



**Jungle Life in India or the
Journeys and Journals of an
Indian Geologist**

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CHAPTER IX.

SECTION I.

BIRBHUM—CHUTIA NAGPUR—CENTRAL PROVINCES.

1872-73.

INSTRUCTIONS FOR SEASON—MINING SPECIALISTS—DIFFICULTIES IN CONNECTION WITH MINING ENTERPRISE IN INDIA—MAHOMED BAZAAR IRON-WORKS—RANIGUNJ COAL-FIELD—IRON-FURNACES NEAR BARAKAR—MARCH TO HAZARIBAGH—IRON ORES NEAR HAZARIBAGH—KARANPURA VALLEY—KARANPURA COAL-FIELDS—MAUDIH TEA PLANTATION—DALTON-GUNJ COAL-FIELD—SONE RIVER—KAIMUR PLATEAU—AKBARPUR—ROHTAS GURH—URAONS—DEHRI—SONE CANALS—APPRENTICE SCHOOL—POOR WHITES AND EURASIANS—DEATH IN CAMP—SEND BACK ELEPHANTS—ARRAH—BREAK-UP CAMP—BENARES—JABALPUR MARBLE ROCKS—MOPANI COAL-MINES—OMERPANI IRON-MINES—TENDUKERA IRON-WORKS—RETURN TO CALCUTTA.

THIS season my duties were of a special and unusual kind; instead of being allotted a new area for original exploration, I was directed to accompany a gentleman who had arrived from England in order to prepare a report for the Secretary of State on the value of the principal iron deposits in India, and on the advisability of establishing iron factories in different parts of the country. From time to time India has been visited by specialists, who have been deputed to report upon Iron, Coal, Petroleum, Gold, &c. They are expected to traverse large areas in a brief space of time, and to give opinions on unopened deposits. In a general way the conclusions which they arrive at may be summarised by saying, that they discover that in India there are special local conditions surrounding every question of this kind, which render it well nigh impossible for them to come to any satisfactory conclusions. In India the profitable exploitation of



the mineral resources depends not merely upon the absolute or comparative richness of particular deposits, but upon the climate, the great distances which the productions must, in most cases, be carried, and the land tenures and mining rights. Although these important elements are or ought to be known to every district official throughout the country, it has been generally left to these specialist visitors to find out for themselves the existence of such abnormal conditions.

A case in point is afforded by the experience of a specialist who is at present engaged in testing the value of the gold deposits in Southern India, and who is making a more thorough and practical investigation of his subject than was possible to some of the others. From a recently-published and apparently authentic source,* we learn that "Mr. Brough Smith and Mr. Laing came to India to determine whether gold is or is not to be found in this country in remunerative quantities, and they have settled that question beyond dispute. There is gold in abundance, but India will never be a mining country like Australia, and for this reason—it can never be properly prospected. It may be asked why it can never be prospected. The answer is very simple: it is broken up into too many proprietorships. What with rajas, zemindars, and planters, men whose profession and livelihood is gold-digging will never come out here to prospect, *because there are no mining regulations*. One of the first things Mr. Laing said to me was, 'India can never be like Australia because there are no miners' rights.' If the gold industry in India is intended to be developed for the benefit of the many instead of the few, then mining rules should be drawn up and copies forwarded to the 'Mining Departments' in the various colonies for publication. Of course landowners will do all in their power to oppose this, as they will say the mining rights are already theirs. But they will find it far more difficult to raise capital to work mines in

* Correspondent of the *Madras Athenaeum*.



India than it would be in any other part of the world. Both Mr. Brough Smith and Mr. Laing agree that some of the gold that they have found is far richer than anything of the kind they ever saw in Australia, and they showed me a large number of very rich specimens. They neither of them believe much in the Wynaad as an alluvial digging except on Vellera Mullah." This quotation is given, *faute de mieux*, merely to illustrate the context. It is not within either my province or present means of reference to describe the recent gold discoveries here.

I might quote numerous cases to show that enormous sums have been paid by companies, and even in some instances by Government, to landholders for the mining rights, simply because the law is so vague on the subject. And such precedents having been established the difficulty in the future has become all the greater. These enormous sums have, in not a few of the cases, more than swallowed up the profits from actual out-turn which have been made, and the works have been either carried on at a dead loss, or have utterly failed and been closed. Once you have proved that a valuable, or even a promising, deposit is to be found on the land of a zemindar or raja, he is sure to demand for the right to work it a rent that is absolutely prohibitive.* This has already, I believe, been the case in the Wynaad gold regions. The sanguine promoters of a company may yield to such exorbitant demands, and the natural results follow—failure and loss. But more than this, there is another feature in the dealings between non-official Europeans and natives, and that is that they are almost inevitably accompanied

* The following which I quote from a native paper illustrates this, though the particular incident had, I believe, no foundation in fact. The *Umdatull Akbar* says, "that a gold mine has been discovered at Lustia, a place about twelve miles distant from Prosunda, in the district of Bhagulpur. Government has already placed there a force of fifty constables under a European officer, and offered to pay the owner of the land fifty lakhs of rupees (*i.e.*, half-a-million sterling) by way of compensation. But the latter demands that he should receive half the profits accruing from the mine; Government has not acceded to these terms. No final decision has been arrived at."



by harassing and chronic litigation. The manager of a mine or factory should combine the qualifications of a lawyer—and a very sharp lawyer—with a knowledge of his own particular business, and, as a matter of experience it will be found that more than a moiety of his time will be devoted to the former branch of his business. The old “interloper” idea is still strong in the land. And not only is the non-official European in remote districts, away from the presidency towns, an object at which the natives fire their incessant darts of petty annoyance, but he is also not unfrequently regarded with disfavour by the district officials, who are jealous of any influence existing in their districts which does not emanate from themselves. I know of numerous individual exceptions to this rule, where the officials are really anxious to aid and encourage independent commercial enterprise; but individual officials are constantly being moved, and the useful and profitable employment of capital in India is seriously affected by the rule, of the existence of which there can be no doubt whatever. District officials may very properly complain of the manner in which non-official Europeans, more particularly those belonging to the lower social ranks, sometimes treat the natives; but, on the other hand, it should be remembered that these people receive an amount of provocation and insolence from the natives which is simply inconceivable to any one who has not been witness of it. The wonder is that they, as a body, show so much self-control, and bear patiently, without the prospect of ever obtaining any substantial redress, the obstruction and impertinence, not only of the pettiest of native subordinate officials, but also of the general population, including not unfrequently their own *employés*, who are ever ready to hasten off to the nearest magistrate with the most trivial and childish complaints. Deplorable casualties occur sometimes, but at wide intervals, in consequence of Europeans under provocation taking the law into their own hands and committing assaults. Generally these casualties are due to the fact of the man assaulted being in a diseased condition of health which the assaulter is in complete ignorance of. Deaths from



this cause occur as the result of combats, or more frequently beatings inflicted by natives on each other, but such cases are dealt with in the ordinary course, and not being trumpeted through the land by a disaffected native press, do not attract much public attention. The notice which this subject has received from the Government and in Parliament has of late years brought it so much before the public, that I shall not dwell upon it further here.

November 28th.—Calcutta to Synthea.—Mr. Bauerman, the gentleman who had come out from England to report on the iron ores of India, and I, started by train for Synthea, in Birbhum, this morning, and shortly after arrival went off to Mahomed Bazaar, and put up in a tent which had been pitched for us near the old Birbhum Iron-Works. On the following day we visited the principal iron-mines in the country to the north. Most of them had been deserted, and were full of water, as there was but little doing in the native furnaces. The information which was to be obtained from the inhabitants as to the thickness of the deposit was of the vaguest and most useless nature. Subsequent explorations in this region, and an attempted resuscitation of the works, have abundantly proved that the ore is not deficient either as regards quality or quantity; but there are difficulties there in reference to the supply of suitable fuel and flux, which seriously affect the prospect of profitable iron manufacture. But regarding this subject reference may be made to what has been published elsewhere.*

Leaving Birbhum we next moved to the Ranigunj coal-field, and during successive days visited the mines and works of the three principal coal companies, the iron deposits, and a large European pottery manufactory, which is the only one in Bengal at present. From Ranigunj we marched to Assensole, and thence to Barakar, examining the coal and iron at all points

* *Vide Mem. Geological Survey of India, Vol. XIII., p. 241.*



where they occur in the vicinity of both places. Since that time two blast-furnaces have been erected by a company near Barakar, and it has been satisfactorily proved that good iron can be manufactured from the materials available on the spot; but the present depression in the iron trade has affected the prosperity of the undertaking very materially.*

At Assensole five elephants belonging to the Commissariat Department arrived to convey our baggage to the country to the west. On the 27th of December we reached Hazaribagh after the usual marches up the Trunk Road, which proved unproductive of any incidents worthy of especial record. The four days next succeeding were devoted to the examination of the various iron-ore localities which had been previously discovered in the neighbourhood of the station. None of them appeared to be of any great promise, and in several cases the supposed iron ore proved to be simply a form of massive garnet, which, though conceivably of use for some other purposes, could not be employed as an ore of iron.

January 1st.—Hazaribagh to Badum.—To-day we marched southwards, descending 800 or 900 feet by a steep ghât or pass into the Karanpura Valley, where there are two coal-fields, which have been surveyed and reported upon by Mr. Hughes, of the Geological Survey. The track then existing, by this the Mutra ghât, was so steep that the load of one of the elephants slipped bodily over its head, and much damage was caused to sundry articles of furniture. The view of this valley, with the block-like mass of the Maudih plateau standing out in the centre of it, as seen from the summit of the ghât, is a remarkably beautiful one. Many of the villages are large, and a considerable proportion of the houses are tiled, while the tracts of terraced

* While these pages were passing through the press, news has been received that this Company has been wound-up. The cause of failure appears to have been the insufficiency of the original capital, which was only £100,000 instead of being half-a-million, as it should have been in order to secure success.



cultivation are here and there interrupted by splendid groves of mangos and fan palms. At Badum there is an old fort, said to have been the abode of the Ramgurh Rajas before they went to Ramgurh; but, judging by the appearance of the ruins at the latter place, I should say that it was the older of the two.

The Karanpura Valley is the seat of considerable native iron factories, and to an examination of these and the iron and coal deposits our time was devoted for several days. As I subsequently had further opportunities of enquiring into the position and particular features of the iron industry, not only here, but also in some adjoining coal-fields, I shall reserve my account of them for a future chapter. While in the neighbourhood we paid a visit to a tea-plantation which is situated on the Maudih plateau, at an elevation, I believe, of about 900 feet or so above the general level of the valley. The plateau, being formed of porous sandstones and conglomerates, similar to those which form the large isolated hills of Lugu in the Bokaro field and Pachete in the Ranigunj field, does not retain moisture long, and in consequence the surface on the top speedily becomes dry after the cessation of rains. It is with extreme difficulty that the tea-bushes are kept alive during the scorching blasts of the hot weather. When the rains come on they flourish and do well, but the plucking season is a short one. The teas manufactured are chiefly the varieties of green, and are I believe of good quality, commanding a high price. Labour is cheap, the coolies receiving only about half what they would in Assam or Cachar.

On leaving the Karanpura Valley our next destination was the Daltongunj or Palamow coal-field, the coal in which was at that time being mined or rather quarried for the supply of the works in connection with the Sone irrigation at Dehri. Eight marches took us to Rajharrah, near which the coal-mines were situated. At several places, more especially between Pugar and Sorodah, we saw groups of stone monuments, the sole remnants of former colonies of Lurka Kols or Hos. Some of these, unlike those erected at the present day, were dressed into shape with cutting



tools, and one or two resembled a form commonly used for head-stones in English grave-yards.

After a few days devoted to the Daltongunj coal-field, we resumed our march westwards, reaching the village of Kabra, on the Sone river, on the 19th of January. From this point a splendid view of the river, with the Kaimur hills forming a very substantial background, is obtained. The Kaimur hills, which are the most eastern extension of the Vindhyan range, are formed of a group of rocks belonging to a series quite different from any occurring in Chutia Nagpur. This series bears the name of the range, and is believed to be the peninsular equivalent of the old red sandstone and Devonian formations of other countries. The Kaimur or Kymore beds are at the base of the upper of the two divisions into which the series is naturally separated.* They consist of sandstones, conglomerates, and shales, and are, like all the other rocks of the series, quite unfossiliferous, and therefore the age assigned has been deduced from a consideration of the relations which exist between this and other formations of ascertained position, rather than by direct evidence such as fossils would afford. The Kaimur beds at this eastern extremity shew little or no signs of disturbance, forming nearly horizontal strata which rest on the limestones and shales of the lower Vindhyan. They thus form the level plateau of Rohtas, which, with its steeply-scarped sides, affords, on the west of the Sone river, physical features of a type not anywhere seen to the east.

January 20th.—Kabra to Akbarpur.—To-day we forded the Sone and marched to Akbarpur, on the western bank, where we became the guests of a renowned bibliophil and friend of the natives, Mr. Davies. This gentleman's name is mentioned by Sir J. D. Hooker in his journal. We found that his library was of considerable size and value, and that although he had, I

* For a full account of the Vindhyan series, reference should be made to Mr. Mallet's report. Mem. Geological Survey of India, Vol. VII.



believe, been born in India and had never visited Europe, he possessed a marvellous acquaintance with modern literature and the progress of scientific research. The contents of books of travels in many countries were simply at his fingers' ends, and we had abundant evidence of his wonderful powers of memory. It was sufficient to mention any country, however remote and insignificant, to hear all about its polity, natural productions, &c. Not only is Mr. Davies looked up to as a father by the people all round, but he is in a measure a patron of the denizens of the neighbouring jungle, since he has quarters in which food is always placed, and which the wild spotted deer have learnt to enter as a haven of refuge where they can come and go as they please. Often they are absent for months, but return again with their fawns when in the hot weather herbage is scarce in the jungle.

Overhanging the village of Akbarpur, on the corner of the Rohtas plateau, there are to be found a number of old ruins of houses and temples included in a fort.* We visited these and explored a portion of the neighbouring plateau, upon portions of which there is still a considerable amount of jungle. It was from this neighbourhood that the Uraons are, according to their own traditions, said to have spread into Chutia Nagpur, and this very probably was a halting place for some years, when with other Dravidian races they pushed into south-eastern India from countries lying to the north-west. To the present day there are some villages and hamlets occupied by Uraons on the plateau.

Two marches from Akbarpur we arrived at Dehri, the centre of operations in connection with the Sone canals which are fed by the water accumulated in the bed of the river by means of a weir or anicut. A vast network of distributories convey this water over a wide area of country, both on the Patna or eastern side of the river, and the Arrah or western. There are also canals for traffic, which, as feeders of the East Indian Railway, may

* An account of these will be found in the *Journal of the Asiatic Society of Bengal*, Vol. XLVI., part I., p. 27.



become of very great importance, more particularly should the coal-fields of Palamow be opened up. When I left India the question of enforcing compulsory water-rates was under consideration. Whether any determination has since been come to I cannot say, but it seems to be only common justice that the people who alone derive benefit from any particular irrigation project should pay for all the expenses of it. And it is likewise evident that the extension of irrigation to any particular tract should be settled upon by the Government, by and with the advice of their most competent experts, and that the matter should not be left to the decision of a parcel of ignorant landowners, and still less to a certain class of writers for the press, and public declaimers, who, whether in Europe or India, fail to grasp the main features and unusual difficulties of the question. Here and in Orissa, as I shall afterwards mention, the supply of water is much larger and less likely to fail in seasons of drought than in Midnapur, the irrigation works at which place I have alluded to on a previous page.

