

CHAPTER I.

THE DISTRICT.

SECTION A.—DESCRIPTIVE.

The Hissár district is the easternmost of the districts of the Delhi division. It lies between 28° 36' and 30° 1' north latitude and 74° 31' and 76° 22' east longitude.

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Lying, as it does, on the confines of Rájputána and forming a part of the great plains which stretch between Bikánir and Patialá, it shares with Simla and Rohtak, alone among the districts of the Punjab, the peculiarity of having no river frontage.

Position, boundaries, tahsíl divisions.

It is bounded on the south by the Dádri territory of Jínd and the Native State of Loháru ; on the east by the British district of Rohtak and the Native States of Jínd and Patialá, the latter of which also stretches along its north-west border ; on the north it is bounded by the Ferozepore district ; and on the west by the prairies of Bikanir.

It is thus completely surrounded by Native territory except where it touches the districts of Rohtak and Ferozepore. Until recently the district was divided into six tahsils, viz., those of Bhiwáni, Hánsi, Hissár, Barwála, Fatahabad, and Sirsa. The Barwála tahsíl was, however, abolished with effect from January 1st, 1891, and its area distributed among Tahsils Hánsi, Hissár and Fatahabad. This change also necessitated the transfer of some villages from the Hissár to the Bhiwáni tahsíl.

Some leading statistics regarding the district and the tahsils into which it is subdivided are given on the opposite page in Table No. I.

The district contains four towns with a population of more than 10,000 souls as follows :—

Bhiwáni	...	...	...	35,468
Hánsi	...	...	...	14,085
Hissár	...	...	...	16,854
Sirsa	...	...	...	16,415

The administrative head-quarters are situated at Hissár, which is somewhat to the south of the central part of the district.

Hissár stands seventh in order of area and tenth in order of population among the 31 districts of the Province, comprising 4.68 per cent. of total area, 3.72 per cent. of total population,

Chapter I, A. and 40 per cent. of the urban population of British territory.

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Position, boundaries, tahsil divisions.

Physical configuration and divisions.

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

Town.	North latitude.	East longitude.	Height above sea-level.
Hissár	29° 10'	75° 48'	699
Hánsi	29° 6'	76° 0'	705
Bhiwáni	28° 48'	76° 11'	870
Barwán	29° 22'	75° 57'	730
Fat áhabad	29° 31'	75° 39'	720
Sirsa	29° 32'	75° 4'	738

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, Jínd and Patiála.

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 Bhiwáni 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 washed away the sandy particles and converted the soil into iron clay.

On the banks of the Western Jumna Canal also constant irrigation has made the soil firmer, and where the irrigation has not been excessive richer 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 Budláda, into five.

At the northern extremity of the district we have the Rohi of Sirsa; south and south-west of this the Bágár of Sirsa, Fatahabad, Hissár and Bhiwáni; west of this again comes the tract known as Hariána 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 Hariána of Fatahabad and the Sirsa Bágár, lies the tract known as the Náli.

The 15 outlying villages to the north of Tahsíl Fatahabad, recently transferred from Karnál and known as the Budláda iláka, lie in the Jungal tract. The latter stretches into the Patiála State on the east and on the west merges into the Rohi of Sirsa, and, broadly speaking, includes the tract lying between the Ghaggar and the Sutlej.

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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 a depth varying from 180 feet on the north to 40 feet on the boundary of the tract watered by the Ghaggar. Under such circumstances well irrigation is impossible and the whole of the agriculture is dependent on sufficient and seasonable rainfall. Vegetation, especially in the form of trees is sparse, except near the villages where the *pipal* and *bar* tree are occasionally found. The tract in many points resembles the more southern Hariána which will be noticed below.

Rohi.

South of the Rohi we come to the western extremity of the Náli tract which stretches from east to west through Tahsíl Fatahabad and Sirsa. The tract may therefore be conveniently described here. It owes its name to the fact that it is traversed by two streams, the Ghaggar and its offshoot, the Joiya or Choya. The characteristic feature of the tract is the hard iron clay soil, locally known as *sotar*, which allows of no cultivation 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 maturity, while an untimely freshet coming down the stream late in the year may cause the destruction both of kharif and rabi.

Náli.

The rabi is by far the most important crop on the lands flooded by the Ghaggar, in fact in the kharif rice is practically the only crop in Tahsíl Fatahabad; and rice with a certain amount of *jowár* and *báira* in Tahsíl Sirsa. In the rabi the staples are wheat, barley and gram. The volume of flood water also varies so largely from year to year that agricultural results in this tract are peculiarly precarious.

In Tahsíl Fatahabad 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 tahsíl, but with a small depth of water, and in consequence the flooded area emerges sooner, sometimes soon enough to allow of kharif crops such as *jowár* and *báira* being sown on the fringe of the flooded area. In Fatahabad, on the other hand, the flow of water in the Ghaggar is more confined in a deep channel, and a much smaller area can be flooded than in Sirsa; in fact

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unless the Ghaggar is in full flood and the Joiya and Rangir channels filled, there will be but little spread of water; moreover owing to the contraction of the flooded area the depth of the floods is greater and the area to be sown does not emerge so soon, in consequence of which kharif crops, except rice, are practically not sown on the flooded lands, while the rice area itself is much less than in Sirsa, and is confined practically to the Joiya, the banks of which are less steep than those of the Ghaggar and allow of a somewhat greater spread of water.

