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neither collected nor noted by me, there is a total of 364 species of wild plants for two months' tour there. This will illustrate the comparative poverty of the flora of the country, since I have frequently in the Himalaya, in a tour of shorter duration, and not covering two-thirds of the ground, and with less experience in collecting than I had in Ladak, got more than double the number of species.

Seven of the species being cryptogamous, and three or four of doubtful identity, about 57 Natural Orders of flowering plants were represented in the collection, the following being about the number of specimens in each of the principal Natural Orders :—

Ranunculaceæ, .	17	Primulaceæ, .	9
Cruciferae, .	30	Gentianaceæ, .	8
Caryophyllæ, .	14	Boraginæ, .	5
Leguminosæ, .	21	Scrophulariaceæ, .	11
Rosaceæ, .	17	Labiatae, .	21
Crassulaceæ, .	10	Salsolaceæ, .	12
Saxifragaceæ, .	6	Polygonaceæ, .	13
Umbelliferæ, .	10	Graminæ, .	39
Compositæ, .	51	Cyperaceæ, .	9

In conclusion, I have again to beg that the Society may be lenient with this paper, as much of its incompleteness is owing to the absence of part of my material, and to the haste with which this has been written, in anticipation of the recess.

II. *Notes on the Famine Foods of Marwar.* By Assistant-Surgeon GEORGE KING, M.B., lately attached to the Marwar Political Agency. Communicated by Professor DICKIE, Aberdeen.

The substances resorted to by the very poor, as articles of food in times of famine, are probably pretty much alike in most parts of Northern India. With those used in our own provinces we are, unfortunately, but too familiar, yet as Marwar is a territory of which most Europeans know so little, I have ventured to throw together a few notes on the substitutes for the ordinary cereals which are being used there during the present severe famine. The accompanying specimens of the raw substances, and of the breads prepared

from them, were obtained by me in October last, in the districts of Joudhpore and Pallee, from famishing wretches who were then subsisting largely on them.

The Marwarees, in common with the inhabitants of the neighbouring states of Jeysulmere and Bikaner, are familiar with famine, or at least with scarcity. In all three states the annual rainfall is extremely small. There are no accurate statistics on record, but that of Marwar may be set down at about 3 or 4 inches, which (with the exception of a very uncertain fall of about a quarter or half-inch in the cold weather) is confined to the latter end of July, August, and September. The rain-crops afford the staff of life, for owing to the scarcity of water for irrigation, and its depth* in many cases from the surface, the area of wheat cultivation is very limited, and pulses are grown scarcely at all. Wide tracts of land are hurriedly ploughed after the first shower of the rainy season falls, and *joar* and *bajra* are sown. But even the fate of these crops is very uncertain, for if the scanty rainfall of 3 or 4 inches is not distributed in showers falling at reasonable intervals, they become stunted, and the yield of fodder (in these parts as important as grain) is insufficient for the support of the cattle. The crops having been reaped, these tracts lie quite fallow until next rains, and are almost undistinguishable from the surrounding "jungle," if the term can be applied to such a comparative desert.

The states I have mentioned are essentially pastoral. In Bikaner, camels are reared in enormous numbers, and in Marwar the wealth of the people lies chiefly in their horned cattle, while in none of the three is sufficient grain grown for the support of its own inhabitants. After the rains a scanty crop of grass springs up, which, with the dry stalks of the *bajra* and *joar*, affords the year's supply of fodder for the cattle. Camels find their chief food all the year round in the leaves and twigs of *Zizyphus*, *Salvadora*, *Acacia*, and other jungle shrubs.

On the first symptoms of a failure of grass, the majority of the horned cattle are driven off under the care of the younger men to seek forage in Malwah or Guzerat, a few bullocks being left to conduct ploughing operations, should

* In Bikaner, some of the wells are more than 800 feet deep.

showers fall in time to give any hope of a rain crop, and to prepare the soil for the cold weather crop, small as it is. Poorer people who have no cattle, aged and infirm people, and children, do not leave the country until pressure for human food begins to be felt.

