

PROVINCIAL GAZETTEERS OF INDIA

PUNJAB

VOLUME I

Punjab (*Panjāb*).—In its strict etymological sense the Punjab, or 'land of the five rivers,' is the country enclosed and watered by the JHELUM, CHENĀB, RĀVI, BEĀS, and SUTLEJ; but the Province as now constituted includes also the table-land of Sirhind between the Sutlej and the Jumna to the south of the former river, the Sind-Sāgar Doāb or wedge of country between the Jhelum and the INDUS, and west of the latter river the two tracts which form Dera Ghāzi Khān and part of Miānwāli District. The Province lies between $27^{\circ} 39'$ and $34^{\circ} 2'$ N. and $69^{\circ} 23'$ and $79^{\circ} 2'$ E., and with its Native States has an area of 133,741 square miles, being larger by one-tenth than the British Isles, and comprising a tenth of the area of the Indian Empire. Of the total area, 36,532 square miles belong to Native States under the political control of the Punjab Government, and the rest is British territory. The population in 1901 was 24,754,737 (of whom 4,424,398 were in the Native States), or 8.4 per cent. of the whole population of the Indian Empire.

General
Description.

On the north the Himālayan ranges divide the Punjab from Kashmir and the North-West Frontier Province. On the west the Indus forms its main boundary with the latter Province, except that the Punjab includes the strip of riverain which forms the Isa Khel *tahsil* of Miānwāli District, west of that river. Its south-western extremity also lies west of the Indus and forms the large District of Dera Ghāzi Khān, thereby extending its frontier to the Sulaimān range, which divides it from Baluchistān. On the extreme south-west the Province adjoins Sind, and the Rājputāna desert forms its southern border. On the east, the Jumna and its tributary the Tons divide it from the United Provinces of Agra and Oudh, its

Boundaries.

frontier north of the sources of the latter river being contiguous with Chinese Tibet.

Physical
divisions.

The Province falls into five main physical divisions. Three of these—the Himālayan region, the Himālayan submontane which stretches from the Jumna to the Salt Range, and the arid plateaux of that range—are small in area, but the submontane is the most fertile and wealthiest in the Punjab. The other two are the arid south-western plains, and the western portion of the Indo-Gangetic Plain west which extends as far eastward as Lahore. Both these divisions are of vast extent, but infertile towards the south, where they encroach on the plains of Sind and Rājputāna.

The
Doābs.

The Punjab proper comprises five *doābs*, or tracts lying between two rivers. These received their names from the emperor Akbar, who formed them by combining the first letters of the names of the rivers between which they lie. They are : the Bist Jullundur, also called the Sāharwāl Doāb, lying between the Beās and the Sutlej ; the Bāri, between the old bed of the Beās and the Rāvi ; the Rechna (Rachin-āb, or Rachin-ao), between the Rāvi and the Chenāb ; the Chinhath, between the Chenāb and the Bihat (another name for the Jhelum), also called the Chaj ; and the Sind-Sāgar, between the Indus and the Jhelum or Bihat.

Mountain
system.

The whole Central Punjab is a vast alluvial plain ; but the north-east of the Province is formed of a section of the HIMĀLAYAS, stretching up to and beyond the great central ranges so as to include the Tibetan cantons of Lāhul and Spiti. The SALT RANGE, with the plateaux which lie to the north between it and the Indus, forms its north-western angle, and the SULAIMĀN Range forms the southern half of the western frontier of the Province. These are the only mountain systems of importance ; but a few insignificant outliers of the ARĀVALLI system traverse Gurgaon District in the extreme south-east, and terminate in the famous Ridge at Delhi.

River
system.

All the seven great rivers of the Punjab rise in the Himālayas, and after long courses, sometimes of several hundred miles, amid snow-clad ranges, they debouch on the plains. The slope of the low country is to the south and south-west, and is very gradual, seldom exceeding 2 feet in a mile ; and this determines the course of the rivers. In the process of time each stream has cut for itself a wide valley, which lies well below the level of the plain, and whose banks mark the extreme limits of the course on either side. Within this valley the river meanders in a narrow but ill-defined and ever-shifting

channel. In the winter the stream is comparatively small ; but as the mountain snows melt at the approach of the hot season, the waters rise and overflow the surrounding country, often to a distance of several miles on either side. At the close of the rainy season, the waters recede, leaving wide expanses of fertile loam or less fertile sand.