Land is irrigated from the Ghaggar and Joiya, either by the natural spread of the water over the banks, though this is not often the case in Fatahabad where the banks are high, or along natural shallow widening depressions called *phats* branching off from the main stream, or by conducting the water along *nálds* or artificially made channels into natural depressions. The latter method is usually employed in the irrigation of the rice crop which requires a constant and equable supply of water.

Where the banks are high and the surrounding soil out of reach of the floods, water is raised by wells dug near the bank and communicating with the stream by means of a channel. Such wells when worked with the rope and leather bucket are called *tuyás* or if worked with the Persian wheel *jhállárs*.

In Sirsa another contrivance called the *Chambal* is used in places where the height of the bank is not great. It consists of a lever beam, to one end of which is attached a leather bucket which raises the water and the other end is weighted with stones. The apparatus is worked by one or more men walking alternately up and down the beam.

For a short distance on either side of the Ghaggar and Joiya where the water level is comparatively near the surface, irrigation is carried on from *kacha* and *pakka* wells worked with the *lao* and *charas*. This form of irrigation might be far more largely used were the tract in the hand of others than its present unthrifty Musalmán owners who form the bulk of the population.

There are large tracts of waste which provide excellent grazing for cattle, and which, until within recent years, were exclusively devoted to that purpose, but they are now being brought under the plough, and cultivation has very largely increased in Tahsils Barwála and Fatahabad since the settlement of 1863. The tract, however, is still the grazing ground for the Bágár and Hariána villages in years of scarcity. Vegetation is far more abundant than in the other parts of the district. The *dáb*, the principal grass of the tract, has given the name of Dában to the villages on the main stream of the Ghaggar.

Bágár.

The Bágár 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 "Táls."

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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 no doubt a more enterprising class of agriculturists than the present Bágri inhabitants would manage to raise a considerable area of rabi crops in the valleys of the Bágar with the help of local drainage from the sandhills.

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 sand-hill. But against all these disadvantages there are compensating advantages. The labour of ploughing is next to nothing owing to the lightness of the soil; again the light soil requires less rain for the production of a crop than the heavier soils of Hariána, so that there will be a crop, scanty indeed, in the Bágar when the richer soil to the west lies unsown; moreover with a moderate rainfall the loamy valleys of the Bágar benefit largely by drainage from the sandhills.

The Hariána 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 Fatahabad tahsíl, but gradually narrows in width towards the south, being encroached upon by the Bágar sand. It comprises within its limits the eastern portions of Tahsils Fatahabad and Hissár, the whole of Tahsíl Hási and a small portion of the eastern half of the Bhiwáni tahsíl, and is traversed by the Western Jumna Canal.

Hariána.

The leading feature of the tract is its firm clay, soil locally known as "karri" or "káthi," opposed, on the one hand, to the *sotar* or iron clay of the Náli, and on the other, to the light shifting sand of the Bágar. Sandhills are to be found, however scattered here and there, even in the Hariána, while in low-lying spots affected by local drainage the soil becomes hard and clayey and is called *dákar*. On the canal also, which runs along what was until recent times the bed of the Chautáng Nála, the former natural flow of water, and since the canal has been opened as such, the constant, and in parts excessive irrigation has hardened the soil by washing out the argillaceous particles and sometimes weakened its productive capacity. As noted above,

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the richer soil of the Hariána requires a more ample rainfall than that of the Bágär, 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 Bágär; and there is in addition to this the absence of local drainage from sand-hills. To meet this the cultivators have been in the habit of leaving elevated pieces of land uncultivated to serve as watersheds (*uprahan*) for drainage which is carried by means of water-courses (*agam*) to the fields. These are gradually disappearing with the spread of cultivation. The labour of ploughing is also considerably greater in the Hariána than in the Bágär.

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 canal-irrigated land agriculture is confined practically to the cultivation of the kharif crops, but here and there in low-lying spots benefited by drainage from higher levels the rabi can be profitably sown. It is only on the rare occasions when the autumnal rainfall is favourable for sowings and the winter rains plentiful that rabi crops are to any large extent raised in *báráni* soils generally. The vegetation is of a somewhat more luxuriant character than in the Bágär, and the villages have a more prosperous look than the poor hamlets of that tract.

In former times large areas were kept waste for cattle-breeding purposes, but most of this has now been brought under the plough.

Rivers, minor
 streams and drain-
 age lines.

The Hissár 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 Fatahabad and the central portion of the Sirsa tahsíl.

The Ghaggar rises in the territory of Náhan or Sirmúr, and after flowing across the Umballa district and the north-western corner of Karnál is joined within the limits of Patiála territory by the united streams of the Saraswati and Márkanda.

By ancient writers the Ghaggar seems to have been treated as the affluent of the sacred Saraswati rather than the Saraswati as that of the Ghaggar, and many of these references to the former must, in all probability, be taken as referring in reality to the latter. The original form of the name Sirsa was Sarsuti, and doubtless carries us back to the time when the Ghaggar, which runs not far from the town of Sirsa, was known throughout the whole of its course as the Saraswati.

Near the town of Phulád in Patiála, a short distance before reaching the Hissár border, the Ghaggar has been divided, either naturally or artificially, into two branches, the one known

as the Ghaggar náli flows along just below the northern border of the district, the other known as the Choya or Joiya nála flows to the south of the Ghaggar náli, and after receding from it to a distance of some 12 miles rejoins it beyond Sirsa.

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The northern branch after passing the Fatahabad border crosses a protruding neck of Patiála territory, and entering the Sirsa tahsíl south of the town of Kori passes to the north of Sirsa and is then joined by the southern branch, the Joiya.