At Dehri there was much of interest to be seen, and in the workshops we were shewn several machines patented by Mr. Fouracres, the Executive Engineer in charge, which had been designed to save labour and meet the particular circumstances of the works. Thus there was a very ingeniously-constructed dredger, which served materially to expedite the sinking of wells in the sandy beds of rivers. A self-acting water buffer, by means of which the shutters at the crest of the weir would open to allow of the sudden rush of water during floods, and close again after they had passed, was likewise a most ingenious device. In the workshops almost anything that can be made with wood or iron could be prepared on the spot. It is essential in India, to prevent delays which would be of the most serious nature, that every great public work shall have its own factories and mills. Hence one of the great primary causes of expense in these undertakings. In connection with the workshops, and likewise under the charge of Mr. Fouracres, there was a school where a number of apprentice lads of European and half-caste parentage



receive a theoretical and practical education, which would enable them to become artizans with a prospect, in certain cases, of rising to something higher. This school was at the time in an experimental stage, but it promised well, and together with others was destined to fulfil a very important mission, as affording a means of employment to the rising generation belonging to the classes mentioned. Such efforts, though but mere drops in the ocean of a vast and speedily-increasing population of poor whites and Eurasians, are deserving of every encouragement. The destitution, degradation, and terrible misery of some of these people is one of the most distressing subjects of contemplation in the present and future condition of India. Various projects of starting colonies for these people have been from time to time talked of, but the material is bad, very bad for the purpose. It is deficient in bone and sinew, and in energy; and in some cases, it is to be feared, vicious propensities render the subjects almost hopeless objects for amelioration. Shipping off batches of Eurasians to Australia, which is sometimes resorted to, is calculated no doubt to relieve India of an incubus; but the benefits to Australia, or even to the persons exported, are perhaps somewhat problematical. In India any unskilled work which the majority of these people are capable of doing can be performed equally well, and at a cheaper rate, by natives, who are preferred by most employers of labour.* They, however, somehow manage to exist, and they rapidly increase and multiply, and their existence and numbers are facts which cannot be ignored, and must be grappled with.

January 24th.—Dehri to Nussergunj.—After going to bed I was disturbed by a moaning sound, and on enquiry found that one of the mates, or mahouts' assistants, was very ill with dysentery,—so ill that I could entertain but little hope of his recovery. However, I administered what remedies I could, but in a few

* The most recent legislation on the subject is unfavourable to the prospects of a career in Government employ opening up to the people of these classes, as all minor appointments are to be given to natives.



hours he was dead. About a week previously I had treated him for fever, and as I had heard nothing further I supposed he had recovered. I now learnt that he had been ill ever since, but that the mahouts had kept it secret from me, and though every one of the servants knew of it, none thought it his business to mention it. They preferred to consult the village doctors, who assured them that the boy was not really ill, but was possessed by an evil spirit, whom they sought to cast out by their incantations.

During the last few days, having been in an open, highly-cultivated country, great difficulty had been experienced in obtaining the usual tree-fodder for the five elephants, and on one or two occasions we were compelled to feed them on sugar-canes—a rather expensive diet, and not easily obtainable, as the proprietors of the fields could not always be found, and, in some cases, it would have required a formal judicial enquiry to have ascertained to whom the crop really belonged. I accordingly hired bullock-carts for the remainder of the journey, and despatched the elephants back to the commissariat dépôt at Hazaribagh. These elephants had only been captured a few months before they came to us, and some of them, though amenable to orders, were by no means thoroughly tamed.

On the 28th we reached the station of Arrah, which has obtained a wide notoriety in consequence of the defence of a small house by a handful of Englishmen against the mutineers in 1857. We there broke up camp, despatching tents and horses to Calcutta, and on the following day proceeded by rail to Benares where we spent a morning visiting the various temples, the Observatory of Raja Maun Singh (the instruments at which are described and figured in Hooker's *Himalayan Journals*)—the Ghâts, the Minarets, the bazaars, and the various other sights for which Benares is so well known. These I shall not pause to describe, as accounts of them are to be found in many works; but shall merely allude to what struck me as the most remarkable feature in this holy city—the religious centre of Hinduism; it was that there was no objection made to our



entering the outer chambers of the temples, and that the priests and people about were uniformly polite. The former, indeed,—till we stopped them—occasionally most unceremoniously swept away kneeling worshippers so that we might get better views of the altars.

In many out-of-the-way places, more particularly in Orissa, one is generally not permitted to enter the temples, and the custodians are often inclined to be discourteous. From Benares we went by train to Jabalpur from whence we purposed to visit the coal and iron mines of the Narbada valley. But while delayed at Jabalpur we availed ourselves of the opportunity of paying a visit to the famed "marble rocks" some ten miles distant. These marble rocks are traversed by the river Narbada, which has excavated a deep gorge bounded by sheer vertical faces of pure white saccharine marble, some of them being 120 feet high. The gorge is about two miles long, and affords a scene of still loveliness of a very charming character. In Peninsular India, south of the Himalayas, I know of none more worthy of a visit. Many descriptions of the locality have been published—none of them, perhaps, more graphic than that by the late Captain Forsyth.* The visiter traverses the gorge in a flat-bottomed boat which, as it is rowed or poled along, enables him to fully realize the extraordinary combinations of colours which the play of light on the rugged white surface affords, and which forms a striking contrast with the deep hues of the water beneath. But the elements for producing scenes of terror and death are not absent from this still retreat. If while in the centre of the gorge you cast your eyes upwards to the most inaccessible points on the cliffs, you will probably see a number of semi-circular objects hanging therefrom. These, you are informed, are the combs of the much-to-be-dreaded bees which infest the gorge, and the boatmen will warn you not to fire off a gun in their vicinity, and to be careful to do

* "Highlands of Central India," p. 38.



nothing else to excite their ire. Once fairly roused the bees swarm down upon all intruders, and there is no means of avoiding their cruel stings. Even good swimmers, who have sought to save themselves by diving, have not always been able to escape. Captain Forsyth records one such instance, and there have been others, I believe. When standing on the narrow gravel beach near the fall, over which the water plunges into the gorge, I put my foot on a bee, in order to secure a specimen, whereupon the boatmen at once protested, declaring that news would be carried by the other bees which were crawling about on the wet stones, and that we should most certainly be attacked; but of this, of course, there was no danger. Real danger may be caused by people firing at the combs, or at the rock-pigeons from above, while there are others in boats below, as these latter are likely, from no fault of their own, to become the objects of attack.

Visitors to Jabalpur should not fail to pay this locality a visit, and if they observe the precautions which the boatmen, for their own safety, suggest, they will not run any great risk. While at Jabalpur we were told that a party of Cook's "personally conducted" tourists had, a short time previously, passed through the station. The marble rocks were not included in their programme, and the tourists declined to go to the expense of carriages themselves, and so the books kept for the purpose at the bungalow had not, at that time, been honoured by the autographs of these distinguished visitors, who left India without having seen one of the most remarkable scenes of natural beauty which it contains. I may add that the bees have not got it all their own way, since, by means of long bamboo ladders suspended from the cliffs above, the natives manage to rob the honey at night, first smothering the bees with the smoke from torches. At the time of our visit there were a number of these frail ladders hanging in close proximity to where combs had been, and where others were again being made to replace them. This locality, like most others in India, which possess any very striking features of natural beauty, has been adopted as the site of several Hindu Sivoid temples, and is esteemed as a place of



particular sanctity. The quality of the marble varies a good deal ; but a selected block of it which was sent to the first Paris Exhibition was pronounced to be equal to Italian marble for statuary purposes.

February 4th.—From Jabalpur we proceeded on this date to the coal-mines of the Narbada Coal and Iron Company, at a place called Mopani, which we reached by a branch line from Gadawara, a station on the Great Indian Peninsular Railway. I shall again allude to and shall briefly describe these mines in the next chapter. We next visited some iron deposits at a village called Omerpani, to the north of Gadawara, and the native iron factories in connection with them at Tendukera. The privilege to work the iron has been conceded to the above-mentioned company ; but hitherto their operations have been confined to the extraction of coal. The ore is brown hæmatite, or the hydrous peroxide of iron, and occurs in lodes in a much-crushed band of siliceous limestones. It has been very extensively mined by the natives—some of the inclines running to depths of from thirty to forty feet from the surface. There are likewise numerous galleries and irregular burrowings, by means of which ore has been extracted. A quantity of detrital ore is also obtained in the alluvium. From Omerpani the ore is carted to Tendukera where it is converted into iron in furnaces similar to those employed in Bengal, except that the bellows are worked by hand instead of by foot, and the metal, which is of good quality, is sold at a rate equivalent to about £6 a ton.

From Gadawara Mr. Bauerman continued his journey to Nagpur and Chanda to examine the iron deposits in the latter region, and I returned to Calcutta on the 12th of February, whence I set forth again in about three weeks on the expedition to the Andaman and Nicobar Islands, of which an account will be found in the next section.



CHAPTER IX.

SECTION 2.

ANDAMAN AND NICOBAR ISLANDS.

1873.

ORGANIZATION OF PARTY TO EXPLORE ISLANDS OF BAY OF BENGAL—CONVICT FELLOW-PASSENGERS ON THE "SCOTIA"—ARRIVE AT PORT BLAIR—START FOR MACPHERSON'S STRAITS IN A STEAM LAUNCH—INFLUENCE OF GEOLOGICAL STRUCTURE ON VEGETATION—BEAUTY OF SCENERY—SUBMARINE LIFE—ASPECT OF THE STRAITS—ACCIDENT TO BOAT—LAND AT ESCAPE BAY—LARGE STONE PLOVER—OTHER BIRDS—CALAMUS PALM—TAKE UP POSITION FOR NIGHT—FISHING—MORNING PLUNGE IN SEA—LAND AGAIN AT ESCAPE BAY—JOLLY BOYS ISLAND—BIRDS SEEN AND OBTAINED—EDIBLE SWALLOWS' NESTS—CRAB PLOVERS—FLYING FOXES—LAND AGAIN ON JOLLY BOYS ISLAND—CORAL REEF AT LOW TIDE—BÊCHE DE MER—BARGE BOARDED BY ANDAMANES—THEIR APPEARANCE, DOINGS, AND SAYINGS—BARTER FOR WEAPONS AND ORNAMENTS—REJOIN THE "SCOTIA"—THE "PRINCESS" TAKES LEAVE OF US—LAND ON TILLIANG-CHONG ISLAND—GEOLOGY—SHOOT BIRDS—CURIOUS DISTRIBUTION OF THE COCOA-NUT PALM—REACH NANKOWRI HAVEN—THE SETTLEMENT—THE NICOBARESE VISIT THE SHIP—TWO OF THEM AGREE TO JOIN THE EXPEDITION—GALATEA BAY—LAND ON THE GREAT NICOBAR—GEOLOGY—TREES—HERMIT CRABS—BIRDS—THE MEGAPODE, OR MOUND-BUILDER—TREE-SHREW—A CANOE CAPSIZES—PURCHASE OBJECTS OF ETHNOLOGICAL INTEREST—LEAVE GALATEA BAY—THE GREAT NICOBAR—LAND ON KONDUL ISLAND—BIRDS—HOUSES OF THE NATIVES—THEIR CONTENTS—HIEROGLYPHIC SCREEN—MY ESCORT—GEOLOGY—LAND AGAIN ON KONDUL—BIRDS OBTAINED—INHABITANTS OF THE INTERIOR OF GREAT NICOBAR—MONTSCHALL ISLAND—CAUGHT BY THE TIDE—GEOLOGY—TREES AND TRACK ISLANDS—BIRDS—GEOLOGY—BOAT CARRIED OFF BY CURRENT—MERU ISLAND—DR. STOLICZKA IS LOST—RELIEF PARTY FIND HIM—CAPTURE OF A ROBBER CRAB—CANOE UPSET—RETURN TO NANKOWRI HAVEN—KATCHALL ISLAND—HUNG-HUNG-SU—CAVES IN CORAL LIMESTONE—BIRDS—BURGLARY OF HUNG-HUNG-SU'S PENATES—BOMPOKA ISLAND—GEOLOGY—BIRDS—VILLAGE—THERESA AND CHOWRA ISLANDS—LAND ON BATTI MALVE—THE HOME OF THE NICOBAR PIGEON—GEOLOGY—RATS—KAR NICOBAR—THE NATIVES—BARTER—MANGROVE-SWAMP—VILLAGE—CROSS-BOWS—BIRDS—RETURN TO PORT BLAIR—MOUNT HARRIET—LITTLE BUTTON ISLAND—EDIBLE SWALLOWS' NEST—THE REEF HERON—TRACES OF A VISIT BY NATIVES—BARREN ISLAND—NARKONDAM—GREAT COCO ISLAND—BIRDS—TREES—GEOLOGY—LITTLE COCO—TREES—CORAL REEF—HYDROSAURUS—BIRDS—GEOLOGY—PREPARIS ISLAND—TREES—COCOA-NUTS NOT FOUND—BIRDS—WRECKAGE—MONKEYS—GEOLOGY—TURTLE CATCHING—RETURN TO CALCUTTA.

SHORTLY after my return to Calcutta I was invited to join an expedition to the Andaman and Nicobar Islands, which was then



being organized by Mr. A. O. Hume, Secretary to the Government of India. Arrangements were made with the British India Steam Navigation Company by which the usual monthly mail trip to Port Blair and the Nicobars, and which ordinarily occupies about seventeen days, was to be extended to a month, thus affording sufficient time for us to visit most of the islands of both groups. Our party included Mr. Hume, the late Dr. Stoliczka, Mr. Wood-Mason, Mr. Davison, and myself, with half-a-dozen native collectors and taxidermists. Being all on leave, we were free to follow our own devices and enjoy ourselves as best we could. The elements of enjoyment proved to be not wanting, and I can now look back to that month spent among the islands of the Bay of Bengal as one of the most pleasant of my life. Although a thorough and, as far as possible, exhaustive examination of the ornithology of the islands formed the primary object of the expedition, other branches of zoology and geology came within the scope of our investigations. Even botany was not neglected, as two native collectors from the Calcutta Botanical Gardens were on board.

On the 1st of March we embarked on the steamer "Scotia," and by 3 p.m. got fairly started on our journey. By sunset we had only reached as far down the river as Budge-Budge, and were therefore compelled to anchor for the night. Together with other passengers on board we found seventy male and thirteen female convicts under the charge of a guard of Sepoys. Among the men were two distinguished from their fellows by a curious episode in their lives. Nearly a year previously they had escaped in a small boat from the convict settlement at Port Blair. After suffering much hardship, they were picked up by a Norwegian vessel and made over to the English Consul at Antwerp, by whom they were forwarded to London. At the Asiatic Home, where they remained for three months, their antecedents were ascertained, and they were sent back to India, and were now about to return to the life from which they had thus ineffectually sought to free themselves. With one of them, a Sikh, I had some conversation, and learnt



from him some of his adventures. The subject he seemed most particularly to dwell upon was the fact of his having walked about London in European clothes. Another of the convicts had a short time before run *ahmak** in one of the suburbs of Calcutta, on which occasion he had killed several people and wounded others. Fortunately such individuals only make their appearance at rare intervals in the crowded thoroughfares of Calcutta. How this one escaped hanging, which he most richly deserved, I cannot say.

During the following day, owing to delay in crossing the dangerous James and Mary Shoals, we did not get far enough down to continue our voyage that night with safety, and were therefore compelled to anchor near Saugor Island. Thus some precious time was lost at the outset, and a slight modification of the careful programme of our trip, drawn up by our leader, became necessary. His prevision proved of great service, and the dates being subsequently strictly adhered to, we were enabled to carry out all our plans.

Before we reached the blue water next day, specimens of a herring gull (*Larus argentatus*) and a Tern (*Sterna Bergii*) were shot, and the steamer was stopped in order that they might be retrieved. In descending into a boat for this purpose our leader unfortunately strained his back, and was in consequence very much crippled throughout the trip.

On the gloriously bright morning of the 7th of March we ran into Port Blair, and anchored off Ross Island. I have on a previous page described the physical characters and beauty of this harbour and its surroundings. I noted that the clearance of jungle had progressed, and that new buildings had been erected since my first visit, but otherwise I saw no change. Soon the different officers of the settlement, with their convict crews, put off in boats from various points on the islands and

* This word is anglicised into a *muck*; hence, perhaps, the slang phrase, "going a mucker." The original simply means foolish, or mad.



came on board. Our rigid programme admitted of our making no delay, and we were therefore unable to accept their offered hospitality. Our leader, after a brief conference with General Stewart, the Superintendent of the Settlement, had arranged that we were to proceed at once in a steam barge to Macpherson's Straits, which divide the Southern Andaman from Rutland Island. During the day the "Scotia's" cargo was to be unshipped, and on the following morning but one she was to pick us up and proceed southwards to the Nicobars. A few hours' steaming in the barge along and close to the coast of the South Andaman brought us to the entrance to Macpherson's Straits. The island up to this point is densely clad with forest, the hills in some places running down almost to the sea, in others terminating on the sea-face in steep cliffs with no beach at foot. At the turning-point of the island there is a small promontory called Bird-nest Cape, formed of reddish, green, and grey serpentine, upon which, save for a few tufts of grass, there is no sign of vegetation. This is but one of many examples to be found in these islands where rocks containing magnesian constituents yield a soil unable to support forest vegetation. In some places the serpentine exhibits a pseudo-bedded structure, due probably to the intrusion of an igneous rock between deposited layers of sandstone and shales. I do not think, from the few sections that I was able to examine, that the original rock was contemporaneous, but that its intrusion was accompanied by the disturbance and crushing of the beds now so apparent. Like the original igneous rock, some of the shales have also undergone alteration, and are unctuous to the touch, from the presence of a serpentinous mineral.

