

CHAPTER I.

THE DISTRICT.

SECTION A.—DESCRIPTIVE.

The Karnal district is the most northern of the three districts of the Dehli division, and lies between north latitude $29^{\circ}9'$ and $30^{\circ}11'$, and east longitude $76^{\circ}13'$ and $77^{\circ}16'$. It consists of a tract of plain country of somewhat irregular shape, lying on the right bank of the Jamná, including a portion of the valley of that river, and stretching away westwards across the Suruswatí and Ghagar into the Eastern Plains of the Panjáb. It may be roughly compared to a square, with its south-western corner cut off as belonging to the Native State of Jínd, and with the addition of a broad projection running up from its north-western corner northwards towards Patiálá. It also includes 45 outlying villages scattered about Patiálá territory, the furthest of which, Budládá, is 101 miles distant from head-quarters. Its average length and breadth are 54 and 50 miles; its greatest dimension measured along the diagonal from Rattan Kheri on the Ghagar to Rákasahrá on the Jamná is 80 miles. It is bounded on the north by the Patiálá State and the Ambálá district, on the east by the river Jamná, which separates it from the Saháranpur, Muzaffarnagar and Meerut districts of the North-Western Provinces, on the south by the district of Dehli, and on the west by the Rohtak district and the Native States of Jínd and Patiálá. It is divided into three *tahsils*, of which that of Pánípat includes the southern, that of Karnal the central and north-eastern, and that of Kaithal the western and north-western portions of the district. The Kaithal *tahsil* forms a sub-division in independent charge of an Extra Assistant Commissioner stationed at Kaithal as his head-quarters.

Some leading statistics regarding the district and the several *tahsils* into which it is divided are given in Table No. I on the opposite page. The district contains three towns of more than 10,000 souls as follows:—

Pánípat	...	...	...	...	25,022
Karnal	...	...	...	...	23,133
Kaithal	...	...	...	...	14,754

The administrative head-quarters are at Karnal, situated in the eastern edge of the district, 5 miles from the river, and upon the Grand Trunk Road 47 miles from Ambálá and 73 from Delhi. Karnal stands 21st in order of area and 14th in order of population among the 32 districts of the Province, comprising 2.25 per cent.

Chapter I, A.

Descriptive.

General description.

of the total area, 3·31 per cent. of the total population, and 3·21 per cent. of the urban population of British territory.

The latitude, longitude and height in feet above the sea of the

Town.	N. Latitude.	E. Longitude.	Feet above sea-level.
Karnal ..	29°42'	77° 2'	800
Panipat ..	29°23'	77° 1'	764
Kaithal ..	29°48'	76°26'	760*

principal places in the district are shown in the margin.

Physical conformation.

The district is everywhere flat, and lies about 780 feet above the sea, the height probably nowhere

differing from this figure by more than some 30 feet. The whole formation is alluvial, *kankar* being the nearest approach to stone, and blue micaceous sand being found everywhere, though at varying depths. The distance of the water table from the surface is much affected by the canal and the river. In their vicinity it is seldom greater than 15 feet, and often not more than two or three feet. In the south of Kaithal the depth is as much as 140 feet; on the water shed of the Ghagar and Suruswati and also between the canal and Chautang the depth is from 30 to 35 feet. There is no real clay, the soil varying from stiff loam to pure sand. The stiffest loam is found in the hollows and drainage lines, where the action of the water has washed out the sandy particles: it is locally known as *dikar*, and is differentiated by the clods not crumbling in the hand. The sandiest soil is known as *bhūr* or *bhāda*; it is found in the riverain tract, chiefly in patches lying in the beds of old river channels; and also occasionally on the water-shed, where it would seem to have been collected by the wind. It includes all soils that do not form clods under the plough. Intermediate soils are classed as *rausli*, and vary in quality between the two extremes. Another common division is into *magra* and *duhr*. The former is the higher land where rain does not lie and the soil is light; the latter the depressions in which the rice is grown, and where the soil is heavy loam.

* Approximate.

The Khádar.

The tract is divided into two parts by the great backbone of Northern India, which separates the water system of the Indian Ocean from that of the Bay of Bengál. This water-shed runs north and south at a distance of from six to twelve miles from the river, and is almost imperceptible to the eye. It runs close under the city of Karnál and thence follows the line of the most eastern of the new canal Rájbahás (No. IV). To the east of, and generally within a mile or two of the water-shed, lies the bank which marks the western limit of the excursions of the Jamná. All to the east of this bank is known as the Khádar, and is a lowlying riverain tract, with light soil and water close to the surface, and largely in the hands of industrious cultivators. It is bounded to the east by the broad sandy bed in which the river runs; and the Jamná has swept over the whole of it within comparatively recent times. The drop at the bank is often ten or twelve feet; and the land immediately below the bank is usually somewhat lower than that at the river edge. The general slope southward is about one-and-a-half feet per mile. There is little heavy jungle except on the upper portions of the river where the banks are fringed with *jháu*; but date palms and mango groves abound,

other trees are scattered about profusely, and the luxuriant cultivation and the frequent wells make the Khádar perhaps the prettiest part of the district.

All west of the Khádar bank is called the Bángar. But it is divided into two parts by a well-marked drop which runs from near Karnál in the north-east to the south-west corner of the district, and is defined almost exactly by the Hánsi road, which runs along its crest, and the Rohtak branch canal which flows below it. This drop and the Khádar bank, already referred to, meet a little above the town of Karnál, and it is the triangular tract that lies between them that is more especially known as the Bángar (proper), in contradistinction to the Nardak or high tract beyond the drop.* It is watered by the Western Jamná Canal almost throughout its area. The soil, where not rendered barren by salts or swamp, is stiff and fertile, and it is in the hands of industrious agricultural castes. The general slope is about one-and-a-half feet per mile southwards, and one foot per mile westwards, the slope decreasing as you go south. Where the Bángar, Nardak and Khádar meet near Karnál, the Nardak drop splits up into several steps which lead imperceptibly from the Nardak to the Khádar, so that the Bángar does not really extend north of Karnál. There is not much timber in the Bángar. Its soil marks a transition between the stiff loam of the Nardak and the light sandy soil of the trans-Ghagar country, Budláda, known as the *Jangal Des.* Mango groves are not uncommon, but other trees are thinly scattered about. As the neighbours say, land is so scarce and valuable that the very ridges between the fields are set up on edge; and the Bángar tract is for the most part a sheet of cultivation, interspersed with great swamps and large barren plains covered with saline efflorescence. In the new settlement the Indrí *parganah* is divided into Khádar, Bángar and Nardak. The Bángar is the tract between the canal and Chautang where well cultivation is more extensive and the soil better than the Nardak beyond the Chautang. In these two tracts, however, the people themselves, though they recognise the difference of the soils, do not distinguish Bángar from Nardak by name.