Last year, so early as the middle of August, the wiser ryots had their flocks in motion towards Malwah, but as rain so utterly failed, many who put off their departure until a month later, were obliged to remain altogether on account of the weakness of their cattle, the impossibility of finding forage for them on the road, and the difficulty of getting food even for themselves. Not a few who had actually reached Guzerat, having sold their cattle and valuables, and being unable to find employment, returned to Marwar, preferring to die in their homes, if it must come to that, and, like true natives, trusting for something to turn up. But the scarcity is not of food only, but of water also, and many a poor wretch was, I believe, prevented from fleeing the country, from his inability to walk from one well of sweet water to the next, much of the Marwar well water being brackish, and the supplies of superficial water having, of course, been exhausted at an early period of the drought.

With reference to the general subject of scarcity and famine in Rajpootana, the conviction has been forced upon me that these are more common of late years than in times past. This is the confidently expressed opinion of many intelligent old Marwarees with whom I have conversed on the subject. Scarcity is, indeed, now quite a chronic condition in many parts of Marwar. There is no evidence to prove that this rises from increased population. The character of the government of the country during the reign of the present and of the last two or three rajahs, has not been such as to render that a probable solution; besides, it is known that the population of the towns, at any rate, has decreased of late. On the other hand, there is a strong impression among the inhabitants that the cause lies in a diminution of the products of the soil, due to a steadily increasing failure of rain. In the absence of meteorological records the question cannot be settled, but I am inclined to think that this is the explanation.

Much attention has been attracted of late to the reciprocal

influence of the vegetation of a district and its rainfall, and the old observation—*that as trees are cut, moisture is lessened*, has been abundantly verified. It is needless to say that in Marwar this principle is unrecognised, and that there is no system of forest conservancy. There does not appear to have been of late any unusual destruction of forest products. For ages the struggle for life in the plains of Marwar has been between men and cattle on the one side, and vegetation on the other. It is an unequal fight, and vegetation is now losing. Nothing is conserved; the few indigenous trees are cut down, and none are planted in their stead. Even shrubs are not spared. Any one who has seen the hedges from 6 to 10 feet high and about as broad, made of dead prickly shrubs, that surround a Marwar village and its fields, can understand what drafts are made on the scanty undergrowth of the jungles for this purpose only. Many more are sacrificed in the preparation of "pala"* as fodder for cattle and camels, as well as for firewood. Herbaceous plants fare no better. These are nowhere numerous, but on the first sign of drought their roots are dug up as fodder for cattle, sheep, and camels. By such measures not only is the influence of vegetation, as at once the conservator and attractor of moisture, interfered with, but the hard surface being broken up and loosened by the removal of the roots that bind it into consistency, the naturally light and sandy soil is exposed to the full force of the prevailing west and south-west winds.

The territory of Marwar lies between the Aravalli range of hills on the east, and the desert on the west, and the fertility of any part of it is in direct proportion to its distance from the latter boundary. At the base of the Aravalli lies Godwar, the garden of Western Rajpootana, while on the margin of the desert is situated the barren and inhospitable district of Mullānee. Sandstorms of long duration and great severity are extremely common at certain seasons, and they invariably blow from the west. Much that I saw and heard during a year's residence in Marwar, leads me to believe that the loose sand of the west is

* "Pala" consists of the dried leaves of *Zizyphus*, the commonest jungle shrub in Marwar. To obtain it, the bushes are cut down and the leaves are shaken off the withered branches.

gradually overwhelming the east, and as the process goes on, the reign of barrenness extends eastward.

It would be rash to say that the ruthless destruction of vegetation just described is the sole cause of the alleged increasing frequency of scarcity in Marwar; but it may with safety be admitted that some attention to the conservation of forests (including in the latter term all the vegetable products of waste lands) would be likely to increase the supply of moisture in these regions. Every one knows the difficulty of planting trees in a dry district where the soil has been opened up to the influence of the sun and air, and where all shade has been removed by the cutting of trees.

Dry as Marwar is, however, several species of trees and shrubs could be successfully planted in the rainy season.

Chief among these are the three species of *Acacia*—*arabica*, *leucophlœa*, and *Catechu*—*Salvadora persica*, several species of *Zizyphus*, and *Capparis aphylla*. The two first-mentioned are valuable as timber trees.

Should a railway, as is proposed, be laid down in Rajpootana, the subject will become one of importance to our interests; but without the interference of our Government nothing whatever will be done by the native rulers, whose interests are really most affected.

