a vote of the Assembly. The Hawaiians formerly possessed two Legislative Houses, but now the nobles and representatives sit and vote together. The experiment, however, does not, it is said, work quite satisfactorily, and there is

a party agitating for the reconstruction of the Council of Fifteen. There are two qualifications necessary to enable a man to vote for a member of Parliament here—he must be able to read and write, and have an income of 75 dollars a year.

The kings of Hawaii do not succeed to the throne exactly as sovereigns do in England, but are appointed by the nomination of the preceding sovereign or by the vote of the Legislative Assembly. The late King Lunalilo died in February 1874, without naming his successor. There were two candidates brought forward for the vacant throne. One was the Queen-Dowager Emma (widow of Kamehameha IV.), the other was a high chief named David Kalakua. David was elected by thirty-nine votes, Emma receiving only six. The result was a riot on the part of the supporters of the defeated candidate, which was soon, however, quelled, the English and American war-ships in port sending to the rescue a number of blue-jackets and marines. The rioters were afterwards imprisoned and peace restored, and now all works harmoniously.

The revenue of the Hawaiian kingdom is about 500,000 dollars a year, and is derived principally from taxation, from custom duties, and from the sale of government land. The local tax amongst the people is five dollars a year—two dollars for roads, &c., two for education, and one as a poll-tax.

The entire revenue of the king is at the rate of

50,000 dollars per annum, and each of the principal ministers of state receives 5000 dollars.

Soon after anchoring, opportunities were afforded for a run on shore, and a great crowd was assembled on the landing to give us a hearty welcome. Men and women of a rich brown colour, with long, wavy, black hair and large brown lustrous eyes, all seeming happy, talking, laughing, and smiling; their greetings, "Aloha!" assailed us wherever we went, floating on the breeze sweet as the sound of distant bells. As I passed through the midst of this thronging crowd, every step seemed to reveal something new, and to recall recollections of my previous visit here, some eighteen years ago.

I cannot say that there is any great beauty in the location of the town, or much taste displayed in its plan; but the streets and dusty roads may soon be exchanged for one of the most agreeable and delightful climates possible, by a short ride to the Pali, through the Nuau valley, which is formed by a break in the central volcanic ridge of the island.

The entrance to the valley, for some considerable distance on either side, has a number of charming residences of the wealthy settlers, forming, during the summer months, pleasing retreats from the heat of the city. It would be difficult to adequately describe the scenery, or the architecture of the villas, is like, so beautifully are they festooned with flowering plants and evergreens; shady lawns, too, stretch

out in front with every variety of charming vegetation, and trees sending their pleasing shadows over all. Thus it is for some miles, until reaching the cemetery, cosily situated in a way-side hollow; and almost opposite is the royal mausoleum, where the remains of the Kamehamehas lie entombed. The road narrows somewhat now, and the green taro patches and charming avenues afford a most agreeable relief to the eye, enhancing the beauty of the views from the various colours of the foliage, produced evidently by the fertilising showers from the clouds, which are occasionally seen lowering on the mountain peaks, where they are, as it were, held in check and condensed, producing numerous small waterfalls, leaping from rock to rock on all sides, and being again distributed by the natives for irrigating their taro patches, and for giving fertility and luxuriance to the plains below.

The valley takes numberless eccentric windings, and the peculiarity of the scenery is, that the hills, which rise to several thousand feet, are precipitous ridges, broken up into all sorts of fantastic shapes, which suddenly terminate in deep precipices known as the Pali.

The beauty of the scene from here is unsurpassed in the island: stretching away seaward are the coral reefs, with the white wavy line of endless surf breaking restlessly over them; while in the valley below are charming glimpses of vegetation; clusters of

palms and sugar-cane, interspersed with native huts, each surrounded with its little plantation of bananas and other fruit, suggesting the boundless liberality of nature.

During our stay it was a daily treat to stroll along the shady streets, and out through the pleasant roads, particularly on Saturdays, which seemed a sort of gala day, when the roads were usually thronged with natives of both sexes on horseback, riding up and down at full gallop, and seeming perfectly at home in the saddle—the women even more so than the men: they sit astride barefooted, with their bright-coloured riding-dresses, like banners, streaming behind them; all apparently happy and reckless: their bright eyes flashing, their long black hair, encircled with garlands and wreaths of flowers—making a gay and graceful spectacle. The men looked hardly less attractive, for they had wreaths of bright flowers round their hats, and garlands around their throats.

Sometimes a crowd of these careless riders came galloping in from the plains, full of fun and laughter, accompanied by a lot of blue-jackets on leave from the *Challenger*, rushing on, helter-skelter, upsetting everything and everybody they came in contact with; bestriding their horses as they would a topsail-yard in a breeze; hanging on to manes and saddles, and evidently enjoying themselves to their heart's content.

One of the sights of Honolulu is the fish-market, and there we were escorted one Saturday afternoon. Although only a tumble-down sort of a place, with a number of rickety stalls, yet these were in many cases covered with numberless varieties of blue, red, and yellow fish, spotted and banded, and striped in the most striking manner. Of shell-fish also there was abundance, crayfish, lobsters, crabs, and many strange orange- and rose-coloured medusa, and here and there little heaps of various qualities of sea-weed, of which the natives are particularly fond.

Here, strolling about making purchases, we saw a laughing, joking crowd of men and women; the latter clad in a single bright-coloured or white garment, falling free and in unconfined folds from the shoulder to the feet, while all wore wreaths of gorgeous flowers round their jaunty hats. The men, with their cheerful smiling faces and friendly greetings, added greatly to the animation of the scene. These people are, on the whole, much better-looking than those met with farther south. The nose is less flat, the lips are less prominent; the colour is a nearer approach to white, and the face is altogether more indicative of intelligence and good-nature, and they take more kindly to the forms of European civilisation.

Of public buildings, the new Legislative Assembly Chambers rank first; they form an extensive pile of buildings of the most modern style, built of concrete,

from plans prepared by a Sydney architect, at a cost of \$120,000. I had an opportunity of going through the spacious halls of this massive structure; they are elaborately furnished, and each appropriated to some department of law and justice. The Council Chambers are only required for a short session once in two years, for voting the required supplies.

In the absence of other outlets for the public funds, the Government, at the instigation of a popular member of the Ministry, voted a large sum of money for building an hotel for the attraction and convenience of visitors. Plans were completed, and the building was finished in 1874. It consists of a large concrete, two-storied house, well situated, with verandahs decorated and festooned with flowering trailers, covering up all that might be unsightly with jessamine and clematis, and bright and pleasing flowers. It stands on a trim-kept lawn, planted with exotic trees, lending shade and beauty to the whole. Military bands occasionally play, and the large number of visitors give quite a busy and imposing aspect to this portion of the city.

The churches claim our attention, and Sunday proved a most pleasant day. Church-bells rang, and the streets and roads were filled by the people in their holiday attire.

Whatever may be the religious requirements of other islands of the Pacific, the wants of the Hawaiians are well supplied. At least three of the

great denominations work side by side. The Roman Catholics, who were introduced to the islands by the aid of a French man-of-war, have had a large church, a local habitation, and a name, since 1847, and now number a very large proportion of converts amongst the population of the islands.

The Church of England has had a Bishop, if not a very large ecclesiastical interest, here since 1862. The cut-stone cathedral, brought all the way from England by Bishop Staley, is still the work of the future. The foundations were laid some years ago by the late king, but the superstructure lies packed in cases within the church inclosure. The funds being exhausted, the chance of erection is somewhat remote. The services are at present carried on in a small temporary building, on which some 20,000*l.* has been expended, and in this Bishop Willis (Dr. Staley's successor) carries out a daily High Church ceremonial, which, from the scanty number of worshippers, does not appear to be very attractive.

The Wesleyan Methodists have a church, but I learnt that this body has not succeeded in making any great head-way in the islands.

It is due to the early missionary enterprise—carried on principally by the American Board of Mission (embracing the operations of the Presbyterians and Independents)—that any moral change has been produced amongst these people.

There are two native churches; one of which is a

large structure, built of coral stone, fitted up with modern pews and carpeted floors: it boasts of a trained choir and an organ of superior construction, with a Sunday school building at one end, and a church sociable, after the American fashion, underneath.

The Queen's Hospital, the Court House, and the Iolani Palace almost exhaust the list of public buildings. The Palace is only a small frame building, standing in solitary grandeur in an inclosure of about an acre in extent; but plans are being prepared for a larger structure, and probably we may soon hear of its commencement.

A Levée was held at the Palace, at which the officers of the *Challenger* and others attended, and were duly presented to his Majesty in the orthodox fashion by the British Minister (Major J. H. Wodehouse); and before leaving the harbour, the King made a return visit on board. His Majesty embarked from the jetty-stairs in the *Challenger's* barge; he was dressed in plain morning suit, with a single decoration (the star of the order of Kamehameha). His suite, consisting of Governors, Ministers, and Court dignitaries in gay uniform, with plumes, epaulettes, and gold lace, followed in other boats after him.

As soon as the king arrived on board, the royal standard was loosed at the main, ship's company manned yards, the guard presented arms, and the

band struck up the Hawaiian national anthem. The party remained some time, seeing all the wonders, and entering fully into the details of our scientific doings. After lunch, &c., they again returned to the shore; and in the evening the King gave a dinner at the Hawaiian Hotel, there not being sufficient accommodation at the Palace.

During our brief stay (for fifteen days was all the time allotted here) I was most favourably impressed, not only with the beauty of the scenery, but with the hospitality of the residents. Amid many happy remembrances of other scenes, the thoughts of these will remain a pleasant memory of my visit to the Sandwich Islands.

Aug. 11th.—This morning all was ready, and with much regret we left the hospitable shores of Oahu, and steamed out through the passage of the coral reefs.

Some hours were afterwards spent in swinging ship, both for azimuth and magnetic corrections. Finally we proceeded on our way for Hilo, steaming on over the golden tropical sea, and before sunset these beautiful islands had sunk below the horizon. A strong head-wind unfortunately sprang up, and very soon we were lurching and tumbling about in the open channel separating Oahu from Hawaii.

After three days of this squally, boisterous weather, land was again in sight; and as we neared it, we could see a pretty coast-line of grey cliff, many hundred feet in height, draped with green, showing

out here and there masses of black volcanic rock. Into cracks and caverns the heavy waves surged, sending the spray high up amongst the ferns and trailers.

On the summits of these cliffs were dense forests of the ohia, koa, ieie, mamane, mamaki, alii, and many other trees, crowded together and sheltering an almost endless variety of ferns and shrubs, encircling Mauna Loa and Mauna Kea, two vast volcanic mountains, whose snow-capped peaks rise to nearly 14,000 feet.

We pass on, catching glimpses of native churches, villages, and sugar-plantations, their bright green vegetation looking most charming.

Aug. 14th.—Later in the day, we arrived and anchored in Byron's or Hilo Bay, a pretty crescent-shaped sheet of water, fringed all round the shore with cocoa-palms and other tropical foliage.

Hilo looks very pretty from the anchorage; its bay, said to be one of the most beautiful in the Pacific, is a semicircle of about two miles in extent; the native houses are half hidden by tall trees that spread their foliage about in all directions; and near the landing-place some white frame-houses and three church-spires are prominently seen.

Soon after our arrival I landed (not for the first time, for I was here in 1858) at a small pier run out through the surf for the convenience of passengers landing from the coasting steamer *Kilauea*.

Roads branch off in several directions ; that along the beach contains a few frame-houses, in which apparently all the business of the island is done. Another road passes the three churches, the most prominent of which is the Roman Catholic, with its two towers. A native church is next ; and then a small one for the foreign residents.

