

CHAPTER I

PHYSICAL ASPECTS

GENERAL DESCRIPTION

THE district of Burdwan, one of the western districts of the Burdwan Division, is situated between $22^{\circ} 56'$ and $23^{\circ} 53'$ north latitude and between $86^{\circ} 48'$ and $88^{\circ} 25'$ east longitude. It contains an area of 2,689 square miles as ascertained by the latest survey, and a population, according to the census of 1901, of 1,532,475 persons. Burdwan, the principal town and administrative headquarters, is situated on the north bank of the Banka, some 2 miles from the Damodar river, in $23^{\circ} 14'$ N. and $87^{\circ} 51'$ E. The name *Bardhamana* in the vernacular is a corruption of the Sanskrit *Vardhamana* (the present participle passive of the verb *vardh*) and implies "the increasing or prosperous."

BOUNDARIES

The district lies mainly between the Ajay, the Bhagirathi or Hooghly, and the Damodar rivers. It is bounded on the north by the Santal Parganas, Birbhum and Murshidabad; on the east by Nadia; on the south by Hooghly, Midnapore and Bankura; and on the west by Manbhum. The Ajay separates it on the north from the Birbhum and Murshidabad district forming a natural boundary line till shortly before its junction with the Bhagirathi; while on the south the Damodar, running parallel to the Ajay for a considerable portion of its course, forms the main boundary. A small portion of the Katwa subdivision lies to the north of the Ajay, and the Khandaghosh and Raina thanas of the head-quarters subdivision lie to the south of the Damodar, which here takes a sharp bend to the north-east. On the west the

Barakar passes along the north-western boundary for a few miles before its junction with the Damodar and divides the district from Manbhum. On the east the Hooghly, known in its upper reaches as the Bhagirathi, forms the main boundary with Nadia, but a small strip of land on the right bank of the river which contains the town of Nadia belongs to that district. The south-eastern boundary marches with the Hooghly district and is formed by an irregular line drawn north-east from the Dhalkisor river, which for a few miles forms the boundary with Midnapore, to the Hooghly. The natural boundaries formed by the great rivers to the north, east and south are fairly constant, and there have been no important changes within recent times.

CONFIGURATION

(In shape the district resembles a club or hammer, of which the handle consisting of the Asansol subdivision is some 60 miles in length.) The head is formed by the delta to the east lying between the great rivers which form the main boundaries, and the greatest breadth here is about 70 miles. The total length of the district from the Barakar river to the Hooghly below Kalna is 130 miles. (It falls naturally into two main divisions. The eastern portion, comprising the Burdwan, Kalna and Katwa subdivisions with a total area of 2,071 square miles, is a wide alluvial plain enclosed by the Ajay, the Bhagirathi, and the Damodar on the north, east, and south, and bounded by the Asansol subdivision on the west. To the west the district narrows to a mere strip of rocky, undulating land, some 15 miles wide, lying between the Ajay and the Damodar river.)

NATURAL DIVISIONS

(These two tracts differ completely from each other in natural characteristics, scenery and population.) That to the east, which contains more than two-thirds of the total

area of the district, is a delta the southern edge of which approaches the sea-board and is of the most recent formation. (The rivers which have worked to form it are the Ajay, the Damodar, and the Ganges, of which river the Bhagirathi is an ancient channel.) The latter in its efforts to break eastwards has left long loops of disused channels all along its western banks and the soil here is water-logged and swampy. (In the Ausgram ^{vicina} ~~thana~~ a large tract of a hundred square miles is still covered with *sal* jungle. Elsewhere the country is densely cultivated. Wide plains, green in their season with rise, and at other times patterned like a gigantic chess-board by the low embankments which divide with fields, stretch in unvarying monotony) to an horizon dotted with trees and villages. The villages are situated on higher ground and are usually buried in tropical vegetation. Large trees are scarce, but the clumps of bamboos, the mango grove, and the date and other plams which encircle the houses have a quiet beauty of their own. (One very noticeable feature of this portion of the district is the great number of tanks which cover its surface. Many of the more valuable lands are irrigated from them and in the villages there is hardly a family of any position which has not its own private tank for bathing and other domestic purposes. Unfortunately little care is taken to cleanse these depressions, and in many cases they become mere cess-pools receiving all the sullage water from the houses on their banks.) The general drainage is from west and south-west to east. The course of the Damodar along the south-western boundary is higher than the Hooghly to the east and several channels run down this slope. The fall however is very slight, the average from the Damodar to the Hooghly being only 4 feet per mile. The Damodar itself drains but a small portion of the district, and its bed here is generally higher than the surrounding country.