To the north and west of the drop, described in the last paragraph, lies the Nardak, another name for the Kurukshetrá, or battle-field of the Pándavás and Kauravás of the Mahábhárat, which lay on this great plain. It consists of a high table-land which runs away with ever-increasing aridity towards the prairies of Hariáná which are locally known as the Bágár. Its limits may be defined by a line drawn from Thanesar to Tik, thence to Sufidon in Jánd, thence to Karnál, and from Karnál round again to Thanesar. To the west of the Nardak is the Kaithal Bángar, including some 90 villages of the Kaithal and Kuthana *parganahs*. The Bángar tract extends as far as the Ghagar. In the extreme south-western corner the canal irrigates its skirts; in the Indrí *parganah* on the immediate edge of the Khádar the country is exactly what the Bángar proper would be were it deprived of canal irrigation; while in the northern portion of the Kaithal *tahsíl*, presently to be described, the Ghagar and its tributary the Suruswati, annually flood the country locally called the

Chapter I, A.
Descriptive.

The Bángar.

The Nardak.

* Bángar is locally used with a purely relative meaning, for higher and more arid land. Thus a village in the Khádar will call a high-lying portion of its area, its Bángar.

Chapter I, A.
Descriptive.
The Nardak.

Naili. To the north of the Naili tract is the Andarwar, or the villages between the influence of the Suruswati floods and the Ghagar. To the north of the Ghagar is the Powadh, a rich country with a light loam soil. But the central and by far the greater portion of the tableland is a high arid tract, with water at great depths, having little more than a quarter of its area cultivated and hardly any of it irrigated, and being largely occupied by cattle-grazing Rájpúts. The general slope of this tract is about two feet in a mile southwards, and the same westwards, the slope decreasing as you go south. The Nardak is conspicuously a grazing country, consisting of large open plains covered with various grasses and separated by dence belts of *dhák* and other small trees. The large trees are almost entirely of the fig tribe. The uniformity of the grassy glades is broken by local hollows (*dàbar*) fringed by trees, in which water collects and produces a dence growth of coarse water-grasses, and by cultivation, which is confined almost entirely to the drainage lines and other lowlying land. The jungle is in places almost impenetrable; and in a good season the scenery is exceedingly park-like and pretty, especially when the *dhák* and *kair* are in flower.

The Ghagar-Suruswati basins.

The Nardak between Karnál and Kaithal is unbroken save by the wholly insignificant Nai Nadí, and the petty stream of the Chautang. But some seven miles north of Kaithal the traveller enters upon the valley of the Suruswati, beyond which again at a distance of some 8 miles lies the Ghagar. These two streams meet just beyond the border of the district. Both are of discontinuous flow; but the floods of the rainy season are of considerable volume, and are, at least in the case of the Suruswati, forced over the banks of the stream, itself often too small to wholly contain them, by rude dams constructed by the villagers. Thus during the rains a broad strip of country on the left bank of the Suruswatí, and on the right the whole country up to the Ghagar watershed, which is roughly defined by a line drawn from Agandh in Chilia to Isahak in Pehawa, are periodically inundated; while near their junction the country is often under water for days together, and large *jhils* are permanent features. The tract thus flooded is known as the Nelí; the soil is for the most part stiff, and yields fine crops of rice, gram, and barley, and wheeled traffic is impossible. The Suruswatí valley is well wooded and highly cultivated; but for a few miles north of the Suruswatí, an excess of moisture has often covered the country with coarse water-grasses of little value save as pasture for buffaloes. Beyond this, on the watershed, the soil is poor, but the cultivation is exceedingly thrifty and good. Further on, towards the Ghagar the jungle again becomes thick, but is quite unlike the Suruswatí jungle and consists of *kair kákar*, *dhák*, and thorny scrub.

The Jamná.

The Jamná meets the district at Chaugánwa, and thence forms its eastern boundary for 73 miles till it passes on to the Dehli district. Its bed varies from half-a-mile to a mile in width, of which the cold weather stream only occupies a few hundred yards. The bed is of course sandy throughout, and the subsiding floods leave sand banks which change annually. The banks vary immensely in character. Where the river has at one time swept over the spot where the bank now stands the edge is low and sandy; where, on the other hand, the

stream has gone round the piece of land which now forms the bank, the latter is perpendicular and often 20 to 30 feet high. In the southern portion of its course the banks are for the most part high and well defined. Generally speaking, the shelving banks are cultivated; they yield, however, a minimum of produce. The higher banks are fringed with dense *jháu* jungle on the upper portion of the stream. But from Pánípat downwards they are cultivated up to the very edge; and their fall often means ruin to individual landowners. The Janná is by no means so capricious in its course as are the Panjáb rivers. The present tendency of the river is very slightly to the eastwards; and it has within the last few years, changed its channel just below Karnál, so that six villages formerly lying to the east of it are now included in the Karnál district. Its present action is almost wholly for bad. Its floods deposit sand for the most part; and the thin skim of loam that sometimes covers it requires a long course of self-sown *jháu* before it is worth cultivating.

The Khádar, especially in the northern part, is much cut up by old river channels (*khálá*), and when the Janná is in flood, the water passes down these channels into the lower land and does much harm by flooding the fields. The largest of these channels runs almost directly under the Khádar bank, and is known as the Búrhí Nadí, or Gandá Nálá. It receives the drainage of the Bángar east of the watershed, and often swamps the country round. In the Bángar the principal drainage is that running under the Nardak drop and occupied by the main canal, and, in its lower course, by the Rohtak branch. Minor local drainages intersect the area between this and the watershed, and empty into this main drainage; but they are very broad and shallow, and are often only perceptible by their effect upon the cultivation. In the Nardak there are two main streams, the Chautang and the Naí Nadí (or narrow creek). The Chautang* cuts off a small corner from the north-west of the tract; and passing on to the south-west, is taken up by the Hánsí Canal, which occupies its lower bed all the way to Hánsí and Hissár. In some parts there is a good deal of cultivation on its banks; but they are for the most parts fringed by dense jungle, in which a leopard was shot in 1871. Its bed is, like the surrounding country, of stiff loam; its depth 6 feet at the most. For a considerable part of its upper course the channel is so straight and the banks so clean, that it has been thought to have been artificially made and to have formed part of the old Imperial canal system. The Naí Nadí is a spill from the Chautang, which it leaves above Taráorí in *pargana* Indrí, and, flowing in a south-westerly direction through the middle of the Nardak, joins the Rohtak Canal in the extreme south-west corner of the district, or rather used to do so until the Hánsí Canal was taken across it. Both these streams flow only after heavy rain; and in both the watershed is immediately to the west of the channel. The floods of both are utilised for cultivation. Small local drainages intersect the catch-basins, and may be traced by the cultivation which follows their course.

* This stream is identified by St. Martin with the ancient Drishádvatí. Manu makes the Kurkshetrá lie outside the Suruswatí and Drishádvatí Doáb, while the Mahábhárat places it between the two rivers. The Chautang is very commonly identified with the Ghagar; and by others including General Cunningham, with the Rákshí.

Chapter I, A.
Descriptive.
The Janná.

Minor drainage
lines.

Chapter I, A.

Descriptive.

Streams of the
Ghagar basin.

