

TABLE I. TEMPERATURE IN THE PUNJAB

Station.	Height in feet of Observatory above sea-level.	Average temperature (in degrees Fahrenheit) for twenty-five years ending with 1901 in							
		January.		May.		July.		November.	
		Mean.	Diurnal range.	Mean.	Diurnal range.	Mean.	Diurnal range.	Mean.	Diurnal range.
Delhi	718	59.0	22.3	92.6	24.1	87.7	13.6	69.8	26.4
Lahore	702	54.8	27.7	89.3	32.9	90.4	21.1	65.8	36.1
Rāwalpindi	1,676	50.3	24.6	82.9	29.5	87.1	21.1	60.6	33.2
Siālkot*	830	54.4	23.0	88.7	28.2	88.8	18.1	65.8	30.7
Multān	420	56.5	26.6	91.8	28.8	94.0	20.1	68.6	31.6
Montgomery†	558	55.0	26.4	92.9	29.8	94.3	21.2	68.0	33.2
Hill Station—Simla‡	7,224	39.4	10.1	65.8	14.8	64.8	9.1	50.6	11.0

NOTE.—The diurnal range is the average difference between the maximum and minimum temperatures of each day.

* The figures are for twenty-four to twenty-five years.

† The figures are for twelve years only.

‡ The figures are for nine to ten years only.

TABLE II. RAINFALL IN THE PUNJAB

Station.	Average rainfall (in inches) for twenty five years ending with 1901 in												
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of year.
Delhi	1.26	0.70	0.50	0.27	0.69	3.25	7.98	8.03	3.95	0.27	0.11	0.64	27.65
Lahore	1.14	1.20	0.67	0.54	0.83	1.86	5.94	5.00	2.11	0.21	0.12	0.46	20.08
Rāwalpindi	2.92	2.35	1.84	1.90	1.61	1.88	8.00	7.98	3.37	0.55	0.47	1.03	33.90
Siālkot	2.54	1.84	1.12	1.00	1.04	2.77	7.95	9.08	2.86	0.28	0.25	0.73	31.46
Multān	0.41	0.42	0.34	0.15	0.38	0.55	2.12	1.92	0.65	...	0.07	0.26	7.27
Montgomery	0.57	0.80	0.43	0.21	0.52	1.19	2.82	2.20	0.82	0.06	0.08	0.29	9.99
Hill Station—Simla	3.02	3.25	2.22	1.73	3.20	7.41	16.54	17.63	5.57	0.98	0.58	1.50	63.63

TABLE III. DISTRIBUTION OF POPULATION, PUNJAB, 1901

	Area in square miles.	Number of towns.	Number of villages.	Total population.			Urban population.			Persons per square mile in rural areas.
				Persons.	Males.	Females.	Persons.	Males.	Females.	
<i>British Territory.</i>										
Hissar	5,217	8	964	781,717	418,162	363,555	97,025	51,602	46,393	131.1
Rohtak	1,797	11	491	235,672	133,217	102,455	62,412	46,625	45,787	159.5
Gurgaon	1,084	8	1,171	745,208	390,443	354,765	76,771	39,410	37,361	337.4
Delhi	1,290	4	714	689,039	371,864	317,175	231,381	126,344	105,037	359.5
Karnal	3,153	7	1,383	883,225	478,983	404,242	90,308	46,571	43,737	251.5
Ambala	1,851	7	1,718	815,880	451,582	364,299	123,902	72,210	53,692	372.8
Simla	201	6	45	40,352	26,164	14,187	18,902	13,530	5,372	212.4
Total, Delhi Division	15,393	51	6,486	4,587,092	2,470,369	2,116,703	733,671	396,292	337,379	250.6
Kangra	9,978	3	715	768,124	399,106	369,018	16,179	9,782	6,397	75.4
Hoshiarpur	2,244	11	2,217	989,782	525,854	463,928	78,324	38,503	33,821	408.8
Jullundur	1,431	10	1,216	917,587	496,690	420,897	134,257	72,785	61,472	547.4
Ludhiana	1,455	5	864	673,097	369,165	303,932	86,966	46,833	40,133	402.8
Ferozepore	4,392	8	1,593	958,072	524,306	433,766	86,024	50,331	35,693	202.7
Total, Jullundur Division	19,410	37	6,413	4,306,622	2,315,121	1,991,541	395,750	218,234	177,516	201.5
Montgomery	4,771	3	1,371	497,706	268,606	229,100	19,770	11,189	8,581	100.2
Lahore	3,704	7	1,533	1,162,109	640,449	521,660	256,090	147,934	108,156	246.3
Amritsar	1,601	5	1,042	1,023,828	559,855	463,973	186,449	105,988	80,461	526.0
Gurdaspur	1,889	12	2,244	940,334	509,951	430,383	70,365	38,263	32,302	460.4
Sialkot	1,991	7	2,348	1,083,909	573,259	510,650	80,580	47,957	41,623	499.4
Gujranwala	3,198	8	1,331	890,577	485,260	405,317	78,221	40,864	37,357	254.0
Total, Lahore Division	17,154	41	9,869	5,598,463	3,037,380	2,561,083	702,675	392,195	308,480	286.1
Gujrat	2,031	4	1,336	750,548	389,402	361,146	41,893	21,002	20,891	345.5
Shahpur	4,840	5	789	524,259	273,144	251,115	55,852	28,421	27,431	96.8
Jhelum	2,823	4	888	501,424	253,058	248,366	40,581	21,805	18,776	163.8
Rawalpindi	2,020	2	1,120	558,699	299,893	258,806	80,532	30,709	28,823	233.4
Attock	4,022	4	614	464,430	242,398	222,032	24,109	13,156	10,953	109.5
Total, Rawalpindi Division	15,736	19	4,807	2,799,360	1,457,895	1,341,465	251,967	143,207	108,760	161.9

TABLE III. DISTRIBUTION OF POPULATION, PUNJAB, 1901 (*continued*)

	Area in square miles.	Number of towns.	Number of villages.	Total population.			Urban population.			Persons per square mile in rural areas.
				Persons.	Males.	Females.	Persons.	Males.	Females.	
Mianwāli	7,816	5	426	424,588	224,008	200,580	29,555	15,055	14,500	50.5
Jhang	6,652	3	1,896	1,002,656	559,295	443,361	49,238	27,198	22,040	143.3
Multan	6,107	6	1,351	710,626	388,598	322,028	108,651	60,430	48,221	98.6
Muzaffargarh	3,635	4	700	405,656	220,207	185,449	12,684	6,998	5,686	108.1
Dera Ghāzi Khān	5,306	5	713	471,149	256,381	214,768	43,276	23,684	19,592	80.6
Total, Multān Division	29,516	23	5,086	3,014,675	1,648,461	1,366,214	243,404	133,365	110,039	93.9
Baloch Trans-Border . . . . .	...	...	...	24,087	13,459	10,628	...	...	...	...
Total, British Territory	97,209	171	32,663	20,330,339	10,942,705	9,387,634	2,325,467	1,283,293	1,042,174	185.2
<i>Native States.</i>										
Patiala	5,412	14	3,580	1,596,692	877,197	719,495	175,368	95,719	79,649	262.6
Jind	1,259	7	439	282,003	153,376	128,627	49,487	21,987	18,500	191.8
Nabha	928	4	488	297,949	165,386	132,563	36,614	20,564	16,050	281.6
Bahāwalpur	15,000	10	960	720,877	395,684	325,193	69,864	38,727	31,137	43.4
Sirmūr	1,198	1	973	135,687	75,461	60,226	8,256	3,611	2,645	108.0
Lohārū	222	1	56	15,229	8,160	7,069	2,175	1,117	1,058	58.8
Dujāna	100	1	30	24,174	12,481	11,693	5,545	2,723	2,822	186.3
Pataudi	52	1	40	21,933	11,511	10,422	4,171	2,121	2,050	341.6
Kalsia	168	2	181	67,181	36,980	30,201	10,161	5,322	4,779	339.4
Simla Hill States	5,918	3	1,597	389,349	200,206	189,143	8,376	4,873	3,503	64.4
Kapūrthala	630	6	597	314,351	169,797	144,554	47,520	26,462	21,058	423.5
Mandi	1,200	1	146	174,045	90,896	83,149	8,144	4,928	3,216	138.3
Māler Kotla	167	1	115	77,506	41,915	35,591	21,122	10,815	10,307	337.6
Suket	420	2	28	54,676	28,964	25,712	2,179	1,165	1,014	125.0
Fardkot	642	2	167	124,912	69,321	55,591	19,924	11,195	8,729	163.5
Chamba	3,216	1	1,670	127,834	66,474	61,360	6,000	3,436	2,564	37.9
Total, Native States	36,532	57	10,997	4,424,398	2,409,809	2,014,589	463,906	254,765	209,141	108.4
GRAND TOTAL, PUNJAB	133,741	228	43,660	24,754,737	13,352,514	11,402,223	2,789,373	1,538,058	1,251,315	164.2

NOTE.—The areas given are supplied by the Surveyor-General of India. Lyallpur District was formed in 1904 out of portions of the Districts of Montgomery and Jhang; it has an approximate area of 3,075 square miles and a population of 654,666, and contains 1 town and 1,141 villages.

