CHAPTER I—DESCRIPTIVE.

A.—Physical Aspects.

Name in vernacular with derivation : area.

THE Hissar District is the most western of the districts of the Ambala Division. It lies between 28° 36′ and 30° 1′ north latitude and 74° 31′ and 76° 22′ east longitude. It takes its name from the town of Hissar, which is the head-quarters of the local administration. The town of Hissar was founded by Firoz Shah, Tughlak, in the fourteenth century and named after him Hissar Feroza, the fort of " Feroz " ; the name was subsequently contracted to Hissar.

The district, which has a total area of 5,212 square miles, lies on the confines of Rajputana and forms part of the great plain which stretches from Bikaner to Patiala. Like the districts of Simla and Rohtak, Hissar has no river frontage.

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It is bounded on the south by the Dadri territory of Jind and the Native State of Loharu ; on the east by the British district of Rohtak and the Native States of Jind and Patiala, the latter of which also stretches along its north-east border ; on the north it is bounded by the Ferozepore District ; and on the west by the prairies of Bikaner.

It is thus completely surrounded by Native territory, except where it touches the districts of Rohtak and Ferozepore. Until 1890 the district was divided into six tahsils, *viz.*, those of Bhiwani, Hansi, Hissar, Barwala, Fatehabad and Sirsa. The Barwala Tahsil was, however, abolished with effect from 1st January 1891, and its area distributed among Tahsils Hansi, Hissar and Fatehabad. This change also necessitated the transfer of some villages from the Hissar to the Bhiwani Tahsil.

Town.	North latitude.	East longitude.	Height above sea-level.
Hissar	29°10′	75°46′	689
Hansi	29°6′	76°0′	705
Bhiwani	28°48′	76°11′	870
Barwala	29°22′	75°57′	730
Fatehabad	29°31′	75°30′	720
Sirsa	29°32′	75°4′	738

The latitude, longitude and height above sea-level of the principal places in the district are shown in the margin.

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The general aspect of the district may be described as a level plain or prairie, stretching from the north-west to the south-east, and unbroken by any natural irregularity, except in the south-western corner, where some of the detached peaks of the Aravalli range stand out against the horizon. The highest of these is the Tosham hill, 800 feet high.

The soil of the district changes gradually from light sand on the western border to a firm loam on the confines of Rohtak, Jind and Patiala.

On the extreme north of the district we have a tract of light loam in the Rohi of Sirsa; south of this, after crossing a strip of hard alluvial clay in the Ghaggar valley, the sandy tract is reached, and this stretches down the western portion of the district till the Bhiwani Tahsil is entered, where the district presents the appearance of a sea of sandy billows of a more or less fluctuating nature.

To the east of this sandy strip the soil gradually changes to a firmer loam but still interspersed with sand hillocks, which become fewer as the eastern border of the district is approached.

The only variation from this general description is to be found in the tract through which the Ghaggar flows where the annual floods have in the course of centuries covered the sand with a thick deposit of hard clay. Much the same result is being attained in the case of land irrigated by the Western Jumna Canal. The silt deposited in the course of irrigation operations is gradually making the soil firmer and more productive.

In accordance with local usage and phraseology the whole area of the district may be divided into four parts, or, including the small Jungal part of Budhlada, into five.

At the northern extremity of the district we have the Rohi of Sirsa; south and south-west of this the Bagar of Sirsa, Fatehabad, Hissar and Bhiwani; west of this again comes the tract known as Hariana, which extends over all the four southern tahsils of the district. Stretching to a short distance on either side of the Ghaggar stream, which flows in an easterly direction across the northern part of the Hariana of Fatehabad and the Sirsa Bagar, lies the tract known as the Nali.

The fifteen outlying villages to the north of Tahsil Fatehabad transferred from the Karnal District in 1889 lie

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in the Jungal tract which, broadly speaking, includes the area lying between the Ghaggar and the old bank of the Sutlej and which differs in name only from the Rohi of Sirsa.

Rohi.