The Court House, a large wooden building, with verandahs, surrounded by beautiful exotic trees, is the most imposing building on the island. Go where one will, in either direction, are great varieties of houses ; for the foreigners have all seemingly carried out their own individual tastes in their dwellings, and the results are very pleasing and agreeable, although for picturesqueness they must yield the palm to the native houses, which, whether built of wood or grass, plain or plaited, whether of one or two stories, seemed so much more in harmony with their surroundings.

In nearly every instance these dwellings have a cool and prepossessing appearance, with their deep-thatched roofs and verandahs, fantastically latticed and screened with gorgeous trailers of jessamine, clematis, and the gorgeous passion-flower. Passing along here leads one to the Anuenue, or Rainbow Falls. The track is a scramble among rocks and holes concealed by grass and ferns, with several small streams to cross. The fall itself is four or five miles off, but the sight is well worth all the trouble

taken to reach it; it is a broad stream of water rushing on from the high land, forming on its way numerous delicious and cool bathing-places, until reaching a precipice of about 100 feet; it falls into a basin with a deep cavern behind, surrounded by beautiful ferns and a jungle of tropical shrubs of great variety. To this spot many made their daily visits, not only for the pleasure of bathing, but to enjoy the delightful scenery in every direction. The principal object of our visit to Hilo was that opportunities might be afforded to those who desired to visit the celebrated Crater of Kilauea. A day or two after our arrival horses and guides were provided, and a large party started to do the thirty miles of rough road leading to the shrine of "Pele," the home of the dreaded goddess of volcanoes. The weather was fine, and all started from Hilo in the best of spirits, well-mounted on sure-footed horses, and in this way for some miles proceeded in single file along narrow roads of hard lava rock, about a couple of feet wide, occasionally passing through forests of true tropical jungle, where Nature seemed to riot in the production of strange and curious forms; where trees have grown and fallen, and where they lie a new vegetation has sprung up over them, altogether obliterating any signs of decay.

Thus all went on for miles; in fact, the whole track is a perpetual upward scramble, rough and rugged in the extreme; for though the ascent is

gradual, so that it is only by the increasing coldness of the atmosphere that the elevation is detected, it is really a rise of 4000 feet in the thirty miles. The half-way house (just a rough grass native shanty) was reached in due course, and here a short stay was made for rest and refreshment, after which we started on again, all being anxious to reach the crater before night set in. Continuing our journey, the country altering but little in appearance, except that, perhaps, the trees appeared of more sombre aspect, all at once, on emerging from a dense forest, a glare, brighter and redder than from any furnace, suddenly brightened up the whole sky. The heavens became brilliant, and when the Volcano House (a small hotel) was reached, clouds of red vapour, mixed with flame, were curling ceaselessly out of a large invisible pit of darkness, and Kilauea was in all its fiery glory : we had reached the crater of the largest volcano in the world.

We took up our quarters at the Volcano Hotel, a long building, constructed of grass and bamboo, which all thought very comfortable after the long and wearying journey. Here a good dinner was ordered, and during its preparation it was cheerful to sit round the great wood fire, for the night was somewhat cool at this altitude.

After rest and a refreshing dinner all set off to see the sights; not far to go at first, for the mighty crater is situated only a short distance from

our house. The abyss, which is at a height of 4000 feet, on the side of Mauna Loa, has the appearance of a large pit, which is estimated to be nine miles in circumference. The guides informed us that there was nothing to fear; the edge of the crater was approachable with safety, except during an eruption. After an hour of very difficult climbing and scrambling, the lowest level of the crater was reached. My highest expectations were more than realised, and I can hardly find words suitable to describe my sensations after seeing such a spectacle. All was confusion and commotion; for the lava, like red-hot metal, broke about with a surging noise on the rough craggy cliffs, cooling as it fell over the edge, where it hung in festoons. With all this, I noticed but little smoke or vapour, and what there was seemed carried away by a light breeze.

Here we remained for a long time, so engrossed by the grand spectacle, that when it was decided to return, by some means we got on the wrong track, and were for more than an hour seeking the right road; however, eventually we reached the hotel, nearly tired out.

Kilauea never overflows its vast crater, but appears to burst a passage for its lava through the mountain-side when relief is necessary, and then the destruction is usually fearful. Fortunately this seldom occurs, for it is many years ago that so great an eruption took place: then it rent its stomach, and

sent a broad river of fire careening down to the sea, sweeping away forests, huts, plantations, and everything else that lay in its path. The last eruption occurred in April 1868; it was accompanied by fearful earthquakes, and was more destructive to life and property than any previous one.

After spending the night at the Volcano Hotel, the next morning we left Kilauea in a heavy rain-storm, which lasted, with but little intermission, nearly all the way back. * * * In the evening we straggled into Hilo, thoroughly tired, still greatly pleased and delighted with the trip. A few days longer here, and preparations were made for leaving. On the 19th August all was complete, and we steamed out clear of the land on a southerly course, and ere night-fall the coast of Hawaii had faded from our sight.



NATIVE BAMBOO HOUSE, TAHITI, SOCIETY ISLANDS.

CHAPTER XV.

SANDWICH ISLANDS TO SOCIETY ISLANDS.

Leave Hawaii, Sandwich Islands—Passage to the Society Islands—Sounding and trawling—Cross the Equator fourth time—Death of Dr. von Willemoes-Suhm—Biographical sketch—Burial at sea—Tahiti in sight—Sounding and dredging outside the reefs—Anchor in Papeite Harbour—The town and country—Streets and natives—*Challenger's* band on shore—Queen Pomare and suite's visit to the *Challenger*—Afternoon dance—Ride to Point Venus—The Broom Road—Charming scenes—Natives met on the road—Tamarind tree at Point Venus—Waterfall—Hill fort of Fautana—Fruits and plants—Alongside Fare Ute—Coaling from the French depot—A day outside the reefs—Dredging—The company on board—Swing ship.

THE run of 2400 miles to Tahiti (Society Islands) was of a very dull and monotonous character. Soundings were obtained on seventeen occasions, and dredg-

ing was frequently carried out. The average depth found was 2800 fathoms, and the bottom composed of a red or chocolate-brown clay, and occasionally large quantities of black manganese. Nothing new or important was obtained in the trawl; so the additions to the natural history collection were somewhat small.

It is with great regret that I have to record the death, on the 13th September, of Dr. von Willimöes-Suhm,* a native of Germany, one of the naturalists attached to the expedition. He had, during the time he had been associated with the scientific department, entered most fully into all its details, and mastered some of its most difficult subjects, and his loss, therefore, was much felt. The next day he was buried with naval honours—his body committed to the deep blue tide. "One sudden plunge, and all was o'er." This was in lat. $11^{\circ} 15'$ south, long. $150^{\circ} 30'$ west,

* The following biographical sketch appeared in 'Nature:':—

"Dr. von Willimöes-Suhm died near Tahiti on the 13th September, and the expedition thus lost one of its most valued members.

"He was a native of Schleswig-Holstein, and studied in the universities of Göttingen and Bonn. He showed at a very early period a strong taste for natural science, and shortly after the conclusion of his studies he was appointed Privat-Docent in Zoology in the University of Munich. This appointment he held at the time of his death, having obtained leave of absence to join the *Challenger* expedition. He has published many valuable papers, chiefly on the structure and physiology of invertebrate animals. He devoted himself with the utmost earnestness to the work of the expedition, and in addition to several important communications to the scientific societies, he leaves behind him a fine series of drawings and a great amount of material, which must now be worked out by other hands."

380 miles from Tahiti. Head winds and calms succeeded each other as we passed on through the Tropics.

At length, on the morning of the 18th September, we came in sight of Tahiti and the outlying island of Morea, and, as we neared, could be seen very plainly the singular zigzag outline, precipitous crags and crater-like depressions, of every shade of blue, grey, and purple, broken into every conceivable fantastic shape, with deep, dark, mysterious gorges, showing almost black by contrast with the surrounding brightness; while in the foreground, stretching away from the base to the shore, is a forest of tropical trees, with the huts and houses of the town peeping out between them.

Some hours were spent outside the reefs in sounding and dredging, in a depth of 1525 fathoms, but not much of interest obtained; it was near 4 P.M. before we entered the lovely harbour of Papeite, which is surrounded by coral reefs, forming a most safe and pleasant haven of rest after the thirty days at sea. Of all the innumerable islands of the vast Pacific, there is none which has at various periods attracted the attention of the civilised world in the same degree as that in whose harbour we are now at anchor. At first, it was from the pleasing description given by Captain Cook of his stay here; then the events connected with the mutiny of the *Bounty*; and still later, by occurrences of a political nature,

which resulted in the French Government taking possession and establishing a Protectorate, and from that date (1843) up to the present administering the affairs, levying the import and export duties, and making the Queen an annual allowance of 1000*l.* per annum to keep quiet ; in fact, treating it to all intents as a French colony.

Papeite lies at the end of a semicircular bay, seven miles west of Point Venus, the northernmost part of the island. It is the chief town, the residence of the Queen and seat of government ; but this is not incompatible with its being of very limited dimensions, not rising above the grandeur of an ordinary English village.

The dwellings of the Europeans, constructed for the most part of wood, roofed with palm-leaves, extend all along the edge of the bay, while diverging or running at right angles or parallel are pretty roads, which help to make regular streets, around which, and on every side, rise up bread-fruit, cocoa, palm, and orange trees, which make up in cheerfulness for any deficiency in aspect.

The streets of an evening, the lighted shops and stores surrounded by the beautiful trees and gaily dressed girls, the rollicking "blue-jackets" from the two French war-ships in port and from the *Challenger*, the universal good-humour of every one, made a very novel, picturesque, and pleasing scene.

My first evening on land I went, with others, for a stroll through some of the beautiful shady avenues, and followed the run of the crowd of pedestrians (everybody seemed to be out in holiday attire, for, in addition to gangs of sailors, there were French soldiers, gendarmes, native girls and men), all strolling on, in the best of spirits, reckless, happy, and good-tempered. At length, on reaching the Queen's Square, in which the amateur band of the *Challenger* was advertised to play, the strange, motley scene that burst on us was altogether indescribable.

All shades of beauty were here represented, from the swarthy Tahitian to the charming European; all, however, dressed much alike, in long, loose, cool-looking drapery, consisting of a sleeved garment, falling in ample and unconfined folds from shoulder to feet, of all hues, shades, and colours; their luxuriant tresses set off by brilliant flowers and masses of snowy reva-reva, a gauzy white material, looking like strips of silver paper (made from the shoots of young cocoa-nut trees). French officers, naval and military, in gay uniforms, with white, brown, and pretty half-caste ladies; several of the *Challenger's* officers, and numerous civilians from far and near, helped to fill in the large space. The music was enjoyable in the cool still night; and it was pleasant to wander about amongst the merry crowd, speaking freely and sociably to anybody we

pleased without fear of giving offence; picking our way amongst the numerous parties that were seated about, interchanging jokes and compliments, or squatting down amongst a lot of lively native girls on their outspread mats, and carrying on a broken sort of conversation with them—all generally so good-humoured and merry that they could not fail to win one's esteem.

All appeared thoroughly to enjoy the music, and to regret when the programme came to an end with the "Marseillaise;" mats, bundles, and babies were gathered up, and the crowd, in a short time, dispersed to their various homes.

A levée was held at the palace, at which the officers of the *Challenger* were presented to royalty in due form. And (on the 1st October) a return visit was made by the Queen; on which occasion the opportunity was taken to entertain her Majesty at a ball on board. The quarter-deck was prettily decorated with flags, trophies, and flowers; and as there were several princes and princesses present, together with the French Governor and staff, the party was a gay and merry one.

During our stay here excursions were planned to various parts of the island; amongst them, that made to Point Venus had a double interest attached to it. It was on this promontory that Captain Cook first made the astronomical observations by which he determined the correct position of the island, and, in

1769, from here he, with a scientific party, observed the transit of Venus.