The Joiya water rarely if ever gets beyond the western limit of the Fatahabad tahsíl, whatever water reaches Sirsa is carried by the Ghaggar náli. The Náli leaves the Sirsa tahsíl at Kariwáli and flows on into Bikánir territory, but the volume of water which reaches this point is insignificant, and it is in fact a comparatively rare flood which penetrates as far as Bikánir territory at all. In ancient times the stream was probably perennial and after passing through Bikánir territory may ultimately have joined the Panjnád, but this state of things has long ceased to exist consequent on the decreased rainfall on the Himalayan slopes and the interception of more and more water for irrigation in sub-montane tracts and in the intervening plains. These causes are still operating to reduce the volume and force of the flow and a greater deposit of silt is the consequence, the ultimate result being that the stream is tending to attain one uniform level throughout, while irregularities in the bed are being gradually filled up with silt.

Proposals have at different times been made for improving the irrigation from the Joiya. This stream, as mentioned above, branches off from the main Ghaggar at Phulád in Patiála, some five or six miles from the Hissár border. The main difficulty which had to be encountered in all these projects arose from the fact that the bed of the Joiya at its point of bifurcation with the Ghaggar was, and is, considerably higher than the bed of the latter, and consequently until the water in the Ghaggar rises to a considerable height none can enter the Joiya.

Joiya irrigation.

The idea of improving the irrigation appears to have been first entertained in 1836, when Colonel Colvin advocated the clearing out of the Joiya from Phulád to Fatahabad, cutting through bars of silt in its bed and drawing out the flood water through sidecuts so as to flood the neighbouring lowlands. In 1837 Captain Wakefield was deputed to prepare plans and estimates. His first project was for a cut so low down the stream as to be out of the Hissár district altogether; the second was for a cut from Nathwána on the Ghaggar to the Joiya at Sakmálpur, the object of which was to replenish the latter stream below the point where its waters were principally drawn off. Neither of these projects were approved by the Military Board; and the latter would certainly not have worked permanently as the level of the Joiya at Sakmálpur is not much if anything lower than the level of the Ghaggar at Nathwána.

In 1840, Colonel Cheape proposed the erection of a masonry dam near Phulád immediately below the head of the Joiya Branch.

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In 1841, Captain Baker repeated the proposal and further advocated the rectification of the Joiya channel with a view to shortening it and thereby increasing the slope of the bed which would secure an increased in-draught of water into the *nála* and a lessened deposit of silt.

In 1844, Mr. Vans Agnew submitted a report supporting Captain Brown's proposals, which, in his opinion, appeared to require amplification in order to deal satisfactorily with the large supply of water which under proper arrangements might be turned into the Joiya, and he further pointed out that a greater in-flow into the Joiya would, by reducing the volume of the Ghaggar, enable rabi to be sown on that stream where then only kharif cultivation was possible. None of the above projects received the sanction of Government.

In 1865 the Rangoi cut was made by the District authorities with funds supplied by the zamindárs. The cut takes out from the Ghaggar opposite Talwára and joins the Joiya near Gháswa. The benefit derived from the work is not commensurate with the expectations entertained when it was undertaken; the villages on the lower part of its course are the only ones which derive any advantage from it.

The improvement of the Joiya irrigation again came up in 1873 in connection with the question of whether the Joiya had silted up in recent years and whether clearance of silt had ever been previously made.

The matter was dealt with in an exhaustive report by Colonel MacMahon, Commissioner of Hissár. The conclusions arrived at by the Punjab Government on the matter in 1874 were as follows:—

- (1). That the bed of the Joiya had silted not only at its head but also for some distance along its course.
- (2). That no partial clearance in the head would be of any material benefit.
- (3). That no general clearance had been made since Phulád and other villages near the head of the Joiya had been transferred to Patiála.
- (4). That even if a general clearance of the bed of the Joiya were effected, the benefit would not last long without the aid of a dam across the Ghaggar below the head of the Joiya.

The above conclusions embody the two essential difficulties in improving the irrigation of the Joiya. The first is the initial difficulty of securing a sufficient flow into the Joiya, owing to the bed at its head being considerably above that of the Ghaggar at the same place. The second arises from the very slight slope of the Joiya bed, owing to its great sinuosity which causes water to move with small velocity and thereby promotes the deposit of silt, while any clearance of the bed would only increase the difficulty by reducing the bed to nearly a dead level.

The final result of the various proposals for improving the Joiya irrigation has thus been *nil*.

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The Ghaggar stream has been a fruitful source of disputes in regard to irrigation rights, both as between the zamíndárs in British territory and as between those of Sirsa and the officials of the Bikánir Darbár.

Irrigation disputes.

The erection of bunds on the Joiya has apparently been always, at all events nominally, forbidden.

In 1867 the matter came up with reference to certain bunds in Tahsíl Fatahabad which were found to be in existence; these were allowed to remain as they were of long standing, but the principle that no new bunds were to be erected in future was clearly laid down.

In 1874 the Deputy Commissioner of Sirsa complained of the erection of bunds in the villages of the Fatahabad tahsíl on the tail of the Joiya which interfered with the flow of water into the adjacent Sirsa villages. In the course of the discussion which followed doubts were expressed as to whether the Sirsa zamíndárs would in any case, even if the bunds complained of were removed, enjoy any great addition to the already scanty supply received by them from the Joiya. The Punjab Government finally ordered that—

- (i). The erection of new bunds in the future should be absolutely forbidden.
- (ii). That several bunds erected since the prohibiting order of 1867 should be abolished.
- (iii). And that a code of rules should be drawn up by a *puncháyot* of the zamíndárs regulating the time during which each bund should be kept closed.