TABLE III. DISTRIBUTION OF POPULATION, PUNJAB, 1901 (*continued*)

	Area in square miles.	Number of towns.	Number of villages.	Total population.			Urban population.			Persons per square mile in rural areas.
				Persons.	Males.	Females.	Persons.	Males.	Females.	
Mianwāli	7,816	5	426	424,588	224,008	200,580	29,555	15,055	14,500	50.5
Jhang	6,652	3	1,896	1,002,656	559,995	443,361	49,238	27,198	22,040	143.3
Multan	6,107	6	1,351	710,626	388,570	322,056	108,651	60,430	48,221	98.6
Muzaffargarh	3,635	4	700	405,656	220,207	185,449	18,684	6,998	5,686	108.1
Dera Ghāzi Khān	5,306	5	713	471,149	256,381	214,768	43,276	23,684	19,592	80.6
Total, Multān Division	29,316	23	5,086	3,014,675	1,648,461	1,366,214	243,404	133,365	110,039	93.9
Baloch Trans-Border . . . . .	...	...	...	24,087	13,499	10,628	...	...	...	...
Total, British Territory	97,209	171	32,663	20,330,339	10,942,705	9,387,634	2,325,467	1,283,293	1,042,174	185.2
<i>Native States.</i>										
Patiala	5,412	14	3,580	1,596,692	877,197	719,495	175,368	95,719	79,649	262.6
Jind	1,259	7	439	282,003	153,376	128,627	40,487	21,927	18,560	191.8
Nabha	928	4	488	297,049	165,386	132,563	36,614	20,564	16,050	281.6
Bahāwalpur	15,000	10	960	780,877	395,684	385,193	69,864	38,727	31,137	43.4
Sirmūr	1,198	1	973	135,687	75,461	60,226	6,256	3,611	2,645	108.0
Lohāru	222	1	96	15,229	8,160	7,069	2,175	1,117	1,058	55.8
Dujāna	100	1	30	24,174	12,481	11,693	5,545	2,723	2,822	186.3
Pataudi	92	1	40	51,933	11,311	10,422	4,171	2,121	2,050	341.6
Kalsia	168	2	181	67,181	36,980	30,201	10,161	5,322	4,779	339.4
Simla Hill States	5,918	3	1,527	389,349	206,206	183,143	8,376	4,873	3,503	64.4
Kapūrthala	630	6	597	314,351	169,797	144,554	47,520	26,452	21,068	423.5
Mandi	1,200	1	146	174,045	90,896	83,149	8,144	4,928	3,216	138.3
Maler Kotla	167	1	115	77,506	41,915	35,591	11,122	10,815	10,307	337.6
Suket	420	2	28	54,676	28,964	25,712	2,179	1,165	1,014	125.0
Fardkot	642	2	167	124,912	69,221	55,591	19,024	11,125	8,729	163.5
Chamba	3,216	1	1,670	127,834	66,474	61,360	6,000	3,436	2,564	37.9
Total, Native States	36,532	57	10,997	4,424,398	2,409,809	2,014,589	463,906	254,765	209,141	108.4
GRAND TOTAL, PUNJAB	133,741	228	43,660	24,754,737	13,352,514	11,402,223	2,789,373	1,538,058	1,251,315	164.2

NOTE.—The areas given are supplied by the Surveyor-General of India. Lyallpur District was formed in 1904 out of portions of the Districts of Montgomery and Jhang; it has an approximate area of 3,075 square miles and a population of 654,666, and contains 1 town and 1,141 villages.

TABLE IV
STATISTICS OF AGRICULTURE, PUNJAB
(In square miles)

	1888-90 (average).	1891-1900 (average).	1900-1.	1903-4.
Total area	89,067	89,711	89,595	89,270
Total uncultivated area	53,644	51,568	48,400	46,958
Cultivable but not cultivated Uncultivable (including forests)	34,515	32,497	26,635	26,373
Total cultivated area	19,129	19,071	19,765	20,585
Irrigated from canals	33,423	38,143	41,195	42,312
Irrigated from wells and canals	3,160	5,363	8,354	9,336
Irrigated from wells	784	1,117	1,555	1,599
Irrigated from other sources	5,674	6,072	5,989	6,124
Total irrigated area	86	133	247	311
Unirrigated area (including inundated)	9,704	12,685	16,145	17,370
	25,719	25,458	25,050	24,942
<i>Total cropped area.</i>				
Rice	1,085	1,055	1,184	1,074
Wheat	9,575	9,847	11,901	12,216
Other food-grains and pulses	16,454	14,899	19,289	16,668
Oilseeds	1,101	1,311	2,705	1,683
Sugar-cane	538	528	514	517
Cotton	1,181	1,231	1,608	1,637
Hemp (<i>san</i>)	66	66	73	77
Other fibres	2	4	5	4
Opium	22	14	12	14
Indigo	203	134	142	84
Tea	14	15	16	16
Tobacco	86	80	99	84
Miscellaneous	1,783	2,147	3,366	4,137
Total area cropped	32,110	31,331	40,914	38,211
Area double cropped	3,126	3,507	5,721	5,414

TABLE V
PRICES OF STAPLES IN THE PUNJAB
(In seers per rupee)

Selected staples.	Selected centres.	Percentage of area under crop in 1900-1.	Average for ten years ending			Average for the year 1901.
			1880.	1890.	1900.	
Wheat	Delhi . . .	29.1	20.39	18.16	15.45	15.87
	Amritsar . .		23.18	21.41	16.73	18.16
	Rāwalpindi .		22.44	20.46	16.25	17.26
Gram	Delhi . . .	12.5	25.77	23.93	21.42	23.35
	Amritsar . .		29.61	28.78	21.99	24.42
	Rāwalpindi .		26.37	25.58	20.55	24.6
Jowār	Delhi . . .	7.0	27.08	23.28	21.60	27.42
	Amritsar . .		31.38	28.37	20.29	29
	Rāwalpindi .		28.37	29.53	24.08	24.96
Bājra	Delhi . . .	10.8	23.65	20.64	18.62	21.75
	Amritsar . .		26.09	22.06	15.94	24.92
	Rāwalpindi .		28.84	28.63	19.97	22.6
Salt	Delhi . . .	...	9.03	11.94	11.24	13.1
	Amritsar . .		10.53	14.09	12.05	15.54
	Rāwalpindi .		10.45	14.24	13.40	16.02

NOTE.—The figures for the famine years 1878, 1879, 1897, and 1900 have been omitted.

TABLE VI. TRADE BY RAIL AND RIVER OF THE PUNJAB
(including North-West Frontier Province) WITH OTHER
PROVINCES AND STATES (excluding Kashmir and Ladākh)
(In thousands of rupees)

	1890-1.	1900-1.	1903-4.
<i>Imports.</i>			
Cotton, raw	2,92	4,11	5,01
Cotton twist and yarn	28,56	18,31	32,18
Cotton piece-goods	2,72,83	3,20,03	3,97,20
Grain and pulse	23,20	1,34,15	42,77
Hides and skins	5,99	15,75	14,95
Metals and manufactures of metals	70,33	1,05,73	1,59,07
Oils	13,26	18,97	21,33
Oilseeds	8,50	32,58	25,72
Opium	74	4,06	4,07
Provisions	43,00	31,82	35,31
Salt	6,57	10,65	8,14
Spices	13,54	22,64	26,29
Sugar	1,14,21	1,65,58	2,01,39
Tea	9,57	5,66	10,03
Wood . . . . .	...	8,16	20,58
Woollen goods	20,70	33,67	37,44
All other articles	2,64,52	3,60,40	4,70,89
Total	8,98,44	12,92,27	15,12,67
Treasure { Government	37,50	1,91,66	1,89,00
{ Commercial	*	*	1,07,81
Total	*	*	2,96,81
<i>Exports.</i>			
Apparel . . . . .	...	52,31	54,25
Coal and coke	1	19	4
Cotton, raw	35,93	1,06,19	2,55,86
Cotton, manufactured	51,00	75,64	79,24
Wheat	1,97,77	1,65,90	5,43,69
Other grains and pulses	1,02,76	1,06,88	1,04,07
Dyes and tans	10,60	17,47	11,03
Jute and manufactures of jute	4,87	10,55	7,92
Hides and skins	31,32	77,45	63,34
Metals and manufactures of metals	13,44	12,12	17,06
Leather	20,41	13,37	13,73
Oils	2,07	9,68	2,44
Oilseeds	16,08	59,74	43,50
Provisions	29,32	27,43	17,53
Railway plant and rolling stock	10,77	26,73	31,82
Spices	11,30	12,84	12,74
Sugar	21,55	24,62	14,83
Tobacco	86	4,43	2,73
Wool, raw	23,30	23,54	30,04
Wool, manufactured	35,28	57,73	30,07
All other articles	97,22	1,14,82	1,33,26
Total	7,15,86	9,99,63	14,69,19
Treasure { Government	7,19†	36,07	72,01
{ Commercial	*	39,48	40,78
Total	7,19†	75,55	1,12,79

* Not available.