Between the Chautang and Síwan there are no drainages of any importance. But in the north-west corner of the district, where it projects in the shape of a narrow neck between Patialá territory and the district of Ambálá, several streams cross it. Taking these in their order from the north the first is the Patialá Nadi, so called from the fact of its flowing under the walls of the capital city of Patialá. This stream only passes through the extreme corner of the district and joins the Ghagar a few miles beyond the border. The Ghagar is the largest and most important of these streams. It enters the district at the village of Arnauli, where it is locally called the Untsarwali, and, running westwards, is joined by several natural lines of drainage on its passage. Its bed is broken into numerous channels, of which the beds are deep and very clearly marked—a fact which renders its diversion a matter of some surprise. On the confines of the district, the river turns south, skirts the border for some distance, and then strikes off into Patialá. There is a ferry over the Ghagar at Titáná in the extreme north of the district, but boats are required only for a few months in the year; for after the close of the rains the river gradually dries away, till at the beginning of the summer it becomes completely dry, occasional swamps and pools of water alone remaining.

The sacred Sarsutí (Suruswatí) enters the district some 10 miles further south and runs nearly due west across the district into Patialá territory, where it soon joins the Ghagar. It is a more considerable river within the confines of Karnál than in the main part of its course through the Ambálá district, being swelled by its junction with the Márkandá, a short distance above the town of Pehowá. The bed of the river is deep and well defined. There is a boat ferry over the Suruswatí at Sothá, but the river is so full as to require a boat for a few months only in the year, and, when at its height, is too rapid to allow of crossing except by an inflated "*massak*."

At P'lar Magra are the remains of an old bridge. It must have been at this point that Timúr crossed the Suruswatí on his way to Dehli. According to Elliot he crossed the Ghagar at Kotila or Kubila, a mistake for Gula, where there is an old bridge the building of which is ascribed to Todar Mal. Throughout the northern portion of the district, in various directions, there are traces of ancient canal cuts from the Ghagar and the Suruswatí. Large quantities of water are at present wasted, which by a restoration of these cuts might be turned to most profitable account both for the cultivators and for the Government.

Jhils, and swamps.

The drainage of the central portion of the district finds its way into the Chautang. To the east of this the country falls towards the Jamná, and the Western Jamná Canal and its minor branches, cutting the lines of drainage at right angles, cause extensive swamping. (See also in appendix). Thus the canals are fringed by an almost continuous series of *jhils* of large extent, many of which retain water throughout the year. They are not of sufficient importance to be dignified by the name of lakes, but are of quite sufficient size very seriously to diminish the capabilities of the villages on whose lands they trench. The land on the edges is extensively cultivated with rice, and, when the water

neither rises so high as to drown the young plant, nor falls so low as to leave it to dry up, heavy crops are obtained. So again, near the confluence of the Ghagar and Suruswati, extensive swamps are formed which cover a large area. It is contemplated to drain some of these, and the drainage cuts are now in hand.

Chapter I, A.
Descriptive.
Jhils and swamps.

The Deputy Commissioner gives a list of the largest *jhils* as follows:—

1.—Parsan *jhil* near the town of Kunjpurá, 5 to 6 miles long, and some 200 yards broad. This is five feet deep in most places.

2.—Dáhá-Báždá *jhil* near Karnál city, some 3 miles in the direction towards Dehli. This is merely a morass, but in the rains it becomes 2½ miles long and some 400 yards in breadth. When the water clears off, the soil is utilized in some measure for cultivation.

3.—Nohrá *jhil* 3 miles to the north-west of Pánípat, about two miles long and one mile broad. In the rains this is 6 feet deep, and throughout the entire year the ground is marshy.

4.—Sherá *jhil* 3 miles west of Nohrá, one mile long, ½ mile broad, and 2 feet deep.

5.—Báholi, close by Sherá, ¼ of a mile long, ½ a mile wide, and about 7 feet deep. The ground here is always marshy. A portion of the soil is occasionally used by cultivators.

6.—The Begampur *jhil*

7.—The Dadláná *jhil*

8.—The Mandí *jhil*

} are on the canal, as are the previous five.

9.—Main *jhil* between Kaithal and Chíká.

10.—Lallí *jhil* close to the above, covered with water for 8 months.

11.—Between Kaithal and Chíká, some 14 miles of the country is converted into a swamp in the rains.

12.—The Káchwá *jhil*, of no great size, near Karnál.

13.—Singoha in Karnál *parganah*, close to the canal.

14.—The Ami lake, a small sheet of water.

15.—Chaugauná, a morass formed by the escape of the water of the Jamná in the extreme north-eastern portion of the district.

The Western Jamná Canal* enters this district from Ambálá about 25 miles north-east of Karnál. It flows through to the Khádar low lands up to a point 4 miles below Karnál, where the Grand Trunk Road crosses it by an old Mughal (Bádsháhí) bridge, and the canal itself enters the Bángar. From this point it holds a south-west course for some 18 miles till, near the village of Rer, the Hánsí branch strikes off westwards *viá* Safidon, and, occupying the bed of the lower Chautang, flows on to Hánsí and Hissár. From Rer the Dehli Branch runs south to Dehli. About ten miles below Rer, another branch strikes off south westwards towards Rohtak, and a few miles beyond this, just upon the confines of the district, a third branch goes to

The Western Jamná
Canal.

* The history of this canal is given at length in the Provincial volume of the Gazetteer series. See also Appendix to the present work.

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Descriptive.

The Western Jamná
Canal.

Butáná. All of these branches are used for irrigation in the district, and channels from one or another of them penetrate to all parts of the tract described as the lower Bángar. It would appear that the canal was first taken to Hánís by Fíroz Sháh in 1355 A. D., and carried on to Hissár next year; and that he took *sharb*, or 10 per cent. on the yield of the irrigation as water-rate. But it very quickly ceased to run as a canal; for Taimúr, in 1398, must have crossed its channel between Pánípat and Kaithal; and his very minute itinerary makes no mention of it; while Bábar, 200 years later, expressly stated that there were no canals west of the Jamná. In Akbar's time Sháhábudín Ahmad Khán, Governor of Dehli, repaired it. In 1648 Sháh Jahán again set it in order, and carried it on to Dehli for his Láal Qilah. In 1739 Nádír Sháh found it in full flow; but it must have ceased to run almost immediately after this, in the terrible times that followed his invasion; and when we took the country in 1805 it had long silted up almost entirely.

In 1815 its restoration was begun; and the Dehli branch was opened in 1820, since which date its irrigation has steadily extended. An account of the growth of irrigation and of the attendant evils is given in the Appendix while the history of the canal as a whole is fully described in the Provincial volume of the Gazetteer. The effect of the canal for good and evil upon the tract which it traverses has been great beyond description. While it has brought prosperity to the people as a whole, and has saved them from the horrors of famine which will presently be described, it has partly by its faulty alignment, but perhaps even more by placing within their reach water which they had not the wisdom or the knowledge to use sparingly, brought ruin to too many. The description given in the Appendix will show how terrible that ruin has been. In 1867 it was decided to realign the canal and its distributaries; but for various reasons the scheme hung fire, and even now (1883) the new line is not complete, though a portion of it is running, and the system of distributaries has been to a great extent remodelled.

