



was not one of those who act on the principle that the use of language is to conceal thought. It was stated that the Raja of Vetnagheri had sent a subscription of 10,000 rupees to the Madras Famine Fund, "*in obedience to the orders of Government and the Collector, and to secure more honours*"—so much for voluntary charity.

*December 25th.—Jugguldugga.*—For the fortnight preceding this I had been occupied, in spite of my crippled condition, in mapping the coal-field, on which, after the principal river which traverses it, I bestowed the name of Aurunga. The village of Jugguldugga is at the foot of a small group of hills formed of sandstones younger than the coal-measures, and resting upon them. The weathering of these sandstones had produced grotesque outlines similar to those which I have already described in the Hingir field. Christmas Day, as spent by me, was only enlivened by a dance, which was performed by some Uraons. For some reason the Uraons of Palamow appear to be in a less prosperous condition than their neighbours in Lohardugga proper. The attractions offered by Assam and Cachar tea-planters and coolie-agents from Demerara and Assam, are causing great numbers of them to emigrate, and large tracts of country are in consequence falling out of cultivation, and becoming depopulated.

As I have not given any general account of the Uraons in previous pages, I shall avail myself of this, the last, opportunity for doing so. The Uraons, or as they are generally called when away from their own country, the Dhangas, are hard-working cultivators, being in this respect vastly superior to any of the races I have previously described. Their houses are small, and badly made, and, the accommodation being scanty, the young men are all sent to sleep in a bachelor's hall, which occupies a central position in each village. There they are watched by a custodian, who is responsible for their good behaviour, and has power to fine absentees. The younger boys act as fags.

There is something very pleasing about the appearance of the Uraons, both men and women; and many of the latter are de-





cidedly good-looking. Their colour varies much, from black to light mahogany; but the cast of their features is so constant that one can readily distinguish a Uraon from people of all other races. Their method of arranging their hair—the women with one-sided chignons, often decorated with flowers, and the men with a huge back-knot, in which a small wooden comb is carried, and the abundance of bead necklaces and brass ear-rings and ornaments in the lobes of the ear which are worn by both sexes, serve also to distinguish them wherever they are met with. The women wear the ordinary sari, with the end thrown over the right shoulder; but when at work in the fields the upper folds of the garment are often regarded as superfluous, and a very moderate skirt arrangement of the cloth is considered sufficient. Tattooing on the arms, back, brows, and temples is practised by the women.

The dancing places, called *Akhara*, which I have described on a previous page as being attached to the villages, afford opportunities for the youths and maidens to become acquainted with one another; and long attachments and real love matches are probably more common with the Uraons than any other people in India. With Hindus such a thing is never known, and with Mahomedans in that country it rarely occurs, also, that bride and bridegroom have any knowledge of each other before they are joined in wedlock.

Uraons will eat almost anything. Tigers, bears, snakes, frogs, &c., are all lawful food to them. Field-mice are esteemed as the very choicest food; and when, according to General Dalton, a young Uraon presents to a maiden a dish of grilled field-mice, his self-denial in doing so indicates that he entertains for her a serious affection compared with which all the attentions he may have paid to others at the *Akhara* count for nothing. According to the Rev. Mr. Batsch, the Uraon language is a poor one. It includes no original religious terms; those which are in use have been borrowed. There are no words to express abstract ideas, and none for actions of the mind or thoughts.

While in this neighbourhood I found the common starling (*Sturnus vulgaris*) to occur in abundance. The bird had never,





so far as I could ascertain, been seen by anyone before in Chutia Nagpur, and its occurrence at this season was, I believe, to be attributed to the drought, and consequent scarcity of food in north-western India, which had driven it beyond its normal range.

*December 28th.—Subano.*—The prospects for the people of Palamow for the coming year were not very cheerful at this season. Owing to the short and late rainfall the rubbi crop promised very badly, and the bulk of the population would be dependent on the crop of mhowa flowers. People who in ordinary years would have had nine or ten maunds of grain stored for consumption, had only on an average about a third of that amount in their granaries. It was becoming clear to me that I should experience the very greatest difficulty in getting supplies of grain in the thinly-inhabited and poverty-stricken country I was about to enter.

*January 1st.—Toobed to Pochra.*—To-day I visited a hot spring at a place called Jarum. It was situated in the middle of the bed of a river, and there was consequently no vegetation about it. The maximum temperature was  $132^{\circ}$  F., and the water was kept in a bubbling condition by a flow of sulphureted hydrogen. Like the hot springs which I subsequently met with in the two other coal-fields which I examined, this one was on a line of fault or fracture. About this date the ground was generally covered with hoar-frost, and on the 3rd the temperature in the early morning stood at  $35^{\circ}$  F.

*January 7th.—Latiahar to Zalim.*—Latiahar, though the largest village in this tract of country, is of no great size or importance. While encamped here the native doctor had, for reasons best known to himself, pitched his tent at some distance away from the rest of the encampment. Early in the morning, just as I was about to get up, a piteous cry from him announced the fact that he had been robbed during the night. I found that the thieves had managed to remove from the tent, while the two occupants were asleep, the heavy medicine-chest and the doctor's clothes-box. From the latter about thirty rupees and a watch and chain





had been extracted, and from the former the brass scruple and dram weights of the scales. These the thieves had no doubt mistaken for gold. I hoped that they might prove the means of ultimate detection. The medicine-bottles were all scattered about the adjoining field. The police were about as useful as usual under similar circumstances. The only suggestion that could be made was that a party of strolling dancers, who had been about the camp on the previous day, but who had already marched, might perhaps be connected with the theft. A constable was accordingly sent after them; but subsequent enquiries served to clear them completely of the possibility of their being implicated in any way. The only further information I received on the subject from the police was that a constable, about a month afterwards, brought to the camp an empty gin-bottle, which had been found in the house of a Dome, a tribe which furnishes the majority of the thieves in Palamow as elsewhere in India. It is the custom of the police to harry these people and ransack their houses after a theft has taken place. The result in this case was the discovery of the gin-bottle, which had, however, not been among the articles stolen from my camp.

*January 11th.—Nowagurh to Bindi.*—At Bindi, which is situated at the foot of a group of hills included in a tract of forest-reserve, I found that the people were in great destitution, and that the village was nearly deserted. Both here and elsewhere the people living on the edges of these forest-reserves complained to me of the great hardship caused to them by being shut out of the forest, which had previously afforded them a means of livelihood, or at least of collecting certain jungle products, the sale of which had enabled them to supplement their other means of subsistence. They said that if their cattle by any chance strayed across the boundary, the chuprasi in charge of the forest was down upon them at once, and they had either to bribe him, or accompany him to the magistrates' court, forty miles off, to answer the charge. This, and much more of the same kind, seemed very hard; but, as Government designed to pay compensation to people who could make a good case, and the reservation of forest tracts is a matter of imperial importance, it





was better that the few should suffer, and, if necessary, migrate to other countries, rather than that the wholesale destruction of timber should be allowed to go on any longer.

*January 20th.*—*Kunki to Bari and Daltongunj.*—I had now completed the examination of the Aurunga field, which I found to occupy a distinct and isolated area; and so much being accomplished, I determined to give my foot some much-needed rest, before commencing examination of the next field on the west. On the road to Bari I visited the ruined Palamow forts, which are picturesquely situated on the banks of the Aurunga, where the bed of the river is much broken up by masses of gneiss rock. The old fort consists of particularly solid and lofty masonry walls and a number of temples, all of which are now deserted. I did not observe any tablets or inscriptions; but I was informed that the new fort, which crowns a neighbouring hill, contained one. With the history of these forts, and of the Rajas who occupied them, I shall not weary the reader.

In the afternoon I rode into Daltongunj, the sudder station of Palamow, where I found the Deputy-Commissioner, who was an old friend of mine, encamped, and made the acquaintance of the Assistant-Commissioner, who offered to put me up in his house while I remained invalided in the station. This station is not a lively one, there being seldom more than three English officials resident there. During my stay there the Mahomedan butcher one morning came to make complaint to the Assistant-Commissioner that the Hindu petty officials at the pound had refused, on religious grounds, to accept his bid for a bullock, which was ultimately sold for two-and-sixpence. It was pointed out to them that a more suitable way of asserting their religious views would have been to have got some one to out-bid the butcher. A case which was before the Assistant-Commissioner at this time was that of a Gosain or strolling priest, who was convicted of theft. The same gentry begged hard that he should be acquitted, on the ground that, as he was journeying to Jugernath, their religion would be disgraced if he were detained in prison. In spite of all this religion, they were a very bad lot, if the accounts of their





nefarious practices which I heard were true, though perhaps they were not worse than those who occupy similar positions elsewhere in Bengal. The native subordinate service in Bengal, of all branches, is often, I believe, as corrupt and oppressive to their fellow-countrymen as any Turkish service can be. The way in which the peasantry are deceived and swindled by these men is something dreadful to contemplate. Among them generally are the most cunning, and they take good care to ingratiate themselves with, and render themselves invaluable to, the European officials over them.

Before leaving Daltongunj again for regular work I paid a visit to the Daltongunj coal-field, which lies a few miles to the north of the station, and encamped at Rajherra, near which the principal mines had been in operation. The demand for coal having ceased, there was nothing going on, and the open quarries were full of water. The coal is of excellent quality, and may yet be worked systematically, on a large scale, in connection with the irrigation works and canals at Dehri-on-the-Sone, for the supply of fuel to stations on the East Indian Railway beyond Arrah.

*February 4th.—Daltongunj to Chando.*—On leaving the station to resume regular work I was accompanied to the first halting-place by the Assistant-Commissioner and the Superintendent of Vaccination, in order that we might have a beat for a tiger which was known to live in the neighbourhood of Chando; two tigers were said to have been seen by some of the beaters, but they must have broken through the line, as they did not come our way. Some of the native matchlockmen shot a pair of the pretty little four-horned antelopes (*Tetraceros quadricornis*, Blainv.), which I subsequently found were not uncommon in these jungles.

*February 6th.—Chando to Seraidih.*—To the west of Seraidih the Koel river has in places a very rocky bed, and the nature of the rapids fully satisfied me that the river could not be relied on as a means of carriage for the coal, though some writers had maintained that it might be so employed.

At Seraidih there is a silk-cotton tree (*Bombax malabaricum*),





which I believe to be the largest tree I have ever seen ; unfortunately I do not retain the measurements of this vegetable monster. I did not realize its enormous dimensions until I saw the pack-cattle and elephants stalled between the huge flange-like buttresses which project from the main stem. I think I estimated by shadow-measurement the height to be 140 feet, but cannot now refer to the note which I made. At Seraidih a considerable business is done in iron, which is smelted in the country further south. I reserve notices of this industry for the conclusion of this chapter. I found that many of the people, having empty granaries, in order to supply present wants were already hypothecating to the money-lenders their crops of wheat at a ruinous rate of interest of several hundreds per cent. per annum. Thus they were receiving four seers, or eight pounds of kodo—a very poor sort of grain—for five seers, or ten pounds of wheat, to be paid in a month. Now the relative values of wheat and kodo being as two to three, then five seers of wheat would be equal to seven and a-half seers of kodo, so that as four only were received, eighty-seven and a-half per cent. per month was being charged for the accommodation.

I employed the natives in this neighbourhood to search for rats and mice, which I wanted for a friend who was engaged in working out the smaller species of Indian mammals. A great number belonging to several species were brought, the most notable being a jerboa rat (*Gerbillus Indicus*), with very short fore-paws, and long and powerful hind ones, and a large coarse bandicoot, with black bristly hairs like a pig's.

I find I have not given any description in the previous pages of the custom of poisoning fish, which is very commonly practised by the inhabitants of these jungles. The fruits of some species of jungle-trees, and the bark or roots of others, furnish a variety of poisons which answer for this purpose. A pool in the bed of a river, or a rock basin, which is known to contain fish, having been selected, and cut off from the inflow of fresh water, the substances mentioned are thrown into it, and the fish be-





coming stupefied rise to the surface, when they are easily captured. No evil results appear to follow from the eating of these poisoned fish.

*February 11th.—Bamundih.*—A tiger having been reported as doing mischief in this neighbourhood, I had had a young buffalo tied up as bait, but found him untouched when I visited him this morning. Having assembled a few men, I beat two small valleys, which were said to be inhabited by the tiger and family. The place looked likely enough, and there were two caves, one a remarkable cylindrical hole in the sandstone, which widened out inside, and the second, a ledge under a waterfall, leading down a wooded valley to the Koel river. The tiger, however, was not at home, and I accordingly proceeded on my day's tramp.

*February 12th.—Bamundih to Chipadohar.*—Owing to rain we did not strike the tents till nearly mid-day. On arriving at Chipadohar, at about 4 p.m., I was told that at a spot about two miles off a tiger had, in the morning, killed a cow, and had wounded one of a party of five men who went to look for the carcass. It had rushed at them while they were still some little distance off, and had struck the man and wounded him in the face, one claw only entering his eye, his sight having been in all probability destroyed for ever; his elbow and hip on one side had also been torn. As soon as the elephants were unloaded I mounted Anarkalli, and, having reached the scene, quartered the grass jungle which was pointed out by the men. For some little time I failed to find any trace either of the tiger or the carcass, but at length the elephant shied at something, which proved on examination to be the foot of the cow. Further search revealed the carcass, or half of it, carefully concealed in a narrow ravine. This explained the absence of vultures, which caused me at first to doubt the existence of a carcass at all. Were vultures guided by scent to their food, as has been maintained by some, there can be no doubt that such concealment would not have availed to keep them off. I have often found, however, that a few leafy branches spread





over a carcass are quite sufficient to protect it from the attack of vultures, who, even if they have already arrived at the spot, soon take their departure again. The tiger, I have no doubt, was close by, but the grass and bushy undergrowth afforded abundant cover, and we saw nothing of him, and as there was no tree in which I could remain on guard over the carcass, and the sun had set, I was compelled to give up the search for him, and return to camp, and a deficiency of beaters prevented me from trying for him on the following day.