† Currency figures only.

TABLE VII

TRADE OF THE PUNJAB WITH KASHMĪR AND LADĀKH

(In thousands of rupees)

	1890-1 (including trade through Hazāra).		1900-1 (including trade through Hazāra).		1903-4 (excluding trade through Hazāra).	
	Kashmīr.	Ladākh.	Kashmīr.	Ladākh.	Kashmīr.	Ladākh.
<i>Imports.</i>						
Total imports.	54,32	3,42	1,29,15	4,18	98,01	6,21
Treasure :—						
Government	...	...	...	...	10,11	...
Commercial	1,67	...	5,20	1	9,41	...
Total	1,67	...	5,20	1	19,52	...
<i>Exports.</i>						
Total exports.	56,52	2,76	95,64	2,17	78,66	3,07
Treasure :—						
Government	...	...	6,00	...	...	...
Commercial	10	10	3,24	33	4,10	45
Total	10	10	9,24	33	4,10	45

TABLE VIII
STATISTICS OF CRIMINAL JUSTICE, PUNJAB

	Average for ten years ending 1890.	Average for ten years ending 1900.	1901.	1904.	Percentage of convictions in 1904.
Number of persons tried:					
(a) For offences against person and property	100,186	121,939	116,446	134,070	15
(b) For other offences against the Indian Penal Code . . .	21,456	23,151	21,713	26,656	20
(c) For offences against special and local laws	51,255	70,117	63,010	79,791	53
Total	172,897	215,207	201,169	240,517	28

TABLE IX
STATISTICS OF CIVIL JUSTICE AND REVENUE COURT CASES,
PUNJAB

	Average for ten years ending 1890.	Average for ten years ending 1900.	1901.	1904.
Suits for money and movable property	212,313	211,844	201,423	180,105
Title and other suits	37,740	34,263	30,811	30,040
Rent suits*	1,778†	1,201†	275†	497
Other Revenue Court cases†	20,330†	34,111†	36,415†	32,944
Total	272,161	281,419	268,924	243,586

* The figures for rent suits and other Revenue Court cases for 1881-4 are for institutions; those for the remaining years for disposals only.

† Other Revenue Court cases include figures for execution of decrees of Revenue Courts throughout, with the exception of the years 1880-4 and 1888 and 1889, for which the data are not available.

‡ These figures are for the old Province.

TABLE X

PRINCIPAL SOURCES OF PROVINCIAL REVENUE, INCLUDING NORTH-WEST FRONTIER PROVINCE
UP TO MARCH 31, 1901, BUT FOR PUNJAB AS NOW CONSTITUTED FOR THE YEAR 1903-4
(In thousands of rupees)

	Average for ten years ending March 31, 1890.		Average for ten years ending March 31, 1900.		Year ending March 31, 1901.		Year ending March 31, 1904.	
	Total raised in Province (Imperial, Provincial, and Local).	Amount credited to Provincial revenues.	Total raised in Province (Imperial, Provincial, and Local).	Amount credited to Provincial revenues.	Total raised in Province (Imperial, Provincial, and Local).	Amount credited to Provincial revenues.	Total raised in Province (Imperial, Provincial, and Local).	Amount credited to Provincial revenues.
Land revenue	2,12,73	72,90	2,40,29	98,98	2,43,75	1,12,24	2,33,32	1,41,06
Stamps	35,04	20,84	42,06	29,56	42,80	32,10	40,48	30,36
Excise	13,55	7,98	21,33	6,23	26,01	6,50	28,00	7,00
Provincial rates	33,45	4,84	41,80	5,91	42,28	5,89	44,77	6,18
Assessed taxes	6,96	3,28	12,95	6,47	14,80	7,40	11,70	5,85
Forests	8,52	3,58	10,68	5,34	13,51	6,75	17,18	8,59
Registration	2,10	1,28	3,29	1,65	3,47	1,74	2,19	1,10
Other sources	49,69	40,53	38,80	30,23	44,91	33,16	48,16	30,46
Total	3,62,04	1,55,23	4,11,20	1,84,38	4,31,53	2,05,78	4,25,80	2,30,60

TABLE XI

PROVINCIAL EXPENDITURE, INCLUDING NORTH-WEST
FRONTIER PROVINCE UP TO MARCH 31, 1901, BUT
FOR PUNJAB AS NOW CONSTITUTED FOR THE YEAR
1903-4

(In thousands of rupees)

	Average for ten years ending March 31, 1890.	Average for ten years ending March 31, 1900.	Year ending March 31, 1901.	Year ending March 31, 1904.
Opening balance	90	2,47	...	25,25
Charges in respect of revenue collection	23,76	31,30	35,05	35,93
Salaries and expenses of Civil Departments:—				
(a) General administra- tion	10,05	10,15	10,05	9,25
(b) Law and justice	34,19	41,84	48,68	43,38
(c) Police	30,17	38,35	43,81	37,30
(d) Education	7,08	7,61	7,63	10,50
(e) Medical	4,85	6,40	8,72	11,19
(f) Other heads	83	1,06	1,06	2,11
Pensions and miscellaneous civil charges	6,06	9,79	12,84	13,14
Famine relief . . . . .	...	1,20	...	— 2
Irrigation	26	76	1,03	53
Public works	25,94	28,32	25,84	43,85
Other charges and adjustments	10,47	10,07	11,07	16,69
Total	1,53,66	1,86,85	2,05,78	2,23,85
Closing balance	2,47	...	...	32,00

TABLE XII
INCOME AND EXPENDITURE OF MUNICIPALITIES (EXCLUDING
NOTIFIED AREAS), PUNJAB

	1889-90.	Average for ten years 1890-1 to 1899-1900.	1900-1.	1903-4.
<i>Income from—</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>
Octroi	22,99,144	25,27,057	27,07,406	30,29,966
Tax on houses and lands	1,17,721	1,37,208	1,37,925	2,37,919
Other taxes	42,966	59,162	83,752	1,36,443
Loans . . . . .	...	2,32,919	1,61,489	6,58,325
Rents and other sources	8,76,838	11,46,599	12,85,011	14,85,673
Total income	33,36,669	41,02,945	43,75,583	55,48,326
<i>Expenditure on—</i>				
Administration and col- lection of taxes	4,88,016	5,79,243	6,39,495	7,00,054
Public safety	5,14,076	5,66,100	6,39,104	6,93,969
Water-supply and drainage :				
Capital	1,32,494	3,19,398	2,70,744	7,53,443
Maintenance	98,651	1,26,788	1,68,174	2,10,378
Conservancy	3,05,986	4,92,286	5,67,395	5,87,339
Hospitals and dispen- saries	2,65,265	3,31,091	4,01,272	5,87,909
Public works	3,71,801	4,05,426	3,26,225	4,18,253
Education	4,44,628	5,40,690	5,63,852	6,14,382
Other heads	8,14,414	7,09,529	8,10,672	8,50,595
Total expenditure	34,35,331	40,70,551	43,86,933	54,16,322