The characteristic feature of the Rohi is a soft reddish loam locally known as *ratti* (red) or *rohi* (soft), occasionally interspersed with sandy patches and generally having some admixture of yellowish clay soil. The tract stretches from the northern edge of the Ghaggar valley to the northern boundary of the district. The water level in the wells in this region is at an average depth of 180 feet, except near the boundary of the tract watered by the Ghaggar, where it is 40 feet and under. Under such circumstances well irrigation is impossible, and the whole of agriculture is dependent on sufficient and seasonable rainfall, except in the case of a few villages watered by the Sirhind Canal. Vegetation, especially in the form of trees, is sparse, except near the villages where the *pipal* and *bar* trees are occasionally found. The tract in many points resembles the more southern Hariana, which will be noticed below.

Nali

South of the Rohi we come to the western extremity of the Nali tract which stretches from east to west through Tahsils Fatehabad and Sirsa. It owes its name (which means river channel) to the fact that it is traversed by two streams, the Ghaggar and the Joiya or Choya. The latter is now merely a subsidiary channel of the Ghaggar, but was at one time undoubtedly the more important of the two. The characteristic feature of the tract is the hard clay soil, locally known as *sotar*, which it is impossible to cultivate until it has been well saturated by summer floods. Successful cultivation in this tract depends on a nice adaptation of the rise and fall of the floods to the times best suited for sowing the *kharif* and *rabi* crops, and even when these have been successfully sown, good winter rains are needed in order to bring the *rabi* crop to full maturity, while an untimely freshet coming down the stream late in the year may cause the destruction both of *kharif* and *rabi*.

In Tahsil Fatehabad the main stream of the Ghaggar is deeper and narrower than in Sirsa, where it is much shallower and the banks far more shelving and of far gentler slope. The result is that a far larger area is flooded in the latter than in the former tahsil.

In the Fatehabad Nali there are large areas of waste land which provide excellent grazing for cattle. Between

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1863 and 1890 much of this waste was brought under cultivation, but since 1895, when the drought began and the Rangoi cut ceased to work satisfactorily, the area of waste has increased. The tract is the great grazing ground for cattle from the Bagar and Hariana villages, and in the rains animals are also brought here from the neighbouring district of Karnal. Natural vegetation is far more abundant here than in any other part of the district, except a portion of the Sirsa Nali. The *dab*, the principal grass of the tract, has given the name of Daban to the villages on the main stream of the Ghaggar. The Sirsa Nali is now much more extensively cultivated than the Fatehabad Nali. The increase in cultivation is most marked in that part which lies immediately to the east of Sirsa town and which is the old bed of the Ghaggar river. It is due to the extension to the tract of the Western Jumna Canal. Below Sirsa there are also large areas of waste in the Nali, but the grazing is not as good as in Fatehabad. Much of this waste is land which has fallen out of cultivation, because it no longer receives flooding from the Ghaggar river.

Bagar.

The Bagar tract stretches from the south and south-west of Sirsa along the western border of the district, gradually widening and extending towards the south. Here the prevailing characteristic is a light sandy soil and shifting sandhills interspersed in places with firmer and in parts loamy bottoms. The sandhills are known as *tibba* and the firmer valleys between as *tals*.

The depth of the water level is well over 100 feet and the water frequently bitter; well irrigation is thus out of the question, except in the neighbourhood of the Tosham hills, where water is nearer the surface. Practically, the only crop sown is the *kharif*, though *rabi* cultivation is undoubtedly on the increase.

Cultivation is carried on with no ordinary difficulty; if there is no rain there is no crop, not even a blade of grass; while too heavy rain will wash the seed out of the soil or choke it in its germination with sand washed down from the neighbouring hillocks, so that cultivators have frequently to sow three or four times in one harvest. Dust-storms often overlay the sown field with a thick layer of sand, and the plough has to be driven afresh over land which had previously been the site of a sandhill. But against all these disadvantages there are compensating advantages. The labour of ploughing is next to nothing owing

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to the lightness of the soil ; again the light soil requires less rain for the production of a crop than the heavier soils of Hariana, so that there will be a crop, scanty indeed, in the Bagar when the richer soil to the west lies unsown ; moreover, with a moderate rainfall the loamy valleys of the Bagar benefit largely by drainage from the sandhills.