(The western portion of the district resembles a promontory jutting out from the hill ranges of Central India and consists of barren, rocky and rolling country

with a laterite soil rising into rocky hillocks on the right bank of the Ajay river and shut in on the west, north and south by the hills of Chota Nagpur and the Santal Parganas.) The actual headland of this peninsula is formed by the *pargana* of Gopbhum formerly by tradition the seat of a Sadgop dynasty, with the delta not only fencing it in on the east but edging round it on the south and north. This tract is practically treeless though a portion is still covered with *sal* forest and before the discoveries of coal in the last century was a tremendous wilderness dotted at long intervals by tiny clearings and settlements and intersected by no great road or route. The surface is generally covered with clay, in some parts alluvial, but in others formed from the decomposition of the rocks, though in places the rocks are exposed and great stretches of land are wholly unfit for cultivation. It is chiefly in the depressions and along the edges of the numerous drainage channels that rice is cultivated in terraces banked up on the slopes. Along the Damodar to the south however there are narrow strips of land formed by alluvion which yield good harvests. (The famous Raniganj coal field is situated in this strip of undulating country enclosed by the Ajay and Damodar rivers and this corner of the district is one of the busiest industrial tracts in Bengal. The country is dotted with coal pits and factories, and its coal and iron fields are thronged by miners from the neighbouring districts.) The drainage is chiefly into the Damodar, the water shed, a range of high ground which rises in places to over 300 feet, running some 5 miles south of the Ajay river. Raniganj and Asansol, the two principal towns in the Asansol subdivision, are situated at an altitude above sea level of 303 and 257 feet respectively.

RIVER SYSTEM

The Bhagirathi, which in its lower reaches below the town of Nadia and after its junction with the Jalangi, is known

as the Hooghly, ultimately receives all the drainage of the district as is shown by the following table :

Kunur	} Ajay	} Bhagirathi or Hooghly	
Banka	...	...	
Khari	...	...	
Nunia	} Damodar		
Singaran	...	...	
Dhalkisor	...	...	

The Bhagirathi is navigable by large boats all the year round, but the channel is gradually silting up and, in February and March below Katwa, is only with great difficulty kept open. The Damodar is only navigable during the rains and in the dry weather dwindles to an insignificant stream, in many places not a foot deep. Before the construction of the East Indian Railway all the coal from the Raniganj Coal field was sent down this river on barges, but the traffic on it is now of little importance. The larger streams within the district are the Kunur, a tributary of the Ajay, the Nunia and Singaran which drain the Asansol subdivision, and the Banka and Khari which flow into the Bhagirathi. The Banka and Khari were originally offshoots of the Damodar, and the old beds up to their junction with the parent stream can still be traced. Throughout their courses these rivers receive numerous smaller tributaries which are merely drainage channels for the superfluous water collected in the rice fields during the rains. There are also a large number of small creeks and water-courses interlacing with the large streams which are almost entirely dry during the greater part of the year.

Cases of alluvion and diluvion are frequent in the larger rivers but no extensive changes in their course have recently taken place though the Bhagirathi is now said to be threatening the town of Katwa. It is clear however that such changes were frequent in former times. The Bhagirathi has left long loops of disused channels all along its western bank and, at the beginning of the last century, by a sudden

changes of course, swung eastwards and left the town of Nadia and a considerable strip of land north and south of that city on its right bank. The Damodar after flowing till comparatively recent times in different channels due east through the silt, has broken violently to the south and is now attempting to break a course back to the south-west. As has already been noted the Khari and Banka, though now separated from it, were originally spill-channels of this river.

The banks of the rivers are generally low and their beds sandy and cultivation is only carried on along the edges of the larger rivers where the fields are protected by embankments. The Bhagirathi is fordable below Katwa in February and March. The Damodar and Ajay are deep streams in the rains but at other seasons are passable on foot at any part of the district. The Khari is never fordable for the last few miles of its course before its junction with the Bhagirathi, while the other streams are fordable at all seasons except after heavy rain. The following is a brief description of the principal rivers.