TABLE XIII
INCOME AND EXPENDITURE OF DISTRICT BOARDS,
PUNJAB

	Excluding the District of Mianwali.			Whole Province.
	1889-90.	Average for ten years 1890-1 to 1899-1900.	1900-1.	1903-4.
<i>Income from—</i>	<i>Ra.</i>	<i>Ra.</i>	<i>Ra.</i>	<i>Ra.</i>
Provincial rates	19,18,204	20,62,940	20,66,918	24,03,661
Interest	1,100	1,124	1,417	1,361
Education	46,858	80,317	1,11,386	1,20,831
Medical	9,326	21,449	25,050	40,662
Scientific, &c.	85,814	86,125	87,428	94,085
Miscellaneous	70,415	1,28,948	2,35,941	2,88,411
Public works	48,233	1,07,151	1,38,919	1,83,233
Pounds	43,436	55,050	53,944	58,273
Ferries	1,44,383	1,51,965	1,62,528	1,51,629
Total income	23,67,769	26,95,069	28,83,531	33,42,146
<i>Expenditure on—</i>				
Refunds	1,967	2,617	3,168	2,318
General administration	1,05,491	1,14,161	1,28,672	1,35,864
Education	4,68,451	5,76,302	6,12,567	6,68,125
Medical	2,59,894	3,16,238	5,61,538	3,77,654
Scientific, &c.	1,15,152	1,45,678	1,52,350	1,33,809
Miscellaneous	4,59,708	6,91,402	8,01,814	10,25,264
Public works	9,14,242	9,16,148	7,56,918	9,04,418
Total expenditure	23,24,905	27,62,546	30,17,027	32,47,452

TABLE XIV

POLICE STATISTICS, PUNJAB (AS NOW CONSTITUTED)

	1881.	1891.	1901.	1904.
<i>Provincial and Ferry Police.</i>				
Superintendents and assistant superintendents	47	53	51	56
Inspectors	44	42	43	49
Sub-inspectors	407	463	401	526
Head constables	1,603	1,666	1,689	1,814
Constables	10,073	9,720	9,767	10,426
<i>Municipal Police.</i>				
Inspectors	6	6	8	8
Sub-inspectors	17	27	34	37
Head constables	339	388	432	448
Constables	3,451	3,538	3,639	3,791
Town watchmen . . . .	...	104	124	138
<i>Cantonment Police.</i>				
Inspectors . . . .	...	4	4	4
Sub-inspectors	2	5	5	6
Head constables	28	58	60	69
Constables	391	518	531	574
<i>Military Police.</i>				
Commandants and sub-commandants . . . .	...	...	3	4
Native officers	Not available.	Not available.	37	14
Non-commissioned officers and men . . . .	...	...	245	606
<i>Railway Police.</i>				
Deputy and assistant superintendents . . . .	...	...	1	3
Inspectors	5	5	10	10
Sub-inspectors	13	13	23	26
European platform sergeants . . . .	...	...	9	18
Head constables	80	90	200	221
Constables	620	681	957	1,108
Chaukidars	84	84	...	7
<i>Rural Police.</i>				
Daffadars and chaukidars . . . .	...	...	...	29,645
Total expenditure	Ra. 32,23,323	Ra. 32,75,278	Ra. 33,45,684	Ra. 38,62,429
	Average of five years ending 1901 (old Province).			1904 (new Province).
<i>Statistics of cognisable crime.</i>				
Number of cases reported	58,229			85,365
Number of cases decided in the criminal courts .	37,397			43,313
Number of cases ending in acquittal or discharge .	6,552			12,796
Number of cases ending in conviction	28,957			30,517

TABLE XV
JAILS STATISTICS, PUNJAB

	1881.	1891.	1901.	1904.
Number of Central jails	2	3	4	3
Number of District jails	28	25	24	25*
Number of subsidiary jails (lock-ups)	17	20	19	16
Average daily jail population:—				
(a) Male prisoners:				
In Central jails	3,488	2,996	6,406	4,860
In other jails	8,645	8,033	7,082	6,885
(b) Female prisoners:				
In Central jails	...	...	1	4
In other jails	512	328	327	270
Total	12,645	11,357	13,816	12,019
Rate of jail mortality per 1,000	62.87	28.26	26.64	19.79
Expenditure on jail maintenance	Ra. 7,41,503	Ra. 7,29,382	Ra. 8,98,117	Ra. 7,59,146
Cost per prisoner	58-10-0	64-4-0	65-0-0	64-13-0
Profits on jail manufactures	1,19,953	1,97,678	1,24,834	1,09,658
Earnings per prisoner	10-3-0	18-4-0	10-0-0	10-5-0

* Including female jail at Lahore.

TABLE XVI. COLLEGES, SCHOOLS, AND SCHOLARS, PUNJAB

	1883-4.			1890-1.			1900-1.			1903-4.		
	Number of institutions.	Scholars.		Number of institutions.	Scholars.		Number of institutions.	Scholars.		Number of institutions.	Scholars.	
		Males.	Females.		Males.	Females.		Males.	Females.		Males.	Females.
<i>Public.</i>												
Arts colleges . . .	2	152	...	7	468	...	12	1,245	...	15	1,360	...
Professional colleges . .	1	57	...	2	199	...	2	233	11	3	486	8
Secondary schools:—												
High	25	912	...	48	12,708	511	106	25,199	853	110	26,555	962
Middle	204	5,107	20	215	29,386	1,095	272	35,576	1,822	269	38,143	1,849
Primary schools	1,882	102,876*	10,358*	1,917	77,617	8,907	2,530	98,369	11,852	2,822	109,343	13,705
Training schools	10	206	191	4	267	...	5	256	...	5	248	...
Other special schools . .	6	300	19	7	773	9	15	2,013	154	22	2,012	244
<i>Private.</i>												
Advanced . . . . .	...	...	...	794	9,408	...	292	5,108	...	354	5,351	43
Elementary . . . . .	...	...	...	6,518	83,780	12,124	3,317	46,540	7,349	4,347	58,756	12,565
Total	2,130	109,610	10,588	9,512	214,606	22,646	6,551	214,539	22,041	7,947	242,254	29,376

* Including scholars reading in the primary department of secondary schools.

TABLE XVII

STATISTICS OF HOSPITALS, LUNATIC ASYLUMS, AND
VACCINATION, PUNJAB

	1881.	1891.	1901.	1904.
<i>Hospitals, &c.</i>				
Number of civil hospitals and dispensaries	170	206	246	263
Average daily number of—				
(a) In-patients	1,236	1,472	1,711	1,924
(b) Out-patients	8,682	13,526	19,897	21,538
Income from—				
(a) Government payments Rs.	59,724	48,391	66,144	59,019
(b) Local and municipal payments Rs.	2,33,582	4,06,063	5,05,042	5,53,765
(c) Fees, endowments, and other sources Rs.	21,835	30,964	58,749	88,376
Expenditure on—				
(a) Establishment Rs.	1,63,437	2,38,612	3,17,249	3,46,700
(b) Medicines, diet, buildings, &c. Rs.	1,44,919	2,40,368	3,18,800	3,30,507
<i>Lunatic Asylums.</i>				
Number of asylums	2	2	1	1
Average daily number of—				
(a) Criminal lunatics	40	50	109	111
(b) Other lunatics	273	278	382	443
Income from—				
(a) Government payments Rs.	31,546	31,721	54,289	60,636
(b) Fees and other sources Rs.	6,284	19,660	17,203	12,666
Expenditure on—				
(a) Establishment Rs.	16,167	14,987	20,376	28,200
(b) Diet, buildings, &c. Rs.	21,063	36,394	51,116	45,102
<i>Vaccination.</i>				
Population among whom vaccination was carried on . . . . .	...	19,629,722	20,734,248	20,293,834
Number of successful operations . . . . .	...	653,300	629,825	632,240
Ratio per 1,000 of population . . . . .	...	33.28	30.36	31.15
Total expenditure on vaccination Rs.	...	62,187	87,459	92,017
Cost per successful case As.	...	1-7	2-3	2-4

MOUNTAINS, RIVERS, CANALS, AND HISTORIC AREAS

Himālayas, The.—A system of stupendous mountain ranges, lying along the northern frontiers of the Indian Empire, and containing some of the highest peaks in the world. Literally, the name is equivalent to 'the abode of snow' (from the Sanskrit *hima*, 'frost,' and *ālaya*, 'dwelling-place'). To the early geographers the mountains were known as Imaus or Himaus and Hemodas; and there is reason to believe that these names were applied to the western and eastern parts respectively, the sources of the Ganges being taken as the dividing line. 'Hemodas' represents the Sanskrit *Himāvata* (Prākrit *Hemota*), meaning 'snowy.' The Greeks who accompanied Alexander styled the mountains the Indian Caucasus.

Modern writers have sometimes included in the system the Muztāgh range, and its extension the Karakoram; but it is now generally agreed that the Indus should be considered the north-western limit. From the great peak of Nanga Parbat in Kashmīr, the Himālayas stretch eastward for twenty degrees of longitude, in a curve which has been compared to the blade of a scimitar, the edge facing the plains of India. Barely one-third of this vast range of mountains is known with any degree of accuracy. The Indian Survey department is primarily engaged in supplying administrative needs; and although every effort is made in fulfilling this duty to collect information of purely scientific interest, much still remains to be done.