*February 15th.—Chipadohar to Saidope.*—Early this morning, before dawn, I was awakened by a great uproar, the elephants trumpeting in concert with the shouts of the men. As I jumped out of bed, the man on guard screamed to me that someone had been carried off by a tiger. Rifle in hand I rushed out, and found that what had really happened was, that a thief had again visited the doctor's tent. He and his brother had been roused, and had gone a short distance in pursuit, when the thief dropped a bundle of clothes, but carried off a brass hookah. The doctor's piteous lamentations were to be heard all over the place, and he came up to my tent bewailing the sad condition of his feet from thorns encountered in the jungle. To follow up the thief in the darkness was, of course, impossible. It was not pleasant to feel that the camp was in all probability being followed up by thieves, who were doubtless on the look out for booty. In selecting the doctor's tent, they shewed that they had acquired a complete knowledge of our arrangements beforehand. The doctor seemed to think that I was somehow responsible for what had taken place, and recalled the fact of another doctor having been robbed, when with me, as I have related on page 275. I however scolded him for his want of care, and told him he might be held responsible for the loss of Government property in the first robbery. The servants, who are so fond of hitting one another when down, amused me by remarking that the doctor, though already well supplied with wrappings for the cold nights, had purchased a shawl recently from a Kabuli merchant, and that when





swathed in all these coverings he was like a corpse, unconscious of what might go on close to him. "I, on the other hand," remarked Saidon, "purposely keep myself uncomfortable at night, lest I should sleep too soundly, and injury should be caused thereby to your honour's property."

*February 16th.—Saidope.*—I had often supposed that the scavenger or pariah kites (*Milvus govinda*), which, though generally to be seen about the tents, are not common in the jungles, must follow the camp for long distances, and to-day I had evidence that such was the case, from the fact that at a place some twelve miles distant, and separated from Saidope by hills and forests, some of the servants having captured a kite in a trap, had cruelly pulled out its tail feathers, thus marking it in a way that could not be mistaken, and to-day it was here in company with others picking up what it could from the cooking tent.

Another man had, I found, been wounded by a tiger near this about a week previously. With two others he had gone to the carcase of a cow which had been killed, in order to remove the hide. While they were squatted down, about to commence operations, the tiger rushed in from behind, and caught the man by the shoulder in its mouth. When he was brought to camp for treatment, the shoulder had swollen to an enormous size, owing to the wounds having been plugged with some native mess. His friends would not leave him with us for treatment, and I subsequently heard that he had died.

During this season I kept a man regularly employed in shooting small birds, and thus obtained many interesting species, some of which were previously unknown to occur in Chutia Nagpur. Shooting small birds, though necessary at times if one wants to thoroughly study the ornithology of a tract of country, is not a pleasant amusement, and I prefer having it done by deputy. A second man did the taxidermy, and as neither of them had any other duties to perform, they had an easy time of it; but it is rare to get one man who will be efficient in both capacities.



Most of the large birds I shot myself, and amongst them were several interesting eagles, spur-fowl, mergansers, &c.

*February 19th.—Morwaie to Purro.*—The exploration of the coal-field to which the name Hutar has been given, and which I had been engaged on since leaving Daltongunj, proved a very arduous undertaking, owing to the wildness of the country, and the density of the pathless undergrowth through which I had to force my way—a small thorny acacia which grew in the long grass being an especial cause of annoyance. The villages being small, supplies had to be sent from a long distance by the Zemindars who live in the more open country to the west of Daltongunj; but this service they performed, under the orders of the local officials, very satisfactorily, pack-bullocks bringing the grain as it was required.

*February 22nd.—Purro.*—Shortly after leaving camp this morning, on my way to work, I suddenly saw a leopard about 400 yards ahead of me in the bush-scattered plain. He was crouching and crawling about in such a peculiar way that I immediately thought that he must be stalking some game. Accordingly taking my rifle I proceeded to stalk him, but without observing much care, and making straight for him, as he appeared to be so engrossed that I did not think he would notice me. While approaching him I came in view of a second leopard which, seeing me while still 300 yards away, made off and was joined not only by the first but by a third also which appeared to be a female, the other two being probably males which were, perhaps, about to contend for the possession of her. The males went off with a crouching gait, but at a good pace their bellies close down to the ground, while the other bounded off skittishly with heels and tail in the air. As I followed them up, I came into tolerably close proximity with a bull nilgai which stood gazing intently at the spot where the leopards had been. I might have shot him with ease, but preferred to follow up the leopards; which, however, I failed to see again. It occurred to me as another way of accounting for the gambols of the leopards that they were only playing a little game to attract the attention





of the nilgai\* while one of them should circumvent it. Nilgai were very abundant in this tract, and I frequently saw herds of females and young, or males which occurred either singly or in pairs.

To the north of Purro there is a deep gorge cut by the Supahi river, through a plateau formed of horizontal beds of the upper sandstones. The path which traverses this gorge runs high above the water, which occupies a very defined channel, in the sides of which the flat beds of reddish sandstones and clays are seen in section; several streams from the plateau, and one in particular, form picturesque cascades, which have eroded the sandstones into large basins or pot-holes, over the edges of which the limpid waters flow in regular pulses. The vegetation in this cool and sheltered retreat, and more particularly in the smaller valleys branching from it, is very fresh-looking and green; and within the spray of the waterfalls, ferns and the sundew, or *Drosera*, were flourishing. Tiger's tracks on the sandy portion of the bed of the river were not absent, as might be expected from the character of the place.

*March 3rd.—Hutar.*—Hutar is a small village which has furnished a name for the coal-field, since the fact of there being coal in its vicinity was first known, and recorded about 100 years ago by some European visiter. While encamped there I had a visit from the Assistant-Commissioner, who joined me for the purpose of having a beat in the neighbouring hills. One young sambar stag was brought to bag, but as usual the tigers managed to evade us. In this neighbourhood I saw a pair of gazelles, commonly called ravine deer (*Gazella Bennettii*). There are also a few in the neighbourhood of Daltongunj; but the most eastern point of their extension, according to my observation, was at Latiahar in Longitude  $84^{\circ} 35'$ , and beyond this they are not known to extend eastwards in Peninsular India. These

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\* More correctly this word in the singular should be written Nilgau, from *Nil*, or *Lil*, blue, and *gau*, a cow.





animals belong to the African element in the Indian fauna,\* as has been pointed out by Mr. W. T. Blanford and other writers on the subject

*March 9th.—Bijka.*—The village of Bijka is situated near the western extremity of a *cul-de-sac*, bounded on the south by a scarp of sandstones which forms the already-mentioned plateau, rising at one point to form a steep sugar-loaf peak, called the Bijka hill, the summit of which is about 1,300 feet above the village. The ascent, by a very steep path on a warm morning, proved not a little severe to me in my lame condition. On the north the Bijka valley is bounded by irregular hills of metamorphic rocks, the coal-measures having been lowered against their bases along a particularly well-marked line of fracture, another, nearly parallel, fault having acted similarly on the south; while a cross fault on the west has permitted these younger rocks to be let down, as it were, into a socket of gneiss and granite. Between Bijka and a village to the north-west I found the granitic gneiss was traversed by veins of a salmon-coloured mineral called stilbite, which, though generally occurring in rocks of volcanic origin, has also occasionally been found in other countries with rocks which are of metamorphic character.

*March 14th.—Bairce to Nowka.*—The mhowa flowers were now nearly ready to fall; but from one tree only had any actually fallen, and this tree, I was told, had been visited by a bear which would very probably return to-night. Accordingly I had a machan erected close by the tree. It proved, when I ascended it in the afternoon, to be a rather crank and rickety affair; fortunately I had with me a light iron-chair upon which I could sit, but only in a very constrained position. After waiting for two hours very patiently I was just about to shout out for my men to come up to take the guns, when, in the moonlight I saw a very fine bear steadily plodding across the field towards me on my left, and in such a position that without

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\* "Ann. and Mag. of Nat. Hist.," October, 1876.





standing up and turning I could not possibly bring my rifle into position to cover him. I thought it best to remain quiet, as he appeared intent upon coming to my front; but, catching sight of me, he sheered off, and I let the chance slip hoping for a better one which never came, as he backed out of sight, and was soon lost to view, and did not return. On the next night, hoping to profit by my experience, I again went to the same place, but the bear did not visit the tree, though I saw him, like a ghostly apparition in the pale light, stalking along under the shelter of some rocks. On my return to camp I noticed that the people were very sensibly cutting their corn by moonlight, thus saving themselves from work in the mid-day sun.

The Indian, or, as it is sometimes called, the sloth bear (*Procheilus* (*Ursus*) *labiatus*, Blainv.), to which frequent allusion has already been made, deserves to be somewhat more fully described than has yet been done in these pages. Its distribution is strictly limited to the peninsula south of the Himalayas, and Ceylon. In Himalayan regions two other quite distinct species are found, viz.:—*Ursus isabellinus*, Horsf., and *U. Tibetanus*, F. Cuv. In Burmah and the Malayan countries to the east of India, there is another, *U. Malayanus*, which, though closely allied to the last, is undoubtedly distinct, while in Biluchistan, to the west of India, there is yet another species, *Ursus Gedrosianus*, Blanf., which has only been recently discovered and named.

By naturalists generally it is considered that the Indian bear cannot be regarded as belonging strictly to the genus *Ursus*. The fact that it has only four incisors in the upper jaw, its large and powerful claws, its long and mobile snout, and some of its habits, serve to separate it from the true bears, and accordingly it is classified in a genus or sub-genus by itself. With its general appearance most of my readers are probably familiar, as it is a common animal in zoological gardens and menageries in Europe. It is covered all over with long black and shaggy hair, except on the muzzle, which is dirty white, and on the chest, where there is a white V-shaped mark. It is an awkward, bow-legged looking animal, but is a splendid tree-climber, and can, when pressed,





cover the ground at a great speed. It is found chiefly in the vicinity of rocks, and lives for the greater part of the year either in natural caves, or in holes which it scrapes for itself among the roots of trees on the banks of rivers. Occasionally, as to the west of Midnapur, it occurs in alluvial tracts which are intersected by numerous ravines, and covered with scrub jungle. Its food is somewhat varied, and it cannot be said to be a strictly vegetable feeder, for although it eats the fruits of several species of fig, the wild plum, or jujube (*Zizyphus jujuba*), the flowers of the mhowa, sugar-cane, &c., it also is fond of termites or white ants, the larvæ of several insects, and honey. If bears exist in any tract of country, the evidences of their presence are numerous and not to be mistaken. Where there have been white ants' nests you often find large holes scooped to the depth of three or four feet, sometimes too in very hard soil in the centre of roads, thus testifying to the great strength of the bears' fore-paws and claws. Such holes may readily be distinguished from those made by any other agency, by the marks of the claws, which they retain for many months. I have known of bears being shot when busily engaged in these holes, sucking up the termites from the deeply-seated galleries below. Again, the trunks of the banyan (*Ficus Indica*, Linn.), gular (*F. glomerata*, Roxb.), and the pakur (*F. infectoria*, Wild.), will be found, at the seasons when these species of figs are in fruit, to be deeply scored by the claws of the bears which have ascended them. The bushes of the jujube, in spite of their thorns, will also be seen to be trodden down and flattened by the bears as they have scrambled over them to pluck the fruit. The female bear, when pursued, carries her cubs on her back, they clinging on by their claws and being half-covered with the shaggy hair. I have already related several instances where this has come under my own observation. The curious thing about it is that the bear should be able to make the cub mount, before it runs off, when disturbed from its lair. These bears have from early infancy a peculiar habit of sucking and mumbling over their paws, the noise they make while doing so being audible from long distances.





*March 17th.—Burkol.*—To-day I ascended the Gul-gul pāt or plateau. At first sight the ascent does not appear to be a very formidable undertaking, but there is a good deal of up and down work, and the route is somewhat circuitous before the top—which is at an elevation of 3,800 feet above the sea—is reached. The main mass of the hill or ridge is formed of vertical beds of granitic gneiss; these are capped by about 250 feet of a pisolitic laterite, which forms the level surface of the plateau. The summit is on a vast block of this rock, from which huge masses have been split off and lie tumbled confusedly on the flanks, with figs, wild mangoes, *Kydia*, and other trees growing between and upon them. A commanding view, more particularly of the Kunhur river and the neighbouring tracts of Sirguja, was obtained from the summit. At about 160 feet below this there is a perennial spring where I slung my hammock and rested for several hours. Taking another route on the descent, I passed through some clearances made on the slopes by the Korewahs, who seem to have been very industrious in cutting down forest. I have mentioned these people in a previous chapter, and shall therefore here give a short account of them. They belong to the Munda family of the aborigines, a fact which is fully testified by their language. In appearance they are perhaps the wildest race in the country; they are particularly notable for the unkempt condition of their matted locks of hair, in which they commonly hitch the shafts of their arrows. They themselves, according to General Dalton, account for their wild and uncouth appearance by saying that the first human beings who settled in Sirguja, being much troubled by the depredations of wild beasts in their crops, put up as scarecrows in their fields figures made of bamboos which were the most hideous caricatures of humanity that they could devise, in order to frighten the animals. When the Great Spirit saw the scarecrows, he hit on an expedient to save his votaries the trouble of reconstructing them. He animated the dangling figures, thus bringing into existence creatures ugly enough to frighten all the birds and beasts in creation, and they were the ancestors of the wild Korewahs. Despite their savage nature, the Korewahs are truthful





to an extraordinary degree. General Dalton says of them, "when several are implicated in one offence I have found them most anxious that to each should be ascribed his fair share of it and no more—the oldest of the party invariably taking on himself the chief responsibility as leader or instigator, and doing his utmost to exculpate, as unaccountable agents, the young members of the gang."