Hariana.

The Hariana tract is perhaps the most important area in the district, containing within its limits the bulk of the Jats who form the main element in the population. It stretches from the confines of the tract watered by the Ghaggar to the south-east corner of the district. On the north it stretches across a considerable portion of the Fatehabad Tahsil, but gradually narrows in width towards the south, being encroached upon by the Bagar sand. It comprises within its limits the eastern portions of Tahsils Fatehabad and Hissar, the whole of Tahsil Hansi and a small portion of the eastern half of the Bhiwani Tahsil, and is traversed by the Western Jumna Canal.

The leading feature of the tract is its firm clay soil, locally known as " karri " or " kathi " opposed, on the one hand, to the *sotar* or hard clay of the Nali, and, on the other, to the light shifting sand of the Bagar. Sandhills are to be found, however, scattered here and there, even in the Hariana, while in low-lying spots affected by local drainage the soil becomes hard and clayey and is called *dakar*.

As noted above, the richer soil of the Hariana requires a more ample rainfall than that of the Bagar, and with a sufficiency of seasonable rain is very productive ; but, on the other hand, no crop can be raised on the scanty falls which suffice for the Bagar ; and there is in addition to this the absence of local drainage from sandhills. To meet this the cultivators have been in the habit of leaving elevated pieces of land uncultivated to serve as water-sheds (*uprahan*) for drainage which is carried by means of watercourses (*agam*) to the fields. These are gradually disappearing with the spread of cultivation. The labour of ploughing is also considerably greater in the Hariana than in the Bagar.

The depth of the water level is generally considerably over 100 feet, except in the canal villages where it falls to 30 or 40 feet. The cost of building a *pakka* well varies from Rs. 1,500 to Rs. 2,000 ; well irrigation is in consequence practically unknown, except on the borders of the canal tract. Except in years of good rainfall the general aspect

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of the country is that of an inhospitable desert. A traveller passing through the district by train between November and July finds it difficult to believe that the soil can produce any green herb for the service of man. Between August and October, if the rainfall has been favourable, the country looks fairly green, and the outlook is more pleasing to the eye, though the prevailing tint is still derived from the uncultivated patches of sand.

The Ghaggar and Joiya Streams: lakes.

The Hissar District cannot boast of a river within its limits. The nearest approach to one is the Ghaggar stream, which flows across the northern parts of Tahsils Fatehabad and the central portion of the Sirsa Tahsil, and which has been identified with the sacred Saraswati, "the lost river of the Indian desert."

The Ghaggar rises on the outer Himalayan ranges between the Jumna and the Sutlej, enters the plain as a rapid and variable mountain torrent, passes near Ambala, and after a south-westerly course of about 70 miles, chiefly through the Sikh State of Patiala, bends to the west through the Hissar District and the Rajput State of Bikaner, where it is finally lost, some 290 miles from its source. Before entering the Hissar District it is joined in Patiala territory by the united streams of the Sarsuti and Markanda, and indeed receives all the surplus waters of the numerous hill torrents which cross the Ambala District between the Jumna and the Sutlej. Of the numerous drainage channels through which the Ghaggar flows, the best defined is that known as the Sotar, from the rich clay soil which is characteristic of this channel. The Sotar is a valley varying in width from three to six miles, of no great depth, and usually almost quite level from side to side, but distinctly marked off from the light-coloured loamy soil of the plain, through which it passes by a clearly defined bank or sand-ridge on either side, and still more by its dark rich clay soil free from admixture of sand, and producing a vegetation of a different character from that of the surrounding country. According to recent tradition the main stream of the Ghaggar flowed along the whole course of this valley so lately as within the last hundred years, but its waters were, either by man or nature, diverted from the Sotar valley at a place called Phulad in Patiala territory before it enters the Hissar District, into one of the other comparatively insignificant drainage channels, with which the country is intersected; and now little of the water from the hills comes along the Joiya or Sotar

from the Fatehabad direction. The drainage channel, which now carries nearly all the water of the Ghaggar, is known to the people as the Nali, or channel.