The ride thither lay through delicious groves of cocoa palm and bread-fruit trees, mingled here and there with citron, orange, bananas, and guavas. The tree-like oleander and beautiful red-flowered hibiscus towered above all, bright and blooming; the entire scene being one not easily forgotten.

The Broom Road (as it is named) ran on thus for a long way parallel with the shore, taking us under the shade of charming trees, and across innumerable little streams, where were seen numbers of native girls either bathing or washing their garments; and occasionally on the way meeting many of the men in their clean white shirts and parti-coloured waist-cloths; each, on passing, greeting us with a cheerful smile and a hearty "Ya rana," which means all kinds of salutations and blessings; sometimes even stopping and shaking hands, with no other earthly object but kindly good-fellowship.

The scenery, look where one would, was exceedingly pretty. Wherever there was a break in the glorious tropical foliage could be seen either precipitous mountains, clad in refreshing green, and cleft by deep, cool gorges, or the fine sweep of the ocean, a brilliant, transparent blue, bound and bordered by a long white line of foamy surf dashing against the reefs.

For some miles the road ran on, intersected occa-



TAMARIND TREE AT POINT VENUS, TAHITI, SOCIETY ISLANDS

sionally with charming little villages, with houses, cool and comfortable, built of hibiscus or bamboo poles, fixed in the ground a few inches apart, giving them the appearance of enormous bird-cages. The roofs are overhanging, and ingeniously constructed of plaited palm leaves. At Point Venus is a lighthouse, with a flashing light visible for 14 miles, and close at hand is still to be seen the tamarind-tree planted by Captain Cook near the spot where he completed those renowned labours which still single him out as the greatest of Pacific discoverers.

Another agreeable excursion was one taken to the beautifully situated hill-fort of Fatauna—renowned in the annals of the country—which well repays the trouble of reaching it.

The road lay through guava fields and sugar plantations, and delightfully cool and shady forests, until reaching one of the most important waterfalls in the island, where a broad sheet of water is seen leaping over a perpendicular precipice nearly 700 feet high, falling into a huge basin some 1500 feet above the level of the sea.

The naturalists and others took every opportunity of becoming acquainted with the productions, soil, climate, and inhabitants. The natives (that is, those living away from the town and European influences) are found to be of the same indolent nature which characterises all those met with amongst the South

Sea Islands, having but few wants, and those easily supplied; for bananas, bread-fruit, oranges, pine-apples, and fais (a sort of wild plantain) grow luxuriantly in all directions. All around are picturesque and rugged hills, imparting a beauty to the scene which cannot fail to arrest one's attention; while in close proximity, yet separated from each other by deep, dark gorges, showing up their precipitous and inaccessible sides, are great crags, almost entirely overgrown with the guava (a plant which was first imported from South America, in 1815, by an American missionary, and which has since increased at so rapid a rate as to extend over some of the loveliest spots in the island). The "Diadem," a name given to several peaks which have a striking resemblance to a crown, displays itself from this point in all its wondrous loveliness; and away in the distance are still more and more lofty mountains, 6000 or 7000 feet high, which probably have never yet been trod by the foot of the naturalist.

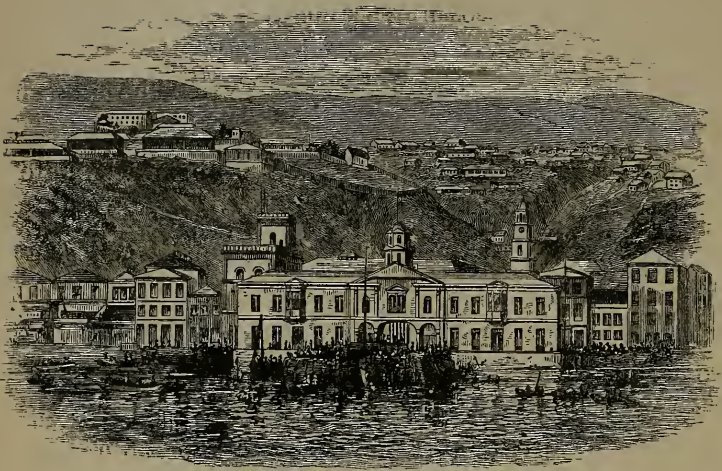
All visitors unite in praise of the beautiful appearance of Tahiti, and speak of the climate as being uncommonly delightful and salubrious. It is moderated by sea and land breezes; this, combined with the fertility of the soil, makes it perfectly evident that almost every tropical plant may be extensively cultivated with but little labour. As it is, the sugar-cane, coffee-tree, cotton shrub, the vanilla, cocoa plant, indigo, rice, and maize are produced;

while of fruits, the banana, bread-fruit, mango, pineapple, papaya, cocoa-nut, pandanus, orange, lemon, custard-apple, guava, &c., are plentiful.

On the morning of September 27th the vessel warped alongside the promontory of Fare Ute, where the French Government have what they designate an "arsenal," if a few rickety sheds, a blacksmith's shop, and a patent slip (for hauling small vessels up for repairs) can be so considered. However, such as it was, we were enabled to fill up with coal, and soon all was ready for sea.

A day was spent outside the reefs dredging amongst the corals, on which occasion we had a small party of ladies, &c., amongst whom were included Moa, Queen of Raiatea, Maru, Princess Royal of Tahiti, the Chieftess of Morea (Mrs. Brander), and others. Of the gentlemen, the most distinguished was the King of Raiatea. The trade-wind was blowing very strongly outside, and a rough and squally day was the result; so there was but little enjoyment for the ladies, who were, after all, far better pleased when, in the evening, the vessel again anchored inside the reefs.

The next day swung ship for azimuth and magnetic corrections.



CUSTOMS GUARD HOUSE, VALPARAISO, CHILI.

CHAPTER XVI.

SOCIETY ISLANDS TO JUAN FERNANDEZ AND VALPARAISO (CHILI).

Leave Tahiti — Parting scenes — Westerly winds — Sounding and trawling — Juan Fernandez in sight — Picturesque scenery — Robinson Crusoe — Anchor in Cumberland Bay — The tablet at Crusoe's look-out — The Settlement past and present — Leave Juan Fernandez — The run to Valparaiso — Arrival and anchor off the city — The city and harbour — Swinging ship for magnetic corrections.

OCT. 3rd.—This morning steamed out clear of the reefs, and so had the parting view of Tahiti. The breeze freshened in our favour, and steam was dispensed with. When a good offing had been made, a course was shaped south-east, and beautiful Tahiti, with its imposing and irregular outline of hills and

rich vegetation, was soon left behind us like a shadowy vision of dream-land.

We had a capital breeze, and all seemed to promise a speedy run over the solitary waste of waters intervening in the 5000 miles between Tahiti and Valparaiso.

On October 17th, however, the wind headed us; and until the 21st we were running on a southerly course. When reaching latitude $40^{\circ} 8'$ south, longitude $132^{\circ} 52'$ west, we picked up the commencement of the westerlies, which carried us on until the 3rd November, in latitude $39^{\circ} 22'$, longitude $98^{\circ} 46'$, and 1368 miles from our destination. For a week now we had calms, during which steam was used for about 300 miles. On the 8th a breeze sprang up, but it was of short duration, and the remainder of the distance, until sighting the island of Juan Fernandez, was performed under steam.

Thus nearly six weeks passed, during which soundings were obtained on twenty different occasions, showing an average of 2160 fathoms (the least being 1500, and greatest depth 2600 fathoms). Dredging was successfully carried out at intervals; the bottom was found to consist for the most part of a chocolate-coloured mud. Large quantities of manganese modules, and on two or three occasions several sharks' teeth, were brought up in the trawl.

Through a succession of unfavourable winds,

causing us to run so far to the southward of our course, the change of temperature was much felt; for having been so long accustomed to the warm, smiling tropical skies, the dull and overcast weather, the low temperature, and frequent rains seemed to be doubly cold and gloomy.

Nov. 13th.—A thousand miles north had to be run when land was reported—the solitary island of Juan Fernandez. The morning was fine, and I think I may say I have never seen a more remarkable and picturesque view than the approach to the anchorage presented. Great mountains appear, torn and broken into every conceivable fantastic shape, with deep ravines, through which the torrents at times sweep down from the precipitous cliffs, which rise one above the other, finally culminating in a great mass 3000 feet high, known as the Yunque, or Anvil (from its resemblance to the iron block used by blacksmiths). This is wooded nearly from the summit to the base, where are indications of its having been at one time cleared for cultivation (at the time probably when the Spaniards made the attempt to colonise it), for the stone walls which served to divide the inclosures still remain. There are also the remains of a fort, named San Juan Bautista, and a few tumble-down shanties, in which some forty or fifty people are existing, seeking a precarious living by supplying vessels that occasionally call here with fresh provisions, &c. It is certainly a strange



THE CHALLENGER IN CUMBERLAND BAY, JUAN FERNANDEZ

fact that people can be found to isolate themselves in such out-of-the-way places as this. Doubtless, in the abstract, it is a fine thing to be monarch of all one surveys; but those who have realised it are generally found to reverse their early aspirations, and own that solitude is not good for mankind. It was on this island that Alexander Selkirk was landed in 1704, from a ship he was serving in at the time as master; and here he remained in solitude for more than four years. Eventually, on being rescued, and returning to England, he gave the narrative of his sojourn here to the great romancer of his day, Daniel Defoe, in order to prepare it for publication; and it was from the ideas so furnished that the excellent and well-known story of Robinson Crusoe was formed.

Anchoring in Cumberland Bay, in 40 fathoms, not far from the shore, we found it quite safe and pleasant. The bay has much the appearance of a huge crater of an old volcano, surrounded on all sides, except one (the entrance), with high precipitous cliffs, which are torn up into deep ravines and valleys. Here, at anchor, a couple of days were spent, and in the brief time permitted the most was made of it. All the places near at hand immortalised by Selkirk were visited—the “caves,” his “huts,” and “look-out” (a gap some 2000 feet above the level of the sea), where a glorious view, both north and south, was obtained. Here H.M.S. *Topaze*, in

1868, placed an iron tablet, with the following inscription:—

In Memory of

ALEXANDER SELKIRK, MARINER,

A native of Lagos, in the County of Fife, Scotland,

Who was on this Island in complete solitude
for four years and four months.

He was landed from the *Cinque Ports* Galley, 96 tons,
16 guns, A.D. 1704, and was taken off in the
Duke privateer, 12 Feb. 1709.

He died Lieutenant of the *Weymouth*, A.D. 1723,
Aged 47 years.

This tablet is erected near Selkirk's look-out by
Commodore Powell and Officers of
H.M.S. *Topaze*, A.D. 1868.

Naturalists and others were busily engaged collecting birds and specimens, and a few photographs were obtained; and, what was very acceptable after the long voyage, plenty of fresh food, for the bay proved a most prolific fishing-ground, and from the settlers, beef, &c., of excellent quality was supplied.

The island is only some ten or twelve miles long, by four broad. The shore is formed by a steep, dark bare rock, rising up some 800 or 900 feet, through which wild ravines run, giving here and there views of grassy plains and verdant valleys of considerable extent, thickly wooded with a luxuriant foliage of great variety, amongst which were noticeable great numbers of peach-trees, which are said to have been planted by Lord Anson in 1741, when on his famous voyage round the world. Figs, straw-

berries, and cherries are also obtainable in their seasons. Twenty-four varieties of ferns were found by the collectors, and myrtle-trees abound in great numbers over the island.