Of these seven rivers the Indus is the greatest. Already a mighty stream when it emerges from the Hazāra hills, it flows almost due south past Attock. Here it enters a deep gorge, terminating at Kālābāgh, where it pierces the Salt Range. Thus far it forms the western boundary ; but south of Kālābāgh it enters the Province, and divides the Isa Khel *tahsil* of Miānwāli from the rest of that District. Farther south again it forms the western boundary until it re-enters Punjab territory near Bhakkar, and divides Dera Ghāzi Khān from Miānwāli and Muzaffargarh Districts and from the State of Bahāwalpur. The Jhelum enters the Punjab east of the Salt Range, flowing south between this and the Pabbi hills, which terminate at Mong Rasūl. Thence the river flows west and then south until it is joined by the Chenāb near Jhang. The Chenāb rises in the Himālayan canton of Lāhul within the Province, and after traversing the Chamba State and the Jammu province of Kashmīr debouches on the plains east of the Jhelum, into which it falls about 225 miles from the hills. The Rāvi, rising in Chamba, reaches the plain below Dalhousie, and joins the combined waters of the Jhelum and Chenāb 50 miles south of Jhang. The united streams of these three rivers form the Trimāb. The Beās, rising on the south of the Rhotang pass on the opposite side of the Central Himālaya to the Rāvi, traverses the Kulū valley southward, and then bends suddenly westward, through the Mandī State and Kāngra District, until it turns the northern flank of the Siwāliks, and enters the plains within a few miles of the Rāvi. Thence its course is more southerly, and it falls into the Sutlej about 70 miles from its debouchure. The Sutlej, rising near the source of the Indus in Tibet, enters the Province near the Shipki Pass, traverses Bashahr and other States of the Simla Hills, and pierces the Siwāliks near Rūpar. Thence it runs almost due west to its junction with the Beās near Sobraon, where it takes a more southerly course for 270 miles, and falls into the Trimāb 9 miles north of Uch. Below this confluence the waters of the Jhelum, Chenāb and Rāvi, Sutlej and Beās form the Panjnad, or 'five rivers,' which fall into the Indus at Mithankot. Lastly, the Jumna, the only one of the great rivers of the Province

which ultimately drains into the Bay of Bengal, rises in Tehri State in the United Provinces, and from its junction with the Tons at the eastern extremity of Sirmūr territory forms the boundary between the Punjab and the United Provinces for a distance of over 200 miles.

Scenery.

The Province presents great varieties of scenery, from the snow peaks and glaciers of the Upper Himālayas to the deserts of shifting sand in the Sind-Sāgar Doāb and Bahāwalpur. The scenery of the Himālayas has often been described. In the Salt Range it is picturesque and even grand in places, and in the interior of the range the slopes are everywhere green with box and bog-myrtle. The southern face exhibits a very rugged and broken appearance, but on the north the contours of the hills are for the most part smooth and undulating. Between the Salt Range and the Himālayas the aspect of the country varies greatly, from the deep, shaly, and infertile ravines of Jhelum to the rich uplands of Gūjar Khān. The Siwāliks and the Pabbi hills are much tamer than the Salt Range, and the vegetation which clothes them is coarser and scantier, though the Jaswān Dūn in Hoshiārpur is not lacking in richness and beauty. But the characteristic scenery of the Punjab is that of the plains, and the contrast between their appearance before and after the crops have been cut is most striking. As harvest approaches, the traveller, especially in the irrigated tracts, rides through an endless expanse of waving crops of different shades of colour, out of which the villages seem to rise like islets in an ocean of green. After the harvest all is changed; and the dull brown of the fields is relieved only by the trees, solitary or in groves and avenues, and by the hamlets and village ponds. The lowlands through which the great rivers work their way retain some of their verdure throughout the year, and, especially in the east of the Province, are studded with groves and gardens. But in the plateaux between the rivers, and in the great sandy plains of the south, where cultivation is impossible without the aid of artificial irrigation, the scanty vegetation takes a more sober hue, and the only relief the eye can find from the stretches of bare soil is afforded by stunted and infrequent bushes.

Geology¹.
The
plains.

Geologically the Punjab falls into three natural divisions: the plains, the Salt Range, and the Himālayas. The plains consist almost entirely of the Indo-Gangetic alluvium, but contain beds of sedimentary rocks of Peninsular type. These

¹ Condensed from a note by Mr. H. H. Hayden, Geological Survey of India.

comprise a small area of rocks of a transition age, which form a series of outliers of the Arāvalli rocks at Delhi and to the south and south-east, whence they are known as the Delhi system¹. They are composed of a lower group of slates and limestones, and an upper and much thicker group of quartzites; the upper beds, known as the Alwar quartzites, are exposed on the Ridge at Delhi. Two small outliers, also referred to the Delhi system, are found near the Chenāb, at Chiniot and Kirāna, within 35 miles of the beds of extrapeninsular type found in the Salt Range. From the strong contrast they afford in petrological and dynamic conditions, they are almost certainly older than the oldest rocks of that range and in all probability pre-Cambrian.