This channel enters the district near Jakhal near the commencement of the Sotar valley, and, after a westerly course past Ratya, crosses a protruding neck of Patiala territory, and re-enters the district a few miles south of Rori. It passes some four miles north of Sirsa, and rejoining the Sotar valley between Sirsa and Rania, flows along it into Bikaner territory. Before it reaches the Sotar, the stream is confined to a comparatively narrow bed between steep banks, and during the rains sometims reaches a depth of eight or ten feet. Here and there its banks recede and leave a broad and shallow channel, or the stream overtops the banks and floods the neighbouring land.

This is markedly the case in the Sirsa Tahsil, where the river used to form three lakes at Chanmal, Dhanur and below Rania. The construction of a dam below Otu has converted the lakes at Dhanur and Chanmal into one long lake stretching from Khaireke to the Otu dam in the rainy season. In the cold weather this lake shrinks to a small area of water just below Dhanur village, and by June it is usually quite dry. The large areas of land flooded in the rainy weather and left dry in the winter are sown with wheat and gram, and produce excellent crops. The lake near Rania was known as the Anakai swamp, but it was drained some years ago, and good crops of wheat, barley, gram and rape can now be raised in it in the winter. Below the Otu dam the river has cut for itself a deep channel in its bed, being helped just above, and for a considerable distance below, the Anakai swamp by the drainage operations already referred to. The result is that it does not now overflow the adjacent lowlands as much as it used to before the Ghaggar canals were dug. These are described later.

The Ghaggar is not fed by the snows, and though there is usually enough flood in the rainy season to make the use of boats necessary at crossing places, the stream always dries up in the hot season, and indeed seldom lasts beyond October. Sometimes a freshet comes down in the cold weather and refills the lakes, but generally in the hot weather the only water to be found in the Ghaggar bed is in the Dhanur lake, and in parts of the channel the river has cut for itself in its bed. The distance to which the stream reaches along the Sotar valley, before it is finally absorbed or evaporated,

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depends on the heaviness of the rainfall in the hills and the sub-montane tract. It seldom reaches Bhatner.

From the appearance of the Sotar valley, and the numerous remains of towns and villages which stud its banks all the way down to Bahawalpur, it is evident that at one time it conveyed a much larger volume of water than at present, and probably was the channel of a perennial stream. But although it must have been, as it is now, the largest and most important of all the drainage channels between the Sutlej and the Jumna, it can never have carried a river at all approaching in size to either of these two. The valley is too shallow, and shows too few marks of violent flood action for this to have been the case; and there is none of the river sand which would certainly have been left by such a stream. The soil is all rich alluvial clay, such as is now being annually deposited in the depressions, which are specimens of those numerous pools which are said to have given the Sarsuti its name, "the river of pools"; and there seems little doubt that the same action as now goes on has been going on for centuries, and that the numerous mountain torrents of the Indo-Ganges water-shed, fed not by the snows, but by the rainfall of the sub-Himalayan ranges, wandering over the prairie in many shallow channels, joined in the Sotar valley and formed a considerable stream—at first perhaps perennial, but afterwards drying up in the hot season. At one time doubtless it reached the Panjnad, but afterwards became absorbed in the sandy tract through which it runs, after a gradually shortening course, as the spread of irrigation in the sub-montane tract intercepted more and more of the annual floods.

Near Sadhan was in the Fatehabad Tahsil a tail of the Ghaggar Branch of the Sirhind Canal discharges its surplus supply. This surplus water does more harm than good, as assisting in the steady though slow erosion of the bed of the Ghaggar that is undoubtedly in progress, at any rate in the Fatehabad Tahsil.