Since the discovery of the island in 1563 it has been the scene of many vicissitudes. At first it was much visited by the old buccaneers, when on their marauding expeditions against the Spaniards; and during one of these visits, in 1681, a negro (from the West Indies) belonging to one of the vessels was accidentally left behind, and remained in solitude for three years until rescued. Twenty years after this (1704) we hear of Selkirk's solitary life, and of several others, each of whom has at times been the solitary inhabitant of Juan Fernandez; which seems to entitle the island to be called the land of Robinson Crusoe. In 1717 the Spanish government, jealous of other nations coming here, established a colony; but it was soon after almost totally destroyed by a dreadful earthquake, a calamity the island has been subject to on more than one occasion since. In 1810, when the Chilians gained their independence, this island formed a part of their possessions; and in 1819 they formed it into a penal settlement, and have had as many as five hundred prisoners at a time here. But it was found expensive; and in 1835 the prisoners mutinied, and for a short time overcame the troops. After this the convicts were removed to the mainland, and the island was again deserted, and

so remained for some forty years. At the present time it is leased to a Chilian merchant, who employs all the settlers in cutting wood, tending cattle, &c., and during the season seal-hunting, both here and at Masafuera, 90 miles distant, when they usually capture some two thousand, the skins of which are at present worth \$16 each. The climate is mild, and considered healthy; but the weather is subject to great changes. During our stay the mornings were generally cloudy, with showers of rain; towards noon it cleared, and for the remainder of the day it was usually fine and pleasant.

On the evening of the 15th November we left Cumberland Bay, steaming out clear of the headlands, when sail was made, and the 360 miles separating us from Valparaiso were expected to be soon got over; but rough seas and head-winds delayed, and made a long passage. It was not until the morning of the 19th November that land was in sight, and as the haze cleared, it proved to be the faint outline of Aconcagua, the highest of the Chilian Andes. A few hours later we made the lighthouse on the southern part of the bay. It was a pleasant sight on approaching the anchorage, which was full of shipping; and the appearance of the city to us, just come in from the turbulent sea, was very charming; the buildings extend along, row after row, for a considerable distance in front of the bay, and surmount the hillocks which rise at

short distances from the shore, forming the districts known to the sailors as the Fore, Main, and Mizen Top.

The west point of the bay (San Antonio) is well-fortified with strong batteries, a precaution taken since the bombardment by the Spaniards a few years ago. A well-built mole extends from the Plaza in front of the Custom House and Exchange, and to the right a pile of fire-proof bonded warehouses are built, and others are in course of construction.

The railway runs for 110 miles, passing several small wayside villages, and by the valley of the Aconcagua, to the north-east of Quillota and its mineral deposits, and so on to Santiago.

A three weeks' stay in the port of one of the principal commercial cities in South America made us quite familiar with the sights. But after all, even by frequent walks through its lengthy and elegant streets, and occasionally a run up the line by rail, it is difficult to form even a slight conception of Chili and the life and country beyond the Andes.

Everything about the town—the houses, shops, and population—has quite a European aspect; so that go where one would, through streets and squares, with their lofty edifices, gay hotels, and large and splendid stores, abounding in everything that can minister to human requirements and luxury (but, I might add, at a most exorbitant price), it

required but little stretch of the imagination to fancy oneself in some European capital.

Nothing here can be seen to tell of its early days, or to show it up as the native home of the Arancanian Indian. All is changed; and it is only when reaching the capital, and contemplating the fine panorama there presented, that the fact can really be realised of our close proximity to the Andes.

Of public buildings there are several; those of the Exchange and Custom House and Palace of Justice being the most extensive and commodious. Banks, theatres, masonic halls, and other edifices, are scattered over its length and breadth. Tram-cars run from one end of the city to the other. It is in communication with Europe by submarine cable, and the numerous lines of mail-steamers, both *via* Panama and the Straits of Magellan, give great facilities to commerce, and increase its importance. Near at hand are numerous protective batteries, and on the heights are the artillery barracks, &c., from which point can be had a fine view over the city and its environs, hemmed in by the ocean. The roadstead resembles that of Bahia, and is about $2\frac{1}{2}$ miles wide and $1\frac{1}{4}$ mile deep, entirely open to the north; and when strong weather from that quarter sets in, there is usually a very heavy sea, that occasions much mischief amongst the shipping, which are usually moored head and stern in pretty regular order, with the double object that

in case of a sudden "norther" they may not suffer from dragging their anchors, and be able to slip their cables and proceed to sea at once.

During a stay of three weeks (19th November to 11th December), refitting and completing with stores, a day was spent outside for swinging ship, with a view of ascertaining (as has been our usual course in every port) by observation the local variation of the needle.



MOUNTAINS AND GLACIERS IN MAGELLAN STRAITS.

CHAPTER XVII.

VALPARAISO, THROUGH THE STRAITS OF MAGELLAN.

Leave Valparaiso—Sight Juan Fernandez—Sounding and dredging—Strong head winds—Fall in with the westerlies—Sight Cape Gallagos and Cape Tres Montes—Anchor in Port Otway—The Entrance Islands—Last day of 1875—Leave Port Otway—Passing through the Messier Channel—Anchor in Hale Cove—The scenery—Foliage—Leave Hale Cove—Continuance of passage through the Messier Channel—Stop and trawl off Middle Island—The pretty scenery—Anchor in Gray Harbour—The excursions—Grass and trees on fire—The grand effect at night—Leave Gray Harbour—Messier Channel and Indian Reach—The English Narrows—Mid-Channel Island—The fine scenery—Dredging off Saumaurez Island—Anchor in Port Grappler—The derelict *Karnack*—Weather during our stay—Leave Port Grappler—Pass through Wide Channel—Dredging, &c.—Anchor in Tom Bay—The excursionists—Squally weather—Drag our anchors—Leave Tom Bay—Conception Channel—Proposed survey in the Trinidad Channel frustrated through the weather—Pass through Conception Channel

— Soundings, &c., in Innocent Channel—The fine scenery—Anchor in Puerto Bueno Bay—Pretty scenes—The weather—Leaving Puerto Bueno Bay—The scenery and weather in passing through Sarmiento Channel—Sounding and dredging—The Zach Peninsula—Anchor in Isthmus Bay—Leave Isthmus Bay—Passing through Mayne Channel and Smyth's Channel—The fine scenery—Enter the Straits of Magellan—Cape Pillar in sight—Enter the picturesque Port of Churruca—The Glaciers—Leave Port Churruca—Pass through Crooked and English Reaches—Off Fortescue Bay—The Fuegians—Off Cape Froward—Anchor in Port Famine—The old Spanish settlement in 1581—The Chilian settlement of 1843—Leave Port Famine and arrive at Sandy Point—The Chilian settlement—Coal mines and gold workings—Leave Sandy Point and reach the anchorage off Elizabeth Island—Exploring parties—Finding fossil bones—Leave Elizabeth Island—Passing through the Second and First Narrows—Off Gregory Bay—Pass the meridian of Cape Horn—Again in the Atlantic—Pass Cape Virgin—Sounding and Trawling.

VALPARAISO TO PORT OTWAY.

AT length all was ready, and on the morning of 11th December we took our departure, favoured with fine weather. On clearing the land, we made sail, and, with a promising breeze, there seemed good prospect that the 800 miles to the entrance to the straits would soon be accomplished, but we had reckoned without our host; strong southerly winds prevailed, causing us to run far to the westward. On the 17th sighted Juan Fernandez, when we dredged in 1375 fathoms with satisfactory results. For another week we continued on our cruise, frequently sounding and dredging from an average depth of 1600 fathoms, by which time we had run as far west as $89^{\circ} 25'$, when we fell in with the commencement of the westerlies, and were able to lay a

course for our destination. On the morning of December 31st, land was reported; amidst the haze and fog, Cape Gallagos was observed, a bold promontory rising from the waters; and somewhat later, on the mist clearing, Cape Tres Montes, a remarkable headland, was seen stretching before us to the height of 2000 feet. We stopped for a short time, and sounded and trawled in 1500 fathoms with good results, then proceeded for some fifteen miles, and came to anchor in Port Otway, a pretty, snug place, with a sandy beach, and several small islets covered with trees (the Entrance Islands), amongst which is the Logan Rock, having a strong resemblance to the celebrated rock of that name on the coast of Cornwall. Here the last fleeting hours of 1875 were passed. We all sat up late, spending a jovial evening with the Captain and Professor, till the advent of the New Year, when, in conformity with an old custom (at the conclusion of the first watch, midnight), sixteen strokes of the bell were given—eight in honour of the departing year, and the same number in celebration of the birth of the new one.

PORT OTWAY TO HALE COVE.

Jan. 1st, 1876.—At an early hour this morning we steamed across the Gulf of Peñas, and had several trawlings; bottom at 50 fathoms. We entered Messier Channel in the course of the afternoon, and anchored about 6 P.M. in Hale Cove, surrounded by high,

steep hills, thickly covered with a scrubby vegetation. Immediately afterwards parties landed, and set out for a cruise in the vicinity of the anchorage. It was a perfectly still evening, and the scenery was exceedingly pretty. The wooded hills bathed in sunlight, and the placid surface of the water, which reflected the clear blue sky, the delicate clouds, and the trees growing at the margin, made a charming picture. The vegetation consisted principally of winter's bark, evergreen birch, with ferns and mosses in profusion.

HALE COVE TO GRAY HARBOUR.

Jan. 2nd.—A fine morning as we steamed from the anchorage; we pursued our way through the Messier Channel, stopped off Middle Island, where we sounded in 340 fathoms, and afterwards proceeded. The perfectly calm surface of the water made it very charming. The mountains on either side rose high out of it, clothed with trees from the base to a height of upwards of 1000 feet, with here and there numerous cascades rushing down their sides, pouring their waters into the channel. It was 6.30 P.M. when we anchored in Gray Harbour, a quiet, secluded spot. Here a second day was spent, and the weather continuing fine, it enhanced the beauty of the scenery, consisting of numerous small islands, and banks well-wooded even to the water's edge, while behind high mountains rose, capped with large quantities of snow. Excursions were made

to a large lake-like expanse of water, with a river flowing into its upper end. A few fish were caught, and several birds (fine ducks, geese, &c.) were shot.

Amongst the numerous picnic parties scattered over the shore, some "by accident" set the long grass on fire, which speedily communicated with the trees and foliage, and after a short time fires were raging with great fury, sweeping up the valleys and along the shore, continuing all the remainder of the day. As night advanced, it was a grand sight; the roaring of the fire in the stillness of the night, and the bright glare illuminating the hill-tops and placid waters of the harbour, had a fine effect.

GRAY HARBOUR TO PORT GRAPPLER.

Jan. 4th.—The fire still burnt in various directions, and trees and shrubs continued to fall under its devouring effect as we left the anchorage, steaming onwards past Indian Reach. The morning was fine, and a bright, clear calm allowed us to fully enjoy the splendid scenery on either side of the channel. We had now entered the English Narrows, where great care is necessary in navigating, for a strong current sweeps through, and a small islet (Mid-Channel Island), situate in the narrowest part, requires to be quickly rounded. After clearing these intricate passages, we came into broader water. The nearer hills rose perpendicularly out of the waters,

clothed almost to their summits with trees, while others more distant were dark and gloomy, their high, jagged peaks covered with glaciers and many a winter's snow.

As we proceeded farther southward, changes became noticeable in the appearance of the land, which on either side became of a much bolder and more elevated character. The sky had become cloudy and overcast, and the temperature of the air had fallen several degrees, while icy blasts came howling down deep gorges and crevasses, with occasional squalls of rain, giving us warning of what we had to expect on our further progress through these wild and inhospitable regions. On arriving off Saumaurez Island, we stopped and dredged in 147 fathoms, obtaining a few starfish, some echini, corals, a couple of fish, and some stones. After this we stood across to the mainland, and entered the excellent and well-sheltered harbour of Port Grappler. On anchoring, a small steam-vessel was observed at the head of the harbour, which, when we boarded, was found to be a supposed total wreck. On the boat returning, it was accompanied by a stranger, from whom the following particulars were elicited.