In the north of the Province the SALT RANGE stretches from the Jhelum valley on the east to the Indus on the west, and crops up again beyond that river. Its geological features are particularly interesting, and the age of the salt which gives its name to the hills is still uncertain. The lowest beds to which a definite period can be assigned are shales, yielding trilobites, *obolus*, and *hyolithes*, and regarded as Lower Cambrian. They are underlain, with apparent conformity, by purple sandstone, which may also be Cambrian. From its apparent position below this sandstone the salt marl has been classed as Lower Cambrian or pre-Cambrian, but it also occurs at various horizons of higher levels. It has no appearance of stratification, but is a soft, structureless mass, showing no signs of sedimentary origin. In it are found immense masses of rock-salt, and bands and strings of gypsum, with disintegrated patches of dolomite. Magnesian sandstone appears to lie conformably on the *obolus* shales, but has yielded only fragmentary fossils. It is, however, probable that this, together with the overlying salt pseudomorph sandstone, belongs to the Cambrian system.

A great break then occurs, representing the Silurian and Devonian and part of the Carboniferous epochs; and the next formation, a boulder-bed, lies unconformably on all the older deposits. It consists of faceted and striated boulders embedded in a fine matrix, giving evidence of a glacial origin: a few fossils are found, including *Conularia*, and the series is regarded as Lower Permian, of the same age as the Tälcher boulder-bed. The Upper Permian is represented by olive and speckled sandstones and lavender clay, containing *Conularia* and other fossils, and the *Productus* beds which yield *Xenaspis* and *Cyclolobus*. Over these are found Lower Triassic beds of

¹ *Manual of the Geology of India*, p. 69 ('The Delhi System').

limestone, sandstone, and marl, containing ammonites, and termed ceratite beds. The Middle and Upper Trias appear to be wanting, the ceratites being overlain by sandstones, oolites, and shales, in the upper beds of which have been found ammonites and belemnites of Upper Jurassic age. They are followed by pisolitic sandstones, containing at the Chichali pass a rich Lower Cretaceous (neocomian) flora, and overlain unconformably by shales and sandstones with coal seams passing into Nummulitic limestone, the coal and limestone being of Lower Tertiary (eocene) age. Above the limestone is another unconformity, followed by a great mass of sandstone, with beds of red clay similar to the Nāhan beds of the Himālayas; this in turn is overlain by typical Siwālik sandstones.

The Himālayas fall into three broad divisions: a northern, a central, and a southern. The northern, known as the Tibetan zone, extends through Kanāwār and Spiti into Lāhul, and affords an almost unbroken sequence of sedimentary deposits ranging from Cambrian to Cretaceous. The oldest beds are slates and quartzites, for the most part unfossiliferous, but containing in the higher beds trilobites and other fossils of Middle and Upper Cambrian age. These are overlain, unconformably, by conglomerate, followed by a great mass of red quartzite, believed to be of Lower Silurian age, and passing up into limestone and marl with Silurian fossils (trilobites, corals, &c.). The limestone gradually gives place to a white quartzite which is one of the most characteristic horizons of the Himālayas. Except in Kanāwār and Upper Spiti the quartzite is usually overlain by beds of Upper Permian age, but near Lis in Kanāwār a great thickness of limestone and shale is found; the limestone contains a rich fauna of Lower Carboniferous age and the shales have yielded Upper Carboniferous brachiopods and bryozoa. Next in order is a conglomerate of variable thickness, overlain by calcareous sandstone and a bed of dark micaceous shale representing the Permian. The uppermost bed, known as the *Productus* shales, is found throughout the Himālayas, and contains Upper Permian brachiopods and ammonites. The latter are especially interesting, as they are closely allied to species (*Xenaspis carbonaria* and *Cyclolobus oldhami*) from the upper *Productus* limestone of the Salt Range. Above these shales is a thin shaly band with ammonites, known as the Otoceras beds, which passes into a vast thickness of limestone, intercalated by shale, and representing the whole of the Trias, and the Lower and probably Middle Jurassic. Fossils are numerous through-

Himā-
layas.
Northern
zone.

out, and representatives of all subdivisions in the Alpine Trias have been recognized. The limestones are succeeded by the well-known Spiti shales, famous for their ammonites. They are of Upper Jurassic age, and are overlain by the Giumal sandstone and Chikkim limestone and shales representing the Cretaceous system.