A few months previous to my visit to this part of the country a party of Korewahs had made a raid from the highlands of Sirguja into British territory. When marching to the scene of their exploit—the house of a well-to-do landowner—their axes and bows and arrows were tied in bundles, and their appearance excited no particular notice. After news of the robbery had been received a party of police were sent off to capture the Korewahs, who, however, shewed an intention of offering an armed resistance, and no little excitement prevailed, as it was thought that the whole of the tribe might rise in open rebellion. However, on a stronger force being sent in command of the Assistant-Superintendent of Police, and the aid of the Sirguja Raja having been obtained, the ringleaders were captured, and the whole country had quieted down ere the time when I reached it.

In the neighbourhood of Burkhoh I saw the only indigenous wheeled vehicles which I came across in the whole of Palamow; they were of a very rude construction and were only used for drawing timber. With the exception of the Uraons, the people of the sub-division do not use and cannot be induced to carry banghys, so that the only means of carriage is afforded by pack-bullocks. The proprietors belong to various castes, and are often Mahomedans. They penetrate the area and bear off the grain to the markets of the Ganges valley.

*March 19th.—Gurria to Tatapani.*—Having completed my examination of the Hutar coal-field, I crossed the British frontier, which is here coincident with the Kunhur river, and entered Sirguja in order to give a few days to the examination of another coal-field to which the name of Tatapani has been applied, that being the name of the purguna in which it occurs. This name is





derived from two words signifying boiling water, and the village of Tatapani is situated in the vicinity of a number of hot springs, which present a very remarkable appearance. They all, with one exception, occur along a line of fracture and disturbance which has defined the limits of the coal-measures close by. It is not easy to say how many distinct active springs there may be, but there were certainly not less than a score; besides these, there are indications of many others whose action has either been temporarily or wholly suspended. As a rule the water rises in small basins, with a bottom formed of large-grained quartz sand. Round the edges of these basins there is frequently an encrustation of siliceous sinter. A strong odour of sulphureted hydrogen pervades the atmosphere all round. Proceeding from east to west the Fahrenheit temperatures, taken by a Negretti and Zambra's boiling point thermometer, were in the successive basins as follows:— $185^{\circ}$ ,  $174^{\circ}$ ,  $162^{\circ}$ ,  $130^{\circ}$ ,  $170^{\circ}$ ,  $168^{\circ}$ ,  $166^{\circ}$ ,  $154^{\circ}$ ,  $184^{\circ}$ ,  $180^{\circ}$ . These were all taken in the forenoon of a day near the end of March, when the sun was hot and there was no perceptible condensation of the vapour. Early on the following morning the position of each spring was distinctly marked by a column of condensed steam. On this occasion the temperatures were somewhat different from what they had been the previous evening. The highest was in a basin off the general line of the others and north of a small temple; in it the thermometer registered  $196^{\circ}$ . I think it probable that this spring is situated on a small branching line of fault or fracture, of the existence of which the neighbouring rocks afford some evidence. The temple alluded to was originally built over what was considered to be the hottest spring; but that particular outlet being now closed, the temple has been allowed to fall into ruins. I was told that the locality is not regarded as being one of particular sanctity. In any more civilized part of India it would assuredly be a place of annual resort and the site of a festival.

While encamped here, I noticed on the roof of my tent a brownish substance, which, on examination, proved to consist of the bodies and dismembered limbs of the red ant (*Formica*





*smaragdina*), the appearance and habits of which I have described in a former chapter. The slaughtered ants must have numbered many thousands, and what had happened appeared to have been that two columns had ascended the roof of the tent from different trees, and had met at the top of the pole, where they had engaged in mortal combat. The contending parties belonged to the same species, and it is marvellous that they should have been able to distinguish foes from friends. Among the pile of bodies, when swept together, there were to be seen heads detached from bodies, but still alive, the jaws clutching fragments of the bodies of their opponents.

Termites, or white ants, of which there are, I believe, several species in India, have attained a considerable notoriety on account of their destructive propensities, since few persons in India can have escaped suffering loss from them. Several particular kinds of timber and substances of mineral origin are alone capable of resisting their attacks. One species builds up hills of clay, with fluted spires culminating in a central minaret. It commences its operations on an old stump of timber or a clump of bamboos as a nucleus, which it gradually surrounds and envelopes, and the hill may ultimately rise to a height of six or eight feet above the surface. If you break down a portion of this hill you find that it is traversed in every direction by anastomosing galleries and passages, which are continued downwards beneath the surface to considerable depths. Great as are these structures compared to the size of the animal which constructs them, they are erected under the disadvantageous circumstance that the termite is obliged to work under cover of a tunnel of clay to protect its tender body from the many insects and birds which are ever ready to seize and devour it. In Calcutta termites are very destructive, and nowhere more so than in the new museum which has been built there within the last few years. Shortly after it was finished, each morning would disclose a number of new clay passages leading from the joints in the stone pavement of the ground-floor rooms to the show specimen-cases, and in a single night the white paper linings would be





riddled and half devoured by the hungry legions. The cases and chests of drawers were of teak timber, which is itself not touched by the termites; but they would pass through chinks and flaws produced by warping. Their extraordinary instinct in discovering the position of these can perhaps be best illustrated by the following. On one occasion I had arranged a number of mineral specimens, with their paper labels under them, in a drawer, one of a series at a height of about three feet from the ground. Two days later my attention was called to a clay tunnel on the outside of the drawers, near the lowest of the series, and on opening the one which contained the specimens I found that the labels had been almost completely eaten, only a few shreds of the paper remaining. I then found that the termites had entered by a flaw in the wood near the centre of the bottom of the drawer, which had been cunningly filled up with putty by the cabinet-maker. The drawer was otherwise quite sound, and fitted well. On inverting it I found that there was a covered tunnel running from the corner of the drawer to the flaw. The termites, who do not scamper about foraging as ants do, must then, by some instinct or sense, have not only known that this particular drawer in this particular cabinet contained paper, but that there was but one means possible to them of obtaining access to it, which means they accordingly adopted.

*March 26th.—Nowadik to Daltongunj.*—This day I reached Daltongunj, and as the examination of the coal-fields had been completed, save as regards the settling of some few points, which remained till I could revisit the ground on the return route, I shall here give a brief sketch of what I had ascertained regarding these fields, but for a full account of them must refer to my official report,\* which, however, the general English reader, in all probability, will never see, nor can I venture to suppose that the subject would have very much interest for him should he see it, though it is needless, perhaps, to observe that India's future

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\* "Memoirs of the Geological Survey of India." Vol. xv., pt. i., pp. 1-127.





prosperity depends in no small degree on the development of her own resources in coal and iron. While remaining dependent upon Europe for a supply of these minerals, so essential to a country's prosperity, she must continue to import many articles which there is no reason she should not manufacture for herself, and must continue to send large sums of money out of the country, and so defer the much-to-be-desired equalization of the exchange.

The Aurunga coal-field occupies an area of about ninety-seven square miles, and includes representatives of four distinct groups of the Damuda and one of the Mahadeva series of sedimentary rocks. In the oldest but one of these groups, the Barakar, are found the principal coal-seams and iron-ores, and the area over which the rocks of this group are exposed is 58.5 square miles. The coal-seams are of great size; but the quality, as ascertained from examination on the spot and by assay,\* is decidedly inferior to that of the coal in the Hutar and Daltongunj fields. Of coal of this inferior character I estimate that about 20,000,000 tons would be available; but, as it would probably prove unfit for smelting the very excellent iron-ores which occur in the field, and as it would not be equal to the coal of the other fields for locomotives, I do not think there is much prospect of its ever being worked to any great extent.

The Hutar field, which lies further west, and is cut in two by the Koel river, has an area of 78.6 square miles. In it the groups of the Damuda series are reduced to two; but the area of coal-measures is nearly equal to that in the Aurunga field, being fifty-seven square miles. There can be little doubt that the two fields were once continuous, though they are now separated by a distinct interval. The data for calculating the amount of coal available are imperfect, and I make no actual estimate. In quality† it com-

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\* The average composition is—Moisture, 6.7; Volatile, 29.2; Carbon, 36.5; Ash, 27.5.

† The average composition of eight specimens was—Moisture, 5.95; Volatile, 28.; Carbon, 55.35; Ash, 10.7.





pare very favourably with most Indian coals, but, from a deficiency of fixed carbon, has less heating power than the coal of the Daltongunj field. Unfortunately, neither the Hutar nor Daltongunj fields contain any rich deposits of iron, so that it would be necessary to carry the ores of the Aurunga field, and the limestones which are found close by, a distance of about fifty miles to the coal of Daltongunj, in order to manufacture the iron. This long carriage, which would necessitate the construction of a special branch line or tramway, will very possibly prevent the proposed iron-works from ever being established, or, if established, from ever proving a profitable undertaking. This difficulty of long carriage is constantly turning up in India with reference to the development of the resources. As an example I may mention that coal, which at the pit's mouth in Ranigunj may be purchased for five shillings, costs five pounds by the time it has reached Lahore; and between Calcutta and Bombay there is on the railway a point where English coal landed at the latter port meets the longer rail-borne coal of Bengal at equal prices.

The iron-ores to which my attention was particularly directed in Palamow admit of a triple classification, founded both on their geological relations and age, and on their chemical composition. In the first class there are magnetites or magnetic ores which occur in the crystalline and metamorphic rocks. In the second class there are siderites and hæmatites which are found in the coal-measures. And in the third class there are hæmatites which are found in the laterite. The magnetite is of great purity and excellent quality; but its abundance in any one spot in suitable form for extraction is very doubtful. The hæmatites of the laterite, being situated on the tops of lofty plateaus upwards of 3,000 feet high, are practically inaccessible, though the quality of the richer varieties leaves nothing to be desired. It is to the ores of the coal-measures, therefore, the siderites or iron carbonates, and hæmatites or iron oxides that I have been compelled to shew the preference, as being most likely to afford an inexhaustible and easily-worked supply of fairly good ore. Further details on this subject are not likely to prove of general interest, so I shall pass on to describe





the method employed by the native Aguriahhs or iron-smelters to produce malleable iron, and in doing so I must refer to the accompanying plate, taken from a photograph, which will, I trust, make the description intelligible. The Aguriahhs, it is considered by the best authorities, belong to the Munda family of aborigines; but another tribe, the Kol-lohars, are, it is supposed, Uraons. Hindus are perhaps seldom met with as smelters; but the Lohars proper or ironsmiths may, I believe, be regarded as of Aryan origin. Whether or not the aborigines possessed a knowledge of iron manufacture, before they were conquered by the Hindus, is not known with any degree of certainty; but if, as some suppose, the art was introduced by Aryans, it is singular that we should find that the non-Aryans furnish the artizans of the present day.

The furnaces of the Aguriahhs are generally erected under some old tamarind or other shady tree, on the outskirts of a village, or under sheds in a hamlet where Aguriahhs alone dwell, and which is situated in convenient proximity to the ore, or to the jungle where the charcoal\* is prepared. The furnaces are built of mud, and are about three feet high, tapering from below upwards, from a diameter of rather more than two feet at base to eighteen inches at top, with an internal diameter of about six inches, the hearth being somewhat wider. Supposing the Aguriah and his family to have collected the charcoal and ore, the latter has to be prepared before being placed in the furnace. The magnetic ores are first broken into small fragments by pounding, and are then reduced to a fine powder between a pair of millstones. The hæmatite ores are not usually subjected to any other preliminary treatment besides pounding. A bed of charcoal having been placed on the hearth, the furnace is filled with charcoal, and then fired. The blast is produced by a pair of kettledrum-like bellows, which consists of wooden

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\* The Sal (*Shorea robusta*) tree generally affords the timber for the charcoal; but in some tracts, as in Sambalpur, the Bija Sal (*Pterocarpus marsupium*) is preferred.