The vessel was named the *Karnack*, belonging to a German company trading between Hamburg and Valparaiso, and had left the latter place about a month before. On her way through the straits (about ten miles to the north) she had struck on a sunken

rock, and, although the water gained rapidly, they were enabled to reach this harbour, and get her into shallow water: they then cleared out all they could from her (for high-water came up to the main-deck), and encamped on the Middle Island. After a short time they were rescued by the French war-steamer *La Cher*, and taken to Sandy Point. On their way they fell in with a steam-vessel bound to Valparaiso, to which they gave information of the wreck. This caused the ship to call here; and finding matters not so bad as represented, they took possession of the derelict, leaving four men behind them in charge, intending, on their reaching Loto or Valparaiso, to send assistance to save the cargo (which consisted of silver ore, hides, sugar, saltpetre, and nuts), and to get her afloat again—to do which there appeared to be but little difficulty. Those in possession would accept no assistance from us.

Although it rained continuously during our stay, it did not deter our sportsmen landing to explore the surrounding land. After scrambling through thick shrubbery, a flat space of tolerably open ground was reached. Here a few ducks and geese were bagged. The whole country seemed drenched with moisture, which we afterwards found, on proceeding farther south, was the normal condition of all the land bordering this part of the straits and channel.

PORT GRAPPLER TO TOM BAY.

Jan. 5th.—There being nothing further to detain us, it was decided to proceed on our way southwards through Wide Channel.

The day at first gave promise of being very fair, and the view of the great masses of rock on either side, the dark frowning headlands, and snowy peaks beyond, was remarkably fine. We stopped for a short time in the channel and dredged, getting a collection of starfish, echini, corals, and sponges; then proceeded on, and anchored in Tom Bay, quite near the entrance to Conception Channel, on the east coast of Madre Channel.

A few geese and other birds were observed, and it was decided to remain the next day for exploration, and to survey the anchorage. Many parties landed, but, after a fatiguing scramble through bushes and over the boggy ground, very little was obtained. However, sufficient of the vegetation was seen to show that it was very similar to that met with at the other anchorages. Continued and heavy rain fell, and during the early hours of the morning violent gales of wind, in squalls, swept down the gorges on us, causing the anchor to drag. Steam was, however, at command, and no danger resulted. Still, all day the furious squalls blew through the ravines from the mountains at short intervals until evening, when the wind moderated.

TOM BAY TO PUERTO BUENO BAY.

Jan. 8th.—This morning, as the weather had cleared, and appeared to be promising, we proceeded down Trinidad Channel, where it was proposed to remain a few days to complete a survey of some of the harbours on the south coast. However, we had hardly cleared our late berth when the weather became overcast; rain and a settled haze set in, and we were prevented from carrying out our intended survey, which had to be abandoned, and our course altered; afterwards, with a fair wind, we entered Conception Channel, and proceeded at a good pace. We stopped in Innocent Channel; sounded and dredged in 142 fathoms (green mud), temperature at bottom 47° Fahr.; passed some beautiful and wild scenes, great ravines opening into charming spots, which occasionally were enlivened by the sun peeping out in the calm intervals between the squalls. Our track now led us through Guia Narrows; here we dredged in 50 fathoms, getting a good haul; at 4.30 P.M. we anchored in Puerto Bueno Bay. Two days were spent here, and the weather being moderately fine, this pretty harbour, which well deserves its name, appeared to full advantage. Many charming little islands, covered with trees are scattered over its waters.

Close along the water's edge is a narrow strip of grass, and immediately behind is a mass of thick

vegetation and trees, consisting of winter's bark, evergreen birch, &c. ; while beyond, and as far as the eye can reach, are extensive bare hills, with occasional patches of stunted shrubs, and tracts of boggy ground covered with a thick, low vegetation. In the evening the weather was very squally, with thunder and lightning and heavy rain, and all were thankful we were lying in so comfortable a berth instead of being at sea. However, in the intervals many parties started for a run over the country with gun and rod, but the sport was not very encouraging.

PUERTO BUENO BAY TO ISTHMUS BAY.

Jan. 10th.—Left the anchorage at an early hour ; the rain fell heavily, it was exceedingly cold, and the landscape presented a most wintry appearance ; the snowy hills ranging along on each side, and the bare rock looking most desolate and dreary in the surrounding haze, and this was midsummer. Steaming on through Sarmiento Channel, we dredged in 400 fathoms (soft green mud) ; temperature 46·5° Fahr. ; we got several specimens of coral, sponges, and fish. On the conclusion of this operation, we proceeded, passing Esperanza, Vancouver's, and Owen's Islands, Staines Peninsula, Carrington Islands, and through the Farquhar Pass into Collingwood Straits ; passed Newton and Hunter Islands, and so through Victory Pass, a lovely spot studded with small islands ; reached the Zach Peninsula, and anchored on its

western side, in Isthmus Bay, finding it an excellent and well-sheltered port.

ISTHMUS BAY TO PORT CHURRUCA.

Jan. 11th.—Weighing early this morning, we sighted the high mountain of King William IV. Land, and passed through Mayne Channel, which led us into Smyth's Channel. It rained heavily and frequently throughout the day, but in intervals of clear weather it was a fine sight to contemplate the magnificent scenery on the Patagonian and Fuegian shores, the mountains towering up steeply from the water's edge, with their summits in most instances covered with snow. Keeping along the Patagonian side, we passed some striking cliffs, with deep chasms and gorges, down which cascades ran from their snowy heights. We had now reached the east coast of Queen Adelaide's Land. On passing, a splendid view was had of rugged grey mountains and snowy peaks, with glaciers of many miles in length. At noon we stopped off Sholl Bay, the south point of Queen Adelaide's Archipelago; here we trawled, obtaining several interesting specimens. We had now really entered the Straits of Magellan, and some few miles in the distance could be seen Cape Pillar, its western entrance. We steamed across, passing Beaufort Bay and Tamar Island, and at 2.45 P.M. we entered by a narrow passage a very remarkable port—Churruca, surrounded on all sides by high and rugged hills,

eventually anchoring in a beautiful landlocked bay. On landing, the woods were found so thick and tangled that it was hardly possible to penetrate into them for any distance; so the sportsmen had to be content at getting a stray shot from the beach, or scrambling over some steep banks close to where some cataracts came rushing down the mountain-sides, from which could be seen masses of ice extending a considerable distance, exhibiting deep longitudinal and transverse crevasses, the fine blue colouring of which formed a great contrast with the dazzling purity of an extensive snow-field.

PORT CHURRUCA TO PORT FAMINE.

Jan. 13th.—We spent a second day at Churruca for an inland excursion, which was much enjoyed by the naturalists, in search of sport and specimens. This morning, being anxious to get on, we again got under weigh. On clearing the harbour, we found a very strong breeze in our favour, and under steam and sail rapidly passed the land, which was covered with thick haze. As the day advanced, it cleared, and massive glaciers could be seen extending almost to the water's edge. Proceeding, we passed the Cordova Peninsula, and through Crooked and English Reaches; the coast appeared to be high, rugged, and seemingly continuous, but on nearing it was seen to be made up of numbers of small islands, the sea intersecting the land in every direction,

and opening into large gulfs and sounds. By noon we were off Fortescue Bay, where it was decided to remain for a short time for dredging. On the somewhat cleared spaces could be seen the fires of the Fuegians, and well can I remember when last here seeing the canoes alongside, with the natives screaming and gesticulating for "tabac." Some of them had small seal-skins over their shoulders, but the greater number, both of men and women, were entirely naked; and considering the severity of the weather, it seems strange how they exist. Yet with all this there is no reason to believe that these people are decreasing in numbers; therefore we must suppose that they enjoy a sufficient share of happiness, of whatever kind it may be, to make life worth having. Nature, by making habit omnipotent, and its effects hereditary, has fitted the Fuegian to the climate and the production of his miserable country.

Proceeding on our way, at 4 P.M. we were off Cape Froward (the most southern point of South America). Here we encountered some fierce squalls (williwaws) of wind rushing down the gorges and channels. We shortened all sail and steamed on the remainder of the way, until reaching Port Famine, where we stopped for the night. It was here the first penal settlement was established by the Chilian government in the straits, in 1843. This place expresses by its name the lingering and extreme suffering of several hundreds of Spaniards, who had

landed here with a view of establishing a settlement, under the direction of Sarmiento (in 1581), their object being to fortify two positions (one here, the other at Cape Possession), in order to prevent the English from passing through. After a short time Sarmiento left for Spain, and on his way there he was taken prisoner by Sir Walter Raleigh, and brought to England, while the unfortunate colonists were left to starve in the straits. Their fate remained unknown, until Cavendish passed through in 1587, when he found only twenty-four out of the original four hundred colonists. The port was then named Port Famine, in commemoration of the sad fate of its first settlers.

The excellent anchorage and sheltered position were the chief reasons for its being selected by the Chilians for establishing their first colony; but the same ill-luck appears to have attended it; for after struggling on for some years, during which time the colonists were frequently reduced to great distress by the failure of supplies arriving from Chili, it was sacked and burnt down by the convicts, who mutinied and killed all the officials, making good their escape in a small vessel. Eventually, however, they were captured, and met with their deserved punishment.

Our stay was very short here. Still numbers landed as usual in search of sport and specimens; but as so much rain had fallen, the country in all

directions was like a great bog. Had several hauls with the trawl in the harbour, getting plentiful supplies of large prawns, starfish, coral, and seaweed.

PORT FAMINE TO SANDY POINT.

Jan. 14th.—A charming morning. We left the port, and steaming over a calm sea, and passing the land rapidly, it was near 9 A.M. when the anchor was dropped in the roadstead off Punta Arenas, the site of a small settlement established by the Chilian government. This colony, the only one in the straits, has a governor and other officials, and some hundred colonists.

I took the opportunity of landing, and had a stroll round the settlement, which consists of a number of wooden buildings so grouped as to form one long straggling street, running nearly parallel with the beach. From this it is intended that other streets shall branch off, but they are at present only indicated by scattered buildings half a mile apart. A large square, or Plaza, is provided for, on one side of which is the hospital, and on the other the residence of the British Consul (Mr. Hamilton). At the extreme end of the main street is the residence of the governor, and beyond is a large inclosure containing the barracks, the prison, and the guard-house.

A small river is at hand, and forests where abundant supplies of timber are to be obtained; here also are considerable tracts of open country for cattle-

grazing. Before leaving, I took the opportunity of visiting the coal deposit which has recently been discovered, and for the working of which a company has been formed.

The mine is situated some six miles inland, and is easily reached by a line of railway, over which a locomotive and trucks run frequently during the day. After leaving the cleared space of the settlement, the road lies through a dense forest (just cleared sufficient for traffic), until reaching the bed of a stream which debouches at Sandy Point. After crossing this stream by a light bridge, a ravine is reached, and in the side of a mountain rising some 300 feet above the level of the sea the shafts or burrows have been driven, perhaps in some places to a depth of 50 or 60 feet; the seams vary from 4 to 5 feet in thickness, and are deposited between layers of clay and shell, with bands of shale in immediate contact. From what could be seen of them, the specimens presented the appearance of the bituminous fuel known as caking coal. The "out-put" as yet has not been very great, but from the results of some thirty tons tried by us, very fair reports have been made, especially when mixed with Welsh.

Gold is also found here. For its working a company has been started. The results, however, have been small, yet I believe sufficient to give encouragement to go on with it.

As population and colonisation increase, the in-

terior of the country will get opened up, and further discoveries be made, and the accommodation afforded by the Pacific mail steamers calling will, ere long, doubtlessly have a beneficial effect on the prosperity of Punta Arenas.

SANDY POINT TO ELIZABETH ISLAND AND CAPE
VIRGIN.

Jan. 18th.—For four days we remained in the roadstead off the settlement, enjoying the favourable weather. This morning proceeded on a course, passing thickly wooded hills, until clear of Cape Negro. The coast consisted of low, undulating plains. The weather being bright and pleasant, a capital view was afforded us of the snow-clad peak of Mount Sarmiento, on the southern part of Tierra del Fuego.