A brief abstract of our knowledge of the Himālayas may be given by shortly describing the political divisions of India which include them. On the extreme north-west, more than half of the State of KASHMĪR AND JAMMU lies in the Himālayas, and this portion has been described in some detail by Drew in *Jammu and Kashmīr Territories*, and by Sir W. Lawrence in *The Valley of Kashmīr*. The next section, appertaining to the Punjab and forming the British District of Kāngra and the group of feudatories known as the Simla Hill States, is better known. East of this lies the Kumaun Division of the United Provinces, attached to which is the Tehri

State. This portion has been surveyed in detail, owing to the requirements of the revenue administration, and is also familiar from the careful accounts of travellers. For 500 miles the State of Nepāl occupies the mountains, and is to the present day almost a *terra incognita*, owing to the acquiescence by the British Government in the policy of exclusion adopted by its rulers. Our knowledge of the topography of this portion of the Himālayas is limited to the information obtained during the operations of 1816, materials collected by British officials resident at Kātmāndu, notably B. H. Hodgson, and the accounts of native explorers. The eastern border of Nepāl is formed by the State of Sikkim and the Bengal District of Darjeeling, which have been graphically described by Sir Joseph Hooker and more recently by Mr. Douglas Freshfield. A small wedge of Tibetan territory, known as the Chumbi Valley, separates Sikkim from Bhutān, which latter has seldom been visited by Europeans. East of Bhutān the Himālayas are inhabited by savage tribes, with whom no intercourse is possible except in the shape of punitive expeditions following raids on the plains. Thus a stretch of nearly 400 miles in the eastern portion of the range is imperfectly known.

Divisions
of range.

In the western part of the Himālayas, which, as has been shown, has been more completely examined than elsewhere, the system may be divided into three portions. The central or main axis is the highest, which, starting at Nanga Parbat on the north-west, follows the general direction of the range. Though it contains numerous lofty peaks, including Nandā Devī, the highest mountain in British India, it is not a true watershed. North of it lies another range, here forming the boundary between India and Tibet, which shuts off the valley of the Indus, and thus may be described as a real water-parting. From the central axis, and usually from the peaks in it, spurs diverge, with a general south-easterly or south-westerly direction, but actually winding to a considerable extent. These spurs, which may be called the Outer Himālayas, cease with some abruptness at their southern extremities, so that the general elevation is 8,000 or 9,000 feet a few miles from the plains. Separated from the Outer Himālayas by elevated valleys or *dūns* is a lower range known as the Siwāliks, which is well marked between the Beās and the Ganges, reappears to the south of central Kumaun, and is believed to exist in Nepāl. Although the general character of the Himālayas in Nepāl is less accurately known, there is reason to suppose that it approximates to that of the western ranges.

Within the limits of this great mountain chain all varieties of scenery can be obtained, except the placid charm of level country. Luxuriant vegetation clothes the outer slopes, gradually giving place to more sombre forests. As higher elevations are reached, the very desolation of the landscape affects the imagination even more than the beautiful scenery left behind. It is not surprising that these massive peaks are venerated by the Hindus, and are intimately connected with their religion, giving rise to some of the most sacred rivers, as well as an account of legendary associations. A recent writer has vividly described the impressions of a traveller through the foreground of a journey to the snows in Sikkim¹:—

'He sees at one glance the shadowy valleys from which shining mist-columns rise at noon against a luminous sky, the forest ridges, stretching fold behind fold in softly undulating lines—dotted by the white specks which mark the situation of Buddhist monasteries—to the glacier-draped pinnacles and precipices of the snowy range. He passes from the zone of tree-ferns, bamboos, orange-groves, and *dal* forest, through an endless colonnade of tall-stemmed magnolias, oaks, and chestnut trees, fringed with delicate orchids and festooned by long convolvuluses, to the region of gigantic pines, junipers, firs, and larches. Down each ravine sparkles a brimming torrent, making the ferns and flowers nod as it dashes past them. Superb butterflies, black and blue, or flashes of rainbow colours that turn at pleasure into exact imitations of dead leaves, the fairies of this lavish transformation scene of Nature, sail in and out between the sunlight and the gloom. The mountaineer pushes on by a track half buried between the red twisted stems of tree-rhododendrons, hung with long waving lichens, till he emerges at last on open sky and the upper pastures—the Alps of the Himālaya—fields of flowers: of gentians and edelweiss and poppies, which blossom beneath the shining store-houses of snow that encompass the ice-mailed and fluted shoulders of the giants of the range. If there are mountains in the world which combine as many beauties as the Sikkim Himālayas, no traveller has as yet discovered and described them for us.'

The line of perpetual snow varies from 15,000 to 16,000 feet on the southern exposures. In winter, snow generally falls at elevations above 5,000 feet in the west, while falls at 2,500 feet were twice recorded in Kumaun during the last century. Glaciers extend below the region of perpetual snow, descending to 12,000 or 13,000 feet in Kulū and Lāhul, and even lower in Kumaun, while in Sikkim they are about 2,000 feet

¹ D. W. Freshfield in *The Geographical Journal*, vol. xix, p. 453.

higher. On the vast storehouse thus formed largely depends the prosperity of Northern India, for the great rivers which derive their water from the Himālayas have a perpetual supply which may diminish in years of drought, but cannot fail absolutely to feed the system of canals drawn from them.

Rivers.

While all five rivers from which the Punjab derives its name rise in the Himālayas, the Sutlej alone has its source beyond the northern range, near the head-waters of the Indus and Tsan-po. In the next section are found the sources of the Jumna, Ganges, and Kālī or Sārdā high up in the central snowy range, while the Kauriāla or Karnālī, known lower down in its course as the Gogra, rises in Tibet, beyond the northern watershed. The chief rivers of Nepāl, the Gandak and Kosi, each with seven main affluents, have their birth in the Himālayas, which here supply a number of smaller streams merging in the larger rivers soon after they reach the plains. Little is known of the upper courses of the northern tributaries of the Brahmaputra in Assam; but it seems probable that the Dihāng, which has been taken as the eastern boundary of the Himālayas, is the channel connecting the Tsan-po and the Brahmaputra.

Highest peaks.

Passing from east to west the principal peaks are Nanga Parbat (26,182) in Kashmīr; a peak in Spiti (Kāngra District) exceeding 23,000 feet, besides three over 20,000; Nandā Devī (25,661), Trisūl (23,382), Pāñch Chūlhi (22,673), and Nandā Kot (22,538) in the United Provinces; Mount Everest (29,002), Devālagiri (26,826), Gosainthān (26,305) and Kinchinjunga (28,146), with several smaller peaks, in Nepāl; and Dongkya (23,190), with a few rising above 20,000, in Sikkim.

Valleys and lakes.

The most considerable stretch of level ground is the beautiful Kashmīr Valley, through which flows the Jhelum. In length about 84 miles, it has a breadth varying from 20 to 25 miles. Elsewhere steep ridges and comparatively narrow gorges are the rule, the chief exception being the Valley of Nepāl, which is an undulating plain about 20 miles from north to south, and 12 to 14 miles in width. Near the city of Srinagar is the Dal Lake, described as one of the most picturesque in the world. Though measuring only 4 miles by $2\frac{1}{2}$, its situation among the mountains, and the natural beauty of its banks, combined with the endeavours of the Mughal emperors to embellish it, unite to form a scene of great attraction. Some miles away is the larger expanse of water known as the Wular Lake, which ordinarily covers $12\frac{1}{2}$ square miles, but in years of flood expands to over 100. A number of smaller

lakes, some of considerable beauty, are situated in the outer ranges in Naini Tāl District. In 1903 the GOHNA LAKE, in Garhwāl District, was formed by the subsidence of a steep hill, rising 4,000 feet above the level of a stream which it blocked.

The geological features of the Himālayas can be conveniently grouped into three classes, roughly corresponding to the three main orographical zones: (1) the Tibetan highland zone, (2) the zone of snowy peaks and Outer Himālayas, and (3) the Sub-Himālayas. Geology¹.

In the Tibetan highlands there is a fine display of marine fossiliferous rocks, ranging in age from Lower Palaeozoic to Tertiary. In the zone of the snowy peaks granites and crystalline schists are displayed, fringed by a mantle of unfossiliferous rocks of old, but generally unknown, age, forming the lower hills or Outer Himālayas, while in the Sub-Himālayas the rocks are practically all of Tertiary age, and are derived from the waste of the highlands to the north.