BHAGIRATHI OR HOOGHLY

The Bhagirathi or Hooghly forms the whole eastern boundary of the district with the exception of a short distance where it enters the Nadia district near the town of Nadia. This river is one of the many channels which the Ganges in its progress eastwards has abandoned, and, although still regarded as one of the mouths of the sacred river, now receives but little water from it. For Hindus the Bhagirathi just above Katwa possesses an especial sanctity even rivalling the Ganges at Benares in this respect; according to tradition the great Vikramaditya used to transport himself daily from his palace at Ujain in Rajputana to Katwa to bathe in its purifying waters. The bed is gradually silting up and in its upper reaches in the dry season there is hardly any current. A large riverborne trade is carried on it, and there is a regular service of river steamers from Calcutta during the rains which competes not unsuccessfully with

the railways both for goods and passenger traffic. The average breadth is about a mile, but in the hot weather the main channel above Kalna is often less than a hundred yards across, and the river is fordable in many places in the Katwa subdivision. The Bhagirathi first touches Burdwan a little south of the battle field of Plassey, which is on the opposite bank. Thence it flows southwards as far as Katwa where it is joined by the Ajay. After an exceedingly winding course in a south-easterly direction it enters the district of Nadia a little north of the town of that name, but again forms the boundary of Burdwan from Samudragarh, where it receives the Khari, and continues its southward course past Kalna till it leaves the district opposite the town of Santipur and forms the eastern boundary of the adjoining district of Hooghly. The principal places on its banks are Kalna, Katwa and Dainhat. A large trade in salt, jute and cloth was formerly carried on at these places which were regarded as the ports of the district. With the advent of the railway, however, their importance has greatly decreased.

AJAY

The Ajay takes its rise in the hills of the Santal Parganas and drains a large portion of their southern and western slopes. It first touches the district near Gaurangdi station ten miles north-west of Asansol, and flowing thence due east forms the northern boundary for about eighty miles until it enters the Katwa subdivision near the village of Kumarpur some fifteen miles above its confluence with the Bhagirathi at Katwa. In the western portion of its course the channel is comparatively straight and the banks are well defined, but after issuing from its rocky bed the river flows in an extraordinary serpentine course which has been formed by the oscillations of the current through the deltaic silt. The bed is sandy and the banks low. The East Indian Loop Line crosses the river at Bhedia and at Baidyanathpur, a recently constructed bridge carries the line connecting Andal and Suri over it. Formerly this river was the only route through the dense jungle that once covered this part of

Bengal and its importance is evidenced by the line of forts planted along its banks. The rapidity of the current and the sudden freshets to which, like other hill-fed streams, it is liable, render navigation hazardous, and there is practically no river-borne traffic of any importance on it. The Ajay has been identified by Wilford as the Amystis of Arrian with Katwa (Sanskrit Katadvipa) as his Katadupa. Hunter derives the name Ajay from the Sanskrit A-jaya, "not without victory, unconquered". It is, however, more probably the ordinary contracted form of the Sanskrit Ajavati.

DAMODAR

The Damodar, the sacred river of the Santals, rises in the Chota Nagpur water-shed and, after a south-easterly course of about 350 miles, falls into the Hooghly just above the ill-famed "James and Mary Sands", a shoal which it has helped to deposit at its mouth. Together with its tributaries it forms the great line of drainage of the country stretching north-west from Calcutta to the fringe of the Central Indian plateau. The river first touches upon the Burdwan district at its junction with the Barakar a few miles south of the Barakar police station. It then flows in a south-easterly direction, past Raniganj and Andal, forming the boundary between Burdwan and Bankura for about 45 miles, and enters the district near Khandaghosh. The river here takes a sharp bend to the north-east and after passing close to the town of Burdwan turns due south and eventually leaves the district near the village of Mohanpur. The principal places on its banks are Kasba Gohagram, Gopalpur, Jamalpur and Salimabad, situated at its junction with the Kana river which here flows out of the parent stream. The course of the river is tolerably straight, but it is full and sand banks with a fall of 3.40 feet per mile. During the rains it is navigable by country boats and before the construction of the railway, which runs parallel to it along its north bank, large quantities of coal were sent down it from the Raniganj mines in boats of 20 tons burden and upwards to the depot at Mahishabha in Hooghly, and were thence transhipped and forwarded *via*

the Uluberia canal and the Hooghly river to Calcutta. The river-borne traffic is now, however, of little importance and consists mainly of rafts of timber which are floated down the stream during the rains. The rafts formed are sometimes 50 to 60 yards long and generally flotillas of 10 or 12 rafts are launched together from the forests higher up. Shortly before entering the Hooghly district the river assumes the usual deltaic type and instead of receiving affluents throws off distributaries, the best known being the Kana which branches from the parent stream at Salimabad. In the hot season the current dries up almost completely. The maximum discharge below Raniganj has been proved to be about 500,000 cusecs, but by October and November this may fall to 1,500 cusecs or even less.