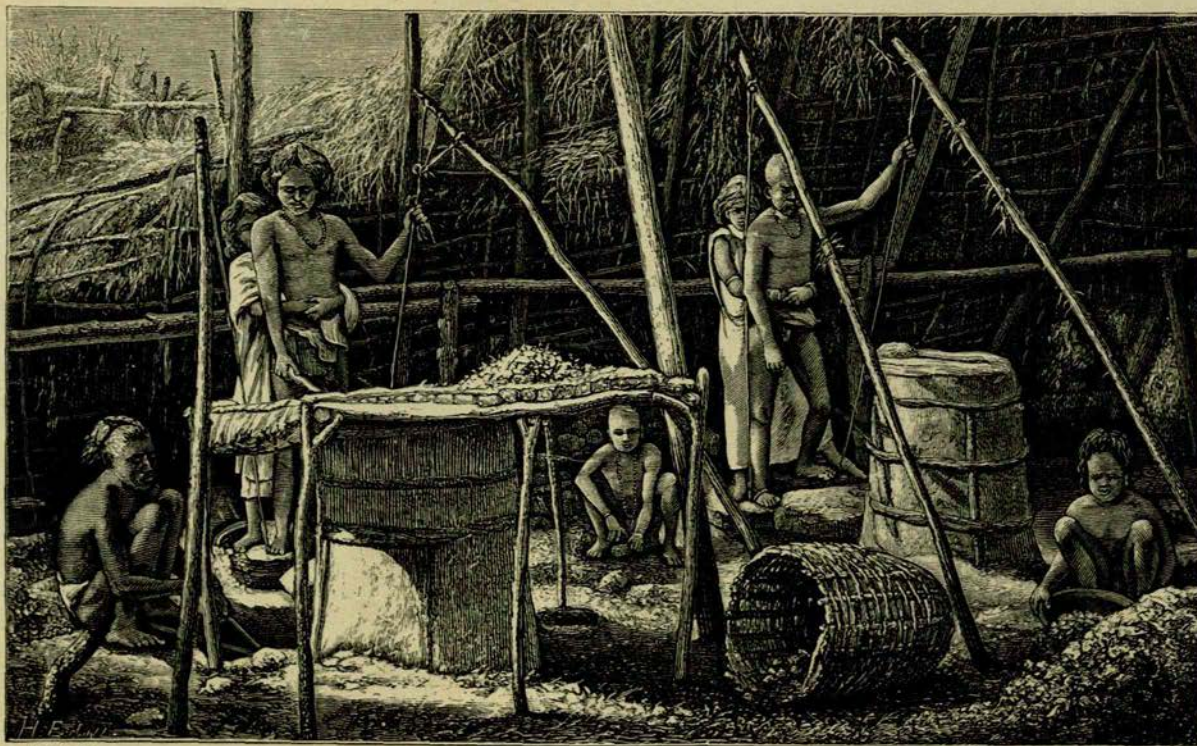


Plate X.]

AGURIAH IRON-SMELTERS, PALAMOW.

(From a Photograph by T. F. Peppé, Esq.)





basins loosely covered with leather, in the centre of which is a valve. Referring to the illustration it will be seen that strings attached to these leather covers are connected with a rude form of springs, which are made by simply planting bamboos or young trees into the ground in a slanting direction. The weight of the operator, or pair of operators, is alternately thrown from one drum to the other, the heels acting at each depression as stoppers to the valves. The blast is conveyed to the furnace by a pair of hollow bamboos, and has to be kept up steadily without intermission, for from six to eight hours. From time to time ore and fuel are sprinkled on the top of the fire, and as the fusion proceeds the slag is tapped off by a hole pierced a few inches from the top of the hearth. For ten minutes before the conclusion of the process, the bellows are worked with extra vigour, and the supply of ore and fuel from above is stopped. The clay luting of the hearth is then broken down, and the ball, or *giri*, consisting of semi-molten iron slag and charcoal, is taken out and immediately hammered, by which a considerable proportion of the included slag, which is still in a state of fusion, is squeezed out. In some cases the Aguriah continues the further process, until after various reheatings in open furnaces and hammerings, they produce clean iron fit for the market, or even at times they work it up themselves into agricultural tools, &c. Not unfrequently, however, the Aguriahs' work ceases with the production of the *giri*, which passes into the hands of the Lohars. Four annas, or sixpence, is the price paid for an ordinary-sized *giri*, and as but two of these can be made in a very hard day's work of fifteen hours duration, and a considerable time has also to be expended on the preparation of charcoal and ore, the profits are very small. The fact is, that although the actual price which the iron fetches in the market is high, the profits made by the mahajans, or native merchants, and the immense disproportion between the time and labour expended and the out-turn, both combine to leave the unfortunate Aguriah in a miserable state of poverty.

March 29th.—Daltongunj to Kewatbar.—To-day I left Dalton-





gunj, on the return march eastwards, and for the succeeding week was principally engaged in the examination of various deposits of iron-ore, which occur in the region extending up to the foot of the Neturhat plateau, at Kotam, from whence, on the 6th of April, I ascended, in order to examine the hill, and visit some tea plantations which have been started on the summit. As the plateau is 3,600 feet above the sea, or 1,800 above Kotam, its ascent by a steep path was at this season a somewhat arduous undertaking. For the first 1,280 feet the only rock seen was granitic gneiss, resting upon which was a cap 420 feet thick, which consisted of trap and laterite, the exact line of demarcation between the two being concealed by fallen masses of the highest layers of the laterite. In places this laterite is very rich in iron, containing as much as 45.5 *per cent.* of the metal.

The open, saucer-like, surface of the plateau presents a curious appearance, with the slopes on the north and west under cultivation. There are two gardens here, one belonging to a small private company, and the other which had been started about three years previously, by the manager and a part proprietor of the former, appeared to be in a flourishing condition: plucking and manufacture was expected to commence in another year. The rate of pay given to the coolies here seemed to be absurdly high, being nearly double that which is paid in the vicinity of the stations of Ranchi and Hazaribagh. I was informed that at one time the experiment had been tried by the manager of importing fifty families of Christian Kols. Before they came he constantly told the local labourers that the Christians would show them what real work was. On their arrival they proved to be lazy and inefficient. They would not commence work till ten or eleven o'clock, and then had to be personally hunted out of their houses. Their awkward way of working made them the laughing-stock of the country side. In the end the manager had to give up the costly experiment, and they were sent back to their homes. The missionary patrons of the Kols charged the manager with having abused their *protégés*,





and this he did not deny, as he said the men exasperated him beyond measure. It is possible that there may be another side to this story, but I fear the main fact, that Christian converts are in the habit of considering themselves too good to engage in mere manual work, is indisputable; and experience in Africa and elsewhere tends to show that other black races of people sometimes adopt similar views.

*April 14th.—Balunuggur to Chiru.*—I had been glad to observe during the early days of this month that there was a large crop of mhowa flowers, that the people were everywhere busily engaged in saving it, and that it promised to afford material aid towards enabling them to tide over the scarcity and want resulting from their poor harvests; but about this time heavy rains set in which served to destroy a great portion of the partially-dried crop—thus was the last hope of these poor people destroyed; how they managed to pull through the summer rains I never heard, but it must have been a hard time for them, though an absolute famine was not announced as existing in that part of the country.

At Chiru and in its neighbourhood I found the most important deposit of iron-ore which I had met with, and should the manufacture of iron ever be started in Palamow, from thence it will be that the material must be obtained. From Chiru I marched through the Karanpura Valley, for the purpose of making a comparison between some of the rocks seen there and those of the fields I had just explored.

On the 22nd I reached Hazaribagh, from whence I proceeded in a carriage drawn by coolies to the railway station at Giridi, and as soon as my camp arrived, some days later, I dismissed my followers, and took the train for Calcutta, thus bringing my jungle life in India to a conclusion for a season; for after two months spent in the preparation of the results of my explorations for publication, I found myself by the end of June free to set forth from India to enjoy two years' furlough at home. It has not altogether proved a period of rest, for the preparation of this volume, together with some other writings,





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have involved an amount of hard work which I little anticipated when I set about writing them. If I have succeeded in conducting the reader without weariness to this stage in the history of my life, and if I have interested, and perchance at times amused him by the record of it which I have here presented to him, I shall feel that my labour has not been altogether in vain. Should the work prove successful, it may be that hereafter I may have an opportunity of writing a sequel; but in regard to such a life as that which I have described, the proverb of the pitcher and the well cannot fail to suggest itself to the mind. Experience has shewn how manifold are the risks to be encountered, while the term of service at present required, before a full pension can be earned, affords but a faintly-seen vision in the far-distant future of a home at home for one who has adopted the career of a geologist under the Government of India.





## APPENDIX A.

*Geological Formations.*

The following table, which is extracted from the recently-published "Manual of the Geology of India,"\* is given here for purposes of reference, as many of the formations are alluded to in this volume, and it may be of interest to some readers to know the position which these occupy in the general scale of sequence.

*List of Geological Formations in Peninsular India.*

<i>Recent and Post-tertiary.</i>	{	Blown sand. Soils including <i>regur</i> , Modern alluvial deposits of rivers, estuaries, and the sea-coast.	Unknown. 100 feet deepest boring.
		<i>Khadur</i> of Indo-Gangetic plain, &c. Raised shell-beds of coast. Low-level laterite. Older alluvial deposits of Ganges, Nerbada, Godavari, &c. Cave deposits.	
CAENOZOIC.	{	<i>Tertiary.</i>	{
		Miliolite of Katiawar, Pliocene, Miocene, and Eocene (nummulitic) beds of Cutch and Guzerat. Sandstones, clays, and lignites of the west coast, Travancore, and Ratnagiri, Cuddalore sandstones, High-level laterite.	
MESOZOIC.	{	<i>Dekan trap Series.</i>	{
		Upper traps and intertrappeans of Bombay. Middle traps. Lower traps and intertrappeans of Central India, Rajamahendri, &c. Lameta or infratrappean group. Infratrappeans of Rajamahendri.	
	{	<i>Marine Cretaceous Rocks.</i>	{
		Arialur, Trichinopoly, and Utatur groups. Bagh beds. Neocomian of Cutch.	
	{	<i>Marine Jurassic Rocks.</i>	{
		Umia, Katrol, Chari and Pacham groups of Cutch, Jessalmir limestones, Tripetty and Ragavapuram beds of east coast.	

\* By H. B. Medlicott, Esq., M.A., F.R.S., and W. T. Blanford, Esq., F.R.S.



*Geological Formations—continued.*

PALÆOZOIC(?)	MESOZOIC.	<i>Gondwana System.</i>	Upper	{ Cutch and Jabalpur. Rajmahal and Mahadeva. }	11,000
			Lower	{ Panchet. Dahnuda, Ranigunj or Kam- thi, ironstone shales, and Barakar. Karharbari and Talchir. }	13,000
		<i>Vindhyan Series.</i>	Upper	{ Bhanrer (Bundair). Rewah. Kaimur (Kymore). }	12,000
			Lower	{ Karnul, Bhima, Son, Semri. }	2,000 (?)
			Upper	{ Gwalior, Kadapah, and Kaladgi. }	20,000
AZOIC.		<i>Transition or sub- metamorphic rocks.</i>	Lower	{ Bijawars, Champaur beds, Arvali, Malani beds, tran- sition beds of Behar, Ben- gal and Shillong (the last extra-peninsular). }	(?)
		<i>Metamorphic or Gneissic.</i>		{ Gneiss, granitoid and schistose rocks. }	(?)



## APPENDIX B.

*On the forms and Geographical Distribution of Stone Implements in India.*

IN a paper on the above subject, which was recently published in the Proceedings of the Royal Irish Academy,\* I have given an abstract of all that is known on the subject of the distribution of ancient stone implements in India, and I am indebted to the Council of the Academy for permission to reproduce the accompanying plates. With two exceptions the figures in these plates are from specimens which have been found in Western Bengal; the two exceptions are of implements obtained in adjoining tracts in the Central Provinces. Notwithstanding the limited area in which the collection has been made, it is fairly representative of the principal types of form which have been found throughout the peninsula. I shall not here quote the details from a consideration of which I have arrived at the conclusions which are given below; nor is the map which illustrates these conclusions reproduced with this abbreviated account; those who are specially interested in the subject will doubtless refer to the original paper.

METHODS EMPLOYED IN THE MANUFACTURE OF THE  
IMPLEMENTS.

The stone implements of India admit of a triple classification, founded both on their forms and the materials of which they are made.

*First.* There are the chipped implements which are generally of quartzite or vein quartz.

*Second.* Flakes of agate, chert, hornstone, &c., with the cores from which they were struck off.

*Third.* The polished celts which are susceptible of sub-division into several distinct classes. With these I include, for convenience, the ring-stones.

The chipped implements may always be distinguished from apparently similar naturally-fractured stones, by the evidence which

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\* Second Series, Vol. 1. (Pol. Lit. and Antiq.) Dublin, 1879.





they afford of a laboriously worked out design, which was, in most instances, to produce a central plane with a cutting edge all round, and this result was arrived at by making a succession of fractures, as is well represented in *figs. 1, 2, and 3*, of Plate 1; but with the agate and chert flakes it is by no means so easy to account for the process employed. The beautiful symmetry of the cores, especially those from Sind, indicate an amount of careful and skilled manipulation which the quartzite chippers rarely if ever possessed. In the Andaman Islands I was told that heat was an agent employed in facilitating fracture, but I could get no full account of the process. I doubt, too, if the Andamanese ever produced cores like those from Sind. Pressure has been rather vaguely suggested as the means by which these flakes were made; but no one, so far as I know, has by any application of it produced satisfactory results.

The polished celts, particularly those of hard materials, in all probability represent a great amount of work. Some of them, particularly those of the shouldered type, may have been sawn into shape. It is well known that fibres and thin laths, in conjunction with sand, have been used successfully to cut through iron fetters. A similar process, with suitable varieties of sand, may have been employed by the ancient manufacturers of celts.

#### USES TO WHICH THE STONE IMPLEMENTS WERE PUT.

Although it has been a common practice with many writers to speak of these chipped stone implements as axes, hatchets, &c., I do not think that any one can really be prepared to maintain that they could ever have been employed as such in the manner in which modern axes or hatchets are used. More unsuitable tools for actually cutting wood can hardly be conceived of, though as wedges for splitting wood, many, both of the chipped and polished kinds, would be fairly efficient instruments. Some may possibly have been used for scooping out canoes and wooden vessels, the operation being facilitated by a preliminary charring by fire. It is known that some have been used in Assam and adjoining countries on the North-east frontier as hoes in rude agriculture, and that for this purpose iron has, in certain remote tracts, only of late become available.