Three hours' run, and anchor was let go off the Island of San Isabel, or Elizabeth Island. From our position it appeared to consist of a range of heights extending in ridges for some eight miles, covered mostly with a thick wiry grass. Exploring parties were soon away, and, besides getting lots of sport with the gun, they were rewarded by discovering numerous remains of dry bones. This caused our remaining a day longer, when reinforcements landed with pick and shovel, and before leaving at night a large heap of dry and fossilised bones was collected, and may possibly by and by suggest the existence of some

strange and unknown creatures, which ages ago roamed over hill and dale in these remote regions. On the morning of the 20th got under weigh with the flood tide, which, with the strong breeze in our favour, took us rapidly through the Narrows, the scenery on either side showing but little variety until sighting the high land near Gregory Bay, which has a very picturesque effect, rising near the shore and running on for some distance in an easterly direction.

On the Fuegian side, as far as Cape de Espirito Santo, the land was low and uninteresting near the coast, but amidst the haze in the distance high, bleak, and rugged mountains were observed.

We had now passed the meridian of Cape Horn, and were again in the Atlantic, and notwithstanding the squally and uncertain weather during the past three weeks, we had been enabled to make a great variety of most interesting daily observations in our passage through the straits and channels, and to obtain many valuable results for the benefit of science. A few hours later, and we were clear of the straits, passing Cape Virgin, a long, low, dark cliff sloping down at one end into the sea.

War Department
Library.



CAPE FROWARD, STRAITS OF MAGELLAN.

CHAPTER XVIII.

CAPE VIRGIN TO FALKLAND ISLANDS AND MONTE VIDEO.

Our first haul in the Atlantic—The Jason Islands—Eddystone Rock—Cape Pembroke—Falkland Islands in sight—Enter Port William—Anchor off Stanley—The settlement—Climate—Death of an able seaman by drowning—Leave for Port Louis—Anchor in Berkley Bay—Funeral of our late shipmate—Return to Stanley—The Stream of Stones—Leaving the Falklands—Stormy weather—Sounding and trawling—Sight the land off Lobos Island—Pass Maldonado Point—Steaming up the Rio de la Plata—Anchor off Monte Video—The city and suburbs.

CAPE VIRGIN TO FALKLAND ISLANDS.

HAVING a strong and favourable breeze, good progress was made, and before nightfall the coast-line was

out of sight. Again we were sounding and trawling, and the first haul in the Atlantic, from a depth of 55 fathoms, was very satisfactory. The weather was bright and clear, with a heavy swell from the southward.

Jan. 22nd.—This morning, amidst fog and haze, the Jason Islands were reported, a group lying on the north-east side of the West Falklands; and later the remarkable Eddystone Rock (about 250 feet high), situated off Cape Dolphin, on the north coast of East Falkland, was to be seen. Here we sounded in 110 fathoms, and trawled, but without success. Continuing our course, the next morning the lighthouse on Cape Pembroke was seen. A few hours later we entered Port William, and soon after passed through the narrows, and had our first sight of the town of Stanley, anchoring within a short distance of the shore. The weather was fine, which caused Stanley to have a pretty appearance from the anchorage, with its white cottages and light frame-houses scattered somewhat irregularly on the slope of a hill, brightening up the otherwise desolate and sterile appearance of the settlement, where not even a single tree exists or a strip of wood grows of sufficient size for the most ordinary purposes. Attempts have been made from time to time to propagate trees, &c., but in all cases they have been attended with entire failure. On landing at the town pier, the first thing to notice is a small obelisk, erected in commemoration of the

visit of Prince Alfred, in 1868, when in command of H.M.S. *Galatea*. From here a street so called leads to the top of the hill, and branching away is Ross Road, which runs along for some two miles, facing the harbour, and in front of all the houses; at its western extremity is Government House, a plain stone building within a fence. At the other extreme is the cemetery. This appears to be the only level walk in the colony. The hills are but very rarely available for a walk, consisting, for the most part, of little else than rock and boggy ground. I cannot call to mind any other settlement (except, perhaps, Tristan d'Acunha) more dismal, miserable, and devoid of all interest, than this at the Falkland Islands. It has formed a portion of our British colonial possessions since 1833, when a Lieutenant-Governor was first appointed, the seat of government at that time being at Port Louis, but in 1842 it was changed to its present site—Stanley. The position these islands occupy in a commercial point of view is of great importance, being placed in the great highway from Australia, and to and from the west coast of America; they are certainly dangerous to approach, yet abound in safe harbours, with facilities for repairs and for obtaining refreshments; beef and mutton being both excellent and very cheap. Of late but very few vessels have called.

The climate is considered remarkably healthy. The winters are about as severe as those usually felt

in the north of Scotland ; the summer months are not so genial, and usually very boisterous. We experienced a little of its inclemency ; having to visit Port Louis, some fifty miles distant, to make magnetic and tidal observations, we found the weather exceedingly stormy, and even while at anchor in Berkley Sound it was most unpleasant. While here, we buried one of our shipmates, Thomas Bush, A.B., who fell overboard from the steam-pinnace, before leaving Stanley, one dark, rough night ; his remains are buried in a little inclosure, on an exposed swampy moorland—not alone, for two or three head-boards indicate that other wanderers have found rest here. On the completion of our scientific observations, we returned to Stanley, which, in the dismal weather, we all concurred in regarding as one of the most wretched settlements we had seen for a long time—all the houses, this cold and rainy afternoon, appearing most dreary.

The next day it was a little brighter ; but there is little of interest here, except, perhaps, to the geologist, whose attention is sure to be attracted by the extraordinary stream of stones, which is so difficult to account for. They are formed of great numbers of fragments of quartz, which are spread out in rows, from half a mile to one mile in width, and two or three in length, extending along valleys and to the tops of some of the highest hills, from which they appear to have descended.

We had now been here some fourteen days, and during that time had imparted a little gaiety to the colonists, with dances and dinner parties.

FALKLAND ISLANDS TO MONTE VIDEO.

Feb. 6th.—Rain, or wind, or both combined, seem to constitute the normal state of things in these bleak and desolate islands; although during our stay we had two or three fine days, yet all were glad when it was decided to proceed on our way north, the weather promising to be very squally, and soon after clearing Cape Pembroke there was every indication of a rough passage before us. Three reefs were taken in topsails, and all made snug for the night, during which but little progress was made. The next day for a time we had clear blue sky; still there was a rough and heavy sea. Pictures from a sailor's note-book in these wild and stormy latitudes rarely contain any sketches of blue sky or smooth water, but are more frequently descriptive (as we now found it) of fierce and stormy waves and howling winds; however, the wind being from the south-west, it was in our favour, and each day brought us nearer our destination. On four occasions we stopped for soundings and trawlings, getting depths of from 1035 to 2425 fathoms. On the 11th, quite unexpectedly, at a depth of 2040 fathoms, we came across a cold current, temperature $33\cdot8^{\circ}$ Fahr., and the next day the

temperature was $32\frac{1}{2}^{\circ}$, surface being 76° . The results from our dredgings to the natural history collection, however, were but scanty.

As we neared the coast of South America, the weather was much finer, and on the 14th we dredged in 600 fathoms, from a rock bottom, and got numerous specimens, but nothing new.

Feb. 15th.—This morning, in the haze, we had a glimpse of the low land lying to the south of Maldonado Point. We now entered the River La Plata, or Plate, as it is commonly termed by sailors. Steaming on over a calm sea for some eighty miles, at 4.30 P.M. the fine panorama of Monte Video and its suburbs, with the harbour full of shipping, was in view, and here we anchored, some two miles off the shore. From what could be seen of the city, it seems a charming place, full of bright-looking, handsome edifices, built on the side of a hill. Here were H.M. gun-vessels *Cracker* and *Ready*, and representative men-of-war steam-vessels, flying the national colours of France, Germany, Italy, Spain, Brazil, and Uruguay, with great numbers of merchant-vessels of different nations.

The River La Plata owes its name to the Spaniards, who transferred the produce of the silver mines of Chili and Peru, on its waters, to the ocean, and thence to Europe. The gold and silver was brought from those provinces across the Andes, to Buenos Ayres, from whence it was shipped; but the extension of

discovery no sooner opened the passage round Cape Horn than this river lost its original importance. In point of magnitude it is the third river of the New World. At its mouth it is 100 miles wide, and off Monte Video it is 50. The banks for some hundreds of miles are the terminations of vast plains, on which there is little visible to cheer or enliven the scene, and nothing to break the solitude, save extensive and numerous herds of cattle.

Twelve hours' run up by steamer and Buenos Ayres is reached, a fine large city, where many things of interest are to be seen. The city of Monte Video stands on a strip of land, which forms the eastern side of a small bay, on the north bank of the river, but with our draught was not approachable within two miles from the shallowness of the water; what could be seen of the city from that distance was somewhat pleasing; the towers and domes of the cathedral, churches, and public buildings, probably appeared all the more charming and picturesque coming as we did from such a miserable place as the Falklands. On landing, I found the city laid out in the regular Spanish style, so prevalent in South America, that is, in rectangular blocks. The streets are wide and clean, intersecting each other at right angles. There is a large proportion of good dwelling-houses and shops, abounding in every necessary and luxury. The Cathedral Square, with its charming gardens and pleasant walks, where the

military bands play every evening, forms the principal promenade, and makes it a cheerful and agreeable resort of the wealthy residents. From here the road leads to a long straight street, with lofty buildings and extensive shops abounding in every requirement; trees are planted on each side, and at the extreme end is a tall column, bearing on its summit a bronze statue of Liberty. The inhabitants swarm in the thoroughfares, where are incessant throngs of vendors, purchasers, and idlers, intermingled with every variety of conveyance; while the ear is stunned by the shrill conflicting cry of the ambulatory dealer of every conceivable commodity. Pleasure-gardens are close at hand, besides theatres, operas, circus, and other places of amusement suited to the seasons. Bull-fights were being carried on, and many from the ship visited the exciting but cruel pastime.



THE CITY OF MONTE VIDEO, LOOKING TOWARDS THE HARBOUR.

CHAPTER XIX.

MONTE VIDEO TO ASCENSION AND THE CAPE DE VERDE ISLANDS.

Leave Monte Video—Swinging ship—Sounding and dredging in the River La Plata—A Pampara off the coast—Enter the cold current—Its course—Completion of the voyage round the world—What has been accomplished—Course shaped for Ascension—South-east trades—Arrive at Ascension—The garrison—George Town—Scenery—The Green Mountain—Ascension turtle—Leave Ascension—Sounding—Cross the Equator for the sixth time—The oppressive region of equatorial calms—Steaming through the Tropics—Sight the Cape de Verde Islands—Arrive at Santiago—Anchor off Porto Praya—Leave for St. Vincent—Anchor in Porto Grande—Strong trade-winds.

FEB. 25th.—We had now been ten days at Monte Video, during the greater part of which the weather had been exceedingly unpleasant; strong northerly

winds and heavy seas made it both disagreeable and difficult to land, lying, as we did, fully two miles from the shore. It happened however to be a fine day on leaving, and a few hours were devoted to swinging ship for magnetic corrections and deviations. We then proceeded, under steam, out of the River La Plata. When off Maldonado Bay, we sounded and dredged in 13 fathoms, getting a good haul of fish, shrimps, holothuria, and dead shell.

On clearing the land, the barometer gave indications of a coming change in the weather, and, ere long, the wind freshened, and rain fell in torrents. It soon became evident we were in for one of the Pamparas, for which the Plata and its vicinity have been long celebrated, and which owe their name to the circumstance of their blowing from off the Pampas or plains.