On the full view of Macpherson's Straits opening to our view as we rounded the Cape, we were much struck by the wild beauty of the scene. Unlike that at Port Blair, not a sign of the presence of human beings was to be seen in any direction. Although there was a decided surf breaking along the shore line, the main body of the water was perfectly still (or appeared to be so), and, as we steamed along, visions of the splendours of the sub-



marine world broke upon our view through the pellucid waters. Though the sight was not a new one to me, I believe I did not yield to those who had never seen it before in the amount of my admiration. I feel quite unable to attempt the task of describing, much less of conveying, an adequate idea of the exquisite assortment of colour of the varied forms of life which were included in every square yard of these tropical coral reefs. The most gorgeous combination of vegetable and insect life afford but a poor subaerial representation of these submarine gardens. And yet there are many who have spent most of their lives in the tropics, and who have returned to Europe, without once having given themselves an opportunity of seeing this most marvellous of sights.

As the small islands which occur near the western end of the Straits shut out the view of the sea, its aspect from the eastern entrance suggests the existence only of a bay, or deep indentation in the coast, and it is not until one is close to the Jolly Boys Islands, as they are called, that the channels to the open sea become apparent. On the north, the Straits are bounded by the hilly, forest-clad southern extremity of the South Andaman. On the south, Rutland Island, which includes one hill, rising to the estimated height of 2,000 feet, limits the view. Along the margin, much variety is caused by the alternations of white sandy beaches with rocky headlands and steep cliffs, and the mangrove-swamps which occupy the low-lying grounds of the estuaries and mouths of streams. On getting inside the Straits, some of the party, I among the number, left the barge and proceeded towards the shore in a row-boat. Our landing in Escape Bay was not effected without some difficulty. So still did the water appear, that our helmsman, an experienced sailor, in whom we trusted, ran the boat in between two rocks. In a moment the swell caught us, and a scene of much confusion ensued. With some it became a question of *saue qui peut*, and they scrambled on shore through the water. The lascars who had been rowing lost their heads and jumped overboard, and the boat was on the point of being smashed, when some



of us had just time to seize the oars and pole out into deep water before any serious injury had happened. After this little adventure, we who remained in the boat rowed round to a sandy beach, where there were no rocks, and walked on shore through the surf.

The first bird seen was a large plover, which I—in my anxiety to shoot the first bird—approached too rapidly, and frightened off before getting within range. It was not until near the end of the trip, when at the Coco Islands, that we got a chance of obtaining a specimen. The species proved to be not the common Indian *Esacus recurvirostris*, as we had at first supposed, but the Australian *E. magnirostris*. The party then separated, and I walked westwards, over rugged purple-and-green serpentine rocks. Birds proved to be very scarce. I only shot a specimen of the Andaman tree-stare (*Calornis Tytleri*), two specimens of the white-breasted kingfisher (*Halcyon saturator*), and one of the red-whiskered bulbul (*Otocompsa emeria*). I saw one specimen of the Burmese stork-billed kingfisher (*Pelargopsis Burmanica*), flying over the sea, and also some flocks of the Andaman paroquet (*Palæornis Tytleri*). I also heard in the depths of the forest what appeared to be the hooting of a large wood-owl, and the note of a barbet; but the Andamans have as yet yielded no species of either.

Leaving the beach, I followed up a creek for some distance, through rank vegetation and fetid mud. It was a most unwholesome locality, pervaded by the odour of wild pigs, of which, however, I did not see any. The enormous length attained by some of the species of rattan-cane, or *Calamus*, in this jungle, attracted my particular notice. Often they might be seen stretched along the ground, like huge cables, for 80 and 100 yards, before rising to ascend the lofty trees, twining through whose branches they passed over incredible distances.

Rejoining my companions, I found that they had obtained several birds which I had not seen, including two brilliantly-coloured minivets (*Pericrocotus Andamanensis* and *P. peregrinus*). We then rowed off to the barge, and our bags, added to that



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obtained by the party on board, sufficed to afford ample occupation to the taxidermists for several hours. The barge then steamed to a sheltered position, and anchored for the night. Almost immediately some of the convict crew commenced to fish, and in a very short time a number of brilliantly-coloured fish were captured; but as soon as the twilight was over, the fish ceased to bite, and no more were taken. Having done ample justice to an excellent dinner, provided by one of the "Scotia's" table-servants, we tumbled into our sleeping garments and on (not in, as in Europe) to our beds, somewhat wearied with the day's exertions.

Next morning, after coffee and a plunge in the sea, the same party landed again at Escape Bay. From thence I proceeded westwards, meeting with birds in much greater abundance than I had on the previous afternoon. The best bird—because new to the islands—which was obtained was the southern brown flycatcher (*A. latirostris*); besides which I shot about a dozen other birds, including the Andaman maina (*Temenuchus Andamanensis*), the Andaman oriole (*Oriolus Andamanensis*), the Andaman green pigeon (*Osmotreron chloroptera*), &c., &c. After a few hours we returned on board, and while discussing breakfast and the cheroot which followed it, the barge steamed through the picturesque islets at the western end of the straits. Of all the places I have seen in Europe, Killarney can alone convey an idea of these scenes. The blue waters, the luxuriant emerald-green vegetation down to the margin of the coasts, and the passing showers which brighten all the aspects of nature, have their counterparts here.

Near the end of the straits there is a small island, with a white sandy beach all round, and an enormous reef, which stretches far to the south, and over which at low tide the surf could be seen boisterously breaking. This is one of the islands mentioned above as the Jolly Boys, and for purposes of distinction it was christened by us Jolly Boy Junior. Landing on it in the afternoon, when the mid-day heat and glare from the sun had somewhat abated, the first birds we saw were crows (*C. Levaillantii*), but they were far too knowing, though at such a distance from



civilization, to allow themselves to be shot. I then worked down through the centre of the island, only shooting a couple of black mainas (*Eulabes intermedia*) and a green pigeon, though I got glimpses of other birds, including a goat-sucker.

At the south end of the island, on the reef, I found our leader and others of the party trying to circumvent a flock of crab-plovers (*Dromas ardeola*). They proved to be very wary, and only one was knocked over, which, falling into the sea, was retrieved by a Lascar, who experienced much difficulty in struggling through the waves and heavy surf, but fortunately sustained no injury. Besides these crab-plovers, there were several other waders on the reef, including the grey curlew (*Numenius lineatus*), the turnstone (*Streptilas interpres*), and sand-plovers (*Ægialitis Geoffroyi* and *Æ. Mongolicus*).

Returning by the west side of the island, we discovered several small caves, the floors of which are covered by the sea at high tide. In the largest of the caves we found a colony of one of the supposed species of edible-nest-building swallows, or rather swiftlets (*Collocalia Linchi*). Many of my readers have, doubtless, heard of the edible nests so much prized by the Chinese. This was the first occasion upon which I had seen one of the bird's breeding-places. We obtained a number of nests, and some eggs. The former consisted in every case of sea-weed or other vegetable matter, firmly agglutinated together by a more or less abundant gelatinous substance of dark colour, and altogether presenting a very different appearance from that of the ordinary commercial article, which, when of the first class, consists of a perfectly white gelatinous substance, unmixed with any foreign materials. The first idea was that the original nests had been removed by the Chinese, who farm the right from Government to collect nests throughout the Andamans for a sum of £200 per annum, and that, as is commonly stated to be the case, these were the second or third attempts at building made by the birds when their supply of pure material had been exhausted. Mr. Hume, in reviewing all the evidence before him, has concluded that this species is not one of those which produces the pure white nests. To what he has stated



I may add, that on Narkondam Island, which is never visited by nest-collectors, I shot, off the face of a cliff quite inaccessible from below, several nests of the same character as those above described. The only circumstance which gives rise to a doubt in my mind is that some nests collected by Chinese, and which I obtained at Port Blair, resembled, in their shape and small size, the nests of *C. linchi*, rather than those which we took on Button Island from a different species, as I shall mention further on.

Just at sunset, as we were about to go on board the barge again, we saw the crab-plovers, which had been very much disturbed by the shooting, settle down on two small table-like islets of rock, a mile or so up the channel to the north. These were, in all probability, their roosting-places. There was only just standing room for them, and they appeared as a white band, scarcely raised above the water-line. Our boat, with the leader in the bows, and Stoliczka and myself in the stern, immediately started off to interview the birds; and visions of a splendid bag appeared before our eyes. We in the stern understood that our orders were to reserve our fire until the birds rose on being fired into by our leader. On we crept, steadily approaching, and allowing twos and threes to pass us within easy shot. At length, when the boat was within range of the main body, our leader turned round and signalled to us, not daring to speak. His signals we failed to interpret; and while he was making them, the birds suddenly rose, and in another second were off, not a shot having been fired. Gentle recrimination, not unmingled with light chaff, passed from bows to stern, and back again. Our leader concludes his account of the transaction with the following:—"In vain I pleaded that politeness alone had kept my finger from the trigger—that I was waiting and waiting for them to shoot; they were deaf to all my blandishments, and could not or would not forgive my misplaced courtesy."

Passing the barge, we rowed along the east side of the Jolly Boy Junior, and as the shades of night commenced to fall, shot a few flying-foxes (*Pteropus Nicobaricus*) as they flew off to their feeding-grounds on the larger islands. Those that we killed dead



sank like stones in the water, and were lost; while the wounded ones, flapping on the surface, were easily captured. This species differs very little in size from the common *P. Edwardsi* of India, but the fur is quite black, and there are, I believe, some other differences which justify its being regarded as a distinct species.

During the night we remained at anchor close to the Jolly Boy Junior, and with the dawn landed again, in order to catch the early birds, and make the most we could out of this charming little island. I first took up a position under an *Erythrina* tree, at the blossoms of which a number of honey-suckers (*Arachnecthra Andamanica*, Hume) were assembled, quaffing a morning draught of nectar from the brilliant corollas. Shooting several of these, I passed on to the cave, where I found one of the Lascars was taking a nest, and as I stood at the entrance, I knocked over one of the swiftlets with a stick as it passed me. Thence I moved on to the reef, where I found three of our party in pursuit of the crab-plovers. I endeavoured to cut off the birds on their retreat, but failed, as when disturbed by the guns they flew out seawards. Three specimens were, however, obtained in the first discharge. Wading about on this reef was very heavy work, more especially where the coral was covered with a foot or so of water. Most destructive it proved to our boots; but the variety of life which it harboured was an irresistible attraction. "Bêche de Mer," or sea-slugs, so much esteemed as an article of food by the Chinese, were here in great abundance and variety, some of them being over a foot in length. Large pinnae and enormous clams (*Tridacna*) were abundant, but difficult to sever from the reefs. Fine specimens of some other molluscs were obtained, and various handsome sea-anemones were observed, but were left undisturbed.

Returning to the barge we steamed off to the eastern end of the Straits, where it had been arranged that we were to rejoin the "Scotia." On our way we were boarded by several canoe-loads of Andamanese, who had been hunting pigs in the neighbourhood. They had been instructed on the previous day to collect shells, &c., and of these they brought a few. These savages,



being away from the restrictions which are enforced at Port Blair, were in a perfectly nude condition, save that the women wore the customary leaf. Some had covered their bodies with a coating of red clay and grease; others—those in mourning for deceased relatives—were adorned with white wood-ash. In no case was the true ebony black of their skins apparent. Indeed, this can rarely be seen, except among the well-washed orphans of the settlement. The more an Andaman native washes, it may be said, the blacker he becomes. To this cause, I have no doubt, is due the difference of opinion of various authorities as to their colour. All, both men and women, had their heads shaved, and there was not a sign of hair on any part of their bodies. This party was headed by the Rutland Island chief. He was accompanied by his wife and several other people. The "princess," as we called her, having supplied herself with a half-smoked cheroot, taken from one of our mouths, looked pleasantly about her, and then communicated in the broken Hindustani which she had picked up at the settlement, the important intelligence that a prince of the blood might shortly be expected to appear on the scene. This was a grand opportunity for obtaining specimens of their bows, arrows, cooking utensils, necklaces, paddles, &c., &c., and a brisk trade was immediately commenced. Cheroots were the currency which we employed. To one of the ladies I offered a bundle of cheroots for two necklaces which she was wearing. They consisted of turtles' vertebræ and human collar-bones strung on a thread, and richly anointed with grease and red-ochre. With most commendable obedience to her spouse, she would not close the transaction without having first obtained his consent. On his signifying his approval, however, she showed that the interests of her family were not likely to suffer while under her management; for not only did she take the cheroots agreed upon, but also suddenly snatched from my left hand those which I had intended to reserve for further transactions. Catching sight then, for the first time, of a human skull suspended from the neck of one of the defunct individual's relatives, I endeavoured to deal for it with cheroots, but found it impossible to obtain it.



Anything else could have been bartered for ; but to avoid further discussion on the point, the skull was taken away and concealed in one of the canoes, and it was evident that nothing would tempt the owner to part with it. Probably it had not been carried about for a sufficient time by the friends of the deceased.

The "Scotia" now hove in sight, and it was necessary that we should proceed to join her ; but our visitors were not to be easily shaken off. On this occasion my conduct seems to have rendered me open to some animadversion, so that, rather than present my own account of it, I give that of the Leader and Historian of our trip, who has written:—"The men, when we succeeded in making them understand, went off one by one, but the ladies, especially the princess, would persist in laughing and jabbering *ad infinitum*. We lifted her gently on her feet, pointed to the men who were already in the canoes, and, in fact, did everything we could think of to induce her to go, but go she wouldn't. At last the geologist, in hopes of quickening her movements, gently prodded her from behind with one of the blunt arrows she had given him; the effect was magical! Each grade of society has its own special etiquette; clearly he had gone too far; even in the most innocent manner you must not, it seems, according to Andamanese etiquette, prod a princess's natural bustle with a blunt arrow. She turned round with a look of offended dignity, that no duchess, suddenly slapped behind by a passing street-imp, as she got into her carriage, could have surpassed, and stalked off stately to her canoe; in another moment we were off."

We found it somewhat difficult to reach the "Scotia" owing to the strong current running into the Straits, against which we had a hard struggle to make any advance. At last, having cleared the shelter of the land, we were exposed to a strong breeze and rough sea, which made the old barge roll to a most unpleasant extent, threatening to send everything which was loose on deck overboard. My whole attention had to be given to my recently-acquired ethnological collection which there had been no time to secure below, and which was now sliding about in



every direction. The old tub, admirably suited for its work within the harbour of Port Blair, was clearly not one to be depended upon as a means of safe transit in squally weather outside. However, without accident, we all got on board the "Scotia," and the barge, in the charge of its convict skipper and crew, steamed off to Port Blair, while we continued our journey southwards to the Nicobars. Early on the following morning we were off the Island of Tillanschong, and immediately landed on a small beach near the southern extremity. Inside the beach we found a neck of low ground covered with screw pines or *Pandanus*, which surround a fresh-water marsh. On the other side lay Novara bay, a very picturesque indentation in the coast line, but of limited area. The rock forming the headland on the north presents a singular resemblance to an old ruined castle. On the beach pebbles of a compact blue limestone abounded. I had not time to hunt up the source whence they were derived, but found a pinkish calcareous sandstone *in situ*. I did not meet with similar rocks in any of the other islands. On the higher parts of the islands there was a dense forest jungle, the more open *Pandanus* scrub being limited to the immediate vicinity of the marsh and the beach. Shortly after landing, eight guns began active operations against the feathered inhabitants of the island. On returning to the marsh, having first examined the opposite beach, I found that vicinity deserted by my companions, who had wandered into the highlands. Thinking the marsh might, small though it was, contain some good birds, I waded about in it backwards and forwards, and so obtained three birds, which are common enough elsewhere, but which had never been shot in or recorded from the Nicobars before. There were two small bitterns (*Ardetta cinnamomea*, and *A. Sinensis*), and the white-breasted water-hen (*Gallinula phenicura*). Another species of bittern was obtained in a different part of the island; it proved to be the Malayan tiger-bittern (*Goisakius melanolophus*). Just as I was leaving the marsh I saw a pair of megapodes, or mound-builders, which were running away from the shooters above. Following them



up I knocked one over as it rose, but immediately it picked itself up and made off; by good luck I got another shot at it just as it was disappearing in the jungle, and, on going up, I found it making its last struggles. Of other birds obtained on this occasion the following were the principal: the Nicobar imperial pigeon (*Carpophaga insularis*), quite a distinct species from the Andaman bird, the Nicobar bulbul (*Hypsipetes Nicobariensis*), the Nicobar paroquet (*Palaeornis erythrogenys*), the white-collared kingfisher (*Halcyon occipitalis*), the Nicobar white-eyed tit (*Zosterops Nicobariensis*), and the black-naped azure fly-catcher (*Myiagra azurea*), which, strange to say, is identical with the Indian species, while the race found in the Andamans seems to be entitled to specific distinction. A gun fired on board the steamer warned us that our time was up, and we reluctantly hurried down to the landing-place, when we partook of the milk of fresh cocoa-nuts which had been collected by the Lascars from a few trees in the vicinity.