Although certain forms of the chipped quartzites may have been carried in cleft sticks as battle-axes or weapons of offence or defence against wild animals, I believe that the bulk of them were used for grubbing wild roots out of the ground. Some years ago I paid a good deal of attention to the subject of the jungle products, which afford a means of support to many of the aboriginal races\*. Besides fruits,

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\* *Vide* Appendix E.





leaves, and stems, I ascertained that the roots, particularly of several species of *Dioscorea*, &c., furnished a substantial food for several months of every year. At the present day people belonging to such tribes may often be seen laboriously digging up these roots, either with a simply pointed stick, or a stick provided with an iron spike. I have a very vivid recollection of the appearance presented by a woman whom I saw thus engaged last year. Her countenance was of the lowest type I have ever seen; to what race or tribe she belonged I did not ascertain, but as I saw her, with hunger in her eyes and an infant strapped on her back, while she crouched over the precious root which she was digging out, I could not but regard her as being in all probability a lineal descendant of the manufacturers and users of stone implements similar to those which are figured.

There is one class of stone implements unsuited to any of the above-mentioned purposes, but which, being provided with sharp edges, it seems very probable were used as skin scrapers. In connection with this I may mention, that on one occasion, as mentioned in Chapter X., in the Satpura Hills, in the Central Provinces, having shot a bear, I gave the carcase, with some knives, to the people who had brought it to camp, in order that they might take off the skin. These people belonged to a tribe who always carry a very small well-sharpened iron axe of a form I have not seen elsewhere. After working for a short time with the knives, they discarded them for the axes, which they removed from their wooden handles, and then placing their thumbs in the holes, grasped them firmly with their fingers and continued the flaying with astonishing rapidity. In a similar way I believe that the scrapers of stone may have been used for the preparation of skins which, when rudely dressed, afforded the only clothing of these early inhabitants. The various forms of traps and snares which are now commonly met with in the jungles may be survivals of the ancient methods which were employed to capture the wild animals.

Opinions differ much as to the probable uses of the ring-stones, of which examples of various sizes have been obtained in Madras, Jabalpur, and Mopani, in the Central Provinces, and Karakpur in Bengal, and in Burmah. They have been supposed to be weights for spindles, net sinkers, and in the case of the specimens from Karakpur, portions of querns or hand-mills. These last, indeed, appear to be of no great antiquity, and the suggestion is probably correct. I possess a specimen of perforated schist of very modern origin, of which I was able to ascertain the history. I picked it up one day at Almorah, in the Himalayas, and seeing it was modern, I thought it possible that I might be able to get a clue to the uses of the ancient forms, to which it had some resemblance. On enquiry I found it was simply a toy mill-stone which had been manufactured by or for the children of the





village, and one small boy laughed outright when he saw me carrying it off.

The example (Plate II, Fig. 13) is, however, ancient beyond a doubt. I have already suggested in my original account of it that I am inclined to believe, from the facility with which it can be grasped, that it may have been used as a sort of "knuckle-duster" in encounters between men and wild animals. As a spindle whorl or net-sinker, it appears to me that it is unnecessarily heavy, and for either of these purposes a softer, more easily worked, stone than basalt would answer equally well.

The chief point of interest about it is its very close resemblance to forms which have not uncommonly been met with in Europe and likewise in Virginia, Pennsylvania, and other parts of North America.\* To those who believe in an Asiatic origin for the North American Indians this fact may be of interest. These implements are commonly called hammer-stones; but I do not think it probable that they were employed in the manufacture of flakes, as has been suggested by some authorities.†

The flakes of chert, agate, &c., which were struck from the cores, were undoubtedly used as lancets, knives, arrow-heads, &c. I have, in Chapter V., Section 2, described how, in the Andaman Islands at the present day, in the vicinity of the settlements, flakes of bottle-glass are used as lancets and razors, they being found to be more efficient than the flakes of chert, &c., which were formerly used there. It is most probable that in some parts of the islands chert or hornstone flakes are still manufactured, and used for these purposes.

I cannot leave this part of the subject without making a suggestion as to a possible use of some of the forms whose efficiency as implements appear to be doubtful. In Burmah, Assam, &c., these objects are regarded either as being of supernatural origin, or as thunderbolts, as I have stated above. In Bandelkhand and the Central Provinces they have sometimes been found placed in the vicinity of Sivoid altars, or the well-known *lingum*. It seems, therefore, possible that some forms may have been specially prepared as votive offerings, and possessed a symbolical significance in a now forgotten cult. Possibly, however, the custom among certain of the

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\* Vide "American Naturalist," for March, 1873.

† I have recently seen a very interesting collection of stone implements from the Solomon Islands. The "celts" are mounted in cleft sticks, apparently for agricultural purposes. There are also two ring-stones fixed on sticks, making very formidable maces, or life-preservers. They are less bevelled than the specimen which is figured, but are otherwise very similar.





aboriginal tribes to make offerings of pottery-images, &c., to the evil spirits which they believe infest their forests and hills, and whom it is considered to be much more important to propitiate than it is to invoke the protection of the good spirits, may be a relic of that ancient time.

Miniature stone models of agricultural implements might very possibly have been offered on the altars of those deities or spirits who were supposed to preside over agriculture, and upon whose favour prosperity was believed to depend. We need not seek far in other religions for analogous offerings of types for actual things. There is an iron adze-shaped tool in use in Burmah at the present day very similar to the shouldered celts found in that province, which fact throws a doubt on the great antiquity claimed for the latter, since it is simply idle to suppose that these stone adzes can have been used for shaping wood.

#### GENERAL AND CONCLUDING REMARKS ON THE GEOGRAPHICAL DISTRIBUTION.

Reviewing the facts given under the several geographical headings, and the further details in the Table appended to the already mentioned paper, it becomes apparent that it is possible, in the present state of our knowledge, to sub-divide India with the adjoining countries on the east and west into three great regions, each characterised by containing a certain class of stone implements. On the map which accompanies my original paper I have attempted to distinguish the limits of these regions respectively. It will be observed that there are patches detached from each, to which the geological term *outlier* may conveniently be applied.

Throughout this account I have not made use of the terms *neolithic* and *palæolithic*, convenient as they doubtless are, since they are calculated to convey what, in the case of India at least, I consider to be an erroneous idea of progression. The different forms of implements seem to be rather indices of race than of time. This opinion may appear to be unorthodox, and the picture of the rude manufacturer of the chipped quartzite being the progenitor of the artist who, in the progress of time, evolves the art of making highly-polished celts out of the hardest materials, though no doubt an attractive one, does not seem to fit in with the facts at our disposal. Of course in certain localities such an advance in art may have taken place; but the wide extent of country we are dealing with, and the magnitude of the data, render it possible to ignore such local cases, supposing them to exist, without vitiating the main results and conclusions.

It would be improper to omit all reference to the influence which the geological structure of the three great regions respectively may have had in determining the form and characters of the imple-



ments. It is clear that where chert, agate, or some similar forms of quartz do not occur naturally, we are not likely to find flakes and cores in abundance; and, therefore, a certain limit has been placed by external causes on the manufacturing capabilities of the people. At the same time each of the regions is so vast and the mineralogical resources are so varied, that the specialized characters of the implements appear to be all the more remarkable, since the materials for greater diversity are not wanting. In Burmah, however, according to Mr. Theobald, the implements are often of schist or basalt, which are quite unlike anything to be found in the areas where the implements occur.

We find that implements belonging to the first class (the chipped quartzites) occur throughout a vast area of India which extends in a north and south direction from Saugor to Madras, and east and west from Raniganj in Bengal to Nimuch in Rajputana. This area overlaps the others to some extent, or it may be otherwise stated has outliers within their limits, as in Chutia Nagpur, and the Central Provinces, and Rajputana. In far distant Java implements of somewhat similar character appear to have been met with. This is a fact of considerable interest, pointing to a pre-historic connection.

The distribution of the flakes and cores which constitute the second class is limited to the area which extends north and south from Kerowlie, in Rajputana to Peyton, on the Godavari in Bombay, and east and west from Singhbhum in Western Bengal to Sukkur on the Indus, in Sind, and still further even to Gwadar in Biluchistan. The principal known outliers from this area are at Rajamahendri on the lower Godavari, and in the Andaman Islands.

The polished celts, &c., whose varieties make up the sub-divisions of the third class, occupy an area which extends from Upper Assam in the north-east to Singhbhum in Bengal, and from the Irawadi Valley in Burmah to Jabalpur in the Central Provinces. The doubtful case of a polished celt from Coorg (or Kurg) and a series of polished celts from the Shevaroy Hills, which are preserved in the British Museum, so far as I know, are the only examples of any being found outside these boundaries.

Such being the rough limits of the three areas of distribution, it is obvious that in Western Bengal and the Central Provinces—*i.e.*, in the most central parts of the peninsula—there is considerable mutual overlap. It now only remains to make an attempt to offer some rational explanation of this fact. Two theories have suggested themselves to me. According to the first, we may regard these central tracts as including a radiating point, from whence successive waves of emigration may, at different stages in the civilization and progression of the people, have spread, as the rising peninsula enlarged the area accessible. We cannot say with any degree of certainty whether the flake-makers or the quartz-chippers were the most ancient. The





former, however, on this supposition, spread in directions to the west and north-west, while the latter found their way southwards to Madras, and even to Java in the south-east, where they met with the manufacturers of polished celts. These last, according to the same theory, spread eastwards from the central point of departure, till, through Burmah and the Malayan countries, they reached the confines of China. This theory is one that may commend itself to the notice of progressionists; but, for my own part, I am rather inclined to adopt the following as the more probable explanation. According to this second theory, our central area must be regarded as including a point of convergence rather than of divergence of immigration rather than of emigration. As we recede from the central area, in the several directions above indicated, we find that the farther off we get, the respective forms become more abundant, and shew higher degrees of skill, being nearer the original seats of the races who manufactured. Thus none of the cores and flakes of the Central Provinces can compare with those of Sind for beauty of workmanship. The chipped quartzites of Madras, if not better formed, are certainly in greater variety and abundance than those of the Central Provinces, while, as regards the polished celts, the superiority of the workmanship of those from the Burmese and adjoining countries cannot well be disputed.

Having again recourse to the idea of the rising peninsula or island, which is, however, a by no means essential feature of this theory, we may suppose that as the central parts of the country became accessible, wanderers from the north-east and north-west, bringing with them a knowledge of their respective arts, came in contact with one another, and became the parents of some of the widely-distinct races who inhabit India at the present day. With the introduction of a knowledge of the art of making iron by the rude process which is still employed, the manufacture of stone implements gradually died out, though, as has been pointed out, it still lingers on the north-east frontier and in the Andaman Islands. At what time iron began to replace the stone we cannot say; but it is most probable, in spite of the fact of copper weapons having been discovered in certain places, that in India there has been no intervening bronze period.

It may be useful to add here Dr. Caldwell's views on the subject of the successive waves of immigration which have served to constitute the four separate strata into which the Indian population is at present sub-divided.\*

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\* I quote from Colonel Dalton's "Ethnology of Bengal," p. 244. Colonel Dalton, in a foot-note, demurs to the correctness of the inclusion of the Bhils with the Kols, considering them to be rather Dravidian. See also on this subject Proc. Asiatic Soc. Bengal, 1873, pp. 130-133.





*First and earliest.* The forest tribes, such as Kols, Sontals, Bhils, &c., who may have entered India from the north-east.

*Second.* The Dravidians, who entered India from the north-west, and either advanced voluntarily towards their ultimate seats in the south of the peninsula, or were driven by the pressure of subsequent hordes following them in the same direction.

*Third.* We have the race of Scythian or non-Aryan immigrants from the north-west, whose language afterwards united with the Sanskrit to form the Prakrit dialect of Northern India.

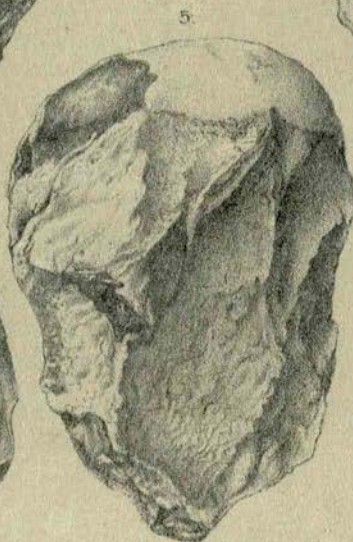
*Fourth.* The Aryan invaders.

The resemblance between the above, and the conclusions which I have arrived at independently, more particularly as regards the source of the Kolarian manufacturers of the polished celts, is sufficiently obvious.

With regard to the Dravidians, who came from the north-west, it may be that they were the people who manufactured the flakes, and afterwards—when they had pushed off the Dekan basalt, further south, took to making the chipped quartzite axes from a material which then became more accessible to them.

In conclusion I would say that the suggestions I have put forward are, to the best of my belief, wholly new, though they first occurred to me many years ago. The progress of discovery has encouraged me to believe that they contain a strong element of probability. It is in the hope that the subject may attract the notice of ethnologists, philologists, and antiquarians, with all of whose special departments it is intimately connected, that I have at length ventured to give them publicity.

ANCIENT STONE IMPLEMENTS FROM



SCALE HALF NATURAL SIZE.