The river is a hill-fed stream deriving its water from the Hazaribagh plateau and is liable in the lower part of its course to sudden floods which have caused much damage in the past. In 1770 the town of Burdwan was practically destroyed by a rising of this river, and immense damage and loss of life was also caused by the floods of 1823 and 1855. The right bank is now thoroughly protected by embankments and in consequence floods are frequent in the portion of the Burdwan subdivision which lies to the south of the river. They do not however last long, and as the quality of the silt which this river carries is good the inundation does good as well as harm and is certainly not a serious evil. Considerable damage and loss of life is however occasionally caused by the bore or head-wave which sweeps down the channel after heavy rain, rising sometimes to a height of 5 feet. Wilford has identified the Damodar as the Andomatis of Arrian.

BARAKAR

The Barakar, though not properly speaking a river of Burdwan, flows for some 5 miles along its north-western boundary before its junction with the Damodar and separates the district from Manbhum. At Barakar it is spanned by the bridge which carries the Grand Trunk Road and by the

railway bridge recently constructed for the Grand Chord line of the East Indian Railway.

DHALKISOR

The Dhalkisor (Dwarkeswar) passes for a few miles along the southern boundary of the district.

KUNUR

The Kunur, a tributary of the Ajay, rises in the undulating country north of Kaksa police station and receive the drainage of the eastern slopes of the Raniganj water-shed. Thence it flows almost due west for some 50 miles past Ausgram and Guskhara till it falls into the Ajay near Mangalkot. During the rains it is liable to sudden freshets and occasionally overflows its banks, but the volume of water brought down by it is not large enough to do any very great damage. In its lower reaches it presents all the usual characteristics of a deltaic river, and its course through the silt is a constant succession of sharp curves caused by the oscillation of the current. The river is fordable everywhere and is practically dry in the hot season. It is not navigable.

KHARI

The Khari river takes its rise in an excavated hollow beside the Grand Trunk Road near the police-station of Bud-bud in the west of the district. Its bed is a wide and deep valley which bears all the appearance of having once been the channel of a great river, and there is little doubt that the stream was formerly one of the many offshoots of the Damodar. The Old bed to its junction with the parent stream can still be traced. After flowing eastwards for some 30 miles in a circuitous course through the Galsi and Sahibganj thanas the river bends sharply to the north and enters the Kalna subdivision a little south of the Manteswar police-station. Some seven miles north of Manteswar after an extraordinarily winding course through that thana it again turns southwards, and forms the boundary between the Manteswar and Purbasthali thanas till, after its confluence

with the Banka near the village of Nadanghat, it falls into the Bhagirathi at Samudragarh. The river is navigable for country boats as far as Gopalpur in the rains, but at other times of the year navigation above Nadanghat is blocked by the numerous dams or weirs which are constructed across it for irrigation purpose. The banks are well defined and there has been no recent change of course of any importance. Floods are not frequent except after very heavy rain.

BANKA

The Banka, the principal tributary of the Khari, rises in a rice swamp near Silla in the Galsi thana. The river was formerly in its origin a spill channel of the Damodar and its present source lies within a few miles of that river. The connecting channel is now completely silted up, but the bed which was formerly scoured out by the action of the main river now serves as a drainage channel for the south of the district where the land is generally lower than the bed of the Damodar. A connection still exists between the Banka and the parent river at Jujuti where a sluice and feeding channel have been constructed in order to admit an adequate supply of drinking water for the town of Burdwan. Unfortunately of late year the main channel of the Damodar has shifted to the southern bank and a high sand bank or *chur* has been thrown up in front of the sluice, with the result that the supply of water from the Damodar is occasionally entirely cut off. The river flows in an easterly course parallel to the Damodar and at a short distance from it, and after passing through the town of Burdwan, which is situated on the north bank, crosses the railway and flows north of it as far as Saktigarh station, where it turns north-east and finally joins the Khari a few miles above the junction of that river with the Bhagirathi. The stream is practically dry during the hot season, and even in the rains is only navigable for a few miles above its confluence with the Khari. There is little or no current excepts after heavy rain and in consequence the river exercises but little action on its banks. Floods do occur but generally do little damage.