The average rain-fall at Karnál is 28 inches, and at Pánípat is 23½ inches. The fall rapidly decreases as we go southwards, and still more rapidly in a north-westerly direction towards the Kaithal highlands. The average Nardak rain-fall is certainly not more than 18 inches. The Khádar receives the most plentiful and most frequent rain, many local showers following the course of the river. Table

Year.	Tenths of an inch.
1862-63 ..	352
1863-64 ..	489
1864-65 ..	251
1865-66 ..	274

No. III shows in tenths of an inch the total rain-fall registered at each of the rain-gauge stations in the district for each year, from 1866-67 to 1882-83. The fall at headquarters for the four preceding years is shown in the margin. The distribution of the rain-fall throughout the year is shown

in Tables Nos. IIIA and IIIB, and in more detail in the figures inserted below; while the average temperatures for each month from 1870 to 1873 are shown below in degrees Fahrenheit.

Average of the thermometer (Fahrenheit) for the year 1870-73, recorded in the west verandah of the dispensary at Karnal.

Chapter I, A.

Descriptive.

Rain-fall, temperature, and climate.

MONTH.	AT SUNRISE.		AT NOON.	
	Maximum.	Minimum.	Maximum.	Minimum.
January	54	42	72	61
February	64	50	77	65
March	71	58	83	72
April	80	69	99	89
May	86	70	100	81
June	91	78	104	89
July	85	77	102	87
August	86	62	97	91
September	84	75	96	89
October	76	53	96	77
November	61	45	73	70
December	53	41	74	63

Rain-fall at Karnal, in inches.

YEAR.	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	Total.
1862-63	0.1	...	0.7	16.0	3.8	11.4	0.2	0.1	...	1.9	...	1.0	35.2
1863-64	0.8	...	7.4	23.8	10.1	2.6	2.5	0.2	0.2	0.2	0.9	0.2	48.9
1864-65	0.9	1.0	0.3	5.4	8.6	2.4	...	...	0.1	0.7	1.2	4.5	25.1
1865-66	0.5	0.4	1.6	4.7	11.0	4.6	...	...	1.6	2.6	0.4	...	27.4
1866-67	0.2	...	3.2	6.9	4.7	0.2	0.9	...	...	0.3	0.2	0.5	17.1
1867-68	0.6	0.9	2.4	7.9	13.1	2.8	...	...	0.6	1.8	1.9	1.0	33.0
1868-69	0.7	0.1	1.1	4.6	0.1	1.3	...	...	...	3.1	1.1	4.2	16.3
1869-70	...	...	...	6.9	2.1	5.7	0.6	...	...	...	0.5	3.2	19.0
1870-71	0.7	0.6	8.2	5.1	6.8	5.0	...	...	...	1.1	4.6	...	32.1
1871-72	0.4	1.9	9.1	10.1	3.8	1.4	...	...	0.9	4.5	0.1	0.9	33.1
1872-73	0.2	0.6	8.1	12.7	7.3	2.1	0.1	...	0.9	0.6	0.1	0.3	33.0
1873-74	...	3.6	1.3	20.7	7.2	6.1	0.2	...	0.5	0.5	0.4	1.8	42.3
1874-75	...	1.1	7.6	18.7	3.4	7.1	...	...	0.2	0.3	4.7	...	43.1
Average	0.4	0.8	3.9	11.0	6.3	4.1	0.3	...	0.4	1.5	1.2	1.5	31.2

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 five years; while the birth and death rates since 1868, so far as available, will be found in Chapter III, A. 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 1881; while Table No. XXXVIII shows the working of the dispensaries since 1877. The Civil Surgeon (Dr. Cookson) thus discusses the disease and sanitation of the district:—

“Malarial fevers, dysentery and enlargement of the spleen are the most prevalent diseases. Stone in the bladder is not uncommon. Ophthalmia, syphilis and itch are very common in the towns. Scurvy, leprosy and elephantiasis are very rare. Guinea worm and tape worm occasional. In the winter months there is much pleurisy; pneumonia and bronchitis are also prevalent at that season. Asthma is very common, particularly among tradesmen, as weavers and silver-smiths suffer

Disease.

Chapter I, B.
Geology, Fauna
and Flora.

Disease.

much. The malarial fevers are the worst in those parts of the district where rice cultivation is carried on, and where there are extensive marshes; thus, the dwellers near the chain of swamps caused by the Western Jamná Canal, and the inhabitants of the tract every year flooded by the Suruswati, are the greatest sufferers. Something has been done towards improving the large towns, and there is a perceptible fall in the death-rate. In the rest of the district, with the exception of a few dams for retaining drinking water for cattle, I have not seen any works for the improvement of their land done by the owners; and those works which in civilized countries have been done by successive generations of occupiers for the improvement in value and healthiness of their holdings all remain to be done. Enlargement of the spleen is, when excessive, usually accompanied by sterility. I apprehend that there is some reason to believe that immunity from malarious influences has a tendency to be hereditary, and as those who suffer the least are likely to have the largest families, an explanation is obtained of the fact that dwellers in swamps after several generations get to an average standard of health little below those living on higher lands."

This may be quite true, but the dwellers in these swamps have a miserable physique, and it is probably, only due to the broadness of their marriage customs, which favour the introduction of new blood, that they continue to exist.

SECTION B.—GEOLOGY, FAUNA AND FLORA.

Geology.

Our knowledge of Indian geology is as yet so general in its nature, and so little has been done in the Panjáb in the way of detailed geological investigation, that it is impossible to discuss the local geology of separate districts. But a sketch of the geology of the Province as a whole has been most kindly furnished by Mr. Medlicott, Superintendent of the Geological Survey of India, and is published *in extenso* in the Provincial volume of the Gazetteer series, and also as a separate pamphlet.

Mineral products.

The only mineral products are *kankar* and sal ammoniac; the former is plentifully found in most parts of the district, generally in the nodular form, but occasionally compacted into blocks. Sal ammoniac is made only in the Kaithal *tahsíl*; and the following account of its manufacture is taken for the most part from Mr. Baden-Powell's *Panjáb Products*.

Sal ammoniac.

Sal ammoniac or *nausádar* is, and has been for ages, manufactured by the *kumhárs* or potters of the Kaithal and Gúla *iláqas* of Karnál. The villages in which the industry is carried on are as follows:—Manás, Gumthala, Karrah, Siyáná Saiyadán, Bárná and Bundrána. About 2,300, maunds (84 tons) valued at Rs. 34,500 are produced annually. It is sold by the potters at 8 annas per maund to the Mahájans, who export it to Bhiwáni, Dehli, Farrúkhábád, Mirzápur in the N. W. Provinces, and to Fírozpur and Amritsar in the Panjáb, and who also sell it, on an average at Rs. 15 per maund.