The disposition of these rocks indicates the existence of a range of some sort since Lower Palaeozoic times, and shows that the present southern boundary of the marine strata on the northern side of the crystalline axis is not far from the original shore of the ocean in which these strata were laid down. The older unfossiliferous rocks of the Lower Himālayas on the southern side of the main crystalline axis are more nearly in agreement with the rocks which have been preserved without disturbance in the Indian Peninsula; and even remains of the great Gondwāna river-formations which include our valuable deposits of coal are found in the Darjeeling area, involved in the folding movements which in later geological times raised the Himālayas to be the greatest among the mountain ranges of the world. The Himālayas were thus marked out in very early times, but the main folding took place in the Tertiary era. The great outflow of the Deccan trap was followed by a depression of the area to the north and west, the sea in eocene times spreading itself over Rājputāna and the Indus valley, covering the Punjab to the foot of the Outer Himālayas as far east as the Ganges, at the same time invading on the east the area now occupied by Assam. Then followed a rise of the land and consequent retreat of the sea, the fresh-water deposits which covered the eocene marine strata being involved in the movement as fast as they were formed, until the Sub-Himālayan zone river-deposits, no older than the pliocene, Age and origin of the range.

¹ By T. H. Holland, Geological Survey of India.

became tilted up and even overturned in the great foldings of the strata. This final rise of the Himālayan range in late Tertiary times was accompanied by the movements which gave rise also to the Arakan Yoma and the Nāgā hills on the east, and the hills of Baluchistān and Afghānistān on the west.

The rise of the Himālayan range may be regarded as a great buckle in the earth's crust, which raised the great Central Asian plateau in late Tertiary times, folding over in the Baikal region on the north against the solid mass of Siberia, and curling over as a great wave on the south against the firmly resisting mass of the Indian Peninsula.

As an index to the magnitude of this movement within the Tertiary era, we find the marine fossil foraminifer, *Nummulites*, which lived in eocene times in the ocean, now at elevations of 20,000 feet above sea-level in Zāskār. With the rise of the Himālayan belt, there occurred a depression at its southern foot, into which the alluvial material brought down from the hills has been dropped by the rivers. In miocene times, when presumably the Himālayas did not possess their present elevation, the rivers deposited fine sands and clays in this area; and as the elevatory process went on, these deposits became tilted up, while the rivers, attaining greater velocity with their increased gradient, brought down coarser material and formed conglomerates in pliocene times. These also became elevated and cut into by their own rivers, which are still working along their old courses, bringing down boulders to be deposited at the foot of the hills and carrying out the finer material farther over the Indo-Gangetic plain.

The series of rocks which have thus been formed by the rivers, and afterwards raised to form the Sub-Himālayas, are known as the Siwālik series. They are divisible into three stages. In the lowest and oldest, distinguished as the Nāhan stage, the rocks are fine sandstones and red clays without any pebbles. In the middle stage, strings of pebbles are found with the sandstones, and these become more abundant towards the top, until we reach the conglomerates of the upper stage. Along the whole length of the Himālayas these Siwālik rocks are cut off from the older rock systems of the higher hills by a great reversed fault, which started in early Siwālik times and developed as the folding movements raised the mountains and involved in its rise the deposits formed along the foot of the range. The Siwālik strata never extended north of this great boundary fault, but the continued rise of the mountains affected

these deposits, and raised them up to form the outermost zone of hills.

The upper stage of the Siwalik series is famous on account of the rich collection of fossil vertebrates which it contains. Among these there are forms related to the miocene mammals of Europe, some of which, like the hippopotamus, are now unknown in India but have relatives in Africa. Many of the mammals now characteristic of India were represented by individuals of much greater size and variety of species in Siwalik times.

The unfossiliferous rocks which form the Outer Himālayas are of unknown age, and may possibly belong in part to the unfossiliferous rocks of the Peninsula, like the Vindhya and the Cuddapahs. Conspicuous among these rocks are the dolomitic limestones of Jaunsār and Kumaun, the probable equivalents of the similar rocks far away to the east at Buxa in the Duārs. With these a series of purple quartzites and basic lava-flow is often associated. In the Simla area the unfossiliferous rocks have been traced out with considerable detail; and it has been shown that quartzites, like those of Jaunsār and Kumaun, are overlaid by a system of rocks which has been referred to the carbonaceous system on account of the black carbonaceous slates which it includes. The only example known of pre-Tertiary fossiliferous rocks south of the snowy range in the Himālayas occurs in south-west Garhwāl, where there are a few fragmentary remains of mesozoic fossils of marine origin.

Unfossiliferous rocks of Outer Himālayas.

The granite rocks, which form the core of the snowy range and in places occur also in the Lower Himālayas, are igneous rocks which may have been intruded at different periods in the history of the range. They are fringed with crystalline schists, in which a progressive metamorphism is shown from the edge of granitic rock outwards, and in the inner zone the granitic material and the pre-existing sedimentary rock have become so intimately mixed that a typical banded gneiss is produced. The resemblance of these gneisses to the well-known gneisses of Archaean age in the Peninsula and in other parts of the world led earlier observers to suppose that the gneissose rocks of the Central Himālayas formed an Archaean core, against which the sediments were subsequently laid down. But as we now know for certain that both granites, such as we have in the Himālayas, and banded gneisses may be much younger, even Tertiary in age, the mere composition and structure give no clue to the age of the crystalline axis. The position of the

The crystalline axis.

granite rock is probably dependent on the development of low-pressure areas during the process of folding, and there is thus a *prima facie* reason for supposing that much of the igneous material became injected during the Tertiary period. With the younger intrusions, however, there are probably remains of injections which occurred during the more ancient movements, and there may even be traces of the very ancient Archaean gneisses; for we know that pebbles of gneisses occur in the Cambrian conglomerates of the Tibetan zone, and these imply the existence of gneissose rocks exposed to the atmosphere in neighbouring highlands. The gneissose granite of the Central Himālayas must have consolidated under great pressure, with a thick superincumbent envelope of sedimentary strata; and their exposure to the atmosphere thus implies a long period of effectual erosion by weathering agents, which have cut down the softer sediments more easily and left the more resisting masses of crystalline rocks to form the highest peaks in the range. Excellent illustrations of the relationship of the gneissose granites to the rocks into which they have been intruded are displayed in the Dhaola Dhār in Kulū, in the Chōr Peak in Garhwāl, and in the Darjeeling region east of Nepāl.

Fossil-
iferous
rocks of
the Tibe-
tan zone.

Beyond the snowy range in the Tibetan zone we have a remarkable display of fossiliferous rocks, which alone would have been enough to make the Himālayas famous in the geological world. The boundary between Tibetan territory and Spiti and Kumaun has been the area most exhaustively studied by the Geological Survey. The rocks exposed in this zone include deposits which range in age from Cambrian to Tertiary. The oldest fossiliferous system, distinguished as the Haimanta ('snow-covered') system, includes some 3,000 feet of the usual sedimentary types, with fragmentary fossils which indicate Cambrian and Silurian affinities. Above this system there are representatives of the Devonian and Carboniferous of Europe, followed by a conglomerate which marks a great stratigraphical break at the beginning of Permian times in Northern India. Above the conglomerate comes one of the most remarkably complete succession of sediments known, ranging from Permian, without a sign of disturbance in the process of sedimentation, throughout the whole Mesozoic epoch to the beginning of Tertiary times. The highly fossiliferous character of some of the formations in this great pile of strata, like the *Productus* shales and the Spiti shales, has made this area classic ground to the palaeontologist.

The great Eurasian sea distinguished by the name 'Thetys,'

which spread over this area throughout the Palaeozoic and Mesozoic times, became driven back by the physical revolution which began early in Tertiary times, when the folding movements gave rise to the modern Himālayas. As relics of this ocean have been discovered in Burma and China it will not be surprising to find, when the ground is more thoroughly explored, that highly fossiliferous rocks are preserved also in the Tibetan zone beyond the snowy ranges of Nepal and Sikkim.

Of the minerals of value, graphite has been recorded in the Kumaun Division; coal occurs frequently amongst the Nummulitic (eocene) rocks of the foot-hills and the Gondwāna strata of Darjeeling District; bitumen has been found in small quantities in Kumaun; stibnite, a sulphide of antimony, occurs associated with ores of zinc and lead in well-defined lodes in Lāhul; gold is obtained in most of the rivers, and affords a small and precarious living for a few washers; copper occurs very widely disseminated and sometimes forms distinct lodes of value in the slaty series south of the snowy range, as in the Kulū, Kumaun, and Darjeeling areas; ferruginous schists sometimes rich in iron occur under similar geological conditions, as in Kāngra and Kumaun; sapphires of considerable value have been obtained in Zāskār and turquoises from the central highlands; salt is being mined in quantity from near the boundary of the Tertiary and older rocks in the State of Mandi; borax and salt are obtained from lakes beyond the Tibetan border; slate-quarrying is a flourishing industry along the southern slopes of the Dhaola Dhār in Kāngra District; mica of poor quality is extracted from the pegmatites of Kulū; and a few other minerals of little value, besides building-stones, are obtained in various places. A small trade is developed, too, by selling the fossils from the Spiti shales as sacred objects.