All due preparations were made by shortening sail, and as the wind increased, it found us well prepared. Fortunately it did not last long, and the next day (Feb. 28) we were able to recommence sounding. Found bottom at 1900 fathoms; temperature 32.7° Fahr.; showing that we had again fallen in with the cold Antarctic current. During the following nine days, daily soundings were obtained from an average depth of 2700 fathoms, showing the same temperature results (for 400 fathoms from the bottom it was below 32° Fahr.). On the 9th March the depth was

found to be 1715 fathoms, temperature having risen to 34° , showing the limit of the cold current in an easterly direction; this was about 900 miles from the first sounding. The current now appeared to turn north, and after crossing the Equator in the vicinity of St. Paul's Rocks, to take a course again to the eastward, and so strike down the western coast of Africa; for on the 27th Oct. 1873, when 130 miles from the Cape of Good Hope, a cold under-current (temperature 32.9°) was found at a depth of 2325 fathoms, which, in all probability, was a branch of this now met with. On March the 10th the depth was found to have increased to 2200 fathoms; temperature 34° . We trawled and obtained serial temperatures during the two following days. The weather continued very miserable—heavy rain and calms; so the progress towards Tristan d'Acunha was very slow.

The 13th March possessed an interest of its own for those on board, as on that day we crossed the course which had been followed some two years and a half before in the passage from Bahia to the Cape of Good Hope. Thus the actual circumnavigation of the world had been successfully completed, and at least the greater portion of the cruise happily achieved. Since leaving this position, latitude $35^{\circ} 41'$ south, longitude $20^{\circ} 55'$ west, the vessel had sailed over about 44,000 miles. Some two hundred soundings, and nearly as many successful dredgings, had been

taken in all the great oceans and channels of importance in our track, in depths averaging from 1000 to 4000 fathoms. The soundings and temperatures have supplied the material information, by which oceanic sections have been constructed, showing formation of the bottom, the depth, variation in the temperatures, the currents, and specific gravity, &c., in all the great seas sailed over.

This, together with the abundance of material collected in the department of natural history and other scientific branches, will make this voyage one of the most important that has ever taken place.

On March 14th, in latitude $35^{\circ} 45'$ south, we trawled in 1400 fathoms, and obtained a few specimens at its conclusion, being about 300 miles from Tristan d'Acunha. Course was altered, and we stood north for Ascension Island, distant 1700 miles. Having a favourable breeze, we daily made good progress. On March 18th we sounded in 1890 fathoms, temperature 36.8° , and reached the south-east trades, which blew with unbroken regularity; not even forsaking us as we occasionally stopped to sound and trawl. However, as we ran farther north, the breeze got lighter, and each day saw the barometer rising, and clear, bright weather greeted us as we entered and passed through the tropical regions. We sounded every 200 miles on the course, the depths varying from 2900 to 1400 fathoms.

On March 27th the solitary island of Ascension was in sight, rising alone in the midst of the vast Atlantic. When about eight miles distant, we sounded and dredged in 425 fathoms, getting a good supply of mud, echini, coral, &c. A heavy squall of rain set in, which detained us for a short time; after which we proceeded towards the land, and later in the day came to anchor off the south or lee side of the island. The island as seen from the ship has a barren aspect, although warmed by the light colour of the sand. It was taken possession of by the British in 1815, and is about nine miles in length from east to west, and five or six miles from north to south.

The surface of the land consists of ridges of naked rock, hills of clinkers and cinders, and plains of ashes, dust, and lava. Just abreast of the anchorage is a somewhat level, cleared space, where are situated the buildings used as stores and workshops, a small fort, a pretty little church, and the hospitals. Barracks and scattered residences of the naval officials complete the group. The garrison is at present under the command of Captain J. W. East, R.N.; man-of-war routine and discipline are carried out in every department as if on board ship; the island is under the direction of the Admiralty, and used as a depot for stores for vessels employed on this part of the West African Station. The hills of Ascension are very numerous. The most elevated

rejoices in the name of the Green Mountain, from the light hue of the verdure at its summit, where there are excellent gardens producing many varieties of vegetables and fruits. It is situated nearly in the centre of the island, and is about 2800 feet high, rising amidst waste and desolation; for around is to be found neither verdure, shade, nor shelter, but one entire field of lava. Over this rough material a road has been made for the six miles leading to the summit. The lofty ridge of this mountain arrests the watery vapours that would pass it, and supplies the settlement with water. Numerous tanks on its side are so situated as to secure every drop of that most essential element. Occasionally the residents run very short, when the distilling apparatus has to be brought into requisition. When about 2250 feet up, the Mountain House is reached, where refreshments are to be obtained; and quite near at hand are the Convalescent Hospital and numerous cottage residences, from which capital views of the island are to be obtained. In various directions are seen craters of extinct volcanoes, varying from 100 to 300 and 400 feet in height. One of these, more terrific and rugged than the rest in appearance, is named the Devil's Riding Ground; it is an elevated mound about half a mile in circumference, with a road winding round it reaching to the top, closed in at the sides by a ridge of lava; and quite near at hand is "Wide-awake Fair," a

rough stony plateau, where thousands of sea-birds land for breeding during the season.

On the whole, the climate of Ascension may be regarded as very healthy, as it is situated in the direct track of the south-east trade-wind, having a particularly dry soil—nothing like swamp or marsh; and from the absence of all vegetation there is nothing to taint the air or to produce impurity.

Fever has occasionally been imported here from the pestiferous coast of Africa, but even that now appears to be a thing of the past. The coast being comparatively healthy, and the vessels not being kept so long on the station, we rarely hear of those dreadful epidemics which formerly made such havoc.

Ascension is famed for its excellent turtle, at one time considered the support of the island, the flesh being termed island beef. Large ponds are constructed for keeping the fish.

During the season, from December to June, men are employed along the sandy beach watching for the full-grown females to land for the purpose of laying their eggs. They crawl up the sandy beaches, and make a large hole by scooping the sand up with their flippers; having deposited their eggs in it, and carefully filled in the hole again, they prepare for their retreat to the water, but are intercepted by the watchers, who speedily turn them on their backs. At daylight they are taken to the inclosed ponds. Some of those captured weigh as much as seven cwt. They

lay from seventy to eighty eggs at a time, and repeat this operation two or three times in a season. The eggs are an inch and a half in diameter, and covered with a soft semi-calcareous shell.

A week was spent very pleasantly at Ascension, Captain East, R.N., and the officers of the island under his command doing their utmost to make our stay amongst them agreeable. However, after completing with stores, there was nothing further to detain us; so on the morning of April 3rd we proceeded on our voyage, and, when in the offing, remained a few hours, swinging ship, both for azimuth and magnetic corrections. On its conclusion a course was shaped north for the Cape de Verde Islands, distant some 1800 miles.

Sounding and trawling were frequent on our course over an average depth of 2000 fathoms; crossing the Equator on the 7th April, for the sixth time. Previous to this, in latitude $4^{\circ} 10'$ south, we lost the south-east trade-wind, and for more than a week afterwards we were steaming through a tedious and depressing region of calms and squalls of rain off the African coast. Its effect on the health and spirits of us all was most enervating; the oppressive and damp heat made it one of the most unpleasant parts of the cruise; calms and head-winds accompanied us each day. At length the island of Santiago was in sight, and early on the morning of the 16th April we anchored off the town of Praya. From what could

be seen from the vessel, it is altered but little in appearance since last we were here (August 1873).

After obtaining a few fresh supplies, we left the same evening for St. Vincent, which was sighted the next morning, and later in the day anchored off Porto Grande. Here a week was spent, completing stores and filling up with coal. A busy shipping-trade appears to be carried on; for numbers of mail steamers and traders make this a port of call for filling with coal, before shaping course to distant lands. The harbour is safe and convenient, but the scattered houses comprising the town, backed up with high volcanic rock, are dismal and uninteresting.

CHAPTER XX.

HOMEWARD BOUND.

Leave St. Vincent—Head-winds and disagreeable weather—Sight the coast of Spain—Anchor in Vigo Bay—The city—Channel fleet—Leave for England—Off Cape Finisterre—Favourable run across the Bay of Biscay—The English Channel—The coast of England—Anchor at Spithead (Portsmouth)—Arrive at Sheerness—Retrospect—Pay off at Chatham—Parting—At home—The end.

ON the 26th April we left under sail, homeward bound. When well clear from the land, we picked up the trades, and ran on merrily through the Tropics towards the Azores, full of the hope of speedily seeing the coast of England. But we were too sanguine; for after meeting with strong and adverse winds, our coal was soon consumed, and we were compelled eventually to run into Vigo for a fresh supply. The coast of Spain was sighted on the morning of the 20th May, and soon after we had exchanged the rolling, turbulent sea for the quiet and placid waters of the Bay of Vigo, which sweeps inland for more than 20 miles. We anchored off the prettily situated town, which is built on the side of a hill overlooking the broad expanse of water, where at the time of our visit some half-dozen ironclads belonging to the Channel squadron were at anchor,

forming the centre of a scene Oriental in its wealth of palms, orange groves, flowers, and orchards. Just time enough was allowed for a scamper on shore, through the narrow, steep, and winding streets of the town, and only a glimpse could be had of its old walls and gates, its churches and quaint-looking houses, of all shapes, sizes, and colours, in white, red, or green, according to the taste of the owners. All this, with a charming bright and sunny sky, and the pretty and picturesque dress of the peasants, made up a picture delightful to the artist as well as the ordinary observer.

By midnight sufficient coal had been taken in, and early the next day we were again at sea. The weather was still squally and unpleasant, yet we managed to get round Cape Finisterre; and now, with the wind somewhat fairer, a capital run was made across the dreaded Bay of Biscay. The evening of the 23rd, the bright light on Cape Ushant was seen; and the next morning, amidst haze and fog, we had our first sight of the English coast, as we passed up Channel, amidst a very maze of shipping outward and homeward bound.

Onward we go, sighting the old familiar headlands and landmarks—the Eddystone, the Start, the white cliffs at Portland and St. Alban's Head—until at last the Needles are in sight. After a few hours' steaming through the Solent, we reach Spithead (Portsmouth); and late on the evening of the 24th

May we anchor in English waters, after an absence of three years and a half.

A few days more, and we are at Sheerness and Chatham, amidst all the bustle and excitement attendant on returning stores and paying off.

Thus the cruise has been successfully accomplished, and the intentions of the expedition happily achieved. That it will exalt our national reputation to a very considerable extent, in one of the most popular branches of the service, cannot for a moment be doubted.* The completion of surveys; the success of soundings; configuration of the depths of the great ocean, with its nature and temperatures, and the composition of its bottom, have all been investigated and carried out by the hydrographic staff; and Professor Thomson and his talented assistants may well be complimented on their labours, which have contributed such an abundance of material to the various departments of natural history and the other scientific branches under their direction.

By-and-by, when all these subjects shall have been investigated, and opinions formed from the numerous and valuable collections sent home from time to time, then—and only then—will a true idea be obtained of the activity and research of each member of the expedition during the course of the voyage.

* The Geographical Congress held at Paris, August 1875, awarded to the members of the *Challenger* Expedition a first class medal as a token of admiration for the work done by them in the cause of science.

Doubtless we shall be told of wondrous facts which will read like fairy tales; for previously no sounding-line had ever traversed the great oceans, or mapped out their figure. We now know that there are laws which govern the geographical distribution of marine plants and animals, as well as those we are familiar with on the earth's surface: of the myriads of curious creatures, organised with delicacy and beauty, existing in these previously unsounded depths; creatures with numberless eyes, and others without any; starfish, growing on long and slender stalks; of beautiful phosphorescent avenues of vegetation; fish of all hues, blue and gold, striped and banded, in all colours and sizes, from the tiniest infusoria to the huge whale.

It is impossible at present to foresee or estimate the vast amount of information that will result from this the greatest scientific expedition that ever sailed from any shore.

The last day has come (June 12th), when all these close associations will be severed; and each one of the *Challenger's* crew goes his own way, to seek relaxation and pleasure amongst home scenes and friends near and dear to him.