The salt is procured by submitting refuse matter to sublimation in closed vessels, in the manner described below, which is similar to

the Egyptian method. The process is as follows:—From 15 to 20,000 bricks, made of the dirty clay or mire to be found in certain ponds, are put all round the outside of each brick kiln, which is then heated. When the said bricks are burnt, there exudes and adheres to them the substance from which *nausádar* is made; this matter is produced by the heat of the kiln in the hot weather in three days, in the cold weather in six; in the rains no *nausádar* is made. On the bricks producing this substance, which is of a grayish colour, and resembles the bark that grows on trees, they (the bricks) are removed from the kilns, and, when cool, this crust is removed with an iron scraper or other such instrument. The substance which is thus produced, is of two sorts; the first kind, which is most abundantly produced, and is inferior, is designated the *mitti khám* of *nausádar*, and the yield per kiln containing 15 to 20,000 bricks is about 20 or 30 maunds; it sells at 8 annas per maund; the superior kind, which assumes the appearance of the bark of trees, is called *pápri* and the yield of it per kiln containing 15 to 20,000 bricks is not more than 1 or 2 maunds; it is sold at the rate of Rs. 2 or 2½ per maund. The Mahájans who deal in *nausádar* buy both the sorts above described; but each sort requires special treatment to fit it for the market. The *khám mitti* is first passed through a sieve, and then dissolved in water and allowed to crystallize. This solution is repeated four times to clear away all impurities. When this has been accomplished, the pure substance that remains is boiled for nine hours; by this time the liquid has evaporated, and the resulting salt has the appearance of raw sugar. The *pápri* is next taken and pounded finally, after which it is mixed with the first preparation, and the whole is put into a large glass vessel made expressly for the purpose. This vessel is globular, or rather pear-shaped, and has a neck 2½ feet long and 9 inches round, which is closed at the mouth, or, more properly speaking, has no mouth.

The composition to be treated is inserted into this vessel by breaking a hole in the body of the vessel, just at the lower end of the neck. This hole is eventually closed by placing a piece of glass over it. The whole vessel (which is thin black coloured glass) is smeared over with seven successive coatings of clay. The whole is then placed in a large earthen pan filled with *nausádar* refuse to keep it firm; the neck of the vessel is further enveloped in a glass cover and plastered with fourteen different coatings of clay to exclude all air, and the whole concern is then placed over a furnace kept lighted for three days and three nights, the cover being removed once every twelve hours in order to insert fresh *nausádar* in the form of raw sugar, to supply the place of what has been sublimed. After three days and three nights the vessel is taken off the furnace, and when cool, the neck of it is broken off, and the rest of the vessel becomes calcined. Ten or twelve seers, according to the size of the neck of the vessel containing the *nausádar*, is then obtained therefrom, of a substance which is designated *pháli*. This *pháli* is produced by the sublimation of the salt from the body of the vessel and its condensation in the hollow neck. There are two kinds of *pháli*; the superior kind is that produced after the *nausádar* had been on the

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fire for only two days and two nights, in which case the neck is only partially filled with the substance, and the yeild is but 5 or 6 seers, and sold at the rate of Rs. 16 per maund; the inferior kind is where the *nausàdar* had been on the fire three days and three nights, and the neck of the vessel is completely filled with *phàli* when it yields 10 or 12 seers, and the salt is sold at Rs. 13 per maund. That portion of the sublimed *nausàdar* which is formed in the mouth and not in the neck of the vessel, is distinctively called *phùl*, and not *phàli*; it is used in the preparation of *surmà*, and is esteemed of great value, selling at Rs. 40 per maund. Each furnace is ordinarily of a size to heat at once seven of these large glass vessels containing *nausàdar*. *Nausàdar* is used medicinally, and as a freezing mixture with nitre and water; also, in the arts, in tinning and soldering metals and in the operation of forging the compound iron used for making gun barrels by native smiths.

Wild animals : sport.

The dense jungles in the northern parts, and the presence of the canal with its attendant *jhils* towards the south, make Karnál an unusually good sporting district. Throughout the jungles of the Kaithal high-lands and bordering on the Jind territory, black buck, *nilgai* and *chikàra* abound. The first, in fact, is common throughout the district, frequenting the cultivated parts while the crops are sufficiently young to tempt it there, and retreating to the thickets during the interval of seed time and harvest. The *nilgai* and *chikàra*, on the other hand, are only found in the densest jungles, notably on the banks of the Chautang, never appearing in the lower and cultivated lands. The jungles of the Indri *parganah* hold hog-deer; and pigs abound wherever there are *jhils* for them to root in. Grey partridges swarm throughout the jungles, and, in smaller number, in the cultivation, though it is a peculiar fact that they are never found in any Khàdar village the area of which is subject to inundation by the river. Black partridges are occasionally found on the banks of the canal and its distributing channels, but they would appear to be dying out here, as in all parts of the Panjáb. Jerdon mentions a bag of 75 brace made by one gun near Karnál; now-a-days, one seldom flushes more than 9 or 10 in a day's shooting. They are still numerous, however, on the banks of the Ghagar. Hares are general but not numerous; they seem to affect the *karir* jungle by preference, and are most frequent on the slope from the Nardak to the lower Bángar. Peafowl abound alike in the cultivated and in the jungle villages, and the blue rock pigeon is everywhere extremely common. Bush quail are scattered sparsely over the district, and rain quail abound in the *bàjrà* fields after the crop has been cut: the large grey quail comes, as usual, with the ripening wheat, but the vast area under wheat crops, due to the presence of canal irrigation, diminishes their apparent numbers. But it is in waterfowl that the district stands conspicuous. As soon as the rice crops appear above the water, every *jhil* is crowded with geese and ducks, whose constant quacking, the villagers say, at first renders sleep next to impossible, and the fowl very seriously diminish the out-turn of rice. The sealing-wax bill, pintail, mallard, pinkhead, shoveller, teal, and goose teal are the common ducks. The grey goose is to be found in hundreds on the larger marshes, and the black barred goose

is to be seen on the river. Full and jack snipe abound in the old rice fields, and 4 or 5 painted snipe are shot yearly; while pelicans, ibises, cranes of many kinds, herons, coots, bitterns, and many sorts of waders cover the *jhils*, the *sáras* and *kunj* being particularly numerous.

The excellency of the shooting lies in its diversity; you may shoot deer at dawn, partridge and hare in the early morning, duck and snipe during the hotter hours, and pick up a peacock on his way to roost for the night as evening calls you home. Perhaps such enormous bags are not to be made here as in some other districts. But you can hardly go anywhere without finding game moderately plentiful at your tent-door, and often in great variety.