A broad zone of metamorphic, crystalline, and unfossiliferous rocks forms the axis of the Himālayas. The crystallines are partly intrusive, and partly the result of contact with the metamorphism of the Cambrian slates in the northern zone. South of the metamorphics, however, the unfossiliferous sedimentary rocks extend from Chamba through Kāngra and the Simla Hill States to Garhwāl. They consist chiefly of limestones, slates, quartzites, and conglomerates of unknown age, and have been divided into three systems. The Jaunsār system, regarded as the oldest, consists of grey slates overlain by blue limestones, followed by red slates and quartzites exposed near Chakrāta. In Jaunsār-Bāwar and the east of Sirmūr the quartzites are overlain by a considerable thickness of trap and volcanic ash. Above the Jaunsār system a great development of limestones forms most of the higher parts of the mountains running north from Deoban, and is known as the Deoban system. It is also seen in Sirmūr, and in the Shali peak north of Simla. Above this follows the carbonaceous system, covering the greatest part of the Lower Himālayas. At the base is a great thickness of grey slate, with beds of grit and quartzite, resembling the Cambrian slates of the Tibetan zone. The slates, which are known as the infra-Blaini or Simla slates, are overlain by a characteristic series of conglomerates or boulder-slate and pink dolomitic limestone, which has been recognized in many parts of the Simla Hill States, while similar beds occur near Mussoorie on the east and in Chamba to the north-west. These are overlain by carbonaceous shale, followed by a quartzite bed of variable thickness, the two being included in the infra-Krol group, while the overlying Krol beds consist of limestone with subordinate bands of carbonaceous shale, the limestone attaining a great thickness in the Krol mountain near Solon. The age of the Jaunsār and Deoban systems is quite unknown; the carbonaceous system has been referred in part to the Permian and in part (the Krol limestone) to the Trias, but this classification is not final.

The sub-Himālayan zone consists entirely of Tertiary beds, as a rule abutting against the pre-Tertiary rocks of the central and lower zone. These are comparatively narrow on the east, Central and lower zones. Sub-Himālayan zone.

but gradually widen, till on the north-west they spread over the plains, forming a continuous mantle covering Jhelum and Rāwalpindi Districts, and extending to the northern parts of the Salt Range. The lowest or Sabāthu group consists of grey and red gypseous shales, with subordinate bands of limestone. It is overlain conformably by the Dagshai group, composed of a great thickness of grey sandstones, with bright red nodular clays. These are followed by bright red or purple clays, overlain by sandstones which constitute the Kasauli group. The Sabāthu group yields fossils of Nummulitic age, while no recognizable fossils have been found in the Dagshai, and only plant remains in the Kasauli group; but it is probable that the two last represent the oligocene and lower miocene of Europe. The Upper Tertiary or Siwālik series is separated from all the older beds by one of the most marked structural features of the Himālayas, the main boundary fault, a great dislocation which can be traced for long distances along the lower parts of the range. Sandstones and red clay form the lowest group, being well seen at Nāhan. They are succeeded, often unconformably, by many thousand feet of very soft grey sandstone, with bands of clay. These are overlain by conglomerates which constitute the uppermost portion of the Siwālik series. In the SIWĀLIK HILLS the thickness of the series is at least 15,000 feet. The two upper groups contain great quantities of mammalian remains of pliocene age.

Botany.

The flora falls naturally into four primary divisions: the Himālayas, the submontane belt from the Jumna to the Rāvi, the plain proper, and the Salt Range on both sides of the Indus with connected country in the north-west of the Province.

Himā-
layas.

The Himālayan tract includes the basin of the Sutlej, from the Tibetan border at Shipki to the hill station of Kasauli in Ambāla District; the basins of the Beās and Rāvi, from their sources to the submontane tracts of Kāngra and Gurdāspur; the basins of the Chandra and Bhāga, which unite to form the Chenāb, from the high watershed that divides their sources from the Indus valley to the eastern borders of Kashmīr and Jammu; and a promontory bounding the Kashmīr valley on the south, and culminating in the station of Murree about 6,500 feet above sea-level.

The Sutlej basin is again divided into two well-marked portions, of which the outer includes Simla District and adjoining Hill States, with Kasauli. The trees and shrubs of this portion, to about 6,000 feet, are mainly subtropical; but

above this is a temperate belt which begins, roughly speaking, at Simla, and is rich in familiar European forest trees, such as yew, pines, oak and holly, elm, a horse-chestnut, several sorts of spindle-tree and buckthorn, and, among humbler growths, crowfoots, columbines, anemones, cresses, violets, stitchworts, cranesbills and St. John's worts, brambles, roses, spiraeas and wild strawberries, woodbines, guelder-rose and ivy, bell-flowers, gentians, Solomon's seal, meadow-rush, and herb-paris. The *Flora Simlensis* of the late Sir Henry Collett (edited by Mr. W. B. Hemsley) takes in only a part of the Simla Hills, but it describes 1,236 species of flowering plants, a number somewhat less than that of the native plants of the British Islands. The component elements, however, differ materially from those of any European flora, for, apart from the sub-tropical contingent, the Outer Himālayas preserve many forms allied to the plants of north-eastern Asia (e.g. *Hydrangea*), as well as Indo-Malayan types. The *deodār*, which flourishes near Simla, is related to the cedars of the Lebanon and the Atlas. East of Simla the rivers drain into the Jumna, and not towards the Sutlej, but as a matter of convenience certain petty States south-east of Bashahr and the territories of Sirmūr are grouped with the Simla area. In this tract the Chaur mountain, rising almost from the plains to over 12,000 feet, shows successive zones of vegetation, from the almost tropical valleys at its southern base to birch forest and subalpine pastures near its summit.