NUNIA

The Nunia enters the district from the north-west flowing like a hill stream in a deep ravine and after passing to the north of Sitarampur and Asansol eventually enters the Damodar at Raniganj. In the hot season the river dwindles to a series of pools with little or no current.

SINGARAN

The Singaran, also a tributary of the Damodar, rises a little to the north of Ikda junction on the Ondal Loop line of the East Indian Railway and, after a course of some 20 miles in a south-easterly direction, falls into the Damodar below Andal at the village of Srirampur.

TAMLA

The Tamla rises a little to the west of the large village of Ukhra and thence flows south-east till it enters the Damodar near the boundary of Shergarh *pargana*. These three rivers, which drain the southern slopes of the Raniganj watershed, all present the same characteristics. There are few springs and for the greater part of the year they are mere *nullahs* or channels consisting of a series of rocky pools unconnected by any flow of water. In the rains, however, there is a considerable flow of water which is used for the irrigation of the rice fields on their banks.

KANA

The principal offshoot of the Damodar is the Kana which branches off from the parent stream at Salimabad. Thence, it flows for a few miles south-eastwards through the Salimabad thana before it leave the district.

BRAMHAIN

The Bramhain, a tributary of the Bhagirathi, rises in the rice fields to the south of Mangalkot police station. Thence

it flows eastwards in a circuitous course and eventually enters the Bhagirathi at Dainhat. Its bed is of clay and the banks being low it is liable to flood after heavy rain. It is fordable everywhere.

BABLA

The Babla enters the district north-east of the Ketugram police-station and flowing south-east falls into the Bhagirathi near Katwa.

EMBANKMENTS

An embankment starting at Silla 20 miles west of Burdwan protects the left or northern bank of the Damodar. Another important embankment runs along the right bank of the Ajay in the Asansol subdivision extending 7 miles from Gaur Bazar to Kajladihi, 4 miles from Bishnupur to Arjunbari and 7 miles from Satkahania to Sagarposta, a total length of 22 miles.

MARSHES, FORESTS AND CANALS

There are no lakes in the district, but in the eastern portion, more particularly in the Katwa and Kalna subdivisions, small *jhils* or swamps in which water remains throughout the year abound. The more extensive of these marshes lie on the right bank of the Bhagirathi and have plainly been caused by the overflow of that river, while a few similarly caused border the Ajay and Damodar. The smaller internal rivers and streams are very often embanked for purpose of irrigation; these embankments form a considerable obstruction to the natural drainage of the district and are supposed to have largely contributed towards the outbreaks of malaria which have been such a scourge in recent times. In some of the smaller rivers a thick variety of reed called *sar* grows wild which is largely used in roofing houses. Long-stemmed rice is not grown in the district and there are no marshes or swamps suitable for its cultivation. The

alluvial plain to the east is covered with an enormous number of tanks which have been excavated for the supply of drinking water or for irrigation, but almost without exception they have been long neglected and many are now overgrown with weeds and filled up with silt. There are no forests properly so called in the district, but a large tract of about 100 square miles in the Ausgram police-station and the western uplands of the Asansol subdivision are covered with young *sal* (*Shorea robusta*). The forests yield but slight revenue and no trees of any size are found. They were cut down when the railway was under construction, but attention has recently been drawn to their value and some of them are now closely preserved. The *sal* saplings are chiefly used as rafters and beams and have an especial value for this purpose on account of their immunity from the attacks of white-ants. There are no large uncultivated pastures in the deltaic portion of the district, all the available ground being taken up for tillage. In the undulating country to the west there are vast stretches of waste land the herbage on which dries up in the hot season.

[The only artificial waterway is the Eden Canal called after Sir Ashley Eden, an irrigation channel 22 miles in length reaching from Kanchannagar, the western suburb of Burdwan to Jamalpur where the Kana river and the Kana Damodar join it. The canal takes its supply from the Damodar at Jujuti where there are two head sluices connecting with the Banka river.] The maximum discharge of the canal in the rainy season is 700 cubic feet per second but in the winter the supply falls very low and sometimes in April and May dwindles to 50 cubic feet per second. The water admitted through the sluices flows along the Banka for about seven miles to Kanchannagar, where it is held up by a weir across the channel and admitted into the canal proper by an anicut. After passing through Kanchannagar, the canal runs parallel to the left embankment of the Damodar for about 20 miles; the supply is then divided, about one-third flowing down the old channel of

the Kana Damodar which falls in to the Hooghly above Ulubaria, while the remainder flows by the Kana river into the Saraswati.