In old times lions and tigers were not uncommon in the tract. The Nardak was a favourite spot for the old Emperors to hunt lions in; and as late as 1827, Mr. Archer says that lions were sometimes seen within 20 miles of Karnál; while tigers were exceedingly numerous in its immediate vicinity, one having carried off a *faqir* at the Imperial bridge where the Grand Trunk Road crosses the old canal, only a few days before his arrival. He describes Karnál as "situated in a large plain but recently recovered from the tigers;" and Thornton, writing in 1834, says that "a few years ago the jungles were infested by lions, which are now rarely met with except further to the west," and gives several authorities in support of his statement. At present leopards are only occasionally found in the *jhau* jungles along the river, or in the Nardak scrub. Wolves are common all over the tract, especially in the Nardak, where goats and sheep abound. Rewards for their destruction of the average amount of Rs. 450 have been paid for the last 15 years, rising as high as Rs. 1,270 in one year. The reward is Rs. 5 per head. Jackals abound, and do an immensity of damage to the crops, especially to maize, which can hardly be grown in some parts, as the jackals "don't leave even the bones." Wild pigs are common, chiefly on the river edge and along the Nardak drainages, and they too do great harm to the crops. The Indian antelope abounds all over the district, and the ravine deer and *nilgai* are found in the high-lands, but are not very common; while the hog-deer is not infrequent in the swampy parts and along the river. Hares are universally distributed. The means adopted to protect the crops from wild animals are detailed under the head of agriculture in Chapter IV. But of all animals the common red monkeys which swarm all along the canal are the most destructive, doing almost as much mischief in the houses as in the fields; and there is no way of keeping off these sacred pests.

The swamps which abound in the canal tract swarm with grey geese, ducks, snipe and waders of all sorts in the cold season; and the yield of the rice crop is seriously diminished by their ravages. *Chirimars* or bird-catchers from the east fix long low nets across the swamps at night, and, frightening the ducks into them, net immense numbers which they sell at Ambálá and Simla. In very wet years pelicans are not uncommon; and in the cold weather the *sáras* and

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kulan cranes abound in the cultivated parts. Grey partridges and quail are common almost everywhere, and black partridges are found in small numbers wherever there is water. The small sand grouse is found on the high-land fallows, and peafowl and several sorts of pigeons and plover abound.

Saurians and
reptiles.

Crocodiles, all of the blunt nose or true crocodile genus, abound in the river and along the canal and its attendant swamps. They frequently seize and kill young cattle; but no really authenticated case of their having attacked a man seems to be discoverable, though in most villages they tell you that this has actually happened in some other village. The poisonous snakes are the *karait*, which is very common indeed, the cobra (*naja tripudians*) and the Russell's viper, which are less so, and the *echis carinata* which is not often seen. No rewards are given for the destruction of snakes in this district; but the stud department paid for the destruction of 1,225 snakes in and about the stud land in 1875 and 1876.

Fish.

Fish abound in the Jamná, in the swamps along the canal in most of the village ponds. They are caught by *Jhinwars* and by a few Meos, and are largely eaten by the Musalmáns of the cities, and by lower castes in the villages. The principal net used is a circular casting net weighted with iron at the edges, and with an iron ring in the middle through which a rope passes. This rope is tied to the end of numerous strings, which when pulled through the ring, draw the edges of the net in towards the centre, and thus enclose the fish over which the net has been cast. There are three sizes—*anti jál*, *bati jál*, and *jáli*. The seine or *mahá jál* is used in still water, often in connection with stake nets (*patti kunjá*). *Ghai* is the name of a large seine used in very deep water. In running water a conical bag net (*handal*) with very fine meshes is used for small fry. In the village ponds the fish are caught by hand groping, or with a conical basket open at both ends (*thapá khaunchá*), which is suddenly plunged to the bottom with its big end downwards, and any fish that splashes is taken out through the small end. The following table of the principal fish used for food is taken from Mr. Ibbetson's report. He writes:—

“There are many other varieties which are either very scarce or not eatable. I have unfortunately not been able to obtain Günther's catalogue, and have only had Beavan's hand-book to work with, the descriptions in which are exceedingly meagre, and I am not always certain about the species. Moreover, several allied species often go by the same native name, in which case I have taken that which appeared to be the most common. The letters in the last column of the table have the following meaning:—

- R. Found in the River.
- J. Found in swamps (*jáils*) or ponds.
- C. Common.
- S. More or less scarce.

Table of the principal fishes eaten in the Tract.

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No.	Native name.	Scientific name.	Reference to Beavan's Hand-book.	Habitat and scariness.
1	Báns	Rhynchobdella aculeata	179	J C
2	Bachwá	Eutropiichthys vacha	131	R C S
3	Bhágan	Crossochilus reba	70	R J C
4	Bherá	Barbus chrysopterus	57	J C
5	Boali	Wallago attu	128	J C S
6	Bulálá	Bola goha	94	R C S
7	Chilwá	Chela gora	99	R C
8	Dahí	Rashora elanga	81	J C
9	Dahwai			
10	Daulá	Ophiocephalus gachua	176	J C
11	Durri (Durhi)	Pseudotropis mitchelli	132	J C
12	Garehi	Ophiocephalus gachua	176	J C
13	Gulábi	Bola goha	94	R C S
14	Gúneh (Gonjá)	Bagarius yarellii	145	R C S
15	Hanwari	Mugil corsula	175	R S
16	Hilsa	Engraulis telara	116	R S
17	{ Kág Kawwa }	Belone cancila	153	J S
18	Kálbáns	Labeo calbasu	62	R J C
19	Khágar	Macrones lamarrii	137	R J C
20	Lonchi	Wallago attu	128	J C
21	Mahásir	Barbus mosal	41	R S
22	{ Mungri Mangari }	Clarias magur	124	J S
23	Moh	Notopterus kaporat	122	R S
24	Pabta	Callichrous bimaculatus	129	R J C
25	Palwá	" egertonii (Sp. ?)	131	R J C
26	Parna	Wallago attu	128	J C
27	Rehu	Labeo rohita	63	R J C
28	Sáwal bará	Ophiocephalus marulius	177	J C
29	" chhotá	" striatus	177	J C
30	Singhára	Macrones lamarrii	137	R J C
31	Singi	Saccobranchus fossilis	126	J C
32	Suni	Crossochilus reba	70	R S
33	Thelá	Catla buchanani	80	R J C
34	Tingra Tangar	Macrones lamarrii	137	R J C
35	Tingra chhotá	Macrones tengara	137	R J C
36	Urni	Mugil corsula	175	R S

The table on the next page includes the commoner of the trees and shrubs, and such herbs as call for notice. This also is taken from Mr. Ibbetson, who says :—

Trees and shrubs.

"For the botanical names I have followed Brandis. But as synonyms, both botanical and vernacular, are numerous, I give the references opposite each tree to the places where full information will be found. B. refers to Brandis' *Forest Flora*, S. to Stewart's *Panjab Plants*, and PP. to Baden-Powell's *Panjab Products*. I mention below the principal uses to which the villagers of the tract put each tree; but many other uses are mentioned by the authorities I quote. I omit officinal uses, which are simply innumerable."