The water carried by the Choya or Joiya Nala never goes beyond the border of the Fatehabad Tahsil. This stream, as mentioned above, branches off from the Ghaggar Nali at Phulad in Patiala some five or six miles beyond the Hissar border, and proposals have at different times been made for improving the irrigation from it. These are referred to in the paragraph dealing with the Rangoi Canal.

Besides the lake at Otu, there is a lake or swamp at Musa Khera in the Fatehabad Tahsil, which is filled by the overflow of the Ghaggar in seasons of heavy rainfall, and a swamp just below the town of Fatehabad. Neither of these is perennial.

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Geology.

A sketch of the geology of the Province as a whole has been published in the Provincial Volume of the Gazetteer.

In a level and in many parts sandy tract like Hissar it is not to be expected that minerals should be discovered in any noticeable quantities.

Kankar or argillaceous limestone in nodules is found in many localities in the district, and the hard kind is largely used for road-making. The only other mineral product is crude saltpetre, which is manufactured from *shora* or saline earth. The earth is dug out and placed in a heap or mound near the village site, an earthen channel connects the mound with the evaporating pans, water is poured on the saline earth, and the resulting dark brown liquid drains off into the pans and is left there to evaporate by solar heat. In some cases the manufacture is carried on by means of solar evaporation alone, while in others, after a certain amount of evaporation, the material is boiled in an iron caldron (*karahi*) for six hours. In either case the resulting product is dirty brown crystals of crude saltpetre. These are purified and re-crystallized by the contractors at Bhiwani, Hansi or Sirsa where there are licensed refineries. The right to work the saline earth in a village is generally sold by the proprietors to the contractor, who works under a Government license for which a nominal fee of Rs. 2 is paid.

Botany—Grasses.

Of all the natural products of the district the most important are the grasses, which formerly covered the whole country, and still abound in good seasons on the land which has not yet been brought under the plough. In the dry tract perhaps the best grass is the *dhaman* (pennisetum cenchroides), a tall grass with a succulent stem, much valued as food for cattle and often preserved as hay. It is common in the pasture-grounds of Bikaner and seems to have been formerly common in this district, but it was one of the first grasses to give way before the plough, as it grew on the best lands which were first brought under cultivation. It is now somewhat rare except in the Hissar Bir. Among the commonest grasses is the *chimber* or *kharimbar* (eleusine flagellifera), a shorter grass readily eaten by cattle; this grass is called by the Bagris *ganthil* or *bhobarya*.

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Another common grass in the dry country is that called by the Panjabis *khoi* or *khavi* and by the Bagris *bur* (andropogon lainger) also eaten by cattle; its red colour when ripe gives a tinge to the general landscape where it abounds. The *sain* or *sewen* (eliomorous hirsutus) is a tall coarse grass growing in high tufts with many stalks on one thick root stem, and several long narrow ears on each stalk. It is eaten by cattle even when dry; camels like it only when it is green and tender; horses are especially fond of it. *Garhaum* is a very tall grass with long thin stalks growing from a knotty root-stem, not often found growing by itself, but generally round a *kair* bush. Cattle eat it when dry; if they eat it when green and young, they are apt to swell, sometimes with fatal result. The smoke from its root-stems is used as a disinfectant in small-pox; before entering an infected house a visitor fumigates his person over a fire made from them. *Duchab* (cyperus sp.), a low grass, which remains green all the year, and is eaten by the cattle, has long spreading roots which cover the ground in all directions and are difficult to eradicate. It is said to have grown faster where sheep have broken up the surface with their feet, and is much complained of in poor sandy soil as preventing cultivation and ruining the land. The *bhurt* (cenchrus echinatus) is a grass which forces itself on the attention by its numerous prickly burrs or seed-vessels which seize firm hold of clothes or skin with their hooked thorns, and are difficult to dislodge. Its seeds are sometimes eaten in times of famine. It is a low grass with a whitish appearance common in poor sandy soil and characteristic of the Bagar. Among grasses characteristic of the hard soil of the Ghaggar valley are the *khabbal* or *dub* (cynodon dactylon), a low jointed grass well-known for its excellent quality as a fodder for cattle and horses; the *dila* (cyperus tuberosus), a coarse grass of little use, eaten by the cattle only when young, common in the low-lying moist lands, and especially in deserted rice fields; the *sanwak* (panicum colonum) eaten by cattle when green, and producing a grain which is eaten by Hindus on fast days, and sometimes made into bread or boiled with milk by the poor; and the *panni* (anatherium muricatum), a grass which grows very thickly and to the height of eight feet in the marshy land of the Ghaggar. The leaves of the *panni* are used for thatching, and its roots are the *khas* used for tatties. They are dug up by the residents of the neighbouring villages, who sometimes pay the owner of the ground a small fee of