[The canal was originally constructed for sanitary purpose.] The Damodar embankments having closed all the old side channels of the river, it was excavated in order to supply drinking water to the town of Burdwan and to scour out the old channels leading from the Damodar, the silting up of which was supposed to be one of the principal causes of the outbreak of the Burdwan fever. [At present about 33 square miles in the Burdwan and Jamalpur thanas and in the Memari outpost are irrigated from it.]

GEOLOGY

The district is covered by alluvium except in the Asansol subdivision where Gondwana rocks are exposed. The deposits which cover the immense alluvial plain of the Ganges and the Brahmaputra and their tributaries belong in part to an older alluvial formation, which is usually composed of massive argillaceous beds of a rather pale reddish-brown hue often weathering yellowish, disseminated throughout which occur *kankar* and pisolitic ferruginous concretions. The soil is partly a laterite clay more or less altered and partly a red-coloured coarse-grained sand, characteristic of the eastern ranges of the Vindhya formation, large surfaces composed of which are to be found in the beds of the Damodar and Ajay rivers.

The Gondwana system is represented in the Rajmahal hills, the Damodar valley, several of the Chota Nagpur district, and in Orissa. The system is divisible into an upper and lower series, characterised by marked stratigraphical discordance and an utter change in the type of the fossil flora, cycads and conifers prevailing in the upper, and equisetaceous plants in the lower subdivision, ferns being found commonly in both. The following table shows the

probable correlation of the Gondwana groups as developed in the different Bengal areas :

GENERAL SEQUENCE	Rajmahal hills	Birbhum, Deogarh and Karharbari	Damodar valley	Darjeeling district	Talcher field
Upper Gondwana					
Umia and Jabalpur (Oolite)	...	...	...	...	...
Rajmahal (Lias)	Rajmahal	...	Mahadeva	...	Mahadeva
Mahadeva (Rhoetie)	Dubrajpur	...	...	...	...
Panchet (Trias)	...	...	Panchet	...	...
Damodar ...	...	...	Raniganj	Raniganj	...
(Permian and Permocar-boniferous.)	Barakar...	Barakar	Iron stone Shales	...	...
Talchers...	...	...	Barakar	...	Barakar
(U. Carboni-ferous)	Talcher	Karhar-bari. Talcher	Karhar-bari Talcher	...	...
				...	Talcher

The Talcher group, which forms the basis of the Gondwana system, consists of silty shales usually of a greenish, grey and olive colour weathering into minute, thin, angular fragments and of fine, soft sandstones composed chiefly of quartz and of undecomposed pink felspar. The most striking feature in connection with these rocks is the occurrence amongst them of unusually well-rounded pebbles and conglomerates, the transport of which to their present position is ascribed to the agency of ice. The rocks of the Karharbari group consist almost solely of sandstones, grits and conglomerates with seams of coal.

The Talcher Karharbari groups are superposed by a great series of beds known as the Damodar series which consists of three subdivisions known in ascending order as the Barakar group the ironstone shales and the Raniganj beds.

The Barakars consist of conglomerates, sandstone (which are often coarse and felspathic), shales and coal seams

of somewhat irregular character thinning out at short distances. Above the Barakar group in the Raniganj and a few other coal fields of the Damodar valley, there is found a great thickness of black or grey shales with bands and nodules of clay ironstone. The Raniganj beds comprise a great thickness of coarse and fine sandstones mostly false bedded and felspathic, with shales and coal seams which are frequently continuous over considerable areas. The Panchets consist chiefly of thick beds of coarse felspathic and micaceous sandstones often of a white or greenish white colour with subordinate bands of red clay. All these groups have yielded plant fossils; and the Panchat rocks contain, in addition, reptilian and fish remains. In the Rajmahal hills the 'Lower Gondwanas are overlaid by coarse sandstones and conglomerates for the most part ferruginous which are comprised under the Dubrajpur group. They are overlaid by the rocks of the Rajmahal Group which consist of a succession of bedded basaltic traps with interstratifications of contemporaneous shales and sandstones. Dykes believed to be of Rajmahal age are abundant in the coal fields of the Damodar valley. The Gondwana strata have a general southern dip varying from 5° to 25°, and along the southern boundary, they are turned up and cut off by a great fault. Their total thickness in the Raniganj field is estimated at about 11,000 feet. The area known as the Raniganj coal field comprises not only the Gondwana formation as developed in the Raniganj subdivision, but also a small coal area immediately adjoining it in the districts of Bankura, the Santal Parganas and Manbhum. The area of the field over which the coal-bearing rocks are exposed is some 500 square miles: but the total Gondwana area may be even double that since on the east side the rocks dip under and are concealed by alluvium.