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No.	Vernacular name.	Botanical name.	References.
1	Ak ...	Calotropis procera ...	B 331 S 144
2	Amb ...	Mangifera Indica ...	B 125 P P 964, 1187, 1968 S 45
3	Arni ...	Clerodendron phlomoides ...	B 363.
4	Bakáin ...	Melia azedarach ...	B 68 P P 1165, 1970 S 33
5	Bar ...	Ficus bengalensis ...	B 412 P P 1486, 1930 S 213.
6	Dhák ...	Butea frondosa ...	B 142 P P 933, 1209, 1587, 1674, 1767, 1790 S 59
7	Farásh ...	Tamarix Articulata ...	B 22 P P 1128, 2081 S 92
8	Gúlar ...	Ficus glomerata ...	B 422 P P 1487, 1929 S 212
9	Hingo ...	Balanites roxburghii ...	B 59 P P 1840 S 44.
10	Híns ...	Capparis sepiaria ...	B 15 S 16
11	Jál ...	Salvadora aleoides ...	B 316 P P 2061 S 175.
12	Jámun & Jamoá ...	Eugenia operculata and jambolana ...	B 233 f P P 2075 S 94
13	Jánd ...	Prosopis spicigera ...	B 169 P P 922, 1248, 1580, 1723, 2010 S 74
14	Jawása ...	Alhagi maurorum ...	B 144 P P 1202 S 57
15	Jháú ...	Tamarix dioica ...	B 21 P P 1126, 1127, 2080 S 91
16	Jhárberi ...	Zizyphus nummularia ...	B 88 P P 1178, 2103, S 43
17	Kaindu ...	Diospyros montana ...	B 296 S 137
18	Kair ...	Capparis aphylla ...	B 14 P P 978, 1120, 1865, S 15
19	Kandái (Chipat)	Solanum-xanthocarpum	P P 1373 S 161.
20	Kandai (Khari) or Satyanási ...	Argemone mexicana ...	P P 1090 S 9
21	Khajur ...	Phoenix sylvestris ...	B 554 P P 950 1796, 1797, 1993, S 243 ff
22	Kikar ...	Acacia arabica ...	B 180 P P 1241, 1567, 1717, 1811 S 50
23	Nágphan ...	Opuntia dillenii ...	B 245 P P p 194 S 101
24	Ním ...	Melia Indica ...	B 67 P P 1166, 1839 S 22
25	Nímbar ...	Acacia leucophloea ...	B 184 P P 1819, S 53
26	Piázi ...	Asphodelus fistulosus ...	S 234 P P 1520
27	Pilkhan ...	Ficus infectoria ...	B 414 S 214
28	Pípal ...	Ficus religiosa ...	B 415 P P 1485 S 213
29	Rus ...	Echinops (?) ...	
30	Satráwal ...		
31	Sonjna ...	Moringa pterygosperma ...	B 129 P P 1173, 1584, 1643 S 19
32	Shisham ...	Dalbergia sissoo ...	B. 149 P P 1219, 1905 S 65
33	Simbhálu ...	Vitex negundo ...	B. 369 P P 1387, 2096 S 166
34	Thohar ...	Euphorbia royleana and neriifolia ...	B. 438 f. P P 1473, 1597, 1923 S 194 f
35	Tút ...	Morus alba ...	B. 407 P P 972 1488 S 217 f.

The dhák.

The *dhák* is the commonest and one of the most generally useful trees in the tract. It grows gregariously in all lowlying stiff soil and drainage lines, and is found in great belts of dense scrub all over the Nardak high-lands. The soft tough wood stands water well, and is used for well curbs and the lantern wheels of Persian wheels, and also for bullock yokes. The scoop for lifting water is made of thin slices of it sewn together with leather, and similar slices are used for the hoops of sieves and the like. Fire used at religious ceremonies is always made of this wood. The leaves are used as plates and drinking cups at big dinners; small purchases from the shop are wrapped up in them, and buffaloes eat them when young. The

flowers boiled in water yield an inferior dye for clothes, and when dried and powdered form the *kesú* or red powder used at the Holi festival. Cattle also eat them, and they improve the milk. The leaves are eaten eagerly by buffaloes, but cows do not like them. When quite fresh they are not good fodder. The roots are sometimes dug up, beaten, soaked in water, beaten again, split up, beaten a third time, washed, and the resulting fibre used for the rope of a Persian wheel and other purposes. But the rope so obtained is very inferior. The fibre is used to coat the rope in a *charas* well. The resin which exudes from the *dhák* is called kino (vern. *kani*). It is collected by a caste called *Heri* who come from the east; and a man following this occupation is called *dhák-pachu*. They pay a small sum for liberty to collect the gum and gash (*páchná*) the trees in rows at distances of a span. Next day the resin which has exuded is scraped off into a small vessel. When dry it is beaten with sticks into small pieces, and winnowed to separate it from the bark and refuse. Its properties are elaborately described by Mr. Baden-Powell. Here it is used chiefly to clear indigo and as a tonic, and never for tanning. The gum is collected from the tree when the thickness of a man's thigh, or about four to five years old, and a good tree will yield two seers, and again a smaller quantity six or seven years later; but the yield varies greatly. A rainy season favours its production, and the best time of year is the cold weather.

The *kíkar* is the next most useful tree. It grows gregariously all over the tract, save in the lightest soils. It is said to flourish in soil impregnated with sulphates; but plantations of it were tried on the canal in such soil, and failed almost entirely. It grows chiefly in Khádar lands, whether Khádar of a hill stream or of the Jamná. The hard, strong, close wood is used largely for agricultural implements and especially for all bearings, rollers, linings of presses, plough-shares, and the like, which undergo much wear and tear. It makes very fine charcoal. The bark is used largely for tanning, and to control the fermentation in distilling, and the seed pods are greedily eaten by cattle and goats.

The *khajúr*, or the wild date palm, is abundant all over the Khádar. Its soft stems are hollowed out for water channels. The leaves are used for hand fans (*bíjna*) and mats. They are also stripped off their stems, split up into strips, and beaten with sticks till the fibre is soft, when ropes are made of it, chiefly for the Persian wheel. The process, however, is very laborious, and the rope exceedingly inferior. The fruit which is poor, is eaten by the villagers. No spirits are distilled from it since the cantonment was moved from Karnál.

The *farásh* is found throughout the district chiefly in Khádar. Its wood is used for building purposes, and when young, for charcoal. The galls (*maín*) are used for dyeing.

The *pípal*, *pílkhan*, *gúlar*, and *bar* are solitary figs, chiefly valued for their splendid shade. One or other is almost always to be found outside the gate of the village. The *gúlar* wood stands water especially well, and is used for well curbs, as is, though less frequently, that of the *pípal*. The *pípal* leaves, too, are very fine fodder; but are only used in famines, as the tree is sacred.

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The *shisham*, *tút* and *nim* are not very common except where sown. The former gives the best wood grown in these parts for all purposes which require strength and toughness. The fruit of the *tút*, or wild mulberry, is eaten by the children, and the twigs are used as withies for basket-work of all sorts, and for the lining of unbricked wells.

The *amb* or mango is the favourite tree for groves, and every village out of the Nardak, and especially in the Khádar, has several. The fruit is exceedingly poor, and not sold as a rule. The leaves are used for charms, the wood for bowls for kneading dough, and for any purposes in which durability or strength is not required.