Tillanschong is quite uninhabited; it has long been regarded as a poor unproductive rocky island, and such is the aspect it presents from the eastern side; but where we landed vegetation was abundant. We all agreed that it was a very charming spot, and regretted that our stay there was so short. Possibly the limited supply of the all-important cocoa-nuts, and also, perhaps, the fact that this long narrow island is deficient in places for concealment, have prevented its occupation by the natives. While on this subject I refer again* to what appears to me one of the most singular and unaccountable facts connected with these islands. In the Nicobars and in the Cocos cocoa-nut forests of greater or less extent are found margining the coasts of all the islands; while in the intervening Andamans, I believe I am correct in saying, not a single tree of self-sown or indigenous origin has ever been met with. Even in the outlying island of Narkondam we met with several trees which were evidently derived from drifted nuts.

* Vide p. 209.



That there is nothing in the soil or climate of the Andamans to have caused their absence is abundantly proved by the fact that at Port Blair planted cocoa-nuts have succeeded well and bear an abundance of nuts. In *Preparis* again, to the north of the Cocos, there are no cocoa-nuts, though they are found on the nearest coasts of the mainland of Burmah.

Continuing our voyage we entered Nankowri haven in the afternoon, and anchored off Kamorta. Little time remained that evening for seeing the new settlement, and of that little time I fear I did not make the best use, as I fancied that on the return voyage we should have plenty of leisure at our disposal. However I had previously, on my first visit, explored the neighbourhood, and in so far as ornithology was concerned, Davison, who joined us here, had been collecting birds in the vicinity for the previous month.

Building at the settlement had progressed much since my previous visit, and the convicts and sepoy guard were all housed on shore; but the officers still continued to use the hulk "*Blenheim*" as their dwelling-place, it being found more healthy than the shore. All precautions, however, are not sufficient to enable those who reside there to escape fever. The junior officers from Port Blair who, in rotation, have charge of the Nicobars only remain there for three months, but seldom succeed in warding off an attack.

The ship was of course visited by the Nicobarese, and I had the honour of renewing my acquaintance with Captain London and some of the other local celebrities. After some little preliminary negotiation it was arranged that two of them, Captains Long and Short, should accompany us to the Southern Islands, bringing with them a canoe which would enable us to land through the surf on uninhabited islands. It was also thought that they would be useful as interpreters between us and the inhabitants. They proved very lazy and very drunken whenever they could get an extra supply of spirits. However, they occasionally did useful service, and at all times afforded us a good laugh by the comicality of their manner and remarks. On



one occasion Captain Long was asked to go off to a reef to collect shells; to this he demurred. On being then asked if shells were to be got there, he quietly replied, "Plenty, you go take." On another occasion, one of our party seeking to renew a former acquaintanceship with the same Captain Long, recalled to his memory a certain expedition which they had been on together. Upon the acquaintanceship being thus established, Captain Long did not omit to improve the occasion, for he promptly replied, "Oh yes; you give me present."

The following morning we started for the most distant part of our trip, Galatea Bay, at the southern end of the Great Nicobar, and the nearest point in these islands to Achin, in Sumatra. It was our intention to work back through the smaller islands, accordingly, during the day, we passed Meroe, Track, Treis, Montschall, the Little Nicobar, and Kabra, without stopping anywhere. In the evening we arrived off Galatea Bay, but as the weather was squally and threatened to become tempestuous, our captain, not knowing the ground, would not venture inside, the more particularly as the Bay offers no protection from the south. Accordingly we remained on and off during the night, rocking on the troubled bosom of the ocean. The following morning we steamed in, and a favourable place for mooring having been found, about a mile distant from the nearest point on shore, the anchor was let go. At eight o'clock we landed near a small village on the east side of the Bay. I at once started along the coast for the mouth of the Galatea river, about two miles distant. Some of the party remained in the vicinity of the landing place, others took the same direction as I did, whilst the remainder crossed the bay in a boat, landing on the western side near a village where we subsequently joined them. The rocks which I met with on the beach proved to be bluish-grey sandstones, similar to those found at Port Blair. In places they were covered by coral, now well raised above the sea level. In many places I encountered the huge recumbent branches of a large *Barringtonia*, with pyramidal fruits three and a-half to four inches long. In order to pass these branches, as they were



washed by the sea, it was often necessary to wade round their tops. Hermit crabs were in great abundance. They seem to be chiefly vegetable feeders, and may sometimes be seen high up on trees eating at the tender inner bark of certain species and the exposed rootlets of others. I saw very few birds, and only shot a specimen of the Paradise fly-catcher (*Tchitrea affinis*) and the black-naped azure fly-catcher. As in the case of the Tillanschong bird, this proved to belong to the Indian species (*Myiagra azurea*). Others of the party were even less successful than myself, and the bag at the end of the day was not one upon which we could congratulate ourselves.

At the northern end of the Bay, east of the Galatea river, I crossed a sandy beach over which a species of *Ipomea* grew in great luxuriance. The outer zone of the jungle here was occupied by a succulent shrub, the name of which I do not know. Inside came a zone of cycads, pandanus, and a few cocoa-nuts, then another of rattans, &c., followed by general forest trees. I saw here, for the first time, the breeding-grounds of the megapode, or mound-builder, and caught sight of a few of the birds themselves running through the jungle. The largest mound which I examined was about five feet high and twelve feet in diameter. I had no means of opening it up to look for eggs, but it had much the appearance of having been deserted. Our leader, who remained during the day near the landing place, devoted some time to a thorough examination of one, and as the facts regarding the hatching of this bird's eggs are so remarkable, and at the same time so little known, I reproduce his account here:—

"I saw a considerable number of these mounds, chiefly at Galatea Bay, and there I examined some of them very minutely. These were situated just inside the dense jungle which commences at spring-tide high-water mark. It appeared to me that the birds first collected a heap of leaves, cocoa-nuts, and other vegetable matter, and then scraped together sand which they threw over the heap, so as not only to fill up all interstices, but to cover over everything with about a foot of pure sand. I say sand, but this term is calculated to mislead, because it does



not contain much silex, but consists mainly of finely triturated coral and shells. After a certain period,—whether yearly or not, I cannot of course say,—the birds scrape away the covering sand layer from about the upper three-fourths of the mound, cover the whole of it over again with vegetable matter, and then cover the whole with the sand. * * * * A small mound—one as I take it still in use, though I could find no eggs in it—contained a much greater amount of vegetable matter, and was sensibly warm inside. I could make no section of it, as it was too full of imperfectly decayed vegetation. I believe that the bird depends for the hatching of its eggs solely on the warmth generated by chemical action. The succulent decaying vegetation, constant moisture, and finely triturated lime, all combined in a huge heap, will account for a considerable degree of artificial heat. The eggs are usually buried from three and a-half to four feet deep, and how the young manage to extricate themselves from the superincumbent mass of soil and rubbish seems a mystery. I could not obtain any information from natives on this point, but most probably they are assisted by their parents, if not entirely freed by them, for these latter, so the natives affirm, are always to be found in the vicinity of the mounds where their eggs are deposited.”*

Be this as it may, the chickens must be fully fledged, or very nearly so, when hatched, as a chick taken from the egg shews the wing feathers well developed. The size of the eggs in proportion to the birds is enormous. Large ones are equal to the eggs of the grey Lag goose (*Anser cinereus*), and the average run very little smaller, since the measurements of sixty-two eggs in Mr. Humes' collection give length 3.25 inches, and breadth 2.07 inches. Some of them from their elongated shape remind one rather of the eggs of turtles than those of any species of bird. The colour changes from a ruddy pink to a buffy stone as the chick develops, and about hatching-time it becomes a yellowish-

* “Stray Feathers,” Vol. II.



brown. Although we do not know it to be a certain fact, the balance of evidence favours the view that the young megapode on its first appearance in the world is of such large size and so well developed that, unlike the young of most, if not all, other warm-blooded animals, it is able to take care of itself. Indeed, if it be true, as is supposed by some, that several pairs of megapodes deposit their eggs in the same mound, it would be a wise chick that could recognise its own parents. And the doing so would evidence a degree of early intellect still more remarkable than the early physical development.

Close to the mouth of the Galatea river I saw in some bushes a squirrel-like little mammal which I shot. It proved to be a species of Tree-shrew. The same animal was obtained by the Novara expedition, and it has been separated from the Indian species of the genus *Tupaia* and called *Cladobates Nicobarica*.

I then followed up the Galatea river for about half-a-mile, experiencing great difficulty owing to the heaviness of the jungle on the banks and the depth and tenacity of the mud where I was obliged to walk in the bed. I here secured a fine specimen of the male cone of a cycad or zamia, which presented a resemblance to and was three times the size of a large pineapple. Before I could make my way across the river a heavy storm came on, and I was soon thoroughly wet. The canoe for crossing had been taken away by one of the ship's officers, who had gone up the river and had been a long time away. Sending the Lascar Ali (who usually accompanied me to carry my spoils) to recall him, I resigned myself to the full downpour of the heaviest rain I was ever exposed to in my life. Shortly afterwards Davison appeared, and taking off his clothes swam across and brought back a crank old canoe, into which we both got with our guns and spoils, but no sooner had we reached the centre of the river than the canoe shipped water and sank, and we had to return ignominiously to the bank. After some time a native who was going on a fishing excursion appeared and ferried us across. I proposed to exchange a bottle of rum for his fishing-spear, but although I added some silver coins he would not close with the offer. We then



heard that the ship's officer had rather come to grief. His canoe had capsized, and his gun, &c., had gone to the bottom in deep water. The gun was, however, recovered by the Lascar I had sent, who had to dive for it. We then walked along the western shore to a village where others of the party had been safely ensconced during the rain. Several objects of ethnological interest had been obtained by them. We refreshed ourselves with some cocoa-nut milk and brandy, and soon afterwards, as the weather shewed no sign of improving, walked through the surf to our boat, and went on board, arriving there in a thoroughly moist and limp condition.

In the evening I bought from the natives a large piece of bark-cloth, which serves as a covering, but is not quite waterproof. It is prepared from the inner bark of a tree which has been stated to be a species of *Celtis*; but I am not sure whether this is correct or not. In appearance it resembles coarse newly-tanned leather. It is both tough and flexible. As to the manner of its preparation I have no information. Some flute-shaped musical instruments of bamboo were obtained here. They are blown into from the end, as in a flageolet; but the "reed" is loosely tied over one of the holes.

The last to come on board that evening were Captains Long and Short, who had evidently found their way to their compatriots' cellars. There was much of the "Won't go home till morning" manner about them; but they had sense enough left to paddle out their canoe in safety, and to realize the chance of the steamer leaving them behind. If I remember rightly, they had managed to bring off sundry cocoa-nut-fed pigs, gifts from their admiring friends. The cocoa-nut-fed pigs yield probably as good pork as is to be found anywhere. It was always an acceptable addition to our commissariat.

We remained at anchor for that night in Galatea Bay, and the following morning, with the first streak of dawn, steamed off along the western coast of the Great Nicobar. On this side of the island the undulating ground rises gently towards the main range, which culminates in a high hill to the north-east of the island.



This by some has been thought to be a volcano, and it is even said that flames have, on one occasion, been seen to issue from it. Trustworthy evidence on the subject is, however, altogether wanting. The geology, fauna, flora, and ethnology of the Great Nicobar are, as regards their details, still quite unknown; and, owing to the risk of sleeping in the pestiferous forests are likely to remain so for many years.

We came to anchor, about noon, in St. George's Channel, between Kondul Island and the Great Nicobar. Soon afterwards we landed, or rather one detachment of our party landed, on Kondul. This, though a small island, was selected, as we knew that most of the previously-obtained specimens of the extremely rare paroquet (*Palæornis caniceps*) had been shot there. At the western side, where we first landed, there was no village, but we found that two Malays, belonging to a vessel now cruising about the island, had established a dépôt there for the collection of cocoa-nuts. While standing near their hut, I heard a paroquet calling, which I thought must be *P. caniceps*. On going to the spot I found a splendid tame male bird in full plumage, perched on an ingeniously-contrived bamboo stand. The Malays were not at first very willing to part with it, but having given them much more than its value could ever be to them, I carried it off in triumph.

Though we caught glimpses of several birds here we did not succeed in shooting any, and as it was impossible to penetrate into the island, owing to the steep cliffs, we got into the boat again, and rowed round to the other side, landing close to a village containing three or four houses. Here we found birds plentiful, and before long nine or ten specimens of the rare paroquet, several of a beautiful little scarlet honey-sucker, since described as new by Mr. Hume, under the name (*Æthopyga Nicobarica*), besides a number of other birds, were brought to bag by our party. In one of the houses I also purchased two fine females of the paroquet. The subsequent fate of these three birds was a sad one. They reached Calcutta safely, and for two months I kept them there, and they proved to be most intelligent and



beautiful pets. As the species, except on one occasion, had never before been sent alive to Europe, I, when about to leave Calcutta myself, sent them by the steamer "Dhulia," bound direct for London. At Madras I went on board to enquire for my pets, and found that all three had been found hanging dead from their perches one morning. That they had died either from poisoning or suffocation I had no doubt. As the ship's officer into whose charge they had been given had himself died from cholera in the river Hugli, they had, I suppose, been neglected.

On this island of Kondul I made some interesting additions to my ethnological collection. Among these were two cleverly-carved wooden images. If I have not been misinformed these objects are no more idols than are the portraits of our ancestors with which we are in the habit of adorning our houses. I availed myself of the opportunity of examining the interiors of several of the houses, as the natives were remarkably civil. Neither women nor children were to be seen. They, as we usually found to be the case, had been already concealed on the steamer being first sighted. In one house I obtained a spear-head of copper; and this is the only one of the kind I have ever seen. I was also given a curious specimen of Nicobarese hieroglyphics, or picture-writing. The material upon which the figures are drawn appears to be the spathe of one of the species of Palm—it is too large for the *glume* or sheath of a bamboo, which it otherwise resembles. It is framed with slips of bamboo, and from the lower margin are suspended offerings of young cocoa-nuts and dried meat. That it is intended to record some event, or is the record of some transaction is, I think, extremely probable. Nearly all the articles represented are well known objects in the domestic economy of the Nicobarese.* The sun and moon and a few stars are to be found at the head of all these paintings, however they may otherwise differ in details, and the presence of these male and female

* An illustration and description of this screen will be found in the "Indian Antiquary—Bombay." Vol. IV., 1875.



emblems suggests to me a possible connection with marriage. The figures in different attitudes, apparently giving expression to different emotions, do not fit in well with an idea that might otherwise appear plausible, namely, that the upper portion represents the property of the man, the lower the dowry of his bride. Some of these screens are divided into three portions—the upper including the celestial bodies and birds, the central, various terrestrial objects, and the lower, fish and other denizens of the waters. Supposing them to have a meaning, I trust ere long it will be decided how far the designs are conventional and how far realistic. As a rule these pictures are not readily parted with. The one I obtained was taken with the consent of the natives from an apparently deserted house.

For most of the day while I remained on the island I was closely followed by one of the natives lightly clad in a narrow strip of cloth, and the usual seedy black silk hat. On one occasion, when I sat down to rest on an old broken and rotten canoe, he came and sat by me, in closer proximity than was absolutely pleasant; but before I could remonstrate and suggest the removal of his somewhat odoriferous person to a distance, the seat gave way with the additional weight, and we were both sent flying on our backs.

The only rocks which I saw on this island were sandstones, which on the east were steeply tilted, but on the west appeared to be horizontal. I saw some traces of carbonaceous matter in them, but found no fossils.

Leaving the ship at six o'clock on the following morning we again landed on Kondul, and got a more complete series of the same birds as we had shot on the previous evening, and some few additional species, more particularly among which should be mentioned a cuckoo (*Cuculus striatus*, Drapiez), as being an addition to the hitherto known fauna of the islands. Of the paroquet (*Palaeornis caniceps*) nineteen dead and five live birds were brought away. Our greatest prize, however, was the beautiful little new species of honey-sucker (*Ethopyga Nicobarica*, Hume). Altogether we were most successful on Kondul, and I think we



all agreed, at the close of our trip, that it was one of the best islands for birds which we had visited.