1. (Blanford, "The Raniganj coal field"; Memoirs, Geological Survey of India, Vol. III part I; Manual of the Geology of India, part III; Economic Geology by V. Ball; Annual Report of the Chief Inspector of Mines for 1901; Report on the Administration of Bengal for 1901-1902).

BOTANY

The district lies almost in the centre of the province of Western Bengal which stretches westward from the Bhagirathi and Hooghly to the eastern base of the Chota Nagpur hills. "Quite narrow at its northern extremity this province widens gradually southwards to where it passes with hardly a break into the low lands of Orissa. Along its eastern edge it forms a rather narrow belt of deltaic alluvium, with all the patterns characterising Central Bengal. West of this belt lies a non-alluvial plain, possessing many of the patterns of Behar, and passing gradually into the submontane forests below the eastern ghats of Chota Nagpur with all the transitions encountered as we pass southwards through Behar to the northern edge of the same table-land. Our knowledge of the northern half of this non-alluvial tract is fairly adequate, and perhaps the most interesting feature in its flora is the fact that here we find growing side by side a few species characteristic of the Punjab and Rajputana that have managed to find their way through Bundelkand and Behar thus far to the east; and a few equally characteristic of Coromandel and the Circars that have succeeded in spreading through the lowlands of Orissa and Midnapore thus far to the north. One of the most interesting members of the latter category is, "perhaps, the intrinsically insignificant monotypic genus *Sphaeromorphaea*."¹

^{1. 2. Vegetation}
[In itself the district presents most of these characteristics. The eastern portion forms part of the great Gangetic delta and here, in land under the rice cultivation, are found the usual marsh weeds of the Gangetic plain and many sedges. On ponds and in ditches and still streams float aquatic plants and many submerged water-weeds. The villages and towns are surrounded by the usual shrubberies of semi-spontaneous and sub-economic shrubs and small trees which often cover a considerable area.] The more characteristic shrubby species are *Glycosmis*, *Ployalthia suberosa*, *Clerodendron infortunatum*, *Solanum torvum* and various other species of the same

genus, besides *Trema*, *Streblus* and *Ficus hispida*. Other species of figs, notably the *pipal* and banyan with the red cotton tree (*Bombax malabaricum*) mango (*Magnifera indica*), and jiyal (*Odina Wodier*) make up the arborescent part of these thickets in which *Phanix dactylifera* and *Borassus flabellifer* are often present. Hedges and waste places are covered with climbing creepers and various milk weeds and also harbour quantities of *Jatropha gossypifolia*, *Urena*, *Heliotropium*, *Sida* and similar plants. Road-sides are often clothed with a sward of short grasses and open glades with tall coarse grasses. [The district contains no forest but the laterite country and the uplands of the Asansol subdivision are in places clothed with coppices of *sal*] (*Shorea robusta*).

FAUNA

The carnivora of the district comprise leopard, wolf, hyaena, jackal and other smaller species. Leopards are not common but are occasionally found in the villages near Dainhat in the Katwa subdivision. They destroy cattle and goats and have been known to attack men. A leopard was quite recently killed close to the town of Burdwan, and in 1909 a good deal of damage was done by one in Kalna town. Tigers were formerly common in the district, especially in the jungles of the Asansol subdivision adjoining the Santal Parganas, but have now entirely disappeared. Wolves are scarce and are mostly met with in the jungles north of Kaksa; they have been known to carry off children. Hyaenas do not commit much mischief as they content themselves with carrion but they occasionally carry off goats and sheeps. Wild pig are numerous throughout the district and do considerable damage to the crops; monkeys also abound. Poisonous snakes are very common and include several kinds of cobra, the karait and the deadly Russell's viper. Snipe are very numerous in the rice fields during the months of September, October and November and afford excellent sport, while among other game birds are grey and black partridges, pea-fowl, and jungle-fowl which are plentiful in the *sal* jungles of the Asansol subdivision. On the Damodar and in

1. D. Prain, *Bengal Plants*.

the marshes and *jhils* east of the Hooghly, goose, duck and teal are found in fair numbers but are not so plentiful as in other parts of Bengal. Green pigeon are also occasionally to be found. Other common birds are those usually met with in Bengal.