These orders finally decided the disputes which had lasted for some 40 years between the zamíndárs of Sirsa and those of Hissár, but it seems more than doubtful whether the Joiya floods ever have in recent years or ever will in future years penetrate across the border of the Fatahabad tahsíl into Sirsa.

It is in the latter tahsíl however that the irrigation disputes have assumed their most distinct shape in a long series of complaints from the Bikánir Darbár against the action of the Sirsa zamíndárs, which, it was alleged, interfered with the natural flow of the Ghaggar into Bikánir territory.

Disputes with Bikánir.

In 1873 the first of the series of complaints was made in regard to a bund on the Ghaggar near Ellenabad. The road from the latter place to Dabwáli had been carried across the stream on a high embankment erected by Mr. Oliver in 1869, which had acted as a bund by diverting the Ghaggar water towards Ellenabad. On the complaint of the Bikánir Darbár the bund was partially demolished by Mr. Wakefield, Deputy

Chapter I, A. Commissioner, in 1874, who at the same time pointed out that the diversion of the water towards the low-lying lands of Ellenabad had a most prejudicial effect on the health of that town.

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In 1877 the Bikánir authorities made a second complaint in regard to the erection of bunds and irrigation works on the Ghaggar in Sirsa. After a joint report by the Deputy Commissioner of Sirsa and the Assistant Political Agent of Bikánir, the Punjab Government laid down the principle that the erection of bunds or dams (*jhámps*) which interfered with the natural flow of the stream and diverted it entirely from its ordinary channel should be forbidden in future, but that the erection of *kunds* or reservoirs of water for the cultivation of rice and the excavation of irrigation cuts was allowable.

In accordance with these orders the demolition of the Ellenabad bund was completed and a bund at Firozabad on the Ghaggar was also removed. The erection of this bund had been necessitated by the gradual deepening of the channel of the Ghaggar between the Dhanur lake and the Annakai *chhamb*. Both the latter are depressions connected by a high level channel. Owing to the natural tendency of the Ghaggar to assume a uniform slope throughout its course, the depressions are being continuously filled up with silt, while the channel between is being gradually deepened, with the result that a greater depth of water is required in order to enable adjacent lands to be flooded; in order to secure the necessary depth a bund had been erected at Firozabad between the Dhanur lake and the Annakai *chhamb*, and the water had been conducted from the head so obtained by a system of 18 *náls* or irrigation cuts. The orders of the Punjab Government quoted above, involving as they did the demolition of the bund, rendered the cuts useless for irrigation purposes, except in years of especially high floods.

Shortly after the bund had been removed it was found that very considerable erosion had taken place at the site of the bund and a proposal was made for the construction of a masonry floor in order to prevent further erosion, but it was not approved, on the ground that the expected benefit would not be commensurate with the cost.

The most important irrigation work on the Ghaggar is that known as the Sikandarpur *nála*. The object of the work was to direct the Ghaggar water to the villages to the south which receive a precarious irrigation from the occasional floods which reach them down the valley of the Joiya from the direction of Fatahabad. The *nála* takes off from the Ghaggar at Musáhibwála to the north-east of Sirsa and joins it again near Jhorar to the south-west. It was originally taken up as a famine work in 1861, but was not finally completed till 1875 or 1876. Much of it was constructed by the zamíndárs with the help of *takávi* advance to the amount of Rs. 16,000. The total cost being over Rs. 20,000. The head of the *nála*, as in the case of the Joiya,

is considerably above the bed of the Ghaggar, and a masonry dam is needed in order to secure a sufficient in-flow. The Punjab Government in 1881, in accordance with the principle which had been laid down, negatived a proposal to construct such a dam, and holding that the project had failed, remitted Rs. 6,700, which had been advanced as *takáci* loans for its construction.

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Numerous other complaints have been made by Bikánir, the object of some of which have been not only to prevent Sirsa zamíndárs from interfering with the natural flow of the Ghaggar water, but also to prevent them from exercising that due enjoyment of irrigation from flowing water which is the natural right of all riparian owners.

The principles which have been laid down may be shortly stated thus: that while no interference with the natural flow of the stream in its natural channel can be allowed, there is no objection to the construction of *kunds* and *nálás*, provided that the water reaches them without artificial aid. Owing to the deepening of the channel in many parts, it is becoming increasingly difficult for the water to reach these works, and the Sirsa zamíndár is thus prevented not only from deriving the maximum of benefit from the water which flows past him, but also from maintaining the area flooded at its present figure. This is all the more regrettable, as of the water which flows uselessly past him but little reaches Bikánir even in a year of good floods, and the water which might benefit an arid tract like Sirsa in fact benefits no one at all.

To the north of Sirsa, and between it and the Ferozepore border, three old drainage lines cross the Rohi or dry tract. They are known by the name of Naiwál, Vál meaning a channel and Nai low-lying. Other drainage lines.

They are probably some of the numerous drainage channels which in former times used to traverse the plains between the Jumna and Sutlej, the most important of which was the Saraswati or Ghaggar. These three channels in former times probably united with the Ghaggar before the latter joined the Panjnad, but within the memory of man no water has come down any of them and the soil of their bed is generally sandy.

The Ghaggar to some degree yet preserves that characteristic which gave to its predecessors the name of Saraswati or "the river of pools." At Musakhera, in Tahsíl Fatahabad, is a *jhíl* some half mile long and quarter mile broad with a maximum depth of seven or eight feet, which is filled by the overflow of the Ghaggar in seasons of heavy rainfall. Lakes.