I asked the people on this island about the "ourang-outang" or inland jungle race of inhabitants, and they at once pointed to the highlands of the Great Nicobar as being the place where they were to be found. My informants said they were very bad men, but that they themselves seldom saw them. From want of an interpreter, I was not able to obtain any detailed account. But I am convinced that they will prove to be people resembling the Andamanese, although a very good authority on the Nicobars, Mr. De Roepstorff, thinks otherwise.

In the afternoon we started for the uninhabited island of Montschall, and landed there soon after. Having shot some of the little shore-waders (*Streptilas* and *Aegialitis*), I started to walk round the island, but soon found the undertaking much more difficult than I had anticipated. Passing some of the party who had given up the idea in despair, I pressed onwards, sometimes scrambling round the steep faces of precipices, again wading, once up to my neck, in the rising sea, carrying my coat and gun aloft; my attendant, the Lascar Ali, following with other traps. At length I was fairly brought to a stand in a small enclosed bay, from which it would have been very difficult, if not impossible, to climb up the cliff into the jungle. The rising tide not only prevented our advance, but our retreat also, except, of course, by swimming, which, with our traps, would have been, to say the least, inconvenient. The sun was now setting, and the prospect of wandering in the dark through the jungle, supposing we could reach it, was not a pleasant one. By a most fortunate chance, at this critical moment a boat, which some of the "Scotia's" Engineers had taken out for a row round the island, made its appearance, and I was glad to accept a seat in it; and I don't think Ali was sorry, as, though he did not say much, the prospect before us of fighting in the dark through a thorny jungle was not cheerful.

The rocks on this island are chiefly stratified limestones of peculiar aspect. Sometimes they look spongy and cellular, like



quite recent coral reefs, but in places the alternating layers were not more than two inches thick; and small faults and dislocations in these were not uncommon.

The next morning we arrived at the small islands of Treis and Track. We first landed on Treis, where we found birds in great abundance, pigeons being particularly numerous. In a short time fifty-two specimens of the very handsome black and white fruit-eating pigeon (*Carpophaga bicolor*) were bagged. These birds were in greatest abundance near the centre of the island in the branches of a large species of fig—what species I cannot say; but certainly not *Ficus indicus*, as has been stated in some of the previous accounts. Having shot nine of the pigeons, and seeing numbers falling to other guns, I proceeded to examine the island, which is very flat; and I think, so far as I can remember, I found no rocks exposed. Certainly I noted none at the time. As I entered a nearly dried-up grassy marsh, a megapode scuttled out, giving me an easy shot. Startled with the report, a young white-bellied sea eagle then rose from the grass in front of me, and received the charge from my second barrel, which, though it only contained No. 8 shot, proved sufficient to bring him to bag also. Another specimen was also obtained on this island. I then tried several long, or rather high, shots at the Nicobar pigeon (*Caloenas Nicobaricus*), but without success, as the birds were very wary, and seldom were to be seen within range. Two, however, were shot by one of the ship's officers. In company with two others I then crossed to the small island of Track, where we saw a number of *Caloenas*, or rather, I should say, heard them; for they would make a heavy flutter in the topmost branches of the highest trees, and be off before one came within range. These birds, except in one instance, to be mentioned further on, were, I found, excessively wary, seldom affording chances of a shot. On Track there were sandstones steeply inclined to the east. Near the landing-place we found some temporary huts, which had no doubt been put up by Nicobarese when visiting for the purpose of collecting cocoa-nuts. In these several articles had been left behind, including a neatly-made



earthenware cooking vessel, of an oblate-spherical shape, and about 14 inches in diameter. A gun was then fired from the ship, and we, with the exception of one of our party, Davison, who had started to return before we left the islands, reached the ship after a rather long row. Davison's boat was at first nowhere to be seen; at last we saw it rounding one of the islands. When he came on board we found that he had been carried away by a strong current, against which the Lascars' feeble rowing had made very little progress.

In the evening we anchored off the island of Meru. We had been all much fagged by the morning's heavy work; and for my part a want of cartridges, and the necessity of preparing more for the following day, afforded an excuse which I was not sorry to avail myself of for not going on shore, the more particularly as it was late, and the island did not present an attractive appearance. Stoliczka, however, said he would go for a stroll on the beach and return before dark. As he did not intend penetrating the jungle, he only wore light canvas shoes, and was otherwise quite unequipped for rough work. He was accompanied by Mackay, Executive Engineer of Port Blair, and two of the ship's officers. They had a pull of more than a mile to the shore, or rather to the outside of the surf, through which the ship's boat could not be taken; but some Nicobarese, who had come to the island to collect cocoa-nuts, landed them in their canoes. They then spread themselves along the coast in order to shoot whatever they could before darkness. When the time to return had arrived Stoliczka did not make his appearance; and, as the evening wore on, his companions on shore began to be anxious, and, as we afterwards learnt, soon started in two parties to search for him. After a couple of hours spent in this way, Mackay and the chief officer, who headed the two parties, returned without having found any trace of the lost Doctor. Seeing the lights carried along the shore, and hearing the firing, we on the steamer at first supposed that bats or some night birds were abundant on the island, and were being shot by the party. But this theory gave way to a growing feeling of anxiety that all was not right.



Accordingly the Captain despatched a boat with the second officer for tidings. A fresh breeze enabled him to make the trip to and fro in about half-an-hour. On his return we were startled by the intelligence that Dr. Stoliczka was *lost*, and that, as above mentioned, search for him had been made but without success. It was added that those on shore were thoroughly fagged and tired, but that they had expressed their intention of renewing the search when somewhat rested. We immediately felt the importance of rendering prompt assistance, the more particularly as the self-devotion of those on shore had already been severely taxed. Volunteers from all grades and classes on board the ship presented themselves, including one of two little English apprentice boys. The late Dr. Dougall, Superintending Surgeon of Port Blair, who had not taken part in our daily excursions, hastily making such preparations as might be useful in the case of an accident having taken place, joined us, and, with a good stock of blue lights and lanterns we rowed off for the shore, and soon after landed through the surf in canoes. While rowing on shore our thoughts dwelt upon all the possible accidents that could have happened to our friend. One suggested that he had fallen over a cliff; another, that he had shot himself, or his gun had burst; another, that he had been bitten by a snake. Any of these were more plausible than that he had been attacked by natives; for wherever we had seen them they had appeared civil and in-offensive. Our leader, though in a state of the greatest anxiety as to what could have happened to our lost friend, was unable, from the effects of his accident, to take any active part in the search himself; but before we left he drew up a code of signals by means of which, with our guns, we might convey to those on board, in the speediest manner, the results of our search. The first thing to be done was to enjoin upon all the necessity of not firing a single shot except under authority. As I carried a handy little Snider carbine, such shots as would be required were to be alone fired by me. It was now about eleven o'clock at night, and I shall never forget the appearance of the motley crowd of Europeans and natives that stood in the moonlight on that white



coral beach. Captains Long and Short, our own Nicobarese, after a short conference with those camped on the island, told us that the latter were ready to cut a path for us through the jungle. They professed themselves able to find the lost one in such a confident way, that we unhesitatingly followed their leadership, and started with a pleasing assurance of success. We first walked for about half-a-mile along the beach on the southern side of the island, and then struck into the jungle, where we had to follow one another in single file in the footsteps of the Nicobarese, who rapidly cut the branches and creepers which they encountered. Sometimes we came upon partly-open spaces, where the trees and the rope-like rattans, stretching to the top-most branches, could be seen with clearness when the blue lights were ignited. Weird and strange were some of these scenes, and unlike anything I had ever before conceived of, much less seen.

After some time, calling for perfect silence, I fired a shot, but no response was heard, and we proceeded for several hundred yards; again I fired, waited a short interval, and then, with what joy did we welcome the sound of a distant shot in reply. This, the first assurance that our friend was alive, and able to use his hands at least, sent us forward with renewed energy. From this onwards we pursued a steady course, our shots, fired at intervals, being replied to, and, at last, our voices too. In reply to "Where are you?" came "I can't get out!" And such, indeed, we found to be the case on reaching him, for he was fairly immeshed by the thorny creepers, and was actually leaning against a barrier of them. Having supplied him with a drink, his parched throat was somewhat relieved, and he then told us that he had replied to our calls with the greatest difficulty. The story of his adventures was, in short, that, contrary to his intention, he had gone into the jungle in pursuit of some rats which he had seen running about, had lost his way, and wandered about until the darkness came upon him. At one place he pushed forward to where he could see the sea, but had to turn back, as he found himself on the margin of a precipitous cliff. After some time he heard the



shots of those who first went in search of him; he had fired in reply to them, but as they were in two parties, this led to no definite result, he being unable to force his way out, and the respective parties not knowing which shots were his, or, indeed, that he had fired at all. When this firing ceased, he lay down on the ground, but did not long remain there, as certain ominous rustlings in the leaves were suggestive to him of snakes. He then climbed up a tree, and was in that position when he heard our first shot. His previous shooting had been so futile of results, that he did not reply; but, on our second report seeming to come from a less distant point, he got down and fired a shot, and continued replying to us until we had reached him. His clothes and hands were much torn by the thorns, and his canvas shoes had been cut to pieces and his feet torn by the coral. Probably, had he taken with him a Lascar, or even his own faithful Hindu collector, Bullaram,* this would never have happened; for natives in such emergencies often show a wonderful instinctive power of steering through trackless jungle.

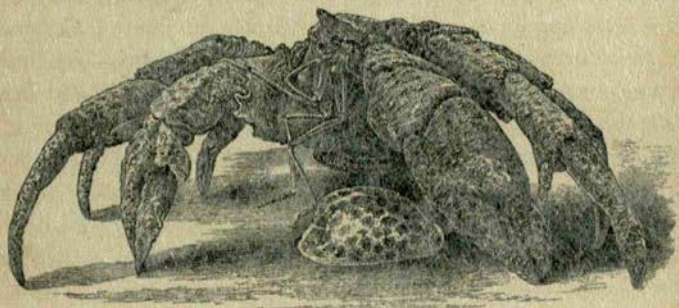
When retracing our steps, the light of the lamp carried in front suddenly flashed on an object at the foot of a tree close to me. A gigantic spider it appeared to me to be at the moment. Calling for the light to be brought closer, I saw that it was a crab of enormous dimensions, and, as it showed some intention of making off, I placed my foot firmly down on the carapace, in such a position that it could not get at me with its claws. None of the party having any rope or string with him, Davison cut a creeper, and making a noose with it, passed it over the animal's body, and proceeded to carry it. He had not got very far before the crab, stretching out its claws, caught his coat, and was gradually working itself upwards, and in a very few

* Some months later, when seeing my poor friend and colleague off at the train, on his departure for Yarkand, I charged this same Bullaram never to lose sight of his master, and bring him back safe to India. Twelve months afterwards, when returning laden with his spoils, Stoliczka succumbed to the effects of his journey at high elevations.



moments there would have been a scene rivalling Victor Hugo's description of the sailor in the toils of the cuttle-fish. However, while I held the crab, Davison took off his coat, and when it was laid on the ground, the strain being removed, the crab speedily let go and tried to make off.

How to give an adequate description of this crustacean fiend, which rejoices in the title of cocoa-nut thief, and is called *Birgus latro* by naturalists, I scarcely know, but the accompanying illustration will serve to convey some idea of its terrific appearance and powerful structure. When stretched to the utmost, it is



THE COCOA-NUT THIEF (*Birgus latro*).

(From a Photograph.)

about two and a-half feet in diameter. Of the great power of its claws we had evidence, from the fact that with one it simply crushed into fibre the end of a stout oak stick which was presented to it. Whether, as is stated to be the case, it climbs cocoa-nut trees and cuts off the nuts, descending again to devour them at leisure, remains to be proved; but there is no reason for doubt that it lives principally on fallen cocoa-nuts. The species has a wide range, being found in some of the islands in the Pacific, as well as in those of the Indian Ocean, and in the former the habits have been more fully studied than there has been opportunity for in the latter. Although living in deep burrows at the roots of trees, it is stated that it at times takes to the sea and to a diet of shell-fish. The inhabitants of the Samoan group of



islands regard the flesh as a delicacy, and dig the crabs out of their burrows, in which there is often to be found a quantity of finely-carded cocoa-nut fibre, which is made use of for various purposes. Our captive being taken on board, we inverted over it an iron tank, under which it was kept alive for several days. On our arrival at the island of Kar Nicobar, where there was abundant evidence of the existence of these crabs, afforded by the torn husks which lay scattered about in every direction, we showed the crab to some of the natives, and offered them rewards if they would bring specimens. When the tank was lifted up, they drew back with horror, and declined most distinctly to have anything to do with the capture of another; and some of them even precipitantly left the ship, as though they had just remembered that they had important business to transact at home.

Having discovered our friend, and on reaching the beach, we fired the preconcerted signal, by which those on board were to understand that all was well, and then we followed the shots by three ringing cheers, which conveyed to them an assurance doubly sure of the successful results of our search.

On our return to the ship's boat we crossed the surf in a canoe, which was so heavily laden that there was barely an inch above the water-line. The Nicobarese paddler brought us alongside, and we—three of us—stretched out our hands to catch the side. In a moment the canoe turned under us, and the outrigger was lifted round out of the water and on to the heads of those who were standing up to receive us. Fortunately we could all swim, and had our guns in our hands, so that beyond the loss of a few trifles we suffered no injury from this midnight immersion. On the "Scotia" a warm welcome, of course, awaited Stoliczka. Somewhere about two o'clock that night we sat down to supper, and though not many could eat, we were able to drink to the health of the universally-popular Doctor.

To some of those who may read this narrative, it may appear, perhaps, that too much has been made of this adventure; but I can assure them—and those who know the character of the



Nicobarese jungles will bear me out in saying—that our extreme state of anxiety at the time was fully justified by the circumstances. Even after Stoliczka was found, the effects of an attack from the severe and too often fatal Nicobarese fever was much to be feared.

The following morning we steamed off for Kamorta, reaching Nankowri haven at nine o'clock. I landed at the village of Malacca, on Nankowri, and got from the natives some spears and two large wooden models of a shark and dolphin. These, like all such objects tied up in Nicobarese houses, had small pieces of dried meat attached as offerings. They were given readily in exchange for some rum, and did not seem to be very highly valued by their owners. The only bird I shot here was a specimen of the chimney swallow (*Hirundo gutturalis*, Scop.).

At four o'clock we steamed out by the western channel, and anchored off the island of Katchall for the night. Early the following morning we landed on Katchall, near a village where resides a somewhat notorious character, called Hung-hung-su. Whether from a consciousness of his guilt, or from a knowledge that though innocent he is in police phraseology "wanted," this gentleman immediately leaves his marine villa for some hiding-place in the jungle, whenever the island is visited by English ships. The charge against him is that he was a ringleader in many of the piracies which took place before the occupation of the islands by the British in 1869. It is believed that a European woman with her child, the wife of a captain of a vessel, who had been murdered with all his crew, were kept for some days and brutally ill-used by this man, who afterwards murdered them. On the present occasion Hung-hung-su's house, into which I peeped, had all the signs of having only been just vacated. We first struck inland to see some caves which are about half-a-mile from the coast. They are situated in a bed of limestone, which seems to have been derived from coral, but is not I think an original reef. Its general appearance is suggestive of coral, but the more closely it is examined the less does its rugose and cellular structure, exposed on the surface, seem to

represent original coral structure. Some portions resemble a form of travertine. I believe its rugose appearance is in a much greater degree due to the solvent action of the rain-water than to its original structure. The greatest length of the principal cave appears to be about sixty yards; but there are low passages leading off in different directions, which we had not the means of exploring. A small species of bat (*Miniopterus pusillus*, Dobson), abounds, and its droppings formed the floor. Of these bats we caught a large number in butterfly nets. There was no time for examination of the country further inland, and I did not see any of the sandstones which are said to occur. I am inclined to think that these caves have been used as places of resort by the natives, and a thorough examination of them might yield some traces of the pre-historic race, which there are some grounds for believing may have occupied the islands before the advent of the Nicobarese, who are undoubtedly of extraneous origin. I would commend the subject to the notice of those who may have opportunities of visiting Katchall.