FISH

Fish is consumed in large quantities by almost all classes of the people excepting the widows of high-caste Brahmans, Baidyas and Kayasths to whom it is forbidden by religious custom. The supply is mainly drawn from the Bhagirathi, the Damodar and the internal rivers and channels in which a large variety of freshwater fish are found. A considerable portion of the supply is also derived from the numerous tanks in the eastern portion of the district, but in many tanks the water has become poisonous in consequence of the decomposition of rank vegetation and the fish as a result are diseased. The practice of salting fish is very little resorted to, but in some parts the Muhammadans are in the habit of drying fish for home consumption, and the lower classes eat it with avidity even in a putrid state. Hunter enumerates six different methods of catching fish which are practised in the district—netting, there are twelve distinct varieties of nets; fishing by traps which are usually small cages of split bamboo placed in a current; fishing by *polus* a conical basket; fishing by rod and line; spear fishing; and fishing by *huri* and *sikti*. The *huri* is a bunch of twigs and thorns tied together and thrown into the river where there is little or no current. Small fish and prawns take shelter among the twigs and are captured by means of a net called *sikti*. Fishing with rod and line is the favourite sport of the Bengali and it is rare to pass a tank without seeing one or more fishermen patiently watching their tiny floats. Breeding fish are largely taken in the district for consumption but are not wastefully destroyed and young fry are also captured in large quantities principally for the purpose of stocking tanks, as it is generally believed that large fish cannot spawn in tanks.

The most common fish are the *rui*, *katla* and *mirgal* which are found everywhere in the rivers and tanks and the *magur* which are found in the tanks only, but there are a great number of other varieties which form an important part of the people's daily food. *Hilsa* are also taken in the Damodar.

CLIMATE

In Burdwan, like some of the more western districts of south-west Bengal where the surface soil is of the red laterite character and the hot westerly winds from Central India penetrate at times, exceptionally high day temperatures are a feature of the hot weather months. The mean maximum temperature, which is on an average below 80° in December and January, rises to 84° in February, 94° in March and 101° in April. Thereafter there is a steady fall until the monsoon is established when the average day temperature remains steady at about 90° up till October. Night temperature, which increases from 55° in January to 79° in June, remains almost unchanged until September when it begins to fall, and is 75° in October, 64° in November and 56° in December. Rainfall for the month is less than one inch between November and February, and between one inch and two inches in March and April, after which there is a rapid increase owing to the occasional incursion of cyclonic storms in May. During the monsoon season weather conditions in Burdwan are very similar to those in other parts of south-east Bengal. The rainfall is maintained chiefly by cyclonic storms which form in the north-west angle of the Bay and influence the weather over the whole of the south-west of the province, and by inland depressions which form over the central districts of Bengal and move slowly westward. As the district of Burdwan is more in the line of advance of these latter disturbances, rainfall is not appreciably lighter, as might be expected from its inland position. The average fall in June is 10, July 12, August 11.5, September 8.6 and in October 4 inches. The total average fall between May and November is 53 inches. The

highest temperature recorded for Burdwan is 113° in May 1889. The heaviest annual rainfall is 99 inches in 1861 and the lightest 40.5 in 1870. Since the latter year the following light falls have occurred : 42.2 inches in 1884, 40.8 in 1892 and 45.8 in 1895.

The district for many years suffered from a fever of a very fatal type to which it gave its name. The real "Burdwan fever", which often proved fatal within one or two days, appears to have died out, though the district is still subject to fevers especially those of a remittent type, the water-logged tract along the Bhagirathi being particularly unhealthy. Statistics of the rainfall for the various recording stations are given below for the cold weather (November to February), the hot weather (March to May) and the rainy season (June to October), the figures shown being the averages recorded :

Station	Years recorded	November to February	March to May	June to October	Annual Average
Burdwan	40-41	2.04	9.00	46.50	57.54
Kalna	30-31	2.58	9.62	43.06	55.26
Katwa	30-31	2.21	8.26	43.86	54.33
Raniganj	31-33	2.10	6.12	47.91	56.13
Mankar	15-16	1.65	7.12	48.26	57.03