The Fatahabad *jhíl* on the Joiya nála is some one and a quarter miles long and half a mile wide, and its greatest depth is eight or nine feet. Neither of these *jhíls* are perennial. Crops of paddy are grown in the hollows, and when dry, wheat, gram and barley are sown in their beds.

In Sirsa tahsíl there are three large sized *jhíls* on the course of the Ghaggar. The first is at Chánmal, three miles north-west

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of the town of Sirsa. The Ghaggar channel here expands into a shallow lake (*chhamb* or *jhil*) about three miles long by half mile in breadth; a short distance further on at Dhanur the Ghaggar fills another depression some three miles long and half a mile broad, but seldom anywhere more than four feet deep.

Finally, after rejoining the Joiya valley and passing along two miles of narrow channel, the Ghaggar spreads into the Annakai *chhamb* some five miles long and two miles wide but only some three feet deep.

The numerous *jhils* on the Ghaggar are doubtless due to the small slope of the bed which by slackening the onward motion of the water enabled it to spread at once over any fairly large area of uniform levels, in which there was no definite channel, which came in its way.

Canals.

The Western Jumna Canal enters the Hānsi tahsíl about half-way down the eastern border of the district from Jínd, and after irrigating 52 villages in Tahsíl Hānsi and Hissár, is finally swallowed up in the sands of the Bikánir desert. A distributary has been taken into a few villages of the Fatahabad tahsíl, but only for the purpose of supplying drinking water, and it has now for several years ceased to run.

The canal was first constructed as far as Hānsi by Feroz Shah in 1355 A.D., and was carried on to Hissár in the next year in order to supply water to the city which he had recently built there. It appears that he took ten per cent. on the yield of irrigation as *sharb* or water-rate. Timúr makes no mention of the canal, so that it probably ceased to flow soon after it was opened. In Akbar's time it was repaired and Shah Jabán improved it and carried it on to Delhi. It was in full flow at the time of Nádar Shah's invasion, but it must have ceased to flow soon after. In 1805, when the territory came under British rule, it had long since silted up entirely. The canal was re-opened in 1826-27, but the fear of an enhancement of land revenue consequent on increased irrigation acted as a check on its extensive use by the zamíndárs. It was not till the famine of 1832-33 that the feeling was overcome, and since then irrigation has increased largely.

The canal after crossing the Karnál Bángar follows the line of the old Chautáng *nála* across the Jínd State and Tahsíl Hānsi and Hissár. As it thus originally flowed in a natural drainage line, it has not had the prejudicial effect on the health and prosperity of the inhabitants of the canal tract consequent on the interception of the local drainage of the country which it has had in Karnál, but the bed has in the course of time silted up and is now in embankment through a large part of its course in the district. The level of the subsoil water has of course been largely raised; and in some villages the soil has become unproductive, owing principally to excessive irrigation from the canal.

The cultivation of rice has lately been prohibited on the canal, and this will no doubt have a beneficial effect on the health of the tract.

A small area is irrigated by branches of the Sirhind Canal in Tahsil Sirsa and in the Budlāda villages of Fatahabad.

Where wells are so deep and the other means of irrigation are exceptionally scarce the rainfall is clearly a most important factor in the prosperity of the district.

Tables III, III A and III B give statistical information on the subject. The average rainfall of the district is some 16 inches in the year.

This low figure is in all probability accounted for by the distance of the district from the hills; indeed it seems clear from the figures quoted in Mr. Wilson's Sirsa Settlement Report that the rainfall decreases along two lines—one running south-west at right angles to the hills and the other north-west parallel to the hills. This is borne out to some extent in the case of the Hissār district, where the rainfall decreases from about 16½ inches in the year in Hissār and Bhiwāni to 15½ inches in Sirsa on the average.

The most striking feature in the rainfall however is its extreme variability and the partial manner in which it is distributed over the country. It often happens that one village receives good rain and raises a good harvest, while a neighbouring one will get little or none and its land will be unsown.

The Hissār district is in that region of India outside the hills where the temperature is highest in summer and lowest in winter.

The minimum temperature of the year is generally attained in the month of January, and the climate, owing to its dry nature from November to February, is all that could be wished. In March the temperature begins to rise, and at the end of April the heat is great, the extreme being reached in June, when the temperature inside the house is frequently between 90° and 100°. During April and June hot west winds and severe dust-storms are prevalent.

The rains are due at the beginning of July when the temperature falls somewhat, but a long break in the rains frequently brings a recurrence of the west winds.

Tables Nos. XI, XIA, XIB and XLIV give annual and monthly statistics of births and deaths for the district and for its towns {during the last six years; while the birth-rates since 1880, and death-rates since 1868, so far as available, will be found at page 61 for the general population, and in chapter VI under the heads of the several large towns of the district. Table No. XII shows the number of insane, blind, deaf, mutes and lepers as ascertained at the census of 1891, while Table No. XXXVIII shows the working of the dispensaries since 1885.

Chapter I. A.

Descriptive.

Canals.

Rainfall.

Temperature and climate.

Diseases.

Chapter I. A.
Descriptive.
Diseases.