Leaving these caves we struck off, each taking independent tracks, to search for the Nicobar pigeons, which were said to occur in the island. I came across several small parties, but could never get within range. Several times I heard megapodes clucking in dense undergrowth quite close to me, but I could not succeed in seeing one. In a stream I found a large *Neritina* in considerable abundance, but only brought away a few, for which I was reviled by the conchologists of the party, who told me it was a rare and valuable species. There was no great bag of birds made: those shot were of species of which many specimens had previously been obtained on the other islands. Something about this island that I cannot explain gives it a sombre and cheerless aspect. It may have been the weather on that particular day which caused the feeling. However this may be, my recollections of the island are less pleasant than those regarding any other upon which we landed.

On our return to the ship I heard that the two before-mentioned European apprentices had been allowed to go on



shore. Coming across Hung-hung-su's house they had scrambled up the ladder, pushed the door aside, and soon after passed down a large, more than life-size, wooden figure of a man. Soon after returning to the ship with this prize, they were at once ordered to return and replace it by the captain. They pleaded, knowing my weakness for ethnological specimens, that they had brought it for me. This argument, however, was very properly not regarded as being sufficient to justify what might be called by a bad name; and the tutelar deity, or whatever these figures should be called, was duly returned to his post at the head of the ladder in Hung-hung-su's house.

About noon we sailed for the island of Bompoka, on the eastern side and landed in the afternoon. I must say that I failed to see a resemblance which this island is supposed by Dr. Rink to present to a volcano. Neither the state of the jungle, nor the time at our disposal, admitted of our penetrating far from the beach. The only rocks which I saw were sandstones *in situ* and loose fragments of serpentine. These sandstones are similar to those in the Great Nicobar. The higher parts, including the supposed volcano, only support a grass vegetation, like that in the highlands of Kamorta, and I fully anticipate that the rocks will prove to be of similar character in both localities. Just within the cocoa-nut zone I came upon several clearances where the natives had made strongly-fenced gardens, in which plantains, chillies, papayas, and limes were growing. I passed quite close to a man at work, but he was so intently engaged that he neither saw nor heard me.

I shot several specimens of the Nicobar bronze-winged pigeon (*Carpophaga insularis*, Blyth), and might have got a large number, but these birds were now rather a drug in our hands. I also shot some of the Nicobar collared kingfisher (*Halcyon occipitalis*, Blyth), and a specimen of the bush-thrush (*Geocichla albogularis*, Blyth). This last species, though I occasionally saw it on the other islands, I had always found difficult to obtain, from the simple fact that perching on the ground it could only be seen at very close quarters, too close to admit of its being fired at without



being blown to pieces, and so hitherto I had allowed it to escape. In the village I found a number of natives lolling about. Only one or two of them had articles of European clothing. They seemed to me to be cleaner-limbed, clearer-skinned, taller, and in every way better-looking men than the inhabitants of Nankowri and Kamorta. Their language is probably the same, or nearly so, as that which is spoken in the latter islands. The houses—both of the bee-hive and rectangular shapes—were remarkably well built; one of large size, and with well-laid smooth and polished plank flooring, since it did not contain any fire-place or domestic utensils, was, probably, a sort of meeting-house. These people were too lazy to climb the cocoanut trees, but kept a ladder which they readily used in order to supply us with as many nuts as we required. They did not seem to care much about rum, and the difference in their appearance may perhaps be due to their having more temperate habits than our more civilized acquaintances of Nankowri.

Returning on board the steamer while there was still light, we cruised along close to Theresa, a somewhat uninteresting-looking island, upon which we determined not to land. We then passed Chowra, a small island where the potters, who supply the whole of the Nicobars with cooking vessels, reside. During the night we steamed slowly towards the small island of Batti Malve, and by early morning circled round it at such a distance that it was impossible to see where a landing might be effected. Yielding to our entreaties, our ever-careful captain circled round again much closer in, and then we saw a little bay with narrow beach, which we thought might answer our purpose. During our first circling we had seen some parties of black birds with white tails flying from the island towards the south-east. At first we could not identify them; but when approaching the above-mentioned little bay, all doubt on the subject was set aside by our seeing, to our intense delight, a number of Nicobar pigeons feeding on the ground. We found that though it would have been quite practicable to land on the beach by wading from the boat, it would have been impossible to scale the surrounding cliff. Everywhere else there was a



heavy swell breaking at the foot of the vertical cliffs which give this small island such a peculiar appearance. By choosing a spot on the west side, where this cliff was only about seven or eight feet high, and where the rock surface was sufficiently rough to be ascended by using hands and feet, and by anchoring the boat astern and then carefully working her bow on until within jumping distance, we one by one effected a landing, and, rushing off into the jungle, soon found that we had lighted upon *the* breeding-place and home of the Nicobar pigeon. In something less than two hours over sixty of these birds were shot, and many more might have been obtained, but that, owing to the somewhat critical position of the boat, the Lascars had to be left in her, and we had to carry our spoils ourselves; and this necessitated frequent returns to the landing-place, as it was impossible to carry a number of these heavy birds at a time without injury to their feathers. In one of these trips I had the misfortune to lose a hunting-knife which had all along proved invaluable for cutting a path through the jungle, and here especially, where the undergrowth was thorny. Had I been on an inhabited island I should probably have thought it had been stolen by the natives, as it often had excited their cupidity. It was made by Anachellum, of Salem, in the Madras Presidency, and was of much better quality and shape than any English hunting-knife I have had or seen. None of the trees on this island were of more than medium height. Many of them were covered with nests, some of which were only about eight feet from the ground; but we did not meet a single instance of a nest on the ground. In one or two Davison found eggs; but we were rather late for them, and young birds in various stages, from the newly-hatched to the fully-fledged, were to be found in most of the nests. Only one young one was found in each nest, and it would appear that but one egg is laid by this bird. In one place the old birds were feeding on the ground on some fallen seeds. Hitherto, on the other islands we had never seen a bird lower than the topmost branches of high trees, and I fancy that it must sometimes feed on fruits while still on the branch, and that it is by no means exclusively a ground-feeder. Previous accounts



have either actually stated or indicated the probability that it breeds on the ground. I believe, however, the nests were never before taken by Europeans. It is probable that a large proportion of the birds which spread throughout the Nicobars come to this island to breed, but that all do not do so is evident from the fact that the natives occasionally have young birds for sale. Not unfrequently, too, they snare the old ones. The bird is a hardy one, and promises to do well in captivity. Some young ones which we brought away arrived safely in Calcutta, and one of them paired and bred with another subsequently brought from the Nicobars. In July, 1873, I saw about twenty of these birds in the Jardin des Plantes, in Paris, labelled from Cochin China. They looked remarkably healthy, and were in splendid plumage. In young birds the tail is not white as it is in the adults, but is of the same colour with the back. There are no hackles, and the general aspect is sombre and utterly fails to convey an idea of the splendour of the adult. Though generally a silent bird, those on Batti Malve kept up a constant croaking. This may be peculiar to the breeding season. When fairly started it is, I should say, a strong flyer, though the heavy and clumsy fluttering made by it as it leaves its perch at first gives the idea of somewhat feeble powers of flight.

Batti Malve appears to be formed of raised coral; but I think there are some sandstones at the northern base. I had no opportunity, however, of giving them a close examination. The remains of a hut and some fragments of broken earthenware vessels shewed that this island has been previously visited by someone; but there were very few cocoa-nuts, so it is difficult to say what the attraction may be—possibly the pigeons. At all times it must be difficult to land on it from native canoes, and when the slightest sea is on quite impossible, as there is no spot where a canoe could be beached. Probably the visitors were not Nicobarese, but the crews of Malay or other vessels.

On a gun being fired on board, our party, with the exception of Davison, all assembled. For about half-an-hour we waited, and as during that time we heard no shots from him, we began to fear



some accident had befallen him. Just as we were about to start in search of him we saw him wearily walking along the rocks. It appeared that he had felt himself completely overcome by heat and exhaustion, and had lain down at the foot of a tree close to where the pigeons were feeding on the ground, and had availed himself of the opportunity of closely observing their habits.

Strange to say, I saw some rats on this small island. In the first pursuit of the pigeons I was so engrossed that I let them pass, and afterwards could not find one when I wanted to do so. None of the party obtained any specimens. The small mammals occurring in the Nicobar and Andaman islands do not appear to be numerous; but their examination, when a sufficient number shall have been collected, is likely to give results of high interest.*

Returning on board, we sailed for the large island of Kar Nicobar, and anchored in a bay at the southern extremity. Our arrival was the signal for the crews of two large native vessels to hoist sail and make off. Whether they had finished their business, or had guilty consciences and dreaded any questions being asked as to their movements, we did not find out. Soon canoes put off from the shore, and the natives, with a narrow strip of red calico round their loins and a band or cincture of palm-spathe binding their flowing locks, pressed up the companion ladder. Ladies being on board, they were not allowed at first to come on deck, upon which Captain Snooks, their leader, looking very much disconcerted, stretched out his hand and exclaimed, "Why are you so unfriendly?" Afterwards the Captain of the "Scotia" took him into his office cabin to do business: in other words, negotiate the purchase of some pigs and fruit. We were not a little amused to observe that the Captain arrayed himself in a staff officer's old cocked hat and feathers, which he proposed, in a fit of generosity, to exchange with other articles for fat swine. I rather think Captain Snooks was not much smitten by it, and considered an ordinary black silk hat, according to Nicobar taste, a more appropriate

* On this subject *vide* Appendix D.



head covering for a gentleman. I believe, however, he took the cocked hat, and will probably astonish future visitors by wearing it when paying them a visit. There were very few articles of European clothing among these people. Captain Snooks speaks English fairly. This knowledge of English possessed by the Nicobarese, of which we found evidence on all the islands, seemed to be remarkable, since the visits of ships with English-speaking crews cannot be very frequent. On one occasion I overheard the Lascar Ali talking English to a Nicobarese, though I had previously no idea that he understood a word of the language. We did not meet any of the personages bearing the distinguished and aristocratic names mentioned by the author of the "Novara" account, and alluded to on a previous page.

On landing I started up a creek which I endeavoured to follow, but after going about half-a-mile through mud, which was often up to my knees, and might at any moment have been up to my neck, I was obliged to stop. Had the tide been in, this creek would have been navigable. The only birds I saw were some whimbrel and curlew, but they would not let me get within range. The Nicobarese who followed me had all along been endeavouring to make me turn back. One man continually calling out "go road." I then, much to their disgust, and subsequently too to my own, struck off into the bordering mangroves, expecting to meet solid ground within a few yards; instead of which I had a weary tramp of nearly a mile through fetid mud and rotten mangrove stems, where I caught two water snakes, but saw no birds. The miasma which arose as I walked was fast beginning to affect my head. On reaching the jungle I went off with a number of natives to a village, where I drank some coconut milk and brandy, and began to shake off the evil effects, but for the whole of the day the fetid vapours seemed as it were to follow me. The village was a poor one; I only looked into one or two of the houses, and they did not appear to be nearly so comfortable as those on most of the other islands. The people are of much lighter build than those at Nankowri; their mouths, too, are less disfigured by pawn chewing.



How far these characteristics may be general throughout Kar Nicobar I do not know. It would appear from the published vocabularies that the language is, though of course allied, distinct from those used on the other islands. It has not as yet, however, I believe, been subjected to any very close analysis. In some of the previous accounts mention is made of cross-bows as being used by these people, and I was on the look out for one, but did not see any in the houses. One of our party, after our return to the ship, told me that he had seen one. I cannot suppose but that this form of weapon was introduced by Europeans. A cross-bow is, however, I believe, used by a tribe in Western Africa. I got here, with some difficulty, two of the cane cylinders which are worn in the ears. The owners were most unwilling to part with them, but by offering three times their intrinsic value, and then setting the other natives to laugh at the men for refusing my liberal offer, I effected my purpose by means of their ridicule.

I then returned to the beach, and walked through the coconut zone, which is on this island very broad, where I shot two very rare birds, the Nicobar Tree-stare (*Temenuchus erythropygius*), and the Hawk Owl (*Ninox hirsutus*), besides several others. The first mentioned as it fell was caught in the leaf-stalk of an areca-palm at about sixty feet from the ground. I asked a man to go up for it and he immediately started. In his ascent he simply grasped the trunk with his hands and walked up. We saw many torn husks of cocoa-nuts on the ground which we supposed shewed the marks of the large crab; but the natives to whom the captive on board had been shown, resolutely refused to point out where one might be found. I saw nothing of the geology of this island, no rocks being exposed where we landed.

The following morning we reached Port Blair, where most of the afternoon was spent in calling on the residents. Early the next morning Stoliczka and I ascended Mount Harriet and shot a few birds. The view from the top of Mount Harriet which, as I have elsewhere stated, is 1,100 feet above the sea, is certainly

very fine; but some indistinctness of demarcation between sea and land was caused by masses of clouds which, at that early hour, filled up the valleys.

By noon we had left Port Blair, and were steaming off northwards to the Archipelago, and in a few hours landed on an island known as the Little Button. In a cave on the south side we got a number of edible nests of a species of Swiftlet (*Collocalia spodiopygia*) as identified by Mr. Hume. These nests are made throughout of a gelatinous material without the admixture of any foreign substances. On the outer surface the material is in overlapping layers terminating in a sharp well-defined edge. Inside is a beautiful web of interlacing cross-stays of thread-like gelatine. These give to the nest great strength, and a certain amount of elasticity. The more regularly-formed had a horse-shoe shape, the flat side being that which was attached to the rock. Modifications of this shape were sometimes caused by the nature of the surface of the rock. They vary in breadth (long diameter) from two to three inches, and in depth from one-and-a-half to two inches. We shot several specimens of the bird; but the extreme rapidity of its flight and the rocking of the boat rendered it impossible to make as large a bag as we wished.

The abundance of the reef-heron on all the islands which we visited had been the cause of my diary up to this containing no notice of it, but it must not be altogether passed, the more particularly as it is of interest to remark that the species, which is normally of a slaty-blue colour, exhibits a marked tendency to albinism in a very similar way to that observable amongst rock-pigeons. According to my estimate, the proportion of white to blue individuals is from one-seventh to one-tenth. The birds when compared differ only in colour, and there can be no doubt that both belong to the same species. One white one which I saw on Little Button had distinct dark marks on the shoulders, which extended to some of the underwing coverts. The white birds appeared to us to be unusually wary, and on more than one occasion I observed them to be



the first to rise as I approached. This may not impossibly be due to some peculiarity of vision, a thing which *prima facie* might be expected to exist in conjunction with albinism. Under certain circumstances it is conceivable that this might lead to the preservation of the white variety, while the blue were exterminated. Even the numbers of the specimens in the collection made by us show to a certain extent the truth of this. Out of thirty-nine skins two only were white. Now if my estimate of the relative numbers be correct, and the white were not more difficult to shoot, there should have been four or five white ones out of the thirty-nine. As a matter of fact, I believe, most of our party, after a certain number of the blue birds had been shot, rarely fired at them, though they never lost an opportunity of trying to get a shot at the white ones,—certainly such was the case with myself. I believe double the number of the blue birds might easily have been shot for the same amount of trouble as was expended on the white.

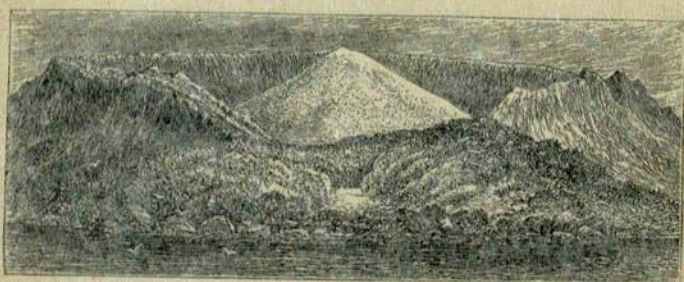
Little Button Island is formed of a white calcareous rock quite unlike anything I have seen anywhere else in the islands. Some broken shells of nautilus, turbo, and trochus, a fragment of pottery, and an empty match-box! shewed that the natives occasionally visit this island in their fishing excursions. The pottery and the match-box pointed to the probability of their belonging to the Port Blair tribe.