four annas per digger for the right to dig, and sold at about a rupee per maund to Banias who send them to Lahore and Ferozepore. The *panni* growing in the Sirsa Tahsil near Amritsar village is said to produce particularly good *khas*.

The *sarkanda* or *sarr*, pure and simple, is found on the Ghaggar and in the Bagar. The thin stalks (*kana*) are used for thatching, for coverings for carts, and for making the *chajj* or winnowing basket.

Shrubs.

The *ak* (calotropis procera) is found everywhere, generally on poor sandy soil. Its leaves are eaten by goats, and are, sometimes, when dried, used as dishes for holding food. Its bark fibre is sometimes made into rope. Near the *ak* and growing on its roots is frequently seen pushing through the sand the *margoja* or *bhumphor* (earth splitter) (phelipœa calotropidis), an orobanchaceous parasite with leafless succulent stems terminating in purple flower-spikes of peculiar appearance. It is said to grow also on the roots of the *bui* and *phog*. A solution of it is given as medicine to horses. Among the characteristic plants of the dry country is the *bui*, a low, whitish plant with flower-heads like "fox-tails," which gives a greyish white appearance to the country where it abounds. It is found chiefly on sandy soil, and is taken by camels; cattle eat it only in times of scarcity. Another is the *lana*, a plant of same size, the leaves of which are eaten by camels, and the stalks used as fuel. The *sajji* plant (salsola), from which barilla is made, used to be much more common in the district than it now is; it has, like the *dhaman* grass, given way before the plough, and is now hardly found except near Ellenabad and in the Hansi Bir. Goats and camels are very fond of it. No attempt has been made to propagate it, but it might be worth while to try. The manufacture of *sajji* is sometimes carried on by the proprietors of the land themselves, sometimes by contractors, generally of the inferior castes (Kumhar, Bhangi or Machhi) who give half or one-third of the produce to the land-holders as their share, or sometimes pay them Rs. 50 or Rs. 100 a year for leave to cut the plant from the village waste. The bushes are cut when in flower about December, allowed to dry in the sun and then burnt in a pit in the ground. The liquid matter, which exudes from the burning plant, cools into a hard mass, something like the refuse of smelting furnaces. This is the *sajji* or *khar* (barilla) of commerce, an impure carbonate of soda extensively

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used for washing and dyeing cloth and tanning leather. Another plant, characteristic of the dry tract, is the *tumba* (citrullus colocynthius) with its trailing stems and beautiful green and yellow orange-like fruit scattered in profusion over the sandhills. The *tumba* is eaten only by goats, for which it is sometimes gathered in quantities. A preparation from it is sometimes used as medicine. The *pheg* (calligonum polygonoides), one of the most abundant and characteristic plants of the Bikaner desert, is found on the Bikaner border in sandy soil. The *dhodh* or *dudhe* is a small milky plant eaten by sheep and goats. The *lathya*, a small plant with pink flowers, is common and is said to be a sign of bad soil. So are the *dhamahan*, a low prickly plant with many small white flowers and the *gandi buti* with its yellow flowers. Another plant of the dry tract is the *lamb*, with peculiar seeds having thorns attached to them; the *khip* or *khimp*, called also *sani*, the wild Indian hemp (crotolaria burhia) is also common in the dry tract, and is often used for making ropes. Of the smaller plants characteristic of the alluvial soil of the Ghaggar valley the most conspicuous are the weeds which infest the cultivated land and lessen its produce, sometimes very considerably. Among these is the camel thorn called variously *jaman*, *janvasa*, *jawanya*, *dhanwasa* and from its thorns, *kanda* (alhagi maurorum), a small prickly plant with red flowers; it is eaten by camels and makes good tatties; it infests the wheat-fields subject to inundation. The *katara*, *kateli* or *satyanas*, a tall thistle-like plant with a yellow flower, is found on poor alluvial soil. So is the *leh*, a low prickly thistle-like plant with long spreading roots. Another weed is the *bakra* or *kuti*, so called because its flower-heads resemble a catterpillar (*kuti*). The *mudphal* is a weed which infests rice-fields.

