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**THE PANJAB
GEOGRAPHICAL
REVIEW**

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Volume 1



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CONTENTS

		PAGE
1. EDITORIAL	E. T. Dean ...	1
2. THE CLIMATE OF LAHORE ...	P. R. Krishna Rao ...	2
3. THROUGH THE HIMALAYAS —FROM SIMLA TO TIBET ...	Raja Ram ...	9
4. THE NATURAL REGIONS OF INDIA	I. D. Malhotra ...	15
✓ 5. THE DEVELOPMENT OF THE FRUIT INDUSTRY IN THE PUNJAB	Farhat Ullah Khan ...	18
✓ 6. AGRICULTURAL REGIONS OF THE PUNJAB	Kazi S. Ahmad ...	21
7. THE EVOLUTION OF THE FIELD PATTERN IN THE INDO-GANGETIC DIVIDE ..	S. Muzaffar Ali ...	27
8. THE KULU VALLEY BETWEEN RAISON AND MANALI ..	Miss B. H. Jacob ...	36
9. THE COUNTRY BETWEEN BANIKHET AND CHAMBA ...	Miss N. Anand ...	38
10. LEIAH	M. L. Renjen ...	41
11. COLLEGE GEOGRAPHY IN THE PANJAB	M. L. Renjen ...	44
12. LIST OF LECTURERS IN GEOGRAPHY		46
13. OBITUARY		47

CONTENTS

Page

1. Editorial	...	1
2. The Climate of Lahore	... P. R. Krishna Rao	2
3. Through The Himalayas —From Sura to Tibet	... Raja Ram	3
4. The Natural Regions of India	... I. D. Malhotra	10
5. The Development of the Textile Industry in the Punjab	...	16
6. Agricultural Regions of the Punjab	...	21
7. The Evolution of the Field Pattern in the Indo-Gangetic Divide	...	27
8. The Ravi Valley between Rawalpindi and Masahi	... Miss B. H. Hood	32
9. The Country between Bambhat and Chamba	...	33
10. India	... M. I. Robinson	41
11. College Geography in the Punjab	... M. I. Robinson	41
12. List of Lecturers in Geography	...	43
13. Geography	...	47

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EDITORIAL

S OON after the Lahore session of the Indian Science Congress held in 1939, some of the teachers of Geography thought it expedient to organize a study circle for discussing topics of Geographical interest, particularly relating to the Panjab and its neighbouring territories and for propagating research in this subject, which is coming to the forefront in the world of to-day. This circle drew a fairly large number of teachers of the subject in the local as well as mofussil colleges and need for an organ, which should serve as a Forum for the publicity of different view points and for the dissemination of specialized knowledge, was greatly felt. Though all of us realized how great the need was for bringing out this journal, certain obstacles in our way kept the actual consummation of this project in abeyance. Financial difficulties and the preoccupation of most of the teachers in the work of organization in their respective institutions delayed the publication of this journal longer than we had anticipated. We feel we are very fortunate that we have succeeded in bringing out this much-needed organ into being and express our thanks to the Vice-Chancellor for the encouragement he has given us in the shape of a sub-vention towards meeting the cost of the present issue.

As we look back upon our unostentatious work during the past few years we have every reason to be proud of what we have achieved. Some of the articles appearing in this issue are abstracts of various papers read at the meetings of this small group, two of the articles are summarised from Regional Surveys conducted by our recent Honours Students. We have been obliged to keep back a few articles for insertion in future issues.

The wide interest that Geography has aroused in the minds of lovers of this subject is evinced by the syllabus drawn up for the systematic study of the subject and the provision made for the teaching of this subject in the Intermediate as well as the Degree classes in so many of our colleges. An account of the progress of 'Geography in this province appears elsewhere in this issue.

No doubt Geography is not yet on par with popular subjects like History, Physics and Chemistry, but it is steadily growing in public estimation and appeal. Even our small numbers have been an advantage in as much as very intensive and concentrated work has been done which has more than made up for the lack of popular support and spectacular results. That probably would have reacted unfavourably on the real interests of the subject at this early stage. The recent decision of the Panjab University to include Geography among the Science subjects is a step in the right direction and would lead to a larger number of students taking up this subject and also a proper recognition of the importance of this subject.

We have moved slowly, but we are moving steadily, consolidating our gains and proceeding towards a definite goal. Let mutual co-operation and co-operative effort be our motto, as we proceed further with our experiment. This journal is a most necessary step which we take with confidence in ourselves and our work.