The *jamoá* is always used for the outer rows of groves, growing straight and tall and close together, and shielding the trees inside. It must be distinguished from the *jáman* or *Eugeria jambos*. The wood is used for building purposes and for bedsteads; and the fruit, which is inferior, is eaten by the villagers.

The *kendu* is common except in the Khádar. The wood is very tough and hard, and is used for prongs and teeth of agricultural implements.

The "*sonjna*" or horse-raddish tree yields long green buds which form a favourite pickle, and the tree is always ruthlessly lopped, as only the young shoots bear fruit.

The *bakáin* or Persian lilac, with its delicious scent, is often found by the well. Its wood is used for ox-yokes.

At Karnál itself there are, probably, the finest fruit gardens in Northern India, dating back from the times of the old cantonment while the mangoes of the canal and other gardens surpass even those of Saháranpur. The old canal, too, has a very fine selection of trees, many of them rare, on its banks.

Shrubs.

The *jál* and *kair* grow gregariously all over the higher and poorer parts of the tract, except in very light soils. The fruit of the former is called *pílu*. The buds of the latter are called *tint*, and are eaten boiled; the ripe fruit is known as *pinjú*. Both fruits ripen in Jeth, and form a real resource for the poorer classes in famine years. The wood of the *kair* is greasy, and the churn-staff is therefore always made of it.

The *jháru* grows in the low sandy flats all along the river edge.

The *simbháru* is common in all the lighter soils of the tract. Both are used for basket-work, and for lining unbricked wells.

The *jánd* makes good charcoal; and the unripe pods are called *sàngar*, and eaten boiled or fried. The tree is often sacred to the inferior deities. In the Nardak it is partly replaced by the *nimbar*.

The *jhárberi* flourishes everywhere except in the Khádar. The ripe fruit is called *bèr*, and is eaten in Jeth. The bushes are cut in Kátik and Jeth and piled in a heap (*bint*) to dry. They are then beaten with sticks, and the broken leaves form *pálu*, a very valuable fodder. The leafless thorny bushes (*wár* or *cháp*) are used for hedges.

The *híns* and the *hingo* are common, especially the former. It is a noticeable feature of the Gbagar jungles. The cut bushes make splendid hedges, the thorns of the former being especially formidable. The latter makes good fuel.

The *arni* and *satrāwal* are chiefly remarkable for the delicious and powerful perfume of their flowers, which scents the air for many yards round. The former is used for charcoal, and pipe stems are made of the branches.

The *thohar* or euphorbia, and the *nāgphan* or prickly pear, are used for live hedges in the Khádar, where thorny bushes are scarce.

The *ák* grows everywhere, and is used in curing tobacco. Its root is officinal.

Among herbs, the *piáji* is chiefly remarkable as the mark of bad sandy soil. It grows in cultivation only, chiefly in Khádar. The *jawásá, rus* and the two *kandái* grow among the crops in the light-flooded soil along the river edge, and do them an immensity of harm. Their presence is a proof that the soil was too wet at sowing for the yield to be good. Traces of *lána* or the *sajji* plant are to be found in the Kaithal *tahsil*.

The principal jungle grasses of the tract are given below omitting the many species that grow on fallow only :—

No.	Vernacular name.	Botanical name.	Reference.
1	Anjan	Andropogo iwarancusa...	S 253. P P 889, 1535.
2	Bará	Sorghum halepense ...	P P 880. S 262.
3	Dáb	Poa cynosuroides ...	P P 1540, 1782. S 254. N W P ii, 278.
4	Dhá	Cyperus tuberosus ...	P P 880. S 264.
5	Dúbh or Dúbra	Cynodon dactylon ...	P P 875, 1783. S 253. N W P ii, 203.
6	Gándhi	Andropogon sp. ?	P P 877.
7	Ganthil.	...	...
8	Kúri	Eragrostis sp. ?	S 255.
9	Múnj	Saccharum munjæ	P P 1878, 1802. S 261.
10	Muthpurá.	...	...
11	Palwán	Andropogon annulatum	P P 879. S 248.
12	Panni	Andropogon muricatum	P P 1534, 1803. S 248. N W P ii, 308.
13	Rus.	...	...
14	Sánwak	Panicum colonum ...	P P 836, 876. S 258.
15	Sarála	Heteropogon contortum	S 255.
16	Sarkara	Saccharum spontaneum	P P 880. S 261.

The *dáb* is the *kushá* or sacred grass of the Hindus. It is a coarse grass growing in lowly moist places, and is chiefly used for ropes. It is cut in Kátik, dried, beaten, soaked in water for a few days in the hot, or a month in the cold weather, and the fibre washed and dried. The process requires little labour, and the ropes never rot. They are not strong, however. They are used for the ropes of the Persian wheel, where they will last three months or more, for stringing bedsteads, and for general purposes. Buffaloes eat the young grass, and the old grass is sometimes used for thatching.

Panni is a very similar grass to the above in habit and appearance. It is very abundant, and is the principal thatching grass of the country. Its roots form the sweet smelling *khas* used for *tattis*. The culm or seed stem is called *béran* or *sínk*, and is used for making brushes, and for religious purposes. Buffaloes eat the young grass.

Chapter I, B.
Geology, Fauna
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Grassae.

The *sarkara* or *sarkanda* (tiger grass) is found on the canal and in the Khádar. The thick strong culms are called collectively *bínd*, and are used for making chairs, boxes and screens, and the leaves for thatching. Mr. Baden-Powell would seem to have confused this grass with the one next following.

Múnj is very like *sarkara* in general habit and appearance, but is much thinner in the stem, and is found only in the Khádar. The top of the culm is called *tílú*, the sheathing petiole *múnj*, and the two together *majori*. *Múnj* is used for making string and rope, and is stronger than *dáb*. It is also used for matting. The *tílú*, which is peculiarly fine, elastic and polished, is used for making winnowing pans (*chháj*), coverings to protect roof ridges, carts, &c., from the rain (*sirkhí*), clothes boxes, and the like. This grass must be distinguished from the hill *múnj* of the Panjáb, which is *Andropogon involutum*, and is here called *bhábar*.

The following are the best fodder grasses in order of merit:—*Dúbh*, *anjan*, *palwán*, *gándhi*, *sarála*, *rus*. All these are cut and stacked as hay. *Sínwák*, when young, is best of all; but falls off as it gets older. Its seed is eaten in fasts. The other grasses given in the list are all grazed when young, but are very little used later on. The roots of the *díla* or sedge are eaten on fast days.

No.	Name of Grass	Local Name	Use
1	<i>Dúbh</i>		Cut and stacked as hay
2	<i>Anjan</i>		Cut and stacked as hay
3	<i>Palwán</i>		Cut and stacked as hay
4	<i>Gándhi</i>		Cut and stacked as hay
5	<i>Sarála</i>		Cut and stacked as hay
6	<i>Rus</i>		Cut and stacked as hay
7	<i>Sínwák</i>		Young: best of all; eaten in fasts
8	<i>Díla</i>		Roots eaten on fast days