Early the following morning we found ourselves close to Barren Island, in Lat. $12^{\circ} 17' N.$, and Long. $93^{\circ} 54' E.$ This volcano, and that of Narkondam, I have described fully elsewhere* so shall confine myself to very brief sketches of them here. As we sailed round the island, and the north-west side opened to view, it first became apparent that it does not consist, as might at first be supposed, of one solid mass; but of a circular ridge forming a huge amphitheatre which is broken down at one side to the

* "Records Geol. Surv. India," Vol. vi., 1873, p. 81; and "Geological Magazine," Decade II., Vol. vi., No. 1., January, 1879.

level of the sea for a distance of perhaps 150 yards. The view obtainable through this entrance discloses a bare cone which rises from the centre of the island. Except at a sort of shoulder not far from the top, and at two peaks close to the summit, no rocks are seen on this cone, its smooth sides being covered with grey ash and occasional strings of shingle. Towards the top some whitish patches are seen—these are due to the presence of gypsum mixed with the ash.

The accompanying illustration, it will be observed, is somewhat diagrammatic in its character, being rather of the nature of a bird's-eye view, than a representation taken from an actual point



BARREN ISLAND VOLCANO.

of view. The total diameter of the island is, on the authority of Lieutenant Heathcote, 2,970 yards. The circuit of the island, from the time it took us to row round, I estimated at about six miles. The high encircling ridge is formed of somewhat irregularly deposited layers of lava, ash, and conglomerate, which dip away from the centre. A section of these may be seen on the left hand of the gap or entrance, and others at various points on the sea-face, no two of them agreeing exactly in character. These beds or layers generally dip at angles of 35° to 40° , which inclination appears to be continued steadily under the sea, as bottom, except at one place, has not been found with a line of 150 fathoms at a quarter of a mile from the shore. This steepness has been unfavourable to the formation of a fringing



reef of coral of any magnitude, such as we find surrounding some of the islands of the Andaman and Nicobar groups. The elevation of this outer ridge varies somewhat in places, but it probably is nowhere much in excess of 1,000 feet. Its highest points are towards the south and west.

The appearance presented by the inner scarped face of this amphitheatre is very peculiar. In several places cornice lines mark the position of particular beds, but a purplish-grey, or in places brownish, ash spreads over the steep slopes, except towards the south-west and west, where there are some trees and shrubby vegetation. To the north, south, and east a few tufts of grass—generally arranged in long vertical lines, the first being a sort of protection to those below it—are the only plants which have managed to establish a footing in the loose ash. The outer slopes facing the sea are for the most part covered with a luxuriant vegetation, in which large forest trees may be discerned. These latter attract considerable numbers of fruit-eating pigeons (*Carpophaga bicolor*). From its composition and character, it is evident that this ring of cliffs is the remnant of the original cone which gradually rises from below the sea. Its top and a portion of the side were, no doubt, blown off by a violent eruption, and the present cone was subsequently formed inside. The gap or fissure in the surrounding walls bears about north-west-by-west from the centre of the island. It is the only place where an entrance can be obtained to the central valley.

For a long time Barren Island was considered by Von Buch and others of his school as a most favourable example of his elevation theory of craters. Since, however, the island is in reality only formed of volcanic materials elevated above the sea without a trace of any pre-existing rocks, it is evident that its peculiar form gives no support to that now exploded hypothesis.

Close to the landing-place, there is a hot spring which has been mentioned in several of the accounts of the island. Dr. Playfair found the temperature to exceed 140° ,—the limit of his thermometer. Dr. Liebig's thermometer was only graduated up to 104° , but judging from the feel to the hands, he estimated it



to be near the boiling-point. The Andaman Committee record it at from 158° to 163° F. At the time of our visit the highest temperature of the water where it bubbled out of the rocks, close to high-water mark, was 130° F. We therefore failed to boil some eggs in it which we had brought with us for the purpose. The water is perfectly clear and sweet,* and there was no trace of sulphurous vapours. Strange to say, where, though mingled with the sea, it was still too hot for the hand to be retained in it with comfort, there were a number of brilliantly-coloured fish swimming about.

Facing the landing-place is the termination of a flow of lava which extends backwards for about a mile to the base of the cone, round which it laps for perhaps three-quarters of the circumference. The height or thickness of this flow of lava is about ten feet at first, gradually rising to about fifty feet where it emerges from the base of the cone. The upper surface is deeply cleft and covered over with blocks of black cellular lava which rest upon one another in confused piles. Sometimes they are poised so insecurely one upon another that it is a matter of no little risk to attempt scrambling over them. Towards the base of the flow, the rock, from its slower cooling, is more compact and less cellular. In places it contains white crystals of a mineral resembling leucite. In others it is a true basalt with numerous crystals of olivine. As pointed out by Dr. Liebig, the older lava seen in the section of the ridge differs from this; it consists of a reddish matrix with crystals of felspar (probably sanidine), olivine, and augite. A somewhat similar rock occurs on Narkondam.

On our way to the central cone from the landing-place, we at first endeavoured to avoid the rough surface of the lava-flow by keeping on the slope of the gap; but after a short distance the bushes and unevenness of the ground compelled us to strike

* The Andaman Committee do not appear to have realised this fact, as they spent no little time and trouble in excavating a well without finding a trace of water.



down on the lava, where we were surprised to find a cleared path which must have been made by the committee sent from Port Blair to report upon the supply of grass. Arrived at the foot of the cone, we commenced the ascent from the west. The loose ashes and shingle rendered it somewhat toilsome work; and those in front found it difficult to avoid loosening fragments of lava which bounded down the hill in a most unpleasant way for those who were following. Dr. Liebig appears to have ascended from the north side, where it seems to have been equally difficult. About a quarter of the way from the top there is a shoulder of rock which shows very well in the photograph. This probably marks the position of an old vent. There is a good deal of firm ground about it. The summit of the cone is truncated, and contains an oval-shaped depression, one half of which is partly filled with *débris*, and the other, some twenty yards in diameter and fifty feet deep, has a circular bottom, which is filled with sand. This appears to have been the last crater formed on the island.

The two principal walls of the depression strike from north-west to south-east; they consist of ash permeated with fibrous gypsum (selenite); numerous cracks and fissures occur in this part of the hill, and the ground is hot. On turning over the surface, the sides of these cracks are found to be encrusted with sulphur, resting upon the rugosities of which small detached crystals of the same mineral were not uncommon. From the highest point on the northern wall a thin column of white vapour and sulphurous fumes is slowly poured forth. Even when standing in its midst, the fumes did not prove so irritating as might have been expected. On the southern side of the crater solid lava is seen *in situ*, and on the west there is a peculiarly-shaped mass which forms a conspicuous object from below. Portions of the lava here have a reddish matrix and are somewhat vesicular. I also found some basalt, the outer surface of which was weathered into a white crust. It seems probable that the nucleus of the cone is solid lava to a considerable extent, the ashes seen at the surface being only superficial. By following water-channels when they



were to be found, and glissading over the ashes, the return to the base of the cone was effected speedily and without much difficulty.

By a small watch-aneroid supplied with a Vernier scale for feet, the height of the cone appeared to be 950 feet; but as one heavy storm of rain had passed, and clouds portended another, I am willing to believe that owing to the atmospheric disturbance the observation was not trustworthy, and that from 975 to 980 feet, given by Lieutenant Heathcote, Dr. Liebig and others, is the true elevation. The temperature on the top was 83° . The diameter of the base of the cone is 2,170 feet according to Lieutenant Heathcote. The slopes of the cone incline, according to my observation, at angles varying between 30° and 35° . Blair, as already stated, gave it at $32^{\circ} 17'$, or about the mean of these two. Other observers say 40° to 45° , but a photograph of the cone, which I possess, shows that the former are correct.

Dr. Liebig has discussed the question of the amount of sulphur obtainable on the island. He seems to think the chances of finding a permanent supply very doubtful, but recommends a preliminary trial. Considering the great expense which keeping up constant communication with the Andamans and the superintendence of convict labour would involve, I cannot see that there is any prospect of the collection and refining of the sulphur being made to pay. So far as is known, the substance occurs only at the summit of the cone, though doubtless, if the right places could be found, it does also occur lower down. But in such places, it could only be as an old deposit which, on being worked out, would not be replaced again. On the summit, deposition, so far as I could see, proceeds very slowly, certainly not with sufficient rapidity to keep labourers constantly employed.

In the paper above alluded to, I have given an account of the history of the island from all available records; and from these it would appear that the volcano has not been in a state of violent eruption since the years which closed the last and commenced the present century. The lava-flow, which stretches



from the entrance, on the sea face, to the base of the cone, was probably poured out during this period, and raised the level of the valley some forty feet above its elevation in 1789, when Blair saw it. He makes no mention of a lava-stream in his time. If it did not exist then, it cannot—as has been supposed by some—have been instrumental in the formation of the entrance. I have pointed out in the above-mentioned paper the origin of some serious errors which occur in several Geological Manuals and works on volcanos regarding this island. These errors, having been unfortunately adopted in the works of Sir Charles Lyell and many others, have obtained a universal currency which will render it very difficult to wholly eradicate them from text-books.

March 23rd.—Slowly during the night we had steamed northwards, and at sunrise we saw and partly circled round the Island of Narkondam, at a distance which, while adopted as a safe precaution by the captain, did not commend itself to us, as we could not distinctly see the lie of the land, nor choose the best place for landing. Narkondam is situated in Lat. $13^{\circ} 24' N.$; Long. $94^{\circ} 12' E.$ So little has been published regarding this island, that a few lines will suffice to dispose of all that has ever been recorded on the subject.

In 1795 it was passed by Colonel Symes,* when on his voyage to Rangoon, whence he started on his embassy to Ava. He speaks of it as “a barren rock, rising abruptly out of the sea, and seemingly destitute of vegetation.”

Dr. McClelland, writing in 1838,† says:—“It is a volcanic cone, raised to the height of from 700 to 800 feet.” He gives a sketch showing the figure of the cone, “the upper part of which is quite naked, presenting lines such as were doubtless formed by lava-currents descending from the crater to the base, which last is

* “Embassy to Ava,” Vol. I., 1827, p. 167.

† “On the Difference of Level in Indian Coal-fields,” “J. A. S. B.,” Vol. VII. Also in the “Coal Committee’s Report,” and in “Corbyn’s Indian Review.”



covered with vegetation." No soundings are to be found at the distance of half-a-mile from the shore. This account is reproduced by Mrs. Somerville, Dr. Daubeney, Dr. Buist, and Mr. Scrope.

Horsburgh* says:—"Narcondam may be seen about fourteen or fifteen leagues from the deck, and appears in the form of a cone or pyramid, with its summit broken off. It is bold and safe to approach all round."

Dr. S. Kurz, in his report on the vegetation of the Andaman Islands, published by the Government of India, writes:—"Narkondam Island has an extinct volcano, remarkable for the great height of its cone, being twice as high as its outer wall. Owing to the great height of the cone (perhaps 2,000 feet) in proportion to the surrounding wall, this island must have sunk very much, or the volcano must have been formed from a considerable depth in the sea." The reasoning by which these alternative conclusions have been arrived at is not very clear. Dr. Kurz gives an outline sketch of the island as it appeared to him from a distance of twenty miles.

In a paper on the geology of the neighbourhood of Port Blair,† I made a few remarks on the appearance of Narkondam as seen from a few miles distance. I then accepted the height of the cone (2,150 feet) given on the chart as authentic. This, it will be seen by the sequel, I do not now adopt as correct.

Viewed from the north-west, at a distance of about four or five miles, the Island of Narkondam appears to consist of a tolerably regular cone, which rises from an interrupted ring of irregularly-piled masses. The apex is somewhat truncated, but has three distinct peaks. On the occasion, in 1869, when I first saw the island, a dense mass of cloud rested on the top. I was then unable to make out the character of the summit. But when subsequently seen, it was observed that there were three peaks,

* "Indian Directory," Fifth Edition, Vol. II. 1843, p. 55.

† "J. A. S. B.," Vol. XXXIX., part ii., 1870, p. 231.



as represented in the rough sketches published by Dr. Kurz and Dr. McClelland. The upper parts of the cone, and the sides for more than half-way down, are deeply furrowed by ravines, and what appears to be a very low scrub jungle spreads uniformly over the island, save upon some vertical scarped faces.

With the observers above-mentioned, who did not land, the conical form alone seems to have been accepted as sufficient proof of the volcanic character of the island. Dr. McClelland, as noted above, speaks of the lined appearance being "doubtless formed by lava-currents descending from the crater to the base." These lines are, however, simply the result of erosion, and mark the position of the watercourses. The elevation of the summit of the cone has been variously estimated at from 700 to 2,150 feet. Since however—according to Horsburgh—the island first becomes visible from the deck of a steamer at a distance of from fourteen to fifteen leagues, it is probable that about 1,300 feet would be nearer the true altitude, and such, indeed, judging by the eye, appears to be a very fair estimate. The general outline of Narkondam is extremely like that of Stromboli.*

We landed in a small bay on the north-west side of the island. At about 100 yards distance from the beach the water becomes so shoal, owing to a coral reef, that we were compelled to land on a raft. We soon found that the jungle, which in the distant view appeared to consist mainly of low scrub, was really composed of large forest trees, with a thick undergrowth. So dense was this, just above high-water mark, that at first it seemed probable that it would be impossible to penetrate it. Added to the natural density of the jungle, another obstacle was presented by the prostrate condition of many of the trees, which in their fall had carried down tangled masses of creepers and undergrowth. It soon became apparent that at no very distant period a violent hurricane or cyclone must have swept

* With the paper in the "Geological Magazine" already referred to, I have given a figure of Narkondam.



across the island. An entrance was at last found, and for three hours, cutting our way and making constant detours to avoid fallen trees, we endeavoured to force onwards to the summit, but were at length compelled to give up all hope of succeeding, and returned to the beach. Further evidence of the hurricane was there afforded by numerous fragments of a wreck which had been thrown up on the sand. Subsequently this storm was identified with one which took place on the 26th of October, 1872, and did much damage in the Coco Islands and other parts of the Bay.

The only rock seen where we landed was a conglomerate, or boulder-bed, some fifty feet thick. The boulders consisted of a trachytic porphyry, which contained sanidine, augite, and mica, in grey or pinkish matrices. We discovered no evidence whatever of recent lava or basalt occurring, though either or both may exist, as our observations were confined to one small bay. There is no historical record, so far as I am aware, of smoke ever having been observed to issue from Narkondam. It has, therefore, long been dormant, if not absolutely extinct.

Notwithstanding the luxuriance of the jungle, which included species of *Ficus*, Palms (*Caryota*), *Acacia*, *Calosanthus*, etc., no fresh water was discovered. We saw no traces of the goats and fowls which many years ago are said to have been let loose on this island. We shot two specimens of a hornbill, to which Mr. Hume has given the name *Ryticeros Narcondami*. We also obtained some bats, and saw swiftlets (*Collocalia linchi*) and sun-birds (*A. Andamanica*), and large water-lizards (*Hydrosaurus*). Much remains to be done in the exploration of this most interesting volcanic island. It is particularly desirable to ascertain whether there is really a crater at the summit, and whether there are any traces of recent lavas. Future visitors would do well to provide themselves with some wood-cutters. They should land near the northern spur, and getting then on the steady rise, they will probably find no insuperable obstacle on their way up. Owing to the fact of the physical geology of the Andaman and Nicobar Islands being as yet imperfectly known, I have not here



discussed the connection which in all probability exists between their elevation and this adjacent line of volcanic activity.

Early on the following morning we landed on the east coast of the Great Coco Island. Just inside the beach there is a broken belt of cocoa-nuts, with cycad trees growing underneath their shade. In the breaks in the continuity of the belt where cocoa-nuts do not occur, the trees are pandanus and occasionally mangroves. Passing through this outer belt I encountered some low sandstone hills covered with thorny shrubs, through which I was unable to make my way. I then traced up several creeks until they lost themselves in the jungle. Occasionally I caught sight of white-breasted water-hens, but besides the ordinary small shore-waders (*Ægialitis*, *Strepsilas*, &c.), the only common bird was a king-crow very closely allied to, but distinguished by its constantly larger size* from the Andaman (*Buchanga Andamanensis*). A good series of this bird was obtained. The other birds shot chiefly belonged to the more common Andaman species.†

Among the larger trees I noticed species of *Bombax* and *Dipterocarpus*, besides others with the appearance of which I was not familiar. A species of *Acacia* and sago palms (*Caryota*) also occur. I saw no trace of fresh water; it may however possibly be had by digging. All the rocks which I came across were sandstones of the same lithological characters as those of the Andamans. Dr. Stoliczka, however, told me that he saw near the highest part of the island some serpentine-diallage rock which was similar to that found in Macpherson's Straits. Through-

* It has been named *B.* (or *Dissemuroides*) *dicruriformis*, by Mr. Hume.