Bushes and trees.

The characteristic bush of the dry tract is the *jharberi* (zizyphus nummalaria), whose small red berries are largely eaten by the poor classes, especially in times of scarcity, and to some extent sold in the towns, while its thorns make capital fences, and its leaves, known as *pala*, are an excellent fodder for cattle. They are stripped off in November and stored or sold. The *jharberi* grows chiefly in cultivated fields, and seems to have spread largely since the waste was brought under the plough. It is especially abundant in the light soil of the sandy tract; in the Sikh villages its growth is discouraged, and it chokes the grain crops. When protected, as it sometimes is, it attains a height of about 12

feet, but it is usually a small bush not over four feet high. Almost the only indigenous tree of the dry tract is the *jand* or *jandi* (prosopis spicigera) which is sometimes found standing by itself out in the field, but more often in clumps round the village ponds. It is generally of stunted and irregular growth, but reaches the height of 30 feet or more. Its wood is used for agricultural implements, but is not durable, being very liable to the attacks of insects. Its pods (*sangri*) are used as fodder for cattle, and in times of scarcity are eaten by the poor. Its wood is used for the sacred fire (*hom*). The *kair* and *van* are two common shrubs found scattered throughout the district, comparatively rare in the dry tract, but especially characteristic of the hard alluvial soil of the Ghaggar valley, where they reach a considerable height and form in places, with the *jand*, *kikar* and *frash*, an imposing jungle. The *kair*, called also *kari* or *karil* (capparis aphylla), with hardly any leaves, is conspicuous in the beginning of the hot weather in the general absence of bright colours by its dull red flower (*bata*), which covers the shrub abundantly, and is in hard times ground and eaten mixed with flour. Its unripe green fruit (*dela* or *tet*) is boiled and eaten, and the ripe fruit (*pinju*) is very largely eaten, especially in times of scarcity. There is a not uncommon variety of the *kari* with whitish branches and yellow flower and fruit. The *van* or *jal* (salvadora oleoides) is very often found along with the *kari*. Its wood is valued for rafters, as it is little subject to the attacks of insects. Its fruit (*pil* or *pilu*), which ripens in the hot weather, is also of great use to the poor in times of scarcity. Among the trees which seem to have been introduced into the district within the last century or so, the most common and most important is the *kikar* (acacia Arabica), which is now found all over the district, but especially near the Ghaggar and Sutlej where there are some large-sized trees. Its wood is strong and durable, and much valued for agricultural implements, and charcoal made from it is considered among the best. A fair-sized tree sells as it stands for about Rs. 12. The pods of the *kikar* (*phaliyan*) are gathered as food for cattle and goats, its bark is used in tanning leather and in making spirits, its gum is eaten, and is used in making ink, selling sometimes at 12 annas per *ser*, and its leaves and twigs are used as fodder in times of scarcity. The variety with close ascending branches called *Kabuli kikar* (acacia cupressiformis) is found here and there. The *babul* (acacia Jaquemonti), which is very like the *kikar*,

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Physical Aspects.