The villagers along the canal suffer from malarial fever, dyspepsia, enlargement of the spleen and liver. They are generally sallow and anæmic in appearance, whereas the inhabitants of the *bárání* tracts, such as Rájputés, Játs, Bishnois, Gujars, are strong, athletic and healthy looking with good physical development and bodily vigour. They suffer mostly from skin disease, guinea worm (*nárwa*), gravel and stone in the bladder. *Nárwa* is very common and is commonly attributed, and probably correctly, to the use of tank water for bathing and washing purposes. The germs of the parasite are in this manner absorbed into the system where they develop and the parasite itself often grows to a great length.

The level of the subsoil water varies greatly, being highest near the canal, which has in the past certainly had a prejudicial effect on the health of the people, due largely to the excessive use of water for rice irrigation. The matter formed the subject of special enquiry by the Sanitary authorities, and rice cultivation on the canal was in consequence prohibited for the future with effect from kharif 1891. Moreover siltage in the canal has raised the level of the bed considerably above the level of the adjacent villages, and this in itself has doubtless caused a large amount of fever in the canal tract with its attendant maladies, such as enlargement of the spleen and general lowering of the system.

The superficial stratum in the central and eastern parts of the district generally consists of clay, more or less mixed with sand, while on the west it is almost entirely sand. Below the stratum, which extends to a depth of 10 or 20 feet, comes a layer of impervious clay having little or no sand intermixed with it which retains the water in tanks for drinking purposes. The small rainfall and generally dry nature of the climate in the *bárání* tracts of the district make them on the whole very healthy, but the occasionally great difference between the temperature by day and that by night in the cold weather causes a large amount of fever.

The village sites except in the canal are, as a general rule, clean, and the absence of local drainages, or of any large amount of moisture, keeps the sources of water-supply free from any great pollution.

Cholera cases are on the whole few, and anything like a general outbreak or epidemic is rare. When the disease does appear it is generally imported from outside the district. In the cold weather the towns of the district are subject to epidemics of pneumonia.

SECTION B.—GEOLOGY.

Our knowledge of Indian geology is yet so general in its nature and so little has been done in the Punjab in the way of detailed geological investigation that it is imprissible to discuss the local geology.

Chapter I, B.
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 Hissár it is not to be expected that minerals should be discovered in any noticeable quantities.

Mineral products.

Kankar or argillaceous limestone in nodules is found in many localities in the district ; the hard kind is of course 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 (*karhai*) 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 Bhiwáni, Hánsi 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.

The villagers make very considerable profits from leasing the right to work saltpetre ; it was ascertained that in 1888-89 and 1889-90 as much as Rs. 15,721 and 15,304, respectively, was paid in this way by contractors to land-owners.

The license fees for the same years amounted to Rs. 542 and Rs. 428, respectively, and the industry seems to have increased considerably during the last few years.

SECTION C.—FLORA AND FAUNA.

Chapter I. C.
Flora and Fauna.
Trees.

The commonest trees of the district are the *jánd* (*Prosopis spicigera*) and the *kíkar* (*Acacia arabica*) which are indigenous to the soil. The *jánd* is generally of short and stunted growth and in favourable localities attains a height of 25 feet. Its wood is soft and liable to attacks of insects; it is however preferred in some parts to *kíkar* for agricultural implements, as it is not so liable to split with the heat.

The *kíkar* grows to a height of 35 or 40 feet, its wood is hard and is used for agricultural implements in many parts. These trees are found generally not in groups but scattered over the fields, except in the tract on either side of the Ghaggar. The leaves are used as fodder and its bark is employed as a tanning agent.

The *babúl* (*Acacia jacquemontii*), a smaller species of *kíkar*, is very common in the Bágár. A tree peculiar in a considerable degree to this district is the *rohira* (*Tecoma undulata*). It is found principally in the Bágár and is remarkable for its beautiful yellow flowers. Its wood is used for the legs of *charpais*.

In the Nali tract on either side of the Ghaggar are found the *farrásh* (*Tamarix articulata*) and the *híns* also called *thor* (*Capparis sepiaria*) and the *dhák* (*Butea frondosa*) is very common in addition to the above. These are also found in the canal tract, especially the *híns*. The latter is a tree or large bush with big thorns. The *dhák* is the Punjabi *chachra*. Its leaves make a very good fodder for buffaloes. The tree itself seems to be regarded as more or less sacred; its wood is used as fuel for the *hom* or sacred fire, and at least a few pieces of it are put in the funeral pyre. Its soft but tough wood stands the action of water well, and it generally affects stiff low-lying soil (*dábar*). The *hingo* or *kangera* (*Balanitis roxburghii*) is not uncommon in the district.

Close to and on the canal bank the *shisham* (*Sisoo dulberghia*), *sartut* (*Morus nigra*), *penda* () and *bakáin* (*Melia azedarach*) are found in considerable numbers in addition to the more common trees. Near the village sites and tanks the *pipal* (*Ficus religiosa*), *siris* (*Albizia lebek*) and *nim* (*Melia indica*) are frequently found. The *bar* or *baniyán* (*Ficus bengalensis*) and the *túnt* (*Morus alba*) are common as roadside trees in and near the canal tract. The *bér* (*Zizyphus jujuba*) is not unfrequently seen in the firmer soils of the district. Its wood is durable and is employed for doors, &c., but it is too expensive for common use.