The general features of the great variety in vegetation have been illustrated in the quotation from Mr. Freshfield's description of Sikkim. These variations are naturally due to an increase in elevation, and to the decrease in rainfall and humidity passing from south to north, and from east to west. The tropical zone of dense forest extends up to about 6,500 feet in the east, and 5,000 feet in the west. In the Eastern Himālayas orchids are numerically the predominant order of flowering plants; while in Kumaun about 62 species, both epiphytic and terrestrial, have been found. A temperate zone succeeds, ranging to about 12,000 feet, in which oaks, pines, and tree-rhododendrons are conspicuous, with chestnut, maple,

Economic
minerals.

magnolia, and laurel in the east. Where rain and mist are not excessive, as for example in Kulū and Kumaun, European fruit trees (apples, pears, apricots, and peaches) have been naturalized very successfully, and an important crop of potatoes is obtained in the west. Above about 12,000 feet the forests become thinner. Birch and willow mixed with dwarf rhododendrons continue for a time, till the open pasture land is reached, which is richly adorned in the summer months with brilliant Alpine species of flowers. Contrasting the western with the eastern section we find that the former is far less rich, though it has been better explored, while there is a preponderance of European species. A fuller account of the botanical features of the Himālayas will be found in Vol. I, chap. iv.

Fauna.

To obtain a general idea of the fauna of the Himālayas it is sufficient to consider the whole system as divided into two tracts: namely, the area in the lower hills where forests can flourish, and the area above the forests. The main characteristics of these tracts have been summarized by the late Dr. W. T. Blanford¹. In the forest area the fauna differs markedly from that of the Indian Peninsula stretching away from the base of the hills. It does not contain the so-called Aryan element of mammals, birds, and reptiles which are related to Ethiopian and Holarctic genera, and to the pliocene Siwālik fauna, nor does it include the Dravidian element of reptiles and batrachians. On the other hand, it includes the following animals which do not occur in the Peninsula—Mammals: the families Simiidae, Procyonidae, Talpidae, and Spalacidae, and the sub-family Gymnurinae, besides numerous genera, such as *Prionodon*, *Helictis*, *Arctonyx*, *Atherura*, *Nemorhaedus*, and *Cemas*. Birds: the families Eurylaemidae, Indicatoridae, and Heliornithidae, and the sub-family Paradoxornithinae. Reptiles: Platysternidae and Anguidae. Batrachians: Dyscophidae, Hylidae, Pelobatidae, and Salamandridae. Compared with the Peninsula, the fauna of the forest area is poor in reptiles and batrachians.

'It also contains but few peculiar genera of mammals and birds, and almost all the peculiar types that do occur have Holarctic affinities. The Oriental element in the fauna is very richly represented in the Eastern Himālayas and gradually diminishes to the westward, until in Kashmīr and farther west it ceases to be the principal constituent. These facts are consistent with the theory that the Oriental constituent of the

¹ 'The Distribution of Vertebrate Animals in India, Ceylon, and Burma,' *Proceedings, Royal Society*, vol. lxvii, p. 484.

Himālayan fauna, or the greater portion of it, has migrated into the mountains from the eastward at a comparatively recent period. It is an important fact that this migration appears to have been from Assam and not from the Peninsula of India.'

Dr. Blanford suggested that the explanation was to be found in the conditions of the glacial epoch. When the spread of snow and ice took place, the tropical fauna, which may at that time have resembled more closely that of the Peninsula, was forced to retreat to the base of the mountains or perished. At such a time the refuge afforded by the Assam Valley and the hill ranges south of it, with their damp, sheltered, forest-clad valleys, would be more secure than the open plains of Northern India and the drier hills of the country south of these. As the cold epoch passed away, the Oriental fauna re-entered the Himālayas from the east.

Above the forests the Himālayas belong to the Tibetan sub-region of the Holarctic region, and the fauna differs from that of the Indo-Malay region, 44 per cent. of the genera recorded from the Tibetan tract not being found in the Indo-Malay region. During the glacial epoch the Holarctic forms apparently survived in great numbers.

Owing to the rugged nature of the country, which makes People travelling difficult and does not invite immigrants, the inhabitants of the Himālayas present a variety of ethnical types which can hardly be summarized briefly. Two common features extending over a large area may be referred to. From Ladākh in Kashmīr to Bhūtān are found races of Indo-Chinese type, speaking dialects akin to Tibetan and professing Buddhism. In the west these features are confined to the higher ranges; but in Sikkim, Darjeeling, and Bhūtān they are found much nearer the plains of India. Excluding Burma, this tract of the Himālayas is the only portion of India in which Buddhism is a living religion. As in Tibet, it is largely tinged by the older animistic beliefs of the people. Although the Muhammadans made various determined efforts to conquer the hills, they were generally unsuccessful, yielding rather to the difficulties of transport and climate than to the forces brought against them by the scanty though brave population of the hills. In the twelfth century a Tartar horde invaded Kashmīr, but succumbed to the rigours of the snowy passes. Subsequently a Tibetan soldier of fortune seized the supreme power and embraced Islām. Late in the fourteenth century the Muhammadan ruler of the country, Sultān Sikandar,

pressed his religion by force on the people, and in the province of Kashmīr proper 94 per cent. of the total are now Muhammadans. Baltistān is also inhabited chiefly by Muhammadans, but the proportion is much less in Jammu, and beyond the Kashmīr State Islām has few followers. Hinduism becomes an important religion in Jammu, and is predominant in the southern portions of the Himālayas within the Punjab and the United Provinces. It is the religion of the ruling dynasty in Nepāl, where, however, Buddhism is of almost equal strength. East of Nepāl Hindus are few. Where Hinduism prevails, the language in common use, known as Pahāri, presents a strong likeness to the languages of Rājputāna, thus confirming the traditions of the higher classes that their ancestors migrated from the plains of India. In Nepāl the languages spoken are more varied, and Newāri, the ancient state language, is akin to Tibetan. The Mongolian element in the population is strongly marked in the east, but towards the west has been pushed back into the higher portion of the ranges. In Kumaun are found a few shy people living in the recesses of the jungles, and having little intercourse with their more civilized neighbours. Tribes which appear to be akin to these are found in Nepāl, but little is known about them. North of Assam the people are of Tibeto-Burman origin, and are styled, passing from west to east, the Akās, Dafās, Mīris, and Abors, the last name signifying 'unknown savages.' Colonel Dalton has described these people in his *Ethnology of Bengal*.

Agriculture.

From the commercial point of view the agricultural products of the Himālayas, with few exceptions, are of little importance. The chief food-grains cultivated are, in the outer ranges, rice, wheat, barley, *maruā*, and amaranth. In the hot, moist valleys, chillies, turmeric, and ginger are grown. At higher levels potatoes have become an important crop in Kumaun; and, as already mentioned, in Kulū and Kumaun European fruits have been successfully naturalized, including apples, pears, cherries, and strawberries. Two crops are obtained in the lower hills; but cultivation is attended by enormous difficulties, owing to the necessity of terracing and clearing land of stones, while irrigation is only practicable by long channels winding along the hill-sides from the nearest suitable stream or spring. As the snowy ranges are approached wheat and buckwheat, grown during the summer months, are the principal crops, and only one harvest in the year can be obtained. Tea gardens were successfully established in Kumaun during the first half

of the nineteenth century, but the most important gardens are now situated in Kāngra and Darjeeling. In the latter District cinchona is grown for the manufacture of quinine and cinchona febrifuge.

The most valuable forests are found in the Outer Himālayas, Forests. yielding a number of timber trees, among which may be mentioned *sāl*, *śūsham* (*Dalbergia Sissoo*), and *tūn* (*Cedrela Toona*). Higher up are found the *deodār* and various kinds of pine, which are also extracted wherever means of transport can be devised. In the Eastern Himālayas wild rubber is collected by the hill tribes already mentioned, and brought for sale to the Districts of the Assam Valley.