Botany—Bushes and trees.

but does not attain the size of a tree and has generally more numerous yellow globes of sweet-scented flowers, is also found in places. The *rohera* (tecoma undulata), with its numerous large, bright, orange-coloured flowers, is a beautiful tree when in full bloom. The *farash* or *pharwan* (tamarix articulata) is common in the jungle of the Ghaggar valley near Rania. A number of *sirin* or *siris* trees (albizzia lebbek) have been planted with success, and the *tali* or *shisham* (dalbergia sisoo), one of the most useful of trees, has been propagated near Hissar, Hansi and Sirsa, and along the canal banks and roads. So has the *nimb* (melia Indica). The *ber* (zizyphus jujuba) was largely planted by the Customs authorities along their Line, and has spread into the neighbouring villages and fields, where it is now common; it is useful for its fruit and grows easily in dry soil, though the best fruit trees grow in gardens on irrigated land. In the dry tract near most villages may be seen one or two specimens of the *pipal* (ficus religiosa) and *bar* or banyan (ficus bengalensis), nourished with much care by the Hindu villagers.

Animals, insects, birds and fish.

In this district with its dry climate and general absence of water and trees, animals are comparatively scarce. Even insects are rare than elsewhere. The most noticeable are those whose presence could be most easily dispensed with. The housefly abounds especially near the towns; the white ant does great damage, not only to timber and garnered grain, but to growing trees and crops: black ants are common, and ants of smaller kinds may be seen in long lines busily engaged in transporting their stores along their well-beaten tracks. Mosquitoes and sandflies do their best to make life a burden and in the Ghaggar valley in the rains the *danki*, a large gnat, drives men and animals wild, and the villagers have often to take away their camels and cattle into the dry country to avoid its attacks. Caterpillars and worms of sorts attack the crops, and at times seriously diminish the produce. Large flights of locusts visit the district almost every year, and sometimes devour every green thing in their path. A small woolly insect does great damage to woollen clothing. Wasps, scorpions and spiders swarm in unfrequented bungalows, and the carpenter-insect may be heard boring his way through the woodwork. Beetles, moths, butterflies and other kinds of insects are represented here. The crickets, large and small, the ground beetle and the *birkahotti*, a kind of lady-bird with scarlet

velvet-like coat, are also noticeable. This last usually appears after rain in company with the earth-worm (*kinchara*), and is popularly supposed to fall from the sky.

Snakes, both venomous and harmless, are not uncommon especially in the moist lands of the Ghaggar valley, where they swarm on the raised embankments which divide the flooded rice-fields from each other. Among the venomous snakes may be mentioned the cobra (naja tripudians), the *karait* (bungarus coeruleus) and the *gurera* (echis carinata). Both house and field lizards are very common.

Fish are to be caught in the Ghaggar, and many tanks are stocked with the red and black *rohu*, and small specimens of the fresh water shark. Of birds the house sparrow is common enough to be a nuisance. The weaver bird is found in the Ghaggar valley and also near Hissar and Hansi. *Mainas*, parrots, blue jays, doves and crows are very common. Peacocks are found near most villages in a semi-domesticated state, and are regarded by Hindus as sacred. For this reason the shooting of peacocks is prohibited throughout the district. Hawks, kites and vultures abound near villages.

The white paddy-bird is common in the Ghaggar valley, and great flocks of the blue-coated *kunj* visit the district in the cold weather, and may be seen watchfully feeding in the fields on their favourite food, the young gram and barley, or hastening back in V-shaped flight to roost near the river for the night. Other water-fowls, including wild duck of various kinds, are common on the Otu lake. The grey partridge is found chiefly in the Ghaggar valley, and the black partridge in the Hansi Tahsil. Quails visit the district, but rarely, and in small numbers, and are most numerous in the Hissar Bir. The small sand-grouse (*bhartittar*) is numerous in the dry tract, and breeds in the district. The large sand-grouse (*Kashmiri titar*) and the florican (*tilaur* or *chhoti tughdar*) make their appearance in large numbers in the cold weather and disappear on the approach of heat. The great bustard (*gurvin or bari tughdar*) sometimes wanders across from the prairies of Bikaner and breeds about Chautala. It is ordinarily a shy bird, but is very bold in defence of its young, sometimes allowing itself to be knocked over by a blow from a stick rather than leave them Field-rats are common, and the ground is