The upper portion of the Sutlej basin within Indian limits—that is to say, Kanāwār and the Spīti valley, with Lāhul and Pāngi, both drained by the Chenāb—constitutes a mainly alpine field of huge extent and great elevation. The flora is most closely linked with the vegetation of Western Tibet and Middle Asia, and includes few trees and very little forest. A pine, which is also found in the mountains of Afghānistān, extends to the lower levels of the inner Chenāb basin; but, except in Pāngi, a small pencil-cedar, stunted junipers, a few scattered birches, with pollard willows grown from saplings planted by the watercourses, complete the list of trees for this portion of the Punjab Himālayas.

Crossing outwards again to the basins of the Beās and Rāvi, the Kulū valley and the higher glens of Chamba present a far more varied and luxuriant aspect to the forester or botanist. The trees are mainly those of the Simla country; but certain shrubs and herbs reappear that are rare or absent in the Sutlej valley, owing doubtless to its greater indraught from the heated

sands of the Punjab and Northern Rājputāna. On the other hand, some West Asian types—for example, the wild olive and the Oriental clematis—are found in the drier parts of Kulū more abundantly than to the eastward, while a few European forms, e.g. the great spearwort and the purple loosestrife, find their eastern limit in the Beās valley. The hill stations of Dalhousie and Dharmsāla come within this area. Epiphytic orchids, which are missing from the Simla country except very locally, reappear near Dharmsāla, but do not pass west of the spurs that divide the Kāngra ranges from the basin of the Rāvi.

The Murree hills, which are separated from the Rāvi country by a long stretch of the Outer Himālayas lying within Jammu territory, differ considerably owing to the presence of a stronger West Asian element in their flora.

The submontane belt is practically restricted to the Districts of Ambāla (with its adjoining States), Hoshiārpur, and Kangra. The *sāl* tree, which is not found elsewhere to the west of the Jumna, survives in a single *dūn* (or strath) connected with the Kāngra valley, but actually within the northern border of Hoshiārpur District. The Kiārda Dūn in Sirmūr State and the Kalesar forest in Ambāla shelter a number of species that are characteristic or abundant in the Siwālik tract east of the Jumna, though unknown or rare farther westward.

Sub-
montane
tract.

Plains.

The plain has also its subdivisions, which are, on the whole, even better marked than those of the Himālayas, an important influence being exercised by the climate of the Great Indian Desert which borders the whole southern limit of the Province, and sends out two arms which embrace the actual country of the five¹ rivers. That on the east takes in a great part of the Phūlkiān States, its apex being near the town of Ludhiāna, on an ancient bed of the Sutlej. The western arm (locally known as the Thal) extends from the Sind border up the Indus valley to the south-west angle of the Salt Range. The eastern chain of sandhills and alternating barriers has of late, however, lost much of its desert character through canal extensions. From Ludhiāna to the Jumna valley, and along the Jumna to the neighbourhood of Delhi, the country is substantially a portion of the great Gangetic plain, though some interesting peculiarities present themselves: a crowfoot (best known from North-Eastern America) occurs, also a rose which is elsewhere most abundant in the swamps of Eastern Bengal, and a kind of scurvy-grass (*Cochlearia*), a genus usually

¹ The Beās, Rāvi, Chenāb, Jhelum, and Indus. The Sutlej is included in Hindustān, of which at the same time it forms the traditional boundary.

partial to far colder latitudes. The south-east portions of the Province, and the upland tract skirting the western valley of the Jumna, present certain features of the Deccan flora, merging ultimately in the Arāvalli system. Trees in the extreme south-east are few, and mostly of Arabian or North African affinity. Similar forms, though seldom reaching the dimensions of a tree, characterize the southern fringe of the Punjab; but towards the Indus, a West Asian or indeed European element becomes prominent, in the case especially of those field annuals which come up each winter with the crops of the season: such as poppy, fumitory, rockets, catchfly, spurrey, chickweed, vetches and trefoils, thistles, blue pimpernel, bindweed, toadflax and veronicas, broomrape, goosefoots, milkspurges, asphodel and others.

Between the desert and the Indus the *doābs* bounded by the great rivers presented formerly a succession of alkaline wastes, often covered with low bushes of the saltwort tribe, or untilled expanses dotted with a scrub of thorny bushes of the *Acacia* family and of *van* (*Salvadora*, a desert representative of the olive), with an occasional row of tamarisks near a creek or waterhole, relieved in the autumn by a short-lived flush of climbing plants, and in good seasons by an abundant crop of grasses, which afforded coarse but invaluable pasture to the cattle of the nomad population. Canal extension and systematic state colonization are now changing all this rapidly, and the flora is approximating to the general spring and autumn series of agrestal species of Northern India, though a strong West Asian admixture maintains itself. Beyond the Indus, in Dera Ghāzi Khān District, this 'Oriental'¹ element begins to predominate, even as regards shrubs and perennials; and it continues northwards to the Salt Range and the hills near Attock, where several types common to the Orient and the Mediterranean, e.g. pinks and larkspurs, may be gathered at less than 2,000 feet above sea-level.