Shrubs,
and plants. bushes

The commonest bushes of the district are the *kair* or *karil* (*Capparis aphylla*) and the *jál* or *van* (*Salvadora oleoides*). They are met with all over the district except in the sandy soil of the Bágár. The fruit of these bushes, called respectively *tend* and *pilu*, play a not unimportant part in the diet of the people. The *pilu* berry makes its appearance in Baisákh (April) and ripens at

the end of May, attaining the size of a pea, it is generally swallowed in handfuls—skins, stones and fruit. It is eaten by the poorer classes, who consider it a good alternative, but it is said to be somewhat heating. The *kair* bush, which produces the *tend* berry, is a straggling shrub devoid of leaves. From Chait (April) to Jeth (June) it is covered with blossoms (*barwa*) of a red coral tint. The poorer classes, especially in times of scarcity, boil these blossoms and eat them as a relish. The green unripe berry (*tend*) is also used in the same way. The berry when it ripens is called *pinju* and is eaten raw, but is not considered wholesome. In seasons of drought the bush is twice covered with blossoms, which the people consider to be a special provision of Providence, as this is not the case in ordinary years.

Other common shrubs are the *ak* (*Calotropis procera*) which is found in all parts and is eaten by goats, and the *phog* (*Calligonum polygonoides*) which is confined to the Bagar sandhills; its wood is largely used as fuel and its green, thread-like leaves, are eaten by camels. Perhaps the most useful and commonest bush in the tract is the *pála* or *iharberi* (*Zizyphus nummularia*), which ripens twice in the year in Baisákh (May) and in Kátik (October) and supplies excellent fodder for cattle. The bush grows best untended in land under tillage and the increase of cultivation has largely encouraged the growth of the plant. Its fruit is eaten, while its thorns make capital quickset hedges (*jhári*) for the protection of crops. *Pála* sells generally at three maunds per rupee and the profits derived by zamíndárs from the sale of the surplus stock are often large. When protected and tended it will obtain a height of 12 feet, but is generally not more than a bush 4 feet high.

The *búi* (*Anabasis nulliflora*) is a plant with white tufts. It grows generally on poor and sandy soils. The *arni* (*Oherodendron phlomoides*) is a shrub or small tree commonly found in the hedgerows of Hariána. Its wood is hollow and is used for pipe stems. *Murel* is a shrub fairly common in the Bagar. *Alao* is a shrub with pink flowers and deep and strong roots. *Basumba* or *tumba* (*Citrullus colocynthus*) is a plant with trailing stem and green and yellow orange fruit, bitter to the taste; it grows on sandhills and light soil. It is eaten by goats and is also sometimes used as medicine. The *klip*, *khimp* or *sani* (*Crotalaria burrhea*) is the wild Indian hemp and is common in the Rohi of Sirsa; it is often used in making ropes.

The *janwása* or camel thorn is very common on the hard alluvial clay of the Sotar valley. It is eaten by camels and goats. The *satyanas* (*Argemone Mexicana*) is a prickly plant or weed with yellow flowers which grows on the *sotar* and also on *báráni* soil. Floods destroy it. The *sarnála* (wild convolvulus) is a creeping plant with becal leaves and is found near water or on the rice beds on the Ghaggar and on the canal bank. Its white flowers or blossoms are eaten by buffaloes. It is not met with in *báráni* soils. *Babúl* is an aquatic plant with broad flat leaves which float on the water, and white flowers; it is found only on the

Chapter I. C.
Flora and Fauna.
Shrubs, bushes
and plants.

flooded land on the Náli. The *kachra* or *bel* (*Cucumis pubescens*) is a trailing plant with yellow flowers, it is distinct from the *basumbha*. *Angniti* is a bush with round green leaves found in the Bagar. *Santhi* is a wild plant common on the Bagar *tibás* or sandhills. Its long spreading feathery leaves are eaten by camels. The *bánra*, a small plant or shrub, is not uncommon, and is a species of wild indigo.

Principal grasses.

The grasses are a very important part of the vegetation of the district, having regard to the large number of cattle possessed by the zamíndárs.

The best grass for fodder is the *dháman* (*Pennisetum cenchroides*). It has a long and broad blade with a feathery tuft, and is generally found in good soil which has not yet been brought under the plough. The spread of cultivation has rendered it a rarity, but it is still common in the Hissár Bir and is often found in other parts of the district growing among the roots of the *kair* bushes, especially in the Náli tract.

The *anjan* (*Cenchrus montanus*) is also found; it is apparently very similar to the *dháman*, but is much more common than the latter.

The commonest grass is the *ghantil* (*Eleusine flagellifera*), it is readily eaten by cattle. It throws out runners and grows on moist soils except those which are light and sandy. The *bhobria* (*Eleusine scindica*) is very similar to the *ghantil*.

Dúbh (*Oynodon dactylon*) is a jointed grass which is very common in the firmer soils of the district, and is specially abundant in the hard clay of the Sotar. It is not uncommon even in sandy soils. It supplies excellent fodder for cattle.

The *dáb* is a coarse grass generally found in low-lying moist spots, especially on the Ghaggar and canal tracts. It is largely eaten by buffaloes.

The *sánwat* (*Panicum colonum*) is a dark green grass with a broad blade and grows only on the hard Sotar clay; it is very good as fodder.

The *díla* or sedge (*Cyperus tria*) is a thin bladed grass, confined almost entirely to low-lying moist spots in the Náli tract. It is eaten as fodder by cattle when other grasses fail.

The *bur* or *khawi* (*Andropogon laniger*) is a common grass, it is most nutritious as fodder, and when ripe it gives a red tinge to the ground.

The *sewan* or *sani* (*Elionurus hirsutus*) is commonly found in the Bagar and is especially plentiful in Bikánir. It supplies excellent fodder when young, when older it is used for the weaver's brush (*kunch*). The *palwa* or *parwa* (*Andropogon pertusus*) is found in the district, and is also good for grazing. The *gándi* (*Iseilema laxum*) is not unknown. The *tandla* is a small weed with a red flower, having much the same appearance

as *gawár*; another weed is *banghara*, it grows on light soil and is of a light colour. *Mandusi* is a grass with a thin blade of a dark green colour which grows on the sandhills.

