

tioned whether as a general rule in this country the area of the air or blast-delivery pipes has been correspondingly enlarged in due proportion to the increased air temperature, often over 1000°, now not uncommon since the introduction of the modern brick-heating stoves. Surely with air expanded to nearly four times its normal volume at 60°, the ordinary blast pipes should be correspondingly enlarged, coupled also with a higher blast pressure. Thus it may be, when using highly heated air, the absolute weight of air (oxygen) supplied may not be properly proportioned to the weight of coke charged, greater or less; and if this be true, it is not surprising that many blast-furnace managers have condemned the use of superheated air; it seems just possible that coke may be charged in excess of the air supply, or *vice versa*. In America they appear, "by dint of sheer practice," to have somehow realized this; they have even gone further, and ascertained that it is quite possible to deliver too much air. It seems, on the whole, that their superior practice may partly, at least, be explained on the probability that heat-intensity—in other words, temperature expressed in C. or F. degrees—plays its part; and that calculations based on heat-units alone, undoubtedly useful and necessary as they are, have only a limited application.

THE ZOOLOGY AND BOTANY OF THE WEST INDIES.¹

THIS Committee was appointed in 1887, and reappointed in 1888 and 1889.

During the past year chief attention has been directed to the exploration of the island of St. Vincent, and two collectors have been maintained in that island at the expense of Mr. F. Du Cane Godman, who has kindly assisted the Committee in this manner in order that the funds at its disposal may be chiefly applied to the remuneration of contributors, to whom would be referred the large collections in zoology, already amounting in Insecta alone to about 3000 species. The plants have been determined at the Herbarium of the Royal Gardens, Kew, and are nearly completed to date. A separate report on the collections in zoology and botany is given below.

It is proposed by the Committee to accept the services of Mr. R. V. Sherring, F.L.S., to make collections in botany in the island of Grenada during the coming winter. Mr. Sherring is well acquainted with the West Indies, and has already made collections there, and added several new species of ferns to the flora of Jamaica.

Zoology.

Since the last Report of the Committee three collections have been received from Mr. H. H. Smith, the collector sent by Mr. Godman to the island of St. Vincent. These collections include a complete set of the birds already known to inhabit the island, and a few additional species; a small number of reptiles and crustaceans; a large series of spiders; and a great many Insecta; these last amounting, it is thought, to about 3000 species.

In 1889, Colonel Feilden paid a visit to the island of Dominica for the purpose of ascertaining whether the Diablotin (*Estrelata hastata*) has become extinct there, as has been reported by Ober. The account of his expedition that Colonel Feilden has published leaves little doubt that this is the case.

Although Mr. Smith has now been occupied about a year and a half in the exploration of the island of St. Vincent, Mr. Godman has decided, with the concurrence of the Committee, that he shall still continue there, as it is not yet clear that the more inaccessible portions of the island have been sufficiently examined.

Mr. Godman has agreed to give a first set of the zoological specimens obtained by his collector to the National Collection contained in the British Museum, and the Committee is at present endeavouring to find competent zoologists to work out the extensive series of insects and spiders that has been obtained.

Commander Markham, R.N., contributed some specimens in zoology collected by him in the Leeward and Windward

¹ Third Report of the B.A. Committee, consisting of Prof. Flower (Chairman), Mr. D. Morris (Secretary), Mr. Carruthers, Dr. Sclater, Mr. Thiselton-Dyer, Dr. Sharp, Mr. F. Du Cane Godman, Prof. Newton, Dr. Günther, and Colonel Feilden, appointed for the purpose of reporting on the present state of our knowledge of the Zoology and Botany of the West India Islands, and taking steps to investigate ascertained deficiencies in the Fauna and Flora.

Islands of the West Indies, and Captain Hellard, R.E., local secretary to the Committee at St. Lucia, has recently forwarded four boxes of Lepidoptera collected by him in that island.

Botany.

A small collection of plants, numbering 143 specimens, was received from Mr. J. J. Walsh, R.N. This collection included plants from Dominica, St. Martin's, St. Eustatius, St. Kitts, St. Lucia, and Grenada. Most of the plants consisted of common West Indian species, presumably such as would be met with in the more accessible spots in the various places visited.

The remainder of the plants collected by Mr. Ramage at St. Lucia have been determined. Of 84 species sent, 62 have been fully determined. The others include several that are apparently new. They are wholly woody or forest plants, and comprise *Sloanea* sp., *Picramnia* sp., *Xanthoxylum* sp., *Bursera* sp., *Miconia* sp., *Cybianthus* sp., *Lucuma* sp., *Siparuna* sp., *Helosis* sp., *Gymnanthes* sp., and *Cyclanthus* sp. In one or two cases the material is hardly sufficient for satisfactory determination. Two of the above undetermined species have also been collected in Dominica and one in Martinique by earlier collectors.