Himālayan forms are still prevalent in the Salt Range, Salt Range. especially at the higher levels. On the north face of the culminating summit (Sakesar), at about 4,800 feet above the sea, there are a few oaks, of a common North-West Himālayan species, while herbaceous plants of the same region intermingle with trans-Indus representatives; but the slopes abound with box-trees, olives, and other Western forms. The herbs and grasses, moreover, although Indian forms abound, include

¹ The region from the Mediterranean to the Indus, and between the Red Sea and the Steppes, is thus termed by botanists.

a decided proportion of more Western types ; but, owing to the dryness of the climate, these are usually such as characterize the arid zone that extends on the west through Africa to the Atlantic Islands.

Wild
animals.

Until the beginning of the nineteenth century both lions and tigers appear to have been common, and the Nardak of the Eastern Punjab was a favourite hunting ground of the Mughal emperors. As late as 1827 Major Archer says that lions were sometimes seen within 20 miles of Karnāl, while tigers were exceedingly numerous in its immediate vicinity ; and in the neighbourhood of Sirsa and in other parts of the Punjab tigers were abundant until past the middle of the nineteenth century. Lions are now entirely extinct and tigers practically so, though occasionally a straggler from the Arāvalli Hills is found in the South-East Punjab, or one from the eastern Tarai in Nāhan or Ambāla. Another animal practically extinct in the Punjab is the wild elephant, though it is occasionally met with in Nāhan and Ambāla. The only common representatives of the feline tribe are the leopard, the hunting leopard, and wild cat, with the lynx, along the southern border ; the leopard is chiefly found in the hills. Two kinds of bear, the black and the brown, are found in the hills ; hyenas and wolves are seen in most Districts, but are not common ; jackals and foxes on the other hand abound. Ibex and *bharal* are found in the Higher Himālayas, and lower down musk deer, barking-deer, and wild goats ; in the Salt Range the *uriāl* (*Ovis vignei*) is not uncommon. In the plains antelope are plentiful, especially in the east and south of the Province, and *nilgai*, 'ravine deer' (*chinkāra*), and hog deer (*pārha*) are common in places. The wild hog, badger, porcupine, and hare are found in most parts. The grey ape (*langūr*) lives in the hills, and monkeys abound, both in the hills and in the canal-irrigated Districts. The otter and river porpoise are found in all the rivers.

Birds.

Peafowl are plentiful, and so is the lesser bustard ; the great bustard is less common. Flocks of sand-grouse (imperial painted, pallas, and pintail) are frequently seen in the dry tracts. The grey partridge is found everywhere, and the black partridge is occasionally met with ; in the hills the *chikor* (*Caccabis chukor*) and *sisi* (*Ammoperdix bonhami*) partridges are common, and the snow partridge is found at high elevations. All the Indian pheasants are found in the Himālayas, including the argus, *monal*, *koklas*, *chir*, and white-crested pheasant. Bush-quail and rain-quail are found in the plains, and the common grey quail comes in hosts at the ripening of the

wheat. In the winter large numbers of waterfowl visit the rivers and *jhils*. The most common ducks are the sealing-wax bill, pintail, mallard, pinkhead, shoveller, teal, and goose teal; geese, cranes, flamingoes, pelicans, ibises, herons, bitterns, snipe are all also more or less plentiful. The crow, vulture, and kite are ubiquitous, and the adjutant bird is occasionally met with. Hawks of various species are found, and often fetch high prices for sporting purposes. Green parrots fill the air with their screeching in the irrigated tracts, the golden oriole sometimes flashes through the trees, and the blue jay and woodpecker lend a frequent note of colour to the scene. Immense flocks of rosy pastors visit the plains in the hot season, and the *maina* is common everywhere in the neighbourhood of houses.

The sharp-nosed or fish-eating crocodile (*ghariyāl*) is found in all the great rivers, and the blunt-nosed crocodile or *magar* (*Crocodilus palustris*) is also met with in the lower reaches. The poisonous snakes are the *karait*, cobra, *Echis carinata* (*kappa*), and, in the east of the Province, Russell's viper. Lizards of various kinds are common. The commonest fish are the *rohu* (*Labeo rohita*) and mahseer, the latter of which runs up to 50 lb.