Communications within the hills are naturally difficult. Rail- Means of communi-
cation. ways have hitherto been constructed only to three places in the outer hills: Jammu in the Kashmīr State, Simla in the Punjab, and Darjeeling in Bengal. Owing to the steepness of the hill-sides and the instability of the strata composing them, these lines have been costly to build and maintain. A more ambitious project is now being carried out to connect the Kashmīr Valley with the plains, motive power being supplied by electricity to be generated by the Jhelum river. The principal road practicable for wheeled traffic is also in Kashmīr, leading from Rāwalpindi in the plains through Murree and Bāramūla to Srinagar. Other cart-roads have been made connecting with the plains the hill stations of Dharmasāla, Simla, Chakrāta, Mussoorie, Dalhousie, Nainī Tāl, and Rānikhet. In the interior the roads are merely bridle paths. The great rivers flowing in deep gorges are crossed by suspension bridges made of the rudest materials. The sides consist of canes and twisted fibres, and the footway may be a single bamboo laid on horizontal canes supported by ropes attached to the sides. These frail constructions, oscillating from side to side under the tread of the traveller, are crossed with perfect confidence by the natives, even when bearing heavy loads. On the more frequented paths, such as the pilgrim road from Hardwār up the valley of the Ganges to the holy shrines of Badrināth and Kedārnāth, more substantial bridges have been constructed by Government, and the roads are regularly repaired. Sheep and, in the higher tracts, yaks and crosses between the yak and ordinary cattle are used as beasts of burden. The trade with Tibet is carried over lofty passes, the difficulties of which have not yet been ameliorated by engineers. Among these the following may be mentioned: the Kangwa La (15,500 feet) on the Hindustān-Tibet road through Simla; the Mānā

(18,000 feet), Niti (16,570 feet), and Balcha Dhurā in Garhwāl; the Anta Dhurā (17,270 feet), Lampiya Dhurā (18,000 feet), and Lipū Lekh (16,750) in Almorā; and the Jelep La (14,390) in Sikkim.

Bibliography.

[More detailed information about the various portions of the Himālayas will be found in the articles on the political divisions referred to above. An admirable summary of the orography of the Himālayas is contained in Lieut.-Col. H. H. Godwin Austen's presidential address to the Geographical Section of the British Association in 1883 (*Proceedings, Royal Geographical Society*, 1883, p. 610; and 1884, pp. 83 and 112, with a map). Fuller accounts of the botany, geology, and fauna are given in E. F. Atkinson's *Gazetteer of the Himālayan Districts in the North-Western [United] Provinces*, 3 vols. (1882-6). See also General Strachey's 'Narrative of a Journey to Mānasarowar,' *Geographical Journal*, vol. xv, p. 150. More recent works are the *Kāngra District Gazetteer* (Lahore, 1899); C. A. Sherring, *Western Tibet and the British Borderland* (1906); and D. W. Freshfield, *Round Kangchenjunga* (1903), which contains a full bibliography for the Eastern Himālayas. An account of the Himālayas by officers of the Survey of India and the Geological department is under preparation.]

Siwālik Hills ('belonging to Siva').—A range of hills in Northern India, running parallel to the Himālayas for about 200 miles from the Beās to the Ganges; a similar formation east of the Ganges separates the Pātli, Patkot, and Kotah Dūns (valleys) from the outer range of the Himālayas as far as Kālādhūngī, where it merges into them, and is believed to reappear still farther east in Nepāl. In the United Provinces the Siwāliks lie between the Jumna and Ganges, separating Sahāranpur District from Dehra Dūn, while in the Punjab they cross the Sirmūr (Nāhan) State and Ambāla and Hoshiārpur Districts. This part of the range is irregular and pierced by several rivers, of which the Ghaggar on the west is the largest. West of the Ghaggar the hills run like a wall, separating Ambāla from the long narrow valley of the Sirsa river in Nālāgarh State, until they are cut through by the Sutlej at Rūpar. Thence the range runs with a more northerly trend through Hoshiārpur, where it terminates near the Beās valley in a mass of undulating hills. Beyond the Sutlej there is merely a broad table-land, at first enclosed by sandy hillocks, but finally spreading into minor spurs. The southern face, in the United Provinces, rises abruptly from the plains and is scored by the bare stony beds of the watercourses which rush down in the rains. On the

northern side is a more gentle descent into the elevated valley of Dehra Dūn, which separates this range from the Himālayas. The greatest height does not exceed 3,500 feet, and the range is about ten miles broad. A road from Sahāranpur to Dehra crosses these hills by the Mohan Pass, but has lost its importance since railway communication was opened through the eastern termination near the Ganges. Geologically, the Siwāliks are separated from the Outer Himālayas by a continuous reversed fault. They contain Tertiary strata consisting of fresh-water deposits, celebrated for the fossil remains found in them and described by Falconer and Cautley. The lower hills are thickly clothed with *sāl* (*Shorea robusta*) and *sain* (*Terminalia tomentosa*), while on the higher peaks a cooler climate allows pines to flourish. Wild elephants are found, and also tigers, sloth bears, leopards, hyenas, various kinds of deer, and hog. The term 'Siwālik' has been applied by Muhammadan writers to the area lying south of the hills as far as Hānsi, and also to the Himālayas.

[Falconer and Cautley, *Fauna Antiqua Sivalensis* (1846-9-66).]

Salt Range.—Hill system in the Jhelum, Shāhpur, and Miānwāli Districts of the Punjab, deriving its name from its extensive deposits of rock-salt, and extending from $32^{\circ} 41'$ to $32^{\circ} 56' N.$ and $71^{\circ} 42'$ to $73^{\circ} E.$ It was known to the ancient historians as the Makhiālah hills and the Koh-i-Jūd. The main chain commences in the lofty hill of Chail, 3,701 feet above sea-level, which is formed by the convergence of three spurs cropping up from the Jhelum river, and divided from the Himālayan outliers only by the intervening river valley. The most northern of these spurs rises abruptly from the river bank at Sultānpur, and runs nearly parallel with the Jhelum at a distance of 25 miles, till it joins the main chain after a course of 40 miles. It bears the local name of the Nili hills. The second spur, known as the Rohtās range, runs half-way between the Nili hills and the river, parallel with both. It contains the fort of Rohtās, and the hill of TILLA in Jhelum District, 3,242 feet above sea-level. The third or Pabbi spur rises south of the Jhelum, dips for a while on approaching the river valley, and rises once more on the northern bank till it finally unites with the two other chains in the central peak of Chail. Thence the united range runs westward in two parallel ridges, till it culminates in the SAKESAR hill, on which are the summer head-quarters of Shāhpur, Attock, and Miānwāli Districts, 5,010 feet above sea-level. Between these lines of hills,

and topped by their highest summits, lies an elevated and fertile table-land, picturesquely intersected by ravines and peaks. In the midst nestles the beautiful lake of Kallar Kahār. The streams which take their rise in the table-land, however, become brackish before reaching the lowlands. From Jhelum District the Salt Range stretches into Shāhpur and Miānwāli. The long spur which projects into Shāhpur terminates in the hill of Sakesar, and comprises a number of separate rock-bound alluvial basins, the largest of which, the Sūn and Khabbakki valleys, occupy the northern half, while the south consists of a broken country, cut up into tiny glens and ravines by a network of limestone ridges and connecting spurs. In the northern portion of the range, the drainage gathers into small lakes, and trees stud the face of the country; but southward, the streams flow through barren and stony gorges, interspersed with detached masses of rock, and covered with the stunted alkaline plants which grow on soil impregnated with salt. The Miānwāli portion of the range runs north-westward towards the Indus, which it meets at Mārī, opposite Kālābāgh, and rising again on the western side is continued in the Khattak-Maidāni hills. The scenery throughout the range is rugged and often sublime, but wanting in softness and beauty. In many parts it becomes simply barren and uninviting.

The beds of salt, from which the range derives its name, occur in the shape of solid rock on the slopes of this table-land, and form the largest known deposits in the world. The mineral is quarried at the MAYO MINES, in the neighbourhood of the village of Khewra, a few miles north-east of Pind Dādan Khān in Jhelum District, at NŪRPUR in Jhelum, at WĀRCHA in Shāhpur, and at KĀLĀBĀGH in Miānwāli District. Coal also occurs in the Salt Range both in oolite and Tertiary strata: the former at Kālābāgh, and the latter between Jalālpur and Pind Dādan Khān. It is of inferior quality, however, consisting of a brown lignite, difficult to burn and yielding a large proportion of ash. Besides salt and coal, other valuable minerals occur in these hills.

Few areas in India are of greater geological interest than the Salt Range, the sedimentary rocks in which have yielded fossils ranging from Cambrian to Tertiary, while the deposits of rock-salt constitute one of the most difficult problems with which the Indian geologist has to deal. A striking feature of the sedimentary beds is their marked variation in different parts of the range, and no single section affords a representative