Three collections have been received from St. Vincent through Mr. Godman, viz. in September 1889, and March and August 1890. The first collection has been determined at Kew by Mr. Rolfe as far as the end of the *Polypetalæ*. Of the 252 numbers (to this point) 47 were duplicates; thus 205 species were represented. All but about 9 of these were fully determined, the great bulk consisting of widely diffused West Indian plants; 128, or more than half, appear to have been recorded from the island before.

The undetermined specimens are *Traitinickia* sp., *Stigmaphyllon* sp., *Trichilia* sp., *Meliosma* sp., *Lysiloma* sp., *Moquilea* sp., a species of *Eugenia* obtained by Hahn in Martinique, and two species, probably of *Pithecolobium*, of which the material was somewhat inadequate. Several of these appear to be new, the first-named being specially interesting, because the genus was hitherto only known from Guiana and Brazil. In addition to this may be mentioned that several species of somewhat restricted distribution in the West Indies, more especially from Martinique and St. Lucia, have also been found in St. Vincent.

The second collection from St. Vincent consisted for the most part of ferns. Mr. J. G. Baker has fully worked out these. They include 133 species and well-marked varieties, three of which are new. The specimens are in excellent state of preservation, and it is probable that we have amongst them nearly all the fern flora of the island, both of the mountains and the lowlands.

As our knowledge of the fern flora of St. Vincent may be now regarded as practically exhaustive, it seems probable that some species hitherto attributed to the island, on the authority of specimens collected by the Rev. Lansdowne Guilding, really belong to other islands. This error has arisen from want of precision in exactly localizing the specimens, a practice the importance of which was hardly recognized at the time they were collected.

The collections received in August last contain three additional species of ferns, making the total number collected by Messrs. Smith 136. The added species are *Dicksonia cicutaria*, Sw., *Davallia aculeata*, Sw., *Cheilanthes radiata*, R. Br. In addition there are 389 numbers of flowering plants, and 3 palms. These will be determined later.

The Committee would again draw particular attention to the botanical and zoological bibliography of the Lesser Antilles prepared under its direction, and published as an appendix to the Report for 1888. This bibliography has been widely distributed in the West Indies and in Europe, and has proved of considerable service in carrying out the objects for which the Committee was appointed.

The Committee recommend their reappointment, and that a grant of £100 be placed at their disposal.

THE HILL ARRIANS OF INDIA.

AT a recent meeting of the Anthropological Society of Bombay, a paper was read by the Rev. A. F. Painter on the Hill Arrians, who live along the slopes of the Western Ghats in the Native State of Travancore, between Quilon in

the south and the Travancore-Cochin boundary line in the north. They differ considerably from the ordinary hill tribes of India, and Mr. Painter considers them as Dravidian rather than Kolarian. In colour many of them are remarkably fair. The men average 5 feet 6 inches in height. Their features are, as a rule, well formed. The lips are thin and the nose frequently aquiline. Their villages are situated at a height between 2000 and 500 feet above sea-level. The houses are generally built of split bamboo and mud with grass thatching, but wooden houses such as those used by the inhabitants of the plains are not uncommon. They cultivate the surrounding lands with rice and vegetables.

Their religion and social customs differ considerably from other Malayalam-speaking people, more markedly so in places where they have not come under the power of those living in the plains. Thus in Malabar the law of inheritance through the sister's children prevails. Even the Musnud, or throne, is inherited in this way. But among the Arrians, except where they have been brought under the power of the Hindus, inheritance through the father's children prevails. Even where the former law has been forced upon them they evade the consequences by marrying cousins, so that the property remains in the family. They are divided into *illams*, or clans. Members of the same *illam* may not intermarry; men of a superior *illam* may marry a woman of an inferior *illam*, but the reverse may not be done. There appears to be no difficulty about eating together, but only about intermarriage.

Women occupy a much better position among the Arrians than among the Hindus. They are regarded as equals, move about unrestrictedly, and eat with their husbands, especially at feasts. The fact that a woman eats out of a man's plantain leaf is a sign that she is his wife. The marriage tie is considered sacred, and seldom broken. Polygamy is almost unknown. A man married two sisters, and was considered to have disgraced himself, and was shut out from all feasts, &c. Adultery is considered a great crime. Infant marriage is unknown amongst them, but a curious ceremony prevails, copied from the customs of Nairs and Chogans, though differing in several particulars. As soon as a woman attains maturity, relatives and friends are summoned to a feast. The propitious hour having been fixed, the girl is brought in and made to stand on a plank of jackwood (a tree considered sacred by the Arrians); the father's sister then ties the *tali* or thread round the neck, the feast is then partaken of, and the ceremony is considered complete.

The actual marriage ceremony among the Arrians takes place when the woman is seventeen or eighteen years of age. The horoscopes of the different parties are examined, and the day fixed by the astrologer. Invitations are issued, and a *pandal* erected and the bride placed seated inside. The bridegroom is then brought up by his friends, who demand to know who is inside. The reply is such and such *Illakar*, as the case may be. If the reply is satisfactory they advance inside, and the bride is brought and placed in the centre. The conductor of the ceremonies on the bride's behalf then proclaims in a loud voice, "I am about to give a woman of such an *illam* to a man of such an *illam*." On the bridegroom's behalf a similar announcement is made. And a set of new clothes is presented by the bridegroom to the bride, and afterwards the happy pair eat out of the same vessel or leaf. This is the crowning part of the ceremony. After a feast the bride is conducted by the wedding party in state to the bridegroom's house, where another feast is spread. The wife lives with her husband in his house.