Locusts sometimes arrive in swarms, chiefly from the south-west, and do considerable damage. White ants attack timber and garnered grain, which is also much subject to injury from weevils. Mosquitoes abound, and with sandflies combine to make life a burden in the hot season; and house-flies swarm, especially towards the beginning and ending of winter. Scorpions and centipedes are numerous, but not much seen. The honey-bee, hornet, and wasp are common, and the firefly's flashing light is to be seen wherever there is irrigation.

Over the greater part of the Punjab the climate is of the most pronounced continental character, extreme summer heat alternating with great winter cold; but its diversified surface, including montane, submontane, and plains zones, modifies very largely the temperature, weather, and climate in different parts of the Province. The Punjab has accordingly been divided into four natural divisions, in each of which the general meteorological conditions are believed to be fairly homogeneous. These are the Himālayan (stations, Simla and Murree), the sub-Himālayan (stations, Ambāla, Ludhiāna, Siālkot, and Rāwalpindī), the Indo-Gangetic Plain West (stations, Delhi and Lahore), and the north-west dry area (stations, Khushāb, Montgomery, Multān, and Sirsa).

As a whole, the Punjab has in normal years two well-defined rainy seasons. The first or period of the north-east monsoon includes the 'Christmas rains,' as they are called, which fall between the end of December and the end of February or the middle of March. The second rainfall period is that of the south-west monsoon, from the end of June to the middle of September. The rainfall is naturally heaviest in the Himālayas. The highest average received is 126 inches at Dharmśāla, and the average of the Himālayas is nowhere less than 36. In the plains the rainfall decreases rapidly away from the hills. The submontane zone, which skirts the foot of the hills, and of which Rāwalpindi and Siālkot may be taken as typical stations, has an annual fall of 30 to 40 inches. The eastern plains from Delhi to Lahore belong to the West Gangetic plain, and have a mean rainfall of about 24 inches, the valley of the Jumna having a higher rainfall than the rest. To the west and south-west lies the dry area, characterized by an extremely light and variable rainfall, and a heat and dryness in the hot season extreme even for the Punjab. The ordinary south-west monsoon winds from the Sind and Kāthiāwār coasts encircle, but do not blow into this area, which therefore gets very little rain from this source, though it occasionally receives heavy cyclonic downpours from storms that have travelled westward from the head of the Bay. Montgomery and Multān are typical stations of this tract.

The plains, owing to their arid nature and remoteness from the sea, are subject to extreme vicissitudes of climate. In the winter the cold exceeds anything met with elsewhere in the plains of India. In January and February the night temperature commonly falls below freezing-point, while by day the thermometer does not as a rule rise above 75°; and for four months of the year nothing can be more perfect than the Punjab climate, with its bright sun and keen invigorating air. In summer, on the other hand, the fierce dry heat is surpassed only in Sind. In June the thermometer commonly reaches 115° to 121°, while the night temperature averages from 79° to 83°.

About the end of December the weather conditions ordinarily become disturbed; rain falls in the plains and snow on the hills. The rainfall of this season is almost exclusively due to cold-weather storms or cyclones, which follow each other at varying intervals, averaging about ten days, from the end of December to about the middle of March. Important features of these storms are the rapid changes of weather which accom-

pany them. Their approach is preceded by the appearance of a bank of cirrus cloud, which gradually overspreads the whole sky. Under this canopy the heat rapidly increases, more particularly at night, and temperatures from 5° to 15° higher than usual are registered. In the rear of the disturbance a rapid change takes place, accompanying the clearing of the skies and the change of wind. The thermometer falls with great rapidity, sharp frost on the ground is experienced, and air temperatures of 18° or 19° are occasionally recorded at the hill stations. This fall of temperature appears to be directly related to the snowfall on the hills, and is proportional to the amount of the snowfall, and to the lowness of the elevation to which it descends. As the rainfall of this period accompanies the march of cyclonic storms from west to east across Northern India, it is ordinarily heaviest at the northern and Indus valley stations, and usually diminishes to a very small amount over the south and south-east.

The mean temperature in most parts increases from February to May at about the rate of 10° a month, and by the end of March or beginning of April the hot season is in most years fairly established. From April till near the end of June there is, as a rule, no rain of importance, though occasional thunder and hail storms afford temporary relief from the great heat. A desiccating, scorching west wind blows during the greater part of this period, and the thermometer ranges from about 95° in the early morning to about 115° in the heat of the day. These westerly winds commence to drop towards the end of June, and for a few days still, calm, sweltering heat succeeds the scorching blasts of the hot winds. About the end of June south and east winds bring up heavy cumulus clouds, and in favourable years the monsoon rains are then ushered in with violent thunderstorms and heavy showers. The rainfall is generally very variable and irregular in its advance, and is ordinarily brought up by the approach to the south-east of the Province of a cyclonic storm from the Bay of Bengal. This carries with it the moist south-east air currents from the Bay, and at the same time induces an inrush of moist air from the north of the Arabian Sea across the Sind and Kāthiāwār coasts and eastern and central Rājputāna into the south and east Punjab. The rainfall of the monsoon season is seldom steady or continuous, nor does it, as a rule, extend over the whole Province, as in the west and south the fall is both scanty and uncertain. For two or three days in succession heavy, fairly general rain may fall; but this is succeeded by intervals of

oppressively hot and sultry weather, when the rain ceases or only falls as scattered showers. These conditions continue with greater or less intensity till the second or third week of September, when, with not infrequently a second outburst of violent thunderstorms, the rains cease and fine weather commences.