† In a recently published work, entitled "Sport in British Burmah," the author, Colonel Pollok, mentions having shot megapodes on the Great Coco. Mr. Hume also heard from the lighthouse-keeper on Table Island that they occur there. Now, if it be true, as is supposed, that they do not occur in the Andamans, then their distribution would appear to be the same as that of the cocoa-nut palms, and may possibly be due to the same yet undiscovered cause.



out the cocoa-nut zone fallen nuts of all ages strew the ground. Many of them have been hollowed out by rats and pigs, and some possibly also by the great crab. Land crabs and hermits here, as everywhere else where there were cocoa-nuts, were very abundant. I doubt very much if these islands are now visited by Burmese or other vessels for the sake of the nuts. We certainly saw no trace of anything of the kind, and the lighthouse keeper on Table Island told some of our party that he had never known any vessel to come to these islands for collecting purposes. From the same authority we learnt that the fallen trees on this island, and doubtless also those on Narkondam, had been thrown down by the cyclone of the 26th October, 1872.

I am unable, from want of space, to give an account of an early European settlement on the Cocos, but it may be of interest to state that last year (1878) the Governor-General in Council in the *Gazette* of India invited tenders for the lease of the island. The terms mentioned, which are otherwise hard, include the payment of a maximum sum of £2,000 per annum for the cost of the administration of civil and criminal justice. The sum is large; but the incubus of an establishment of petty native officials who, to prove their *raison d'être*, could not fail to make it their business to stir up disputes and litigation between employers and employed, would, to many experienced in Indian matters, be no doubt regarded as the hardest part of the contract.

The following morning we steamed over to the Little Coco, and landed at about ten o'clock. Here there was a similar zone of cocoa-nuts, with cycads growing in their shade, then a zone of brambly bushes and creepers. Inside were large trees without much undergrowth. One tree which I measured was close upon six feet in diameter. On the western side there is a coral reef which at low tide was uncovered for more than a quarter of a mile out from the land. Here there were several waders feeding, and among them a small flock of the large plover, which I had first seen at Escape Bay. I winged one of these, and as I was following him up came across a huge specimen, fully five feet long,



of the great water-lizard (*Hydrosaurus*). As I did not care to shoot him, though I wanted to capture him, I threw stones at him, whereupon he hissed and lashed his tail in a manner that might prove alarming to any one not knowing the harmless nature of the beast. As I was pressing him into a corner he made a rush into the waves, but returned—apparently not liking the surf. Just as I thought he could not escape he made a sudden dart into the water, dived through the surf, and disappeared. I could not wait any longer, as I had to pick up the large plover. Another of the party secured a second specimen and an egg of this species, which turned out to be *Esacus magnirostris*. Among the birds shot on this island were the Paradise fly-catcher (*Tchitrea affinis*), the Malayan koel (*Eudynamys Malayana*), the Andaman bush-thrush (*Geocichla albogularis*), Boie's grey thick-head (*Hylocharis philomela*), the brown fly-catcher (*Alseonax latirostris*), and several others. I caught a glimpse of one pig in the jungle, but could not get a shot at it, as it disappeared immediately.

The rocks are sandstones, which may possibly be in places penetrated by igneous rocks; but there is no foundation whatever for the statement made in an old account that this island is of volcanic origin.

The following day (March 26th) at about eleven o'clock, we landed on Preparis Island, the most northern of the group. The heat on shore was intense. I have never seen a more dangerous looking place than this island. Reefs stretch out from it in every direction—to the south, it is said, to the distance of eight miles. Taking a Lascar with me, I started through the jungle, steering as far as possible due west, in order to examine the opposite coast. I was joined by one of the ship's officers, and after a walk of about a mile and a-half we reached the opposite beach. The undergrowth is for the most part light, there not being enough moisture perhaps to support thick shrubs; there are, however, plenty of fine trees. I saw no birds in the jungle, but I shot a grey squirrel. We heard a rustling in one thicket which we supposed to be made by pigs, but we did not see any. The outer zone of



vegetation is formed of pandanus and mangroves, with an internal one of cycads. There is not a single cocoa-nut tree, I believe, on the island.

On reaching the western beach we found it had a reef very similar in character to that on the Little Coco. Where it was bared by the fallen tide there were numerous waders (*Aegialitis*, *Numenius*, *Strepsilas*, and *Ardea*). As the jungle had proved so devoid of bird-life, we determined to return by the beach round the southern point of the island. All along the high-water line there were numerous pieces of wreck, barks of timber (teak), several canoes, and portions of ship's boats. When about three-quarters of a mile from the south-west point, we saw some animals rushing across from the reef to the jungle. At first I thought they were pigs, but on reaching the place saw the foot-prints of monkeys. Subsequently we had a closer view of several parties of them which we startled on the rocks at the margin of the sea where they appeared to be feeding on crabs.* They were excessively wild, and I most unfortunately could not obtain a specimen. Altogether I must have seen fifty individuals. The occurrence of monkeys on this island is of particular interest, as none are known to exist in the Andamans. This seems to point to a more recent connection of this island with the main-land. What the species may be I am unable to say—possibly Blyth's *Inuus leoninus*, which occurs in Arakan, but it may be *I. carbonarius*. Some of the individuals I saw appeared to be almost

* I have elsewhere in these pages alluded to some of the late Mr. Waterton's positive assertions, and shewn them to be open to question. He states, "One traveller writes about apes feeding upon 'crabs, oysters, and other shell-fish,'" and then sneeringly enquires, "Did these fishes frequent trees in the forest?" On a preceding page of his work he scouts the idea of an ourang-outang feeding itself with a spoon, &c. All I can say to this is, that I have, like hundreds of other residents of Calcutta, seen an ourang take milk with a spoon from a cup, and put it most carefully into its mouth, and the man in charge said he had not taught the animal to do so. The same ourang "Jenny" was afterwards exhibited in the Regent's Park Gardens for some months, but was killed by last winter's severe frost.



black. At the extreme south point of the island we suddenly came upon a large sea-eagle (*Cuncuma leucogaster*). He was seated on a balk of timber busily engaged in eating a sea-snake. This was evidently a favourite perch, as there was quite a pile of snake vertebræ on the ground underneath. On rounding the point we were rejoiced to see the boats, although still some three to four miles off. Our long tramp over sand, loose coral, and rocks, together with the great heat, had so exhausted us, that we almost despaired of being able to accomplish the distance before nightfall. We saw no fresh water, but at about a mile from the south point we examined a superficially dried-up swamp, which is just inside the pandanus zone. The luxuriant condition of the grass seemed to point to the probability of water being found at no great depth from the surface. In one place the caked earth had been much disturbed, probably by pigs, though the way it was done seemed rather to suggest human agency. In this neighbourhood I saw a chestnut bittern (*A. cinnamomea*) and also the little green heron (*Butorides Javanicus*). Reef-herons were very abundant along the beach.

The most common rocks on Preparis are greasy dark shales. Sandstones are somewhat rare. I saw no fossils. Towards the southern end of the island there are some low hills, quite bare of vegetation. On one of them I noticed a well-worn path leading to the top; this had probably been in regular use by the monkeys, as they took that direction as they left the reef when startled by us. I was far too weary and exhausted to examine the ground closely then. On our rejoining the rest of the party we found that they had not wandered far from the landing-place, and that a large portion of their time had been devoted to the capture of sundry turtles, which they had discovered in pools in the reef. Altogether Preparis had not charmed us. There were few birds; the heat was excessive, and there were no cocoa-nuts to assuage our thirst. This island was the last place on our programme; so we steamed off for Calcutta, arriving there on the afternoon of the 30th of March, one day within our month's period of leave.

I remained in Calcutta during April and May; but on the 7th



of June was again on the move, having been appointed to take joint charge of the geological collections which were sent by the Government of India to the Vienna Exhibition. I remained in Vienna till the close of the Exhibition in November, and then returned to India for the next season's field-work.



CHAPTER X.

SECTION I.

NARBADA VALLEY, SATPURA HILLS, PACHMARI.

1873-74.

INSTRUCTIONS FOR SEASON—FORM CAMP AT JABALPUR—GADAWARA—BORINGS FOR COAL—VACCINATION—NARBADA VALLEY—FATAL ACCIDENT—DIFFICULT NATURE OF GROUND TO BE EXAMINED—TRACES OF FORMER CIVILIZATION—GONDS—BHURYAS—BIRMAN GHÂT—HINDU FESTIVAL—COPPER-MINES—NARBADA FOSSILS—SINKING SHAFT AT COAL-MINES—DUDHI VALLEY—RAJA OF HURRA—SAMBAR SHOOTING—BORING OPERATIONS STARTED—UNDERGROUND TEMPERATURES—ANCIENT RING-STONE—CAPTAIN FORSYTH ON THE DUDHI VALLEY: ITS GEOLOGICAL STRUCTURE, FAUNA, AND FLORA—SHOOT A BEAR—THE BEAR'S CARCASE VISITED BY A TIGER—ATTEMPTS TO SHOOT TIGERS—SHOOT A SAMBAR—GAUR (BISON) AND ELEPHANT—TREE-SHREW AND MALABAR THRUSH—VISIT PACHMARI: ITS NATURAL BEAUTY AND ITS FITNESS FOR A SANITARIUM—RETURN TO CALCUTTA—THE COAL RESOURCES OF THE NARBADA VALLEY.

My instructions for this season were to undertake the geological supervision, on the spot, of certain boring operations which had been started in order to test the extension of the coal-measures under the alluvium of the Narbada Valley, and under a series of sandstones, which are the only rocks visible in some valleys which traverse the portion of the Satpura hills included in the Narsinghpur and Hosungabad districts of the Central Provinces. Concurrently with these duties I had to carry on the systematic geological mapping of the hills surrounding the Denwa and Dudhi valleys to the east of the Pachmari plateau.*

Owing to my not having returned from Vienna (where I had

* I apply the term Satpura Hills to the whole range, though, locally, it is only strictly applicable to the western portion. The central portion, including Pachmari is known under the title of Mahadeo, and the extension thence eastwards is called the Mykal range.



been on duty in connection with our geological collection at the Exhibition) till near the middle of December, I was later than usual in taking the field, and did not start from Calcutta for Jabalpur till the 22nd of December—arriving there on the morning of the 24th, when I immediately set about buying a horse and hiring camels for the conveyance of baggage, in addition to that which was to form the load of the only elephant available. This elephant had been with me some years before in Bengal, when he was remarkably good-tempered as a rule, but he had since developed into a very dangerous animal, difficult to manage, and he had, I believe, killed more than one person. Already I had received some intimation of this change of temperament, and a trophy, in the shape of a portion of one of his tusks, which had a year or two previously been broken off as he tripped and fell when pursuing his mahout with murderous intent. For his management it was necessary to have three men on extra pay, and when he was loosed for watering or other purposes they all accompanied him armed with spears. During the season he did his work well, though he occasionally threatened the lives of his keepers; but, as the mahouts said, the greater his load the faster did he travel.

From Jabalpur I went on by train ninety miles to Gadawara, from whence I visited a boring which had been made at a place called Sukakheri. The object of this boring was to test whether the coal-measures of the adjoining Mopani field did or did not extend northwards under the alluvium of the Narbada Valley. The hole had been carried down to a depth of 343 feet without any solid rock having been met with; indeed, at this depth a running quicksand had been encountered, which prevented further sinking, as the tubing had already resisted all attempts to sink it lower than 333 feet, though it had been weighted with from twelve to thirteen tons of iron. Subsequently this boring, when better tools became available, was carried down to a depth of 491 feet, with only the negative result that no rock was met with, the base of the valley deposits not having been reached.



At Gadawara I had a conversation with a Mahomedan on various subjects; among others he introduced that of vaccination, and asked me its real object, stating that some of his co-religionists believed that the interest of the Government in the matter was due to the fact that they were anxious to discover the Imam Mundi, or Saviour of the World, who has still to come, Christ and Mahomet being merely prophets sent before. The Imam Mundi, it was believed, would restore the Mahomedans to power, and the object of vaccination was to examine the blood of all the infants born in the country, and when one with white blood should be found he would be immediately destroyed, and thus the British Raj would be preserved. He was somewhat astonished when I assured him that I had myself been vaccinated, as he had no idea that any but black children had to submit to the operation. This story is but one of many which might be told of the curious ideas which are simmering in the minds of the natives of India.

December 31st.—Gadawara to Thelwara.—On this, the last day of the year, I at length was able to commence camping, and march to the attack of the great bluff mass of hills on the south of the Narbada valley. The valley is here a highly-cultivated plain, about fifty miles wide, and is bounded both to north and south by steep scarps of rocks which belong to formations of very different ages. On the north there are quartzites and sandstones of Vindhyan age, which are overlaid by an extension of the great Dekan basalt sheet, while on the south there are sandstones, &c., referable to several groups of the great Jura-triassic Gondwana series. These likewise are overlaid by basalt.

Wide stretches of corn cultivation occupy the central valley, in which there is a rich black soil. Little or no rice is to be seen in this area. In lieu of fences, the corn near the roads is bordered by a zone of flax cultivation, the object of which is to avoid the loss which would be caused by passing cattle nibbling the heads of the corn. The flax, not being eaten by cattle, attains maturity, ultimately, however, affording, in the form of oil-cake, a valuable

and favourite food for them. This Indian flax seems to be deficient in fibre. It is certainly never manufactured by the natives, who merely cultivate the plant for its oil-yielding seeds, of which large quantities are exported to Europe. The oil expressed from them in England is, I am given to understand on the best authority, largely exported to Italy, from whence, after undergoing some process, known only to the trade, it travels forth and is sold all over the world as the finest olive oil! a portion of it, no doubt finding its way back to India, as also do gin and other spirits which are distilled from Indian rice. Here and there throughout these wide plains parties of antelope or black buck are occasionally to be seen. As they are often shot at, and cover for stalking is rare, they are very wary, though on several occasions when riding I have been able to get very close to single bucks. On this first day I heard of the break-up of a shooting party in the neighbouring hills in consequence of an unfortunate casualty. A native police constable, having climbed into a bushy tree in the line of fire, was struck by a stray bullet, which passed through and shattered both thighs, and he fell out of the tree like a smitten bird, and died soon afterwards.

January 4th.—Chargaon to Chaluk.—The last few days having been spent in visiting the Mopani coal-mines, and examining the base of the scarp of younger rocks for possible outcrops of the coal-measures, to-day I obtained a first experience of the very difficult nature of the country I had to survey. The geology of the principal open valleys which intersect the great plateau masses of the hills had already, to a great extent, been worked out, so that, as supplies were not to be obtained at the small hamlets in these higher levels, and moreover the camels could not have travelled over the steep passes and stony paths, it was necessary for me to leave my camp below, taking the elephant, lightly laden with a small sleeping tent and other requisites. The first night was spent at the village of Chargaon, and next morning I sent the men and tent on to a village called Chaluk, intending to work up to it along the bed of the Sitariva river. With this object in view I descended about 1,000 feet into the valley, and immediately



began to experience the very greatest difficulty in making any progress along the bed, owing to huge angular masses of sandstone which, having fallen from the steep bounding scarps, were piled upon one another throughout the breadth of the channel in massive confusion. At one spot, too, a trap-dyke, jutting out from the faces of sandstone on either side, proved a formidable obstacle, and I only succeeded in scrambling round it with the greatest difficulty. Having managed to traverse about a mile, we were at length brought to a stand in front of a waterfall, which fell over a sheer face of sandstone 80 to 100 feet high. To be compelled to return as we had come was not a pleasing prospect. At first I looked in vain for any place where the cliffs could be ascended. At length I saw a trap-dyke in one spot, which stood out vertically from the face of sandstone. Partly by ascending, after the manner of chimney-sweeps, a fissure left by the shrinkage on cooling of this trap-dyke, partly by scrambling up the exposed edge of the dyke, we were at length able to escape from the *cul-de-sac* to the level of the highlands, some 300 feet above. Still eight or nine miles of very severe up-and-down climbing remained to be accomplished before we got to Chaluk long after sunset. This was one of the hardest days' walking I ever had.

During the night I was awakened by seeing the flap of my tent lifted and a man creep stealthily in. On enquiring who he was and what he wanted, I found it was one of my own men, who said that he had heard a tiger close by and had come in for protection.

January 8th.—Baskera.—To-day I saw, but had not time to ascend, a massive block of sandstone called the Batkagurh Hill, upon which I was told there are remains of an old fort and tank similar to those I have described as occurring on certain hill-tops in Sirguja. That a civilization in advance of what is now to be found in these wild highlands, formerly existed, was further evidenced by a life-size carving of a curiously skirted figure which I found on a huge fallen block of sandstone in the bed of the Sitiriva river. The present inhabitants of this tract belong to one or