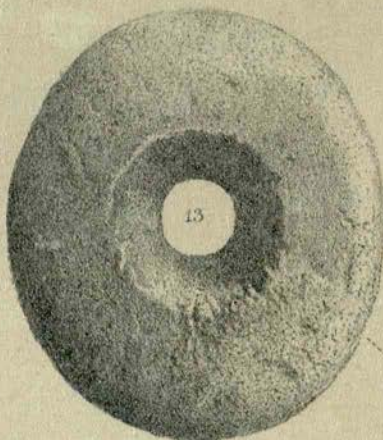




9



14



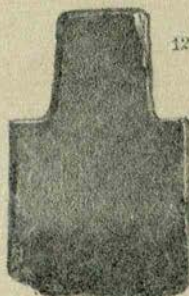
13



15



8



12



10





## EXPLANATION OF PLATES.

- Plate I. 1. Chipped quartzite, Jeriah Coal-field, Western Bengal.  
" 2. " " S.S.W. of Beherinath Hill, Western Bengal.  
" 3. " " Ranigunj Coal-field, Western Bengal.  
" 4. " vein-quartz, Talchir, Orissa.  
" 5. " quartzite, Denkenal, Orissa.  
" 6. " " Ungul, Orissa.  
" 7. " " Sambalpur, Central Provinces.
- Plate II. 8. Polished argillaceous slate, Buradih, Chutia Nagpur, Western Bengal.  
" 9. " trap, Parisnath Hill, Western Bengal, with section.  
" 10. " argillaceous slate, Parisnath Hill, Western Bengal.  
" 11. " quartzite } Singhbhum. These are of the shouldered  
" 12. " trap } Burmese type.  
" 13. Ring-stone, basalt, Mopani Coal-mines, Central Provinces, with section.  
" 14. Core of horn-stone, Singhbhum.  
" 15. Do. Do.

Scale. —Half natural size.





## APPENDIX C.

*On the Mammals and Birds occurring in the area which extends from the Ganges to the Godavari rivers.*

## LIST OF MAMMALS.

## MONKEYS.

*Presbytis entellus*, Dufres.—The Langur is very local in its distribution; it is uncertain whether a distinct species does not come in towards the south.

*Inuus rhesus*, Desm.—The Bengal Monkey is not very common, being generally restricted to heavy forest, near the larger rivers.

## BATS.\*

*Pteropus medius*, Temm. (The flying-fox.)

*Cynonycteris amplexicaudata*, Geoff.

*Megaderma lyra*, Geoff.

*Rhinolophus mitratus*, Blyth.

*Nyctinomus tragatus*, Dobson.

*Taphozous longimanus*, Hardw.

*Taphozous melanopogon*, Temm.

*Scotophilus temminckii*, Horsf.

*Vesperus Tickelli*, Blyth.

*Vesperugo abramus*, Temm.

*Kerivoula lanosa*, Smith.

## SHREWS.

*Sorex carulescens*, Shaw.† The common, so-called, musk rat.

*Tupaia Elliotti*, Wat.—The Madras Tree-Shrew probably occurs throughout; but is more abundant in the Valley of the Mahanadi, and thence southwards.

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\* This list is extracted from Dobson's "Catalogue of Asiatic Cheiroptera."

† Other species of shrews occur, it is believed, but their names are not yet known.



## BEAR.

*Procheilus labiatus*, Blainv.—The Indian Black Bear is found at intervals throughout, but is absent from some wide tracts for no apparent reason. Its habits have been described on p. 659.

## RATEL-BADGER.

*Mellivora Indica*, Shaw.—The Indian Badger or Grave-digger occurs in rocky tracts throughout; but owing to its nocturnal habits its distribution is not very well known.

## OTTER.

*Lutra nair*, F. Cuv. (?).—An otter, belonging I believe to this species, is found in most of the larger rivers in this area.

## CATS.

*Felis tigris*, Linn.—The tiger is found throughout; but is rare in the open tracts and the heaviest forest.

*Felis pardus*, Linn.—The leopard is found throughout. The black variety is sometimes met with.

*Felis chaus*, Guld.—The jungle-cat, though not commonly met with, has been seen by me in most of the districts. Other species of cats very probably occur too, but I have not shot them. The occurrence of the Lynx is doubtful.

*Felis jubata*, Schreb.—The hunting-leopard appears to have been obtained in Sambalpur.

## HYÆNA.

*Hyæna striata*, Zimm.—The hyæna is common throughout.

## CIVET.

*Viverra zibetha*, Linn.—The large civet-cat is probably common in many parts of the region, but is not often seen. The lesser civet-cat (*Viverra malaccensis*) also in all probability occurs, but has not been seen nor obtained by me.

## TREE-CAT.

*Paradoxurus musanga*, Marsden.—The common tree-cat has been seen by me on rare occasions in Manbhum and Western Chutia Nagpur.

## ICHNEUMON OR MONGOOSE.

*Herpestes Sp.* (?).—I believe that there are two species of Mongoose or Ichneumon within the area; but they have not yet been properly identified. One specimen obtained by me had the characters of *H. monticolus*, W. Elliott.

## WOLF, &amp;c.

*Canis pallipes*, Sykes.—The Indian wolf has been seen by me in the valleys of the Damuda and Koel rivers, but not further south.





*Canis aureus*, Linn.—The Jackal occurs throughout, but is rare in heavy forest.

*Cuon rutilans*, Temm.—The Wild Dog occurs in packs, and is probably very migratory; but it is not often seen.

*Vulpes Bengalensis*, Shaw.—The Indian Fox is principally found in open cultivated tracts.

#### SQUIRRELS.

*Sciurus maximus*, Schreb (according to Jerdon).—The Central Indian Red Squirrel, is very local in its distribution. I have seen it on Parisnath, the banks of the Mahanadi, in Orissa, where it is common, and in Gangpur.

*Sciurus palmarum*, Gmel.—The common striped squirrel occurs in mango-groves, in some places in great abundance. It is said to be replaced by another nearly allied species, *S. tristriatus*, towards the south.

*Pteromys oral*, Tickell.—The brown flying-squirrel has only been seen by me in Raipur; it has, however, been obtained in Chutia Nagpur and Bustar.

#### RATS AND MICE.

Materials for an account of the *Muridæ* are very insufficient, and I shall not attempt to give a list of the species. Among those which I have obtained are the Indian Jerboa rat, *Gerbillus indicus*, Hardw., the Bandicoot, *Mus bandicota*, Bech., and the bush rat, *Golunda Elliotti*, Gray.

#### PORCUPINE.

*Hystrix leucura*, Sykes.—The Indian porcupine is the species which occurs throughout the area, where it lives in burrows in rocky hills, and is by no means rare.

#### HARE.

*Lepus ruficaudatus*, Geoff.—The common Indian hare occurs throughout.

#### ELEPHANT.

*Elephas indicus*, Cuv.—The elephant occurs in the hill ranges of Manbhum and Singbhum, in the Rajmahal Hills,\* in Western Chutia Nagpur, and in the states of Mohurbunj, Hindole, Keonjur and Denkenal, in Orissa. South of the Mahanadi I do not know of its occurrence.

#### PIG.

*Sus indicus*, Schinz.—The wild pig occurs locally throughout.

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\* In 1870, there were two there, the sole survivors of former herds.



## DEER.

*Rucervus Duvaucellii*, Cuvier.—The swamp deer is found in Western Chutia Nagpur; but appears to be more common south of the Mahanadi.

*Rusa Aristotelis*, Cuv.—The sambar occurs pretty generally where there is heavy forest throughout the region.

*Axis maculatus*, Gray.—The spotted deer has a local distribution throughout.

*Axis porcinus*, Zimm.—The hog-deer has only been seen by me in Jaipur, and I have not heard of its occurrence elsewhere.

*Cervulus aureus*, Ham. Smith.—The barking-deer occurs throughout, and is very common in certain tracts.

*Memimna indica*, Gray.—The mouse-deer occurs in Manbhum and Orissa; from its small size it often, probably, escapes observation.

## ANTELOPES.

*Pertax pictus*, Pallas.—The Nilgai occurs in open jungle in the more thinly inhabited tracts.

*Tetracerus quadricornis*, Blainv.—The four-horned antelope does not appear to be very common. I have only shot it in Palamow.

*Antilope cervicapra*, Pallas.—The antelope, or black-buck, occurs very locally in grassy plains in Western Chutia Nagpur, Sambalpur, and Jaipur.

## GAZELLE.

*Gazella Bennettii*, Sykes.—The Indian gazelle occurs in Sirguja and Palamow. I have seen it at Latiahar, Long.  $84^{\circ} 35'$  which is its most eastern point of extension in the peninsula.

## BOVINÆ.

*Gavæus gaurus*, Ham. Smith.—The gaur, or Indian bison, is found on most of the lofty plateaus throughout the region.

*Bubalus arni*, Kerr and Shaw.—The buffalo occurs in the south and extreme west of Chutia Nagpur; in Sambalpur, Jaipur, Raipur, and Bustar.

## ANT-EATER.

*Manis pentadactyla*, Linn.—The Indian scaly ant-eater is found inhabiting rocky hills in Chutia Nagpur and Sambalpur, but its distribution is not very well known at present.





## BIRDS.

In a paper recently published in the Indian Ornithological Journal, called "Stray Feathers,"\* I have given an account of the distribution of birds, so far as it is at present known, throughout the hilly region which extends from the Ganges, near the Rajmahal Hills, to the Godavari Valley.

It was my original intention to have reproduced the list of species in this appendix, but I have been compelled by the great size to which this volume has grown to curtail very considerably both this and the other appendices. The region included between the above-indicated limits corresponds, very nearly, with the Bengal sub-province of geographical distribution, as it has been defined by Mr. W. T. Blandford, F.R.S., in an important paper by him on the "African element in the Fauna of India."†

In preparing the list I have only included species and localities of which there is an absolute record in either printed or manuscript lists to which I have had access. The total number of species enumerated in the list is 418. Short lists which I give at the end of my paper serve to illustrate the value of the sub-province as a natural area of distribution. In these latter, species will be found which never appear to cross a sharply defined boundary line; on the other hand there are lists of species which, though crossing the boundary-line, do so but rarely, and occur within the sub-province merely as stragglers.

Those who have not paid much attention to the curious facts in connection with the geographical distribution of animals, which have been collected and discussed by Mr. A. Wallace and others, will be perhaps little prepared to hear that birds conform in a very remarkable degree to the distribution of other animals, which are not endowed with similar means of locomotion. In some cases the character of the vegetation has, no doubt, a great influence on the type of fauna to be found within a given area; but it is certain that so apparent a cause will not always serve to explain the facts which come under the notice of the field naturalist.

To a former arrangement of land surfaces the main features of the existing distribution of animals is generally traced; but some of the minor features appear to be connected with occult causes, which have still to be discovered and explained.

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\* "From the Ganges to the Godavari." "Stray Feathers." Vol. vii., p. 191.

† *Wide* "Ann. and Mag. of Nat. Hist." October, 1876.



## APPENDIX D.

*On the Mammals and Birds of the Andaman and Nicobar Islands.*

## MAMMALS.

Although it is probable that further research may result in the discovery of some few additions to the meagre list of mammals given below, it may still be taken as a tolerably well-established fact that the mammal fauna of these islands is a very poor one.

*ANDAMAN, PREPARIS, AND COCO ISLANDS.*

## MONKEY.

*Macacus Sp. (?)*—I saw monkeys on Preparis; but, as I failed to obtain a specimen, I cannot say to what species they belonged. They may have been *M. carbonarius*, F. Cuv., as some of them were very dark, or nearly black; but it is possible that the species is *M. cynamologos*, Linn., which appears to be the one found in the Great Nicobar.

No well-authenticated case of a monkey having been obtained in the Andamans has yet been recorded.

## BATS.

*Pteropus Nicobaricus*, Fitz and Zelebor.

*Cynopterus brachyotus*, Müller.

*Rhinolophus Andamanensis*, Dobson.

*Vesperus Tickelli*, Blyth.

*Vesperus pachypus*, Temm.

## TREE-SHREW.

*Tupaia peguana (?)*.—We obtained one specimen of tree-shrew on Preparis which appeared to be referable to this species.

## TREE-CAT.

*Paradoxurus Tytleri*, Blyth.—This species is known only from the middle and southern Andamans, where specimens have from time to time been obtained.





## SQUIRREL.

*Sciurus Assamensis*, McClell.—Two specimens obtained on Preparaïs appeared to belong to this species.

## RATS AND MICE.

*Mus Andamanensis*, Blyth.—Whether this is really a distinct species seems open to doubt. Blyth himself, according to Jerdon ("Mammals of India," p. 194), identified it with *M. setifer* of Cantor. Jerdon suggests its identity with *M. rattoides*, Hodgson. By whatever name it is to be called, it seems probable that it is identical with the Nicobar animal *M. palmarum*.

What other, if any, species of rats and mice occur in the Andamans is at present unknown.

## PIG.

*Sus Andamanensis*, Blyth.—This is a small race of pig said to be a hybrid between two species from neighbouring countries; but its true history and origin can only be a matter of conjecture. A pig is found on the Cocos and also, I believe, on Preparaïs.

## NICOBAR ISLANDS.

## MONKEY.

*Macacus cynomologos*, Linn. This is the species which, according to Blyth, occurs in the Nicobars. Zelebor gives *M. carbonarius*, F. Cuv., from the Great Nicobar; but the former identification is more likely to be correct.

## BATS.

*Pteropus Nicobaricus*, Fitz. and Zelebor.  
*Cynopterus Scherzeri*, Fitz. and Zelebor.  
*Phyllorhina Nicobariensis*, Dobson.  
*Miniopterus pusillus*, Dobson.

## TREE-SHREW.

*Cladobates Nicobaricus*, Zelebor.—This interesting little mammal was obtained on the Great Nicobar by the "Novara" expedition, and afterwards by myself on the same island.

## RATS.

*Mus palmarum*, Fitz., and *Mus Novaræ*, Fitz.—According to the "Saligethere" of the Reise Novara two species of rats were obtained on the Nicobars. But it is thought that there may perhaps be really only one, and that that is identical with *M. Andamanensis*.

## PIG.

*Sus Sp. (?)*—The pig of the Nicobar Islands is said to have been introduced, and to have come from a Chinese stock.