A last shake of the hand, with "Good luck and good-bye!" and so now, to you, my reader, I say farewell.

From	To	Date of		Distances made good.	Tons cwt. Coals expended.	Number of Days at Sea.	Number of Deep Sea Soundings obtained.	Number of Serial Temperatures.	Number of Successful Dredgings.	Number of Successful Trawlings.
		Sailing.	Arrival.							
Sheerness	Portsmouth	1872 Saturday, Dec. 7	1872 Wednesday, Dec. 11	200	87 1½	5	..	..	..	..
Portsmouth	Lisbon	Saturday, Dec. 21	Friday, Jan. 3	1,091	207 5½	13	4	..	1	..
Lisbon	Gibraltar	1873 Sunday, Jan. 12	Saturday, Jan. 18	340	68 13½	7	10	..	3	1
Gibraltar	Madeira	Sunday, Jan. 26	Monday, Feb. 3	655	100 0½	9	12	..	..	3
Madeira	Teneriffe	Wednesday, Feb. 5	Friday, Feb. 7	255	15 9½	2	1	..	..	..
Teneriffe	St. Thomas.	(Off Teneriffe) Friday, Feb. 14	Sunday, March 16	230	45 5½	4	11	2	2	..
St. Thomas.	Bermuda	Monday, March 24	Friday, April 4	2,879	122 18	30	24	13	11	2
Bermuda	{Halifax, <i>via</i> New York.	Monday, April 21	Friday, May 9	870	79 18½	11	10	5	6	..
Halifax	Bermuda	Monday, May 19	Saturday, May 31	1,261	127 9½	18	14	7	9	..
Bermuda	{St. Michael's, Azores.	Friday, June 13	Friday, July 4	796	158 19½	12	11	8	7	2
St. Michael's	Madeira	Wednesday, July 9	Wednesday, July 16	2,031	109 13½	21	18	13	4	6
Madeira	St. Vincent.	Thursday, July 17	Sunday, July 27	528	34 10½	7	6	4	3	..
St. Vincent.	Porto Praya	Tuesday, Aug. 5	Thursday, Aug. 7	1,066	46 1½	10	11	7	3	..
Porto Praya	St. Paul's Rocks	Saturday, Aug. 9	Wednesday, Aug. 27	170	12 15½	2	1	..	..	..
St. Paul's Rocks	{Fernando No-ronha.	Friday, Aug. 29	Monday, Sept. 1	1,955	101 10	18	12	12	1	4
Fernando No-ronha.	Bahia	Wednesday, Sept. 3	Sunday, Sept. 14	342	18 13	3	5	2	..	..
Bahia	{Cape of Good Hope.	Thursday, Sept. 25	Tuesday, Oct. 28	815	87 5	11	17	2	2	7
Bahia	Hope	Total of first section of voyage	..	3,883	173 15½	33	13	10	9	2
				19,367	1,597 6	216	180	85	61	28

ABSTRACT OF THE VOYAGE OF H.M.S. CHALLENGER—continued.

From	To	Date of		Distances made good.	Coals expended.	Number of Days at Sea.	Number of Deep Sea Soundings obtained.	Number of Serial Temperatures.	Number of Success-ful Dredgings.	Number of Success-ful Trawlings.
		Sailing.	Arrival.							
Cape of Good Hope.	Melbourne.	1873 Wednesday, Dec. 17	1874 Tuesday, March 17	7,637	247 16	91	15	13	11	6
Melbourne.	Sydney.	1874 Wednesday, April 1	Monday, April 6	550	58 18½	5	1	1	4	3
Sydney.	Wellington.	Monday, June 8	Sunday, June 23	1,432	177 16	20	11	6	1	5
Wellington.	Tongatabu.	Tuesday, July 7	Sunday, July 19	1,547	73 8	13	6	4	..	5
Tongatabu.	Ngola Bay.	Wednesday, July 22	Saturday, July 25	400	13 8	3	..	..	2	1
Ngola Bay.	Levuka.	Monday, July 27	Tuesday, July 28	120	7 0½	1	..	..	..	..
Levuka.	Ngola Bay.	Saturday, Aug. 1	Monday, Aug. 3	120	33 14	2	1	1	3	..
Ngola Bay.	Port Albany.	Monday, Aug. 10	Tuesday, Sept. 1	2,250	71 6½	22	9	8	5	3
Port Albany.	Dobbo.	Tuesday, Sept. 8	Wednesday, Sept. 16	656	24 6	8	..	2	..	1
Dobbo.	Kii Doulan.	Wednesday, Sept. 23	Thursday, Sept. 24	100	17 9½	1	2	2	..	4
Kii Doulan.	Banda.	Saturday, Sept. 26	Tuesday, Sept. 29	200	38 4	3	1	1	..	..
Banda.	Amboyana.	Friday, Oct. 2	Sunday, Oct. 4	115	17 10½	2	..	2	..	..
Amboyana.	Termete.	Saturday, Oct. 10	Wednesday, Oct. 14	300	30 2½	4	2	2	..	1
Termete.	Samboangan.	Saturday, Oct. 17	Friday, Oct. 23	511	48 10½	6	2	1	2	2
Samboangan.	Iloilo.	Monday, Oct. 26	Wednesday, Oct. 28	220	21 12½	2	1	1	..	1
Iloilo.	Manilla.	Saturday, Oct. 31	Wednesday, Nov. 4	350	38 0½	4	..	1	4	..
Manilla.	Hong Kong	Wednesday, Nov. 11	Monday, Nov. 16	650	24 5	5	1	1	..	1
Total of second section of voyage				17,158	943 18½	192	52	41	37	36

ABSTRACT OF THE VOYAGE OF H.M.S. CHALLENGER—continued.

From	To	Date of		Distances made	Coals expended.	Number of Days at Sea.	Number of Deep Sea Soundings obtained.	Number of Serial Temperatures.	Number of Successful Dredgings.	Number of Successful Trawlings.
		Sailing.	Arrival.							
Hong Kong	Manilla.	1875 Wednesday, Jan. 6	1875 Monday, Jan. 11	650	35 17	5	1	1	..	..
Manilla.	Zebu	Thursday, Jan. 14	Monday, Jan. 18	380	45 14½	4	1	1	..	..
Zebu	{ Camiguin Is-land }	Sunday, Jan. 24	Tuesday, Jan. 26	110	..	2	1	1	1	1
Camiguin Is-land	Samboanga	Tuesday, Jan. 26	Friday, Jan. 29	250	..	3	1	1	..	..
Samboanga	Humboldt Bay.	Friday, Feb. 5	Tuesday, Feb. 23	1,333	108 18½	18	6	5	..	5
Humboldt Bay.	{ Admiralty Is-lands }	Wednesday, Feb. 24	Wednesday, March 3	403	42 2	7	1	1	..	1
Admiralty Is-lands	Yokohama	Wednesday, March 10	Sunday, April 11	2,533	106 0½	32	13	12	2	3
Yokohama	Kobe	Tuesday, May 11	Saturday, May 15	350	72 19½	4	1	1	1	1
Kobe	Miyana	Tuesday, May 25	Wednesday, May 26	120	20 8½	1	..	..	..	2
Miyana	Kobe	Friday, May 28	Saturday, May 29	120	19 5	1	..	..	..	2
Kobe	Yokohama	Wednesday, June 2	Saturday, June 5	400	80 13	3	4	3	..	2
Yokohama	Honolulu	Wednesday, June 16	Tuesday, July 27	4,302	279 3	42	24	24	2	7
Honolulu	Hilo.	Wednesday, Aug. 1	Saturday, Aug. 4	200	60 4	3	1	1	..	..
Hilo.	Tahiti	Thursday, Aug. 19	Saturday, Sept. 18	2,630	189 9	30	17	17	1	5
Tahiti	Juan Fernandez	Sunday, Oct. 3	Saturday, Nov. 13	4,643	222 19	41	22	19	1	11
Juan Fernandez	Valparaiso	Monday, Nov. 15	Friday, Nov. 19	400	17 3	4	1	1	..	1
Total of third section of voyage				18,824	1,325 12½	230	94	88	7	45

From	To	Date of		Distances made Good.	Coals expended.	Number of Days at Sea.	Number of Deep Sea Soundings obtained.	Number of Serial Temperatures.	Number of Success- ful Dredgings.	Number of Success- ful Trawlings.
		Sailing.	Arrival.							
Valparaiso . . .	Port Otway . . .	1875 Saturday, Dec. 11	1875 Friday, Dec. 31	2,033	Tons cwt. 76 6	D. hours. 21 0	4	5	1	4
Port Otway . . .	Hale Cove . . .	1876 Saturday, Jan. 1	1876 Saturday, Jan. 1	700	9 3½	0 14	1	1	1	1
Hale Cove . . .	Gray Harbour . . .	Sunday, Jan. 2	Sunday, Jan. 2		7 15½	0 13½	1	1	1	1
Gray Harbour . . .	Port Grappler . . .	Tuesday, Jan. 4	Tuesday, Jan. 4		6 18½	0 7	1	1	1	1
Port Grappler . . .	Tom Bay . . .	Wednesday, Jan. 5	Wednesday, Jan. 5		9 13½	0 12½	1	1	1	1
Tom Bay . . .	Puerto Bueno . . .	Saturday, Jan. 8	Saturday, Jan. 8		10 8½	0 11½	1	1	1	1
Puerto Bueno . . .	Isthmus Bay . . .	Monday, Jan. 10	Monday, Jan. 10		13 10½	0 12½	1	1	1	1
Isthmus Bay . . .	Port Churrueca . . .	Tuesday, Jan. 11	Tuesday, Jan. 11		10 5½	0 10	1	1	1	1
Port Churrueca . . .	Port Famine . . .	Thursday, Jan. 13	Thursday, Jan. 13		14 3½	0 13½	1	1	1	1
Port Famine . . .	Sandy Point . . .	Friday, Jan. 14	Friday, Jan. 14		5 2½	0 4	1	1	1	1
Sandy Point . . .	Elizabeth Island . . .	Tuesday, Jan. 18	Tuesday, Jan. 18		6 4½	0 3½	1	1	1	1
Elizabeth Island . . .	Falkland Islands . . .	Thursday, Jan. 20	Thursday, Jan. 20		400	52 11	3 0	3	1	3
Falkland Islands . . .	Monte Video . . .	Sunday, Jan. 22	Sunday, Jan. 22		1,173	80 15	9 0	4	4	2
Monte Video . . .	Ascension Island . . .	Friday, Feb. 6	Tuesday, Feb. 15		3,729	177 13½	31 0	21	20	3
Ascension Island . . .	Porto Praya . . .	Monday, Feb. 25	Monday, March 27		1,620	187 17½	14 0	3	8	2
Porto Praya . . .	Porto Grande . . .	Monday, April 17	Monday, April 18	180	23 18	1 0	0	2	2	
Porto Grande . . .	Vigo . . .	Wednesday, April 26	Saturday, May 20	2,926	141 10	24 0	2	2	2	
Vigo . . .	Portsmouth . . .	Sunday, May 21	Wednesday, May 24	630	122 1	3 0	1	1	1	
Portsmouth . . .	Sheerness . . .	Thursday, May 25	Friday, May 26	150	30 18	1 0	1	1	1	
Total of fourth section of voyage				13,541	959 16	111 0½	48	41	6	20
Total of first section of voyage				19,367	1,597 6	216 0	180	85	61	28
" second "				17,158	943 18½	192 0	52	41	37	36
" third "				18,824	1,325 12½	200 0	94	88	7	45
" fourth "				13,541	959 16	111 0½	48	41	6	20
Grand total				68,890	4,826 13	719 0½	374	255	111	129

ABSTRACT OF THE VOYAGE OF H.M.S. CHALLENGER—continued.

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