Storms and cyclones. Severe cyclonic storms are practically unknown in the Punjab. Hailstorms are fairly frequent, especially in March and April, and often cause considerable damage to the crops.

Floods. Although the Province is traversed or bounded by seven large rivers, it is not to any serious extent subject to inundations from them, and it is only in the comparatively narrow riverain belts bordering the channels of the rivers that floods do serious harm. An exception to this generalization is to be found in the extreme south-west, where parts of the Districts of Dera Ghāzi Khān, Muzaffargarh, and Multān, bordering on the Chenāb and Indus, are low enough to be subject to frequent inundations even during the passage of normal floods. Protection is afforded by the erection of dikes, but they are not always sufficiently strong to resist a heavy spate. Nearly all the high floods of which records exist have occurred in July or August, when the summer monsoon is at its height. The earliest of these was in 1849, when the town and civil station of Shāhpur were washed away by the Jhelum. In 1856 and in 1878 the Indus rose very high, and on both occasions the towns of Muzaffargarh and Dera Ghāzi Khān were flooded out and large portions of the Districts submerged. In 1892, 1893, and 1905 the Chenāb and the Jhelum were heavily flooded, and in the second of these years the Kohāla suspension bridge on the Kashmir road was carried away. The great Indus flood of 1878 is said to have been in part the result of heavy landslips in the hills.

Earth-quakes. Throughout the period over which authentic records of Indian earthquakes extend, the Punjab has repeatedly suffered from the effects of seismic disturbances of greater or less intensity. This is due to the presence of important lines of weakness in the earth's crust, caused by the stresses involved in the folding of the Himālayas and resulting in the development of faults. The most important of these is that known as the 'main boundary fault,' which runs through the Lower Himālayas from end to end of the Punjab. Along these lines readjustments of the equilibrium of the crust are constantly taking place, and when these readjustments are irregular or spasmodic the movement results in an earthquake. Such

earthquakes as are due to this cause are naturally most severe in the neighbourhood of the fault. A striking exemplification is to be found in the Kāngra earthquake of 1905. About 20,000 human beings perished in this catastrophe, which ranks as one of the most disastrous of modern times. The loss of life occurred principally in the Kāngra valley, Dharmśāla, Mandī, and Kulū, but the shock was perceptible to the unaided sense throughout an area of some 1,625,000 square miles. Although this most recent catastrophe dwarfs all earthquakes previously recorded in the Province, those of 1803, 1827, 1842, and 1865 were of considerable severity.

The Punjab was undoubtedly the seat of the earliest Aryan settlements in India, and the Rig-Veda was probably composed within its borders. In one of its finest hymns the Vipāsa (Beās) and Sutudrī (Sutlej) are invoked by the sage Visvāmitra to allow the host of the Bharatas to cross them dryshod. And in the later Vedic period the centre of Aryan civilization lay farther to the south-east, between the Sutlej and the Jumna, in the still sacred land of KURUKSHETRA round Thānesar, the battle-field of the Mahābhārata, while Indrapat near Delhi still preserves at least the name of Yudhishtira's capital, Indraprastha. For a brief period after 500 B.C. part of the Punjab may have formed a Persian province, the Indian satrapy conquered by Darius, which stretched from Kālābāgh to the sea, and paid a tribute of fully a million sterling.

History.
Early
period.

In invading the territories east of the Indus Alexander yielded to mere lust of conquest, for they no longer owed allegiance to the Persian empire. In 326 B.C. he crossed the river at Ohind or Und, invading thereby a dependency of Porus (Paurava), whose kingdom lay in the Chaj Doāb. The capital of this dependency was Taxila (Sanskrit, Takshasilā), now the ruins of Shāhdheri, but then a great and flourishing city, which lay three marches from the Indus. Its governor, Omphis (Ambhi) or Taxiles, was in revolt against Porus, and received the Macedonians hospitably. Leaving Philippos as satrap at Taxila, Alexander, reinforced by 5,000 Indians under Taxiles, marched to the Jhelum (Hydaspes), where he found Porus prepared to dispute his passage of the river, probably near Jhelum town. Alexander, however, turned his enemy's right flank by crossing higher up, and defeated him with great loss. Porus himself was captured, but soon admitted to alliance with the Macedonians and granted the country between the upper reaches of the Jhelum and Chenāb (Bhimbar and Rājauri). His nephew, also named

Alexander.