## BUFFALO.

*Bubalus arni* (?).—Buffaloes in a wild condition are found on the island of Kamorta. There is no doubt that they were originally introduced by the Danes. It has also been stated that there are herds of wild cattle; but this needs confirmation.

## BIRDS.

The total number of species of birds known to occur in the islands which intervene between Arakan and Sumatra—namely, Preparis, the Cocos, Narkondam, Barren Island, the Andamans, and the Nicobars, and which have been observed at sea in the vicinity of these islands, amounts to but 188. If the waders and swimmers are omitted, to only 132. As among the waders two, at least, are locally-specialised forms, and in both orders species occur which belong properly to far-distant countries outside the geographical regions into which India and the adjoining countries are sub-divided, it is necessary for the purpose of making a complete analysis of the bird fauna that these orders should not be excluded from consideration.

In my earliest papers which I published on the subject of the ornithology of these islands I was inclined to separate the fauna of the Nicobars from that of the Andamans, in consequence of the latter being, I then thought, more nearly affined to the Indian or Indo-Burmese. Subsequent discoveries have shewn that the faunas of the two groups are linked together in such a way that they cannot be conveniently separated. There are, indeed, but four local species in the Nicobars, which are unrepresented by close allies in the Andamans (*vide* 6th sub-division, *infra*). In the Andamans, it is true, there are twenty-three local species not represented by near allies in the Nicobars; but this fact is of less importance, since the Nicobars have not yet been thoroughly explored, and further research will probably diminish the number.

In the examination of the fauna of such groups of islands the specialised forms—the species which have been modified by local conditions from ultra-insular or continental types—claim a large share of attention, though it is mainly from the old well-known species that the greatest aid in the determination of the affinities is to be obtained. It would require more space than is here available for the purpose to go fully into this question. Mr. Hume's conclusion\* from an analysis is, that the birds of these islands present a stronger affinity, owing to the greater number of identical genera, with those of India than with the Indo-Burmese or Indo-Malayan

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\* "Stray Feathers." Vol. II., p. 134.





countries. On the other hand, he points out that many common Indian genera are totally unrepresented in these islands, though they ought to be present were the affinity really very close. My own impression is that when full weight is given to all these factors, and when the birds have been more completely collected, the balance of evidence will favour the view that the closest affinity is with the bird fauna of Burmah. The occurrence of fresh-water fish in the Andamans identical with species found in Burmah, and the few mammals belonging also to allied or identical species from Burmah, certainly point in the direction of a land connection having formerly existed between the islands and Burmah; and the physical features, and I believe also the *flora*, afford evidence of similar character.\* The question being connected with a very large subject as to the former distribution of land in the Indian Ocean, cannot be now discussed here, so that I shall pass to the enumeration of the local species.

The specialized forms† found in these islands only amount to fifty-eight. These may conveniently be grouped as follows:—

*First.* Species which occur in both the principal groups of islands without any local modification. Of these there are eleven, viz.:—

- Spilornis Davisoni*, Hume.
- Ninox affinis*, Tytler.
- N. Obscurus*, Hume.
- Alcedo Bengalensis*, Gmel. var.
- Zosterops Nicobariensis*,† Blyth.
- Calornis Tytleri*, Hume.
- Eulabes Javanensis*, Osbeck (var. *Andamanensis*, Tytler).
- Janthanas palumboides*, Hume.
- Macropygia rufipennis*, Blyth.
- Megapodius Nicobariensis*,‡ Blyth (?).
- Turnix albiventris*, Hume.

*Second.* Species which shew local variation not considered to amount to specific distinction. Of this there are but two examples. The racket-tailed drongo (*Dissemurus affinis*, Tytler) and the green pigeon

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\* Mr. S. Kurz calls the flora a Malayo-Burmese one, vide "Vegetation of the Andamans," p. 15.

† Inclusive of five *varieties* of ultra-insular forms which do not bear distinctive names.

‡ The occurrence of *Megapodius* in the Andamans has not yet been ascertained; but, as a species is known to occur in the Cocos, it is not improbable that it may hereafter be found there.



(*Osmotreron chloroptera*, Blyth). In both of which the Nicobar examples are distinguished from the Andaman by certain small but constant characteristics.

*Third.* Species with allied representatives in the two groups respectively. Of these paired species there are six recognised.

ANDAMANS.	NICOBARS.
<i>Spilornis Elgini</i> , Tytler.	<i>S. minimus</i> , Hume.
<i>Ephialtes Balli</i> , Hume.	<i>E. modestus</i> , Wald.
<i>Palæornis Tytleri</i> , Hume.	<i>P. erythrogenys</i> , Blyth.
<i>Oriolus Andamanensis</i> , Tytler.	<i>O. macrotus</i> , Blyth.
<i>Temenuchus Andamanensis</i> , Blyth.	<i>T. erythropygius</i> , Blyth.
<i>Munia fumigata</i> , Wald.	<i>M. semistriata</i> , Hume.

*Fourth.* Species which are represented in one group by a specialized form; in the other, by an ultra-insular ally.

ANDAMANS.	NICOBARS.
<i>Pelargopsis Burmanica</i> , Sharpe.	<i>P. intermedia</i> , Hume.
<i>Halcyon chloris</i> , Bodd.	<i>H. occipitalis</i> , Blyth.
<i>Arachnethra Andamanica</i> , Hume.	<i>A. pectoralis</i> , Horsf.
<i>Myiagra Tytleri</i> , Beavan.	<i>M. azurea</i> , Bodd. var.
<i>Carpophaga aenea</i> , Linu.	<i>C. insularis</i> , Blyth.

*Fifth.* Species occurring in the Andamans without representatives in the Nicobars. Of these there are twenty-two, viz. :—

*Spizaetus Andamanensis*, Tytler.  
*Strix De Roepstorffi*, Hume.  
*Collocalia innominata*, Hume.  
*Caprimulgus Andamanicus*, Hume.  
*Halcyon saturator*, Hume.  
*Alcedo Beavani*, Wald.  
*Palæornis magnirostris*,\* Ball.  
*Picus Andamanensis*, Blyth.  
*Thriponax Hodgii*, Blyth.  
*Centropus Andamanensis*, Tytler.  
*Dicaeum virescens*, Hume.  
*Graucalus Dobsoni*, Ball.

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\* These two last species should perhaps not strictly be included here, as, since their discrimination, they have been found to occur in ultra-insular regions.



APPENDIX D.

*Pericrocotus Andamanensis*, Tytler.  
*Dissemuroides Andamanensis*, Tytler.  
*Oreocinchla inframarginata*, Blyth.  
*Brachypodius fuscoflavescens*, Hume.  
*Oriolus melanocephalus*, var.  
*Copsychus saularis*, var.  
*Kittacinchla albiventris*, Blyth.  
*Dendrocitta Baylei*, Tytler.  
*Euryzona Canningi*, Tytler.  
*Hypotaenidia obscuriora*, Hume.

Further research in the Nicobar islands will probably result in the discovery of species which will necessitate the transfer of some of the above under one of the other headings.

*Sixth.* Species occurring in the Nicobars without representatives in the Andamans :—

*Ephialtes Nicobaricus*, Hume.  
*Palæornis caniceps*, Blyth.  
*Æthopyga Nicobarica*, Hume.  
*Hypsipetes Nicobariensis*, Blyth.

*Seventh.* Species found in outlying islands not included in the two principal groups :—

*Rhyticeros Narcondami*, Hume, Narkondam.  
*Dissemuroides dicruriformis*, Hume, Cocos.

These two species are of very great interest. The first, a hornbill, is a well marked form which is only known to occur on the outlying volcanic island of Narkondam; and the second, a king-crow, though closely allied to a species in the Andamans, is restricted in range to the Cocos.

Pressure of space prevents me from entering more fully into an account of the birds of these islands; but the subject is one of high interest, and the reader is referred to the papers by the late Marquis of Tweeddale in the "Ibis," and to those by Mr. Hume in "Stray Feathers," for further information.



## APPENDIX E.

*On Jungle Products used as articles of Food in Chutia Nagpur.*

What I have said in various parts of this work, more particularly on pages 63, 65 and 71, regarding the food of the lower races of the population inhabiting the jungle tracts, renders it unnecessary to enlarge further on the subject here. Although from the time of my first acquaintance with these people I was struck with the important part played by various jungle products, as affording a means of subsistence, it was not till the Orissa famine in 1866-67, that I fully realised the extent to which they were employed and their number and variety. The result of my enquiries I embodied in a paper which was published in the "Journal of the Asiatic Society of Bengal,"\* from which I extract the following table with sundry small alterations and corrections. Although it is not quite complete as, since its publication, I have met with several food-yielding plants which are not enumerated in it, still as it includes all the principal and the bulk of the minor products, it will serve the present purpose sufficiently well. Upwards of seventy species will be found in the table, and I have endeavoured as far as possible to arrange them in the order of their relative importance under the headings of seeds, fruits, leaves, stems, and roots. At the top of the lists are the species which may be regarded as staple articles of food, which are made use of in all years whether the harvest be abundant or not. These are followed by species less commonly used, and these last by others, which though edible, are injurious to health if used in quantity.

The reservation of forest tracts, which prohibits the inhabitants from taking a blade of grass from within the boundaries, has resulted, as I have pointed out, in the people being cut off from these food sources throughout wide areas, and many have been forced to migrate in consequence to other regions, not yet included in reserves, where they can continue to supplement their scanty cultivation with the productions afforded to them by nature.

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\* Vol. XXXVI., p. 37.





## List of Jungle Products used as articles of Food in Chutia Nagpur.

## SEEDS.

NAMES.	VERNACULAR NAMES.	REMARKS.
<i>Shorea robusta</i> , Roxb. ....	Sal .....	Much used by the Sentals; occasionally roasted and eaten alone, but more frequently boiled up with the dried flowers of <i>mhowa</i> .
<i>Bauhinia Vahlii</i> , W. & A. ....	Chehúr .....	Sometimes stored, but more frequently roasted and eaten close to the spot where found.
<i>Mucuna imbricata</i> , D. C. ....	Kusee .....	Sometimes cultivated.
— <i>prurita</i> , Hook. ....	Alkússa or Kiwách .....	
— <i>nivea</i> , Buch. ....	Khamach? .....	Kernels if eaten in quantity are said to produce intoxication.
<i>Terminalia bellerica</i> , Roxb. ....	Bhæra or Bora .....	
— <i>catappa</i> , Linn. ....	Bádám .....	Seeds used as a substitute for almonds.
<i>Fuirena ciliaris</i> , R. Br. ....	Band-kobi .....	
<i>Cassia fistula</i> , Linn. ....	Bunderlati or Amultás .....	Seeds used as a sort of meal, and are sometimes ground into flour before use.
<i>Nelumbium speciosum</i> , Willd. ...	Moolum Puddoo or Bansera... ?	
<i>Ventilago calyculata</i> , Tulasne. ...	?	Placentæ between the seeds used to make sherbet.
		Seeds eaten in the same way as those of Sal.

## FRUITS.

<i>Bassia latifolia</i> , Roxb. ....	Moul or Mhowa.....	The fruit is dried in the sun and eaten in times of scarcity, and the seeds yield an oil which is used as a substitute for <i>ghi</i> . (See flowers.)
<i>Buchanania latifolia</i> , Roxb. ....	Píál or Piár .....	Fruit collected and sold in bazaars.
<i>Mangifera Indica</i> , Linn. ....	Am .....	Tree occasionally found wild in the jungle; use of fruit well known; seeds softened by steam and eaten in times of famine.
<i>Spondias mangifera</i> , Pers. ....	Amará.....	Fruit eaten raw when ripe; pickled when unripe.



<i>Zizyphus jujuba, Lam.</i> .....	Bier .....	Is dried and stored. A cultivated variety yields a much larger fruit.
<i>Zizyphus cœnophia, Mill.</i> .....	Siá-Kol or Makoi .....	A small black fruit having a slightly acid taste.
— <i>rugosa, Lam.</i> .....	?	
<i>Ficus Indica, Roxb.</i> .....	Bur .....	Are much eaten in time of scarcity by the very poorest Sontals and Kols.
— <i>religiosa, Linn.</i> .....	Pipul .....	
— <i>glomerata, Roxb.</i> .....	Doomur .....	
<i>Carissa carandas, Linn.</i> .....	Benchí or Karróná .....	Is capable of much improvement by cultivation.
<i>Trapa bispinosa, Roxb.</i> .....	Páni-phul or Singhára .....	Are procurable in large quantities in some of the tanks. They furnish a very wholesome food.
— <i>quadrispinosa, Roxb.</i> .....	Jamún .....	Fruit is collected and sold in the bazaars.
<i>Eugenia jambolana, Lam.</i> .....	Keond or Kaned .....	
<i>Diospyros melanoxylon, Roxb.</i> .....	?	Ditto.
— <i>exculpta, Ham.</i> .....	Makúr-kendi .....	
— <i>embryopteris, Roxb.</i> .....	Koko-aroo .....	
<i>Olex scandens, Roxb.</i> .....	Bael .....	Chiefly used for making sherbet, but are also prepared in other ways.
<i>Egle marmelos, Corr.</i> .....	Kuthbel .....	
<i>Feronia elephantum, Linn.</i> .....	Tetul or Emle .....	Dried and exported in large quantities.
<i>Tamarindus Indica, Linn.</i> .....	Bágh-ankúra .....	Fruit somewhat astringent.
<i>Alangium decapetalum, Lam.</i> .....	Katái .....	
<i>Flacourtia sapida, Roxb.</i> .....	Páni-zali .....	
— <i>cataphracta, Roxb.</i> .....	Ourá .....	Used for making pickles.
<i>Phyllanthus emblica, Linn.</i> .....	Catchuá .....	
<i>Bauhinia variegata, Linn.</i> .....	Bohl or Moulseré .....	
<i>Mimusops elengi, Linn.</i> .....	Bellá .....	Acrid, except when perfectly ripe.
<i>Semicarpus anacardium, Linn.</i> .....	?	
<i>Erycibe paniculata, Roxb.</i> .....	Khusm .....	
<i>Schleichera trijuga, Willd.</i> .....	Sálgá .....	
<i>Boswellia serrata, Colebr.</i> .....	Rakhalsusa .....	Both ripe and unripe fruit are eaten.
<i>Karivía umbellata, Arn.</i> .....	Tela-kúcha .....	
<i>Coccinia grandis, W. &amp; A.</i> .....		