The Arrians bury their dead. Ancestral worship being practised among them, the ceremonies connected with death are the most elaborate and important. Death brings defilement with it, and none in the house may eat until after the funeral. The body having been washed and betel-nut placed in the mouth, a member of the same clan is appointed, who undertakes to act as master of the ceremonies. He first carefully bathes, then takes a new cloth, and from it tears a narrow strip which he fastens upon himself after the fashion of the Brahminical thread. Going to the place selected for the grave he calls upon the earth to give up 6 feet. He then advances backwards and digs with a hoe, removing three hoeful of the earth. Afterwards he may dig facing the grave. This completed, the body is brought forth and laid in it, the head always lying towards the south. The earth having been thrown, he again advances backwards and draws with a knife three lines round the grave, which are supposed to protect it from evil spirits. A cocoa-nut is broken and some paddy is strewn on the top. In addition to this in some hills a light is placed at the head, another at the foot of the grave.

The master of the ceremonies again bathes and returns to the house; two sticks tied crossways are taken and rags soaked with oil tied in the ends and lighted. Taking them in his hands he walks in procession round the house three times, followed by the relations of the deceased. The sticks are then placed, one at the head, the other at the foot of the grave.

After the ceremonies at the grave are over, all concerned in them bathe, a clean new cloth is placed in an inner room of the house, and on it the dead man's property, knife, betel-box, topee, &c., are placed. A feast is prepared, plantain leaves are cut into narrow strips, rice, boiled fowl, plantain, fish, toddy, arrack, and parched rice are placed upon the leaves, lights are lighted, the master of the ceremonies then does obeisance to the spirit which is now supposed to be in the house. The door is closed and the spirit is left to feast. After half an hour it is opened and the things taken forth. At the conclusion of the ceremony the whole assembly partake of a feast consisting of flesh, fish, rice, and arrack. As soon as possible an image of the deceased is prepared, which is brought into the house. Twice a year similar offerings are presented; and in times of drought, ravages by wild beasts, or sickness, vows are made, and prayers such as, "O Ancestor, be not angry with us," are offered.

Female ancestors receive equal honours with males. Of what happens to a soul after death they have no certain belief. The doctrine of transmigration is unknown amongst them. Spirits of men and women for whom no offerings have been made are said to wander about working mischief. If a man dies from accident, such as the fall of a tree, or is killed by a man or wild beast, no ceremonies may be performed for him, nor in the event of a woman dying in child-birth. The spirit is said to wander about working mischief. Ancestral worship is the essential part of their religious system. It consists of a yearly feast and offering to the spirit of ancestors similar to that described as made on the eleventh or fifteenth day after death.

Besides worship of ancestors, there is also the worship of evil spirits or demons, which appears to consist in paying "black-mail" to avoid injury, or bribes to inflict injury on others. The chief demon worshipped by them is the goddess of small-pox, cholera, &c., and it is noticeable that in all their religious festivals and ceremonies strong drink plays a very large part.

ANCIENT MOUNDS AT FLOYD, IOWA.¹

ON the west side of the Cedar River, one half mile east from Floyd, Iowa, are located a group of three ancient mounds. These mounds, instead of being located on the highest eminence in the region, as is most usually the case, are arranged in a slightly curved line, on a high but level space, fifty feet above, and two hundred and twenty yards back from the stream, and midway between two points (from fifty to sixty rods from each) which face the river, and rise from twenty-five to fifty feet above this level space. The ground, between the mounds and the Cedar, has a rather gently sloping surface. At this point the stream makes a bend to the east, and the mounds thus occupy a position on the south side. The north side of the stream is occupied by a steep, and somewhat broken, wooded bank, which affords a limited though beautiful bit of scenery to this place.

This area, as well as the surface of the mounds themselves, was originally possessed by a heavy growth of timber, but which was cleared away more than twenty years ago, and the soil kept under the plough ever since. These mounds are low and circular, and twenty feet distant from each other. The east, or largest mound, is thirty feet in diameter, and was originally two feet high (so reported by Mr. Sharkey, who first cleared, and still owns the tract), although owing to degradation by the plough it now rises only one and a half feet above the surface of the ground surrounding the mound. The two remaining mounds are smaller and lower than the first one. The third mound—there may be some slight doubt expressed regarding its origin, for the reason that in the south portion of it there is embedded a drift boulder, weighing some seven or eight hundred pounds. This, however, may have been placed here by human hands in the long ago, or the mound may have been an intrusion upon the stone. A partial exploration of the two smaller mounds was made, but without discovering anything.

¹ Reprinted from *The American Naturalist*.