Chapter I. C.
Flora and Fauna.
Principal grasses.

Sarkanda or *sarr* (*Saccharum sara*) and the *panni* (*Andropogon muricatus*) seem to be not uncommon in the sandy parts of the district. A grass grows there strongly resembling the *sarkanda* of the irrigated tracts, which is called *pannior sarkanda* indifferently. The *sarkanda* or *sarr*, pure and simple, is found on the Ghaggar and near the banks of the canal. The thin stalks (*kána*) are used for thatching, for coverings for carts and for making the *chajj* or winnowing basket. The *panni* is found mostly in low-lying damp spots near the Ghaggar, and it resembles *dáb* strongly in both appearance and habitat. The stalks are only grazed when young and tender; they are mostly used for roofing. The roots of the grass are the fragrant *khas-khas* used for making tatties.

Kaundra, *dihán* and *chaupara* are three grasses or weeds which spring up in great abundance upon the first fall of rain and are largely used as green fodder for cattle. The first can be distinguished by its pink flower, the *dihán* by its small oval leaves, and the *chaupara* by the four branching tufts which give it its name. *Baru* (*Sorghum halepense*) and *takria* are two other common grasses or weeds which supply fodder, they both have a long blade and the former a feathery head. *Ghamúr* or *garham* (*Panicum antidotale*) is a grass with a long, thin stalk; it is very common near the canal, and is often found at the roots of *kair* bushes. It is only grazed when young; it is also said to be used as a disinfectant. The *keo* grass (*Sporobolus orientalis*) is found on *tibás* and sand hillocks, it is good for grazing, and resembles the *palinjí*, which is used as food by the people in times of scarcity.

Ducháb (*Cyperus* sp.) is common on the Bagar sandhills and on poor soil. It has long spreading roots and is grazed by cattle, but interferes largely with cultivation. The *bhurt* (*Cenchrus catharticus*) is very common on the sandy soil of Bagar, and with its prickly corn or seed vessels interferes considerably with the progress of the passers by. *Motya* is a common grass in the *tahs* or valleys of the Bagar, where it springs up on the first rain.

In the district, owing to its generally dry climate and the absence of water, animals are comparatively rare.

Wild animals,
beasts and birds—
sport.

Of those which are found, the black buck (*hírn*, *mírg*) and the ravine deer (*chínkára*) are by far the commonest. They are found in immense numbers in the Hissár Bir and also in the neighbourhood of Bishnoi villages, the inhabitants of which protect them on religious grounds. They do much damage to crops and are said to be especially fond of *sarr*. *Nilgáe* are not uncommon in the Hissár Bir. Wild pigs are found all over the district except Sirsa, more especially in the more wooded Náli tract; they are also common in the Government Bir. They do immense damage to crops.

Chapter I. G.

Flora and Fauna.

Wild animals,
beasts and birds—
sport.

Birds.

Wolves and jackals are fairly plentiful but do little damage; hares and rabbits are common in the Bir, and the porcupine (*sih*) is occasionally met with. Monkeys are very common on the banks of the canal.

In addition to the numerous classes of small wild birds which are included under the generic name of "*chirya*" may be mentioned the florican (*tughdar*), sand-grouse (*titar*), quail (*bater*), hawk (*chil*). The latter bird is said to eat corpses, but does no damage to crops. The vulture (*gidh*) eats carrion. Crows and parrots of various species are common. The weaver bird (*báyal* or *báya*), with its hanging nest, is found, and also the *koil*.

Among water fowls the *kúnj* (*koolan*) and *saras* cranes appear in the cold weather and live on fish and frogs. The *kúnj* is also partial to the seeds of wheat and barley. The male and female *saras* are said to be so attached to each other that one will not survive the other. The *bagla* is another species of water bird.

The *golia* is a bird which appears in October; it damages the crops, but as a set off against this, it is a special enemy of the locusts. The *gurral* is another bird which has a well developed taste for standing crops.

The peacock (*mor*) is found in considerable numbers, especially in Hariána near Jat and Bishnoi villages, the inhabitants of which regarded it with a certain amount of veneration.

Reptiles and in-
sects.

The chief snakes are the cobra or *kála sámp* (*Naja tri-pudians*), the *gurera* (*Echis carinata*), and the *karait* (*chit-kanna*) (*Cæruleus bungarus*). They are all poisonous. The *domúhya*, so called because its head and tail are exactly the same in appearance, is also found; it is not poisonous.

The *guhera* is said to be a species of four-footed lizard, and its bite is said to be so deadly that it requests its victim after biting him not to fall on itself. It is probably a myth. The house lizard is of course common. A larger kind of lizard is the *sánda*, which is common in the dry tract of Sirsa and is extensively eaten by Bawariyás, a low caste. The hedgehog (*jaya*) is not uncommon.

The *tij* or *bírbahotti* is a small insect, which looks as if it were covered with red plush; it corresponds to the English lady-bird, and makes its appearance at the beginning of the rains, a fact which has probably given rise to the tradition that it is carried down from heaven with the rain.

Ants, white and black, are very common, and the former do immense damage. Scorpions (*bichhu*) are of two kinds—the bigger one is of a black colour, and its bite is said to be deadly; the smaller one is white, and its sting is comparatively harmless.