FLOWERS.

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APPENDIX F.

NAMES.	VERNACULAR NAMES.	REMARKS.
<i>Bassia latifolia</i> , Roxb. ....	Moul or Mhowa.....	Extensively used throughout the district. Is generally cooked with <i>Sal</i> seeds. Price varies from 10 seers up to 8 maunds for one rupee.
<i>Bauhinia variegata</i> , Linn. ....	Catchná .....	Used in <i>tarkaris</i> , or vegetable curries.
<i>Butea frondosa</i> , Roxb. ....	Pulás .....	Stamens and young pods occasionally eaten.

LEAVES (*Sdg.*).

<i>Antidesma diandrum</i> , Tul. ....	Muttá .....	} Trees or shrubs.
— <i>ghosembilla</i> , Gertn....	Umtoá.....	
<i>Flacourtia sapida</i> , Roxb. ....	Benchi or Katái .....	
<i>Tamarindus Indica</i> , Linn. ....	Tetul or Emle .....	
<i>Bauhinia purpurea</i> , Linn. ? .....	Koinár or Purenposti .....	
<i>Olex scandens</i> , Roxb. ? .....	Bhadwilá or Koko-aroo .....	
<i>Cassia</i> Sp. ? .....	Chakúra .....	} Herbs.
<i>Oxalis corniculata</i> , Linn. ....	Amrool or Umtha .....	
<i>Marsilea quadrifoliata</i> , Linn. ....	Susné .....	
<i>Amaranthus viridis</i> , Linn. ....	Batwá .....	
— <i>spinosus</i> , Linn. ....	Kántá .....	
<i>Alternanthera sessilis</i> , R. Br. ....	Sáronchi .....	
<i>Trichodesma indicum</i> , R. Br. ....	Hetmurria or Chota Kulpa .....	
— <i>Zeylanicum</i> , R. Br. ....	Burra Kulpa .....	
<i>Mollugo spargula</i> , Linn. ....	Ghíma .....	
<i>Spermacoce hispida</i> , Linn. ....	Burdmutta .....	
<i>Polygonum plebejum</i> , A. Br. ....	Myá or Kaet .....	



<i>Colocasia antiquorum</i> , Schott. ....	Kachú or Ulwa .....	} Herbs.
<i>Cissampelos</i> , Sp.? .....	Poe .....	
<i>Marsdenia tenacissima</i> , W. & A. ....	Herina .....	
<i>Jussiaea repens</i> , Linn. ....	Dhabnee .....	
<i>Leucas</i> Sp.? .....	Dhurup .....	
<i>Polycarpon depressum</i> , Kurz. ....	Cheera .....	

## STEMS.

<i>Bambusa stricta</i> , Roxb. ....	Karáil or Kopar .....	Base of stem and young shoots are eaten. The native names given are those of the stem, not of the plant itself.
<i>Phoenix acaulis</i> , Buch. ....	Jungly-kájúr .....	Interior of stem (sago).
<i>Nymphaea lotus</i> , Linn. ....	Saluk or Sirke .....	Leaf stalks and underground stems.
<i>Vitis quadrangularis</i> , Wall. ....	Hurjora .....	Young shoots.

## ROOTS.

<i>Discorea</i> , Sps.? .....	{ Bengo-aloe .....	} These roots furnish considerable nutriment, and are extensively used throughout the country.
	{ Dola-aloe .....	
	{ Dudha-aloe .....	
	{ Kondre .....	
	{ Genti .....	
<i>Nelumbium speciosum</i> , Willd. ....	Moolum Puddoo or Bansera .....	} The bulbs are capable of being ground up into a useful flour.
<i>Scirpus kysoor</i> , Roxb. ....	Kesúr .....	
<i>Cyperus rotundus</i> ? .....	Tikur .....	
<i>Curcuma leucorrhiza</i> , Roxb. ....		Wild arrowroot. Other species also occur I believe.

## FUNGI.

<i>Geaster</i> , Sp.? .....	Kukúri Chatú
<i>Agaricus</i> , Sp.? .....	Kanchutak





## APPENDIX F.

*Classified Table of Non-Aryan Races and Tribes mentioned in this Volume.*

Andamanese .....	Negritto.
Aguriah .....	} Kolarian or Munda Family.
Bhumiz .....	
Behur, or Birhor .....	
Gudaba, or Gudwa .....	
Ho, or Larka-Kol .....	
Juang .....	
Keriah .....	
Korewah .....	
Mal-Paharia (?) .....	
Munda .....	
Mun of Burmah .....	} Dravidian Family.
Paharia of Chutia Nagpur .....	
Saontar, or Munjwar .....	
Sontal .....	
Chero .....	} Hinduized .....
Karwar ...	
Bendkar .....	} Tribes of uncertain position; some have adopted Hinduism, while others have, perhaps, fallen away from it by miscegenation.
Gond, Gour, or Gore (= Maria of Bustar ?) .....	
Jhoria, or Jhara .....	
Khond, or Khunjwa .....	
Kol-Lohar .....	
Malé, Rajmahali, or Usul Paharia .....	
Meriah .....	
Nicobarese (?) .....	
Sowra, or Savara .....	
Uraon .....	
Uraon-Keriah .....	} Hinduized .....
Bhuiya ...	
Bui .....	} Tribes of uncertain position; some have adopted Hinduism, while others have, perhaps, fallen away from it by miscegenation.
Baiga .....	
Baori .....	
Karen .....	
Kaur (perhaps = Karwars) .....	
Pab .....	
Panka .....	
Rajwar .....	} Tribes of uncertain position; some have adopted Hinduism, while others have, perhaps, fallen away from it by miscegenation.
Raj-gond .....	



Nath.....	}	Have adopted a form of Mahomedanism.
Brinjara, or Bunjara .....		Gipsies.
Bhatra .....	}	Position unascertained.
Purji (= Pardis, or bird-catchers) (?) .....		





## APPENDIX G.

*List of papers published by the Author on subjects referred to in this volume.*

## GEOLOGY.

*In the "Memoirs of the Geological Survey of India."*

- 1.—The Ramgurh Coal-field. Vol. vi., p. 109.
- 2.—The Chopé Coal-field. Vol. viii., p. 347.
- 3.—Geology of the Rajmahal Hills. Vol. xiii., pt. ii.
- 4.—The Aurunga and Hutar Coal-fields, and the iron-ores of Palamow. Vol. xv., pt. i.

*In the "Records of the Geological Survey of India."*

- 5.—On the occurrence of Gold in the District of Singhbhum. Vol. ii., p. 11.
- 6.—On the occurrence of Argentiferous Galena and Copper in Manbhum. Vol. iii., p. 74.
- 7.—On the Copper deposits of Dhalbhum and Singhbhum. Vol. iii., p. 94.
- 8.—The Raigurh and Hingir Coal-field (1st notice). Vol. iv., p. 101.
- 9.—The Bistrampur Coal-field. Vol. vi., p. 25.
- 10.—Barren Island and Narkondam.\* Vol. vi., p. 81.
- 11.—On the discovery of a new locality for Copper in the Narbada Valley. Vol. vii., p. 62.
- 12.—On the building and ornamental stones of India. Vol. vii., p. 98.
- 13.—Geological notes made on a visit to the coal recently discovered in the country of the Luni Pathans, South-east corner of Afghanistan. Vol. vii., p. 145.
- 14.—The Raigurh and Hingir Coal-field (2nd notice). Vol. viii., p. 102.

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\* Republished in the "Geological Magazine." Decade II. Vol. vi., 1879.



- 15.—On the Athgurrh Sandstones, near Cuttack. Vol. x., p. 63.  
16.—On the Geology of the Mahanadi basin and its vicinity. Vol. x., p. 167.  
17.—On the Diamonds, Gold, and Lead-Ores of the Sambalpur District. Vol. x., p. 186.  
18.—On the origin of the Kumaun Lakes. Vol. xI., p. 174.

*In a Special Report.*

- 19.—On the Coal-fields of Orissa. 1877.

*In the "Journal of the Asiatic Society of Bengal."*

- 20.—Brief notes on the Geology and on the fauna in the neighbourhood of Nankowri Harbour, Nicobar Islands. Vol. xxxix., pt. ii., p. 25.  
21.—Notes on the Geology of the vicinity of Port Blair—Andaman Islands. Vol. xxxix., pt. ii., p. 231.

*In the "British Association Reports."*

- 22.—On the New Geological Map of India (abstract). Dublin, 1878.

MAMMALS.

*In the "Proceedings of the Asiatic Society of Bengal."*

- 23.—Elephants. 1868, p. 129.  
24.—On the occurrence of Tupaia Elliotti in the Satpura Hills. 1874, p. 95.  
25.—Notes on certain Mammals occurring in the Basin of Mahanadi. 1877, p. 168.

BIRDS.

*In the "Journal of the Asiatic Society of Bengal."*

- 26.—On the birds of the Nicobar Islands. Vol. xxxix., p. 29.  
27.—On birds observed in the neighbourhood of Port Blair, Andaman Islands. Vol. xxxix., p. ii., pt. 240.  
28.—On a collection of birds made in the Andaman Islands by Asst.-Surgeon G. E. Dobson, M.B. Vol. xli., p. 273.

*In "Stray Feathers."*

- 29.—List of birds known to occur in the Andaman and Nicobar Islands. Vol. I., p. 52.  
30.—On the Avifauna of Chutia Nagpur. Vol. II., p. 353.  
31.—Avifauna of Chutia Nagpur. *Addenda et Corrigenda*. Vol. III., p. 288.





- 32.—Notes on some birds observed in the Suliman Hills—west of Dera Ghazi Khan. Vol. III., p. 204.  
33.—Notes on some birds collected in Sambalpur and Orissa. Vol. IV., p. 231.  
34.—Notes on birds observed in the region between the Mahanadi and Godavari rivers. Vol. V., p. 410.  
35.—From the Ganges to the Godavari (on the distribution of birds, so far as it is at present known throughout the hilly region which extends from the Rajmahal Hills to the Godavari valley. Vol. VII., p. 191.

## BOTANY.

*In the "Journal of the Asiatic Society of Bengal."*

- 36.—On Jungle products used as articles of food. Vol. XXXVI., p. 73.  
37.—On the Flora of Manbhum. Vol. XXXVIII., pt. ii. p. 112.

*In the "Journal of the Agri-Horticultural Society of India."*

- 38.—Remarks on a kind of farina from the fruit of a Pandanus in the Nicobar Islands. 1870.

## ETHNOLOGY. ANTIQUITIES. LANGUAGE.

*In the "Proceedings of the Asiatic Society of Bengal."*

- 39.—Ancient Stone Implements. Manbhum. 1867, p. 143.  
40.—Ancient Stone Implements. India and Islands. 1867, p. 147.  
41.—Ancient Stone Implements. Singhbhum. 1868, p. 177.  
42.—Notes on the Keriahs, an aboriginal race living in the hill-tracts of Manbhum. 1868, p. 177.  
43.—Copper Miners of Singhbhum. 1869, p. 170.  
44.—Notes on a trip to the Nicobar Islands (abstract).\* 1869, p. 251.  
45.—Notes on a trip to the Andaman Islands (abstract). 1870, p. 177.  
46.—Notes on children found living with wolves. 1873, p. 128.  
47.—Ancient perforated stone found in the Satpura Hills. 1874, p. 96.  
48.—Stone Implements of the Burmese type found in Singhbhum. 1875, p. 118.

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\* Printed in extenso in "Land and Water."



- 49.—Indian Boomerangs, or throwing-sticks. 1875, p. 136.  
50.—Stone Implements found in the Tributary States of Orissa. 1876, p. 122.  
51.—On an ancient Kitchen-midden at Chaudwar, in Cuttack. 1876, p. 120.  
52.—Khond weapons and musical instruments. 1876, p. 114.  
53.—Stone Implements from Parisnath. 1878, p. 125.

*In the "Journal of the Asiatic Society of Bengal."*

- 54.—Names of birds in four of the Aboriginal languages of Western Bengal. 1871, pt. i., p. 103.

*In the "Indian Antiquary."*

- 55.—Stone monuments in the District of Singhbhum. 1872, p. 291.  
56.—On the antiquities of the Ramguri Hill. 1873, p. 243.  
57.—On Nicobarese Hieroglyphics. Vol. IV., p. 341.

*In the "Records of the Government of India."*

- 58.—Note on the Nicobarese language. No. LXXVII.

*In the "Proceedings of the Royal Irish Academy."*

- 59.—On a visit to the Andamanese Home at Port Blair, Andaman Islands.\* Ser. II., vol. i.  
60.—On the forms and Geographical Distribution of Ancient Stone implements in India. Ser. II., Vol. I., p. 387.

*In the "Calcutta Review."*

- 61.—The Nicobar Islands (Review).

*Published separately.*

- 62.—On the Physical Features, Geology, Fauna, Flora, Ancient Temples and Inhabitants of Mahendragiri District of Ganjam.

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\* Republished in the "Indian Antiquary."





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