The chief jungle products being used as food during the present famine in Marwar are as follows:—

1. *Mothee*.—This is the root of *Hymenochaete grossa*, of the natural order *Cyperaceæ*, a tall rush which grows on the margin of tanks. It is not eaten by cattle, but in times of famine the root is eagerly dug up for human food. The fibres and dark cuticle being removed, the solid part of the root is dried, ground, and made into bread, a little flour being sometimes mixed with it. The accompanying specimen of the bread I got from a man who, with his family, was making his dinner of it. Even when freshly made, the bread is dark brown in colour, and has a sour and earthy taste. Roots of other species of rushes besides that named above are also collected under the name of "*Mothee*," but not in any quantity.

2. "*Kejra*."—The bark of *Acacia leucophlœa*, a tree common in Rajpootana. Bread is made from the ground bark,

with or without the addition of flour. It has an astringent bitter taste, and is far from palatable. On the principle of *experimentum in corpore vili*, I made my sweeper fare on it for a day. The poor man suffered a good deal of griping and discomfort in consequence. I found this to be the usual experience for the first few days that either this or *Mothee* are eaten, but ultimately the stomach gets accustomed to the nauseous food. The young pods of several species of *Acacia* are eaten as vegetables even during times of plenty; and such of their seeds as had ripened were this season ground into a flour, but the quantity available was very small.

3. *Broont* or *Bharoont*.—The seed of *Achyranthes aspera*, a plant common all over the plains of India. When the outer covering of the seed has been removed, as in the specimen which I have forwarded, a wholesome-looking grain remains. The bread made from it is very good, and this is considered the best of all the substitutes for the usual cereals.

4. *Gokhur-Kantee*.—The capsules of *Tribulus lanuginosus*, of the natural order *Zygophyllaceæ*, a decumbent herbaceous plant of wide distribution in India. From the difficulty of collecting it, this does not take a prominent place as a famine food. The unopened capsules are ground down into a rough kind of meal; but from the small proportion which the contained seeds bear to the tough fibrous tissue of the seed-vessel, the bread, of which a specimen is shown, must be indigestible, non-nutritious, and irritating.

5. *Maleecha*.—The seed of a species of grass (probably an *Eleusine*). I have no sample of the bread made from this, neither could I obtain any specimens of the plant itself so as to identify it.

6. *Tilli*.—The refuse of the seeds of *Sesamum orientale*, remaining after the oil has been expressed. This is not made into bread, but is boiled with water into a kind of soup. The specimen exhibited was brought from a bunniah in Joudhpore bazaar, who was selling it to an eager crowd at the rate of seven seers for a Company's rupee. In Marwar this substance is largely stored up by bunniahs against seasons of scarcity. It keeps for many years without further deterioration than a darkening of colour.

7. *Seeds of various Cucurbitaceous Plants.*—Water-melons of great size grow in a semi-wild state in enormous numbers in Bikaner, and some parts of Marwar, during the rains. The seeds of these, of cucumbers, pumpkins, and melons, are stored up against scarcity. They make a not unpalatable bread.

With the exception of Tilli cake, none of the articles just enumerated can be had to buy. *Mothee* will not keep, but the others are hoarded up in their houses by the poorer people themselves for their own use when the crops fail. These hoards are, however, insignificant, and are soon exhausted during seasons like the present, when in many parts of Marwar no rain whatever has fallen for more than a year.

III. *On the Parasites which affect the Government Timber Plantations in South India.* By Dr CLEGHORN.

Dr Cleghorn adverted to the injury done to the plantations of teak in Malabar, and to the Australian plantations on the Neilgherry Hills, by various species of *Loranthus* and *Viscum*, which are rapidly propagated, and not easily kept down. The fruit of these loranthaceous plants forms the favourite food of several birds, which deposit the seeds, coated with viscid matter, in the angles of the upper branches. The only remedy is amputation, the affected branches being foreshortened by long-handled chisels. He particularly noticed the occurrence of *Loranthus memecylifolius* on *Acacia melanoxylon* (a tree introduced from Australia), and *L. longifolius* on *Tectona grandis* (teak). He also exhibited a specimen from the University Herbarium, showing a *Viscum* growing parasitically on a *Loranthus*.

IV. *Mosses Indigenous to Forfarshire not included in the Flora of Forfarshire.* By the Rev. JOHN FERGUSON, New Pittligo.

The mosses mentioned in this list are new to Forfarshire, and have been gathered principally in Clova, between the dates of Christmas 1866 and Christmas 1868. The great majority of them have been discovered by myself, either