E. T. DEAN

THE CLIMATE OF LAHORE

By P. R. KRISHNA RAO

Meteorologist, Lahore

Introduction

Lahore, situated in Lat. $31^{\circ}34' N.$, Long. $74^{\circ}20' E.$, about 80 miles from the foothills of the Western Himalayas and about 200 miles from the north-west frontier hills, has a climate of the inland continental type of a very pronounced character, with extreme summer heat and winter cold and a large annual and diurnal variation of temperature and humidity. Climatically, the year falls into four seasons—Winter, December to March; Summer, April to mid-June; Monsoon, mid-June to September; and the Transition period or Autumn, October and November. During winter the air over Lahore is dry and of continental origin. It is a period of clear bright days interspersed by spells of cloudy weather with light rain caused by a few disturbances entering India from the west having moved through Persia and Afghanistan. These disturbances, called "western disturbances," which have their origin in the Mediterranean regions have the same general characteristics as European depressions. When the skies clear after a spell of cloudy and rainy weather, cold dry air following the disturbance causes the well-known 'cold waves' in which the temperature falls sometimes below the freezing point. Summer is a dry and warm period with mainly clear skies but occasional thundershowers and duststorms occur in May and June, and sometimes also in April mainly due to local convection. (The Monsoon Season is a moist and rainy period when about 13 inches of rain occur, mostly in July and August.) These rains occur generally with the incursion of moist monsoon air into east Punjab from the east and south-east through the Gangetic Plain from the Bay of Bengal, mainly under the influence of depressions moving west or north-west from the head of the Bay of Bengal. A few of these depressions come as far as the Punjab or its immediate neighbourhood and cause sometimes locally heavy rain at Lahore. October and November are clear and dry months with equable temperatures and very little rainfall.

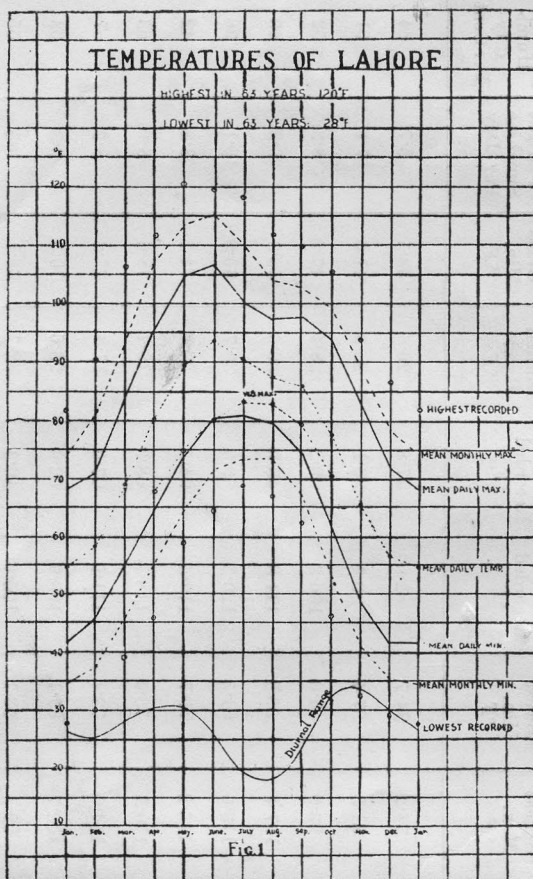
The chief features of the main climatic elements, temperature, humidity, rainfall, wind and weather phenomena are dealt with in the following paragraphs.

Temperature

Monthly means of (i) daily maximum and minimum temperatures, (ii) monthly highest maximum and lowest minimum temperatures, and (iii) daily mean temperature (average of daily maximum and minimum temperatures) are shown in Table 1. The extreme values of temperature recorded and the monthly mean diurnal range of temperature are also included in the table. These data, which are based on 63 years' observations (1878—1940), are also shown graphically in Fig. 1.

TABLE 1.—TEMPERATURE, SUNSHINE AND HUMIDITY OF LAHORE

Month	Mean Daily Max. °F	Mean Daily Min. °F	Daily Mean Temp. °F	Mean Monthly Highest Max. °F	Mean Monthly Lowest Min. °F	Highest Temp. Recorded °F	Lowest Temp. Recorded °F	Mean Monthly Diurnal Range °F	Mean Daily Grass Min. °F	Mean No. of Hours of Bright Sunshine Per Day	Mean Daily Relative Humidity Per Cent.
✓ January	68.0	41.4	<u>54.7</u>	<u>74.2</u>	<u>34.7</u>	<u>82.0</u>	<u>27.8</u>	<u>26.6</u>	33.5	<u>6.7</u>	64
February	71.0	45.7	58.3	81.3	37.4	90.4	30.1	25.3	41.0	7.1	61
March	83.2	54.8	69.0	93.9	45.6	106.3	39.2	28.4	47.0	8.3	52
April	95.5	64.9	80.2	107.4	55.1	111.8	46.0	30.6	56.3	9.3	40
✓ May	104.6	73.9	<u>89.3</u>	<u>113.6</u>	<u>64.5</u>	<u>120.3</u>	<u>59.0</u>	<u>30.7</u>	<u>66.9</u>	<u>10.1</u>	36
✓ June	106.6	80.6	<u>93.6</u>	<u>115.2</u>	<u>71.7</u>	<u>119.5</u>	<u>64.5</u>	<u>26.0</u>	74.5	<u>8.8</u>	42
✓ July	100.1	81.0	<u>90.5</u>	<u>110.3</u>	<u>73.4</u>	<u>118.1</u>	<u>68.9</u>	<u>19.1</u>	78.6	<u>8.0</u>	63
August	97.3	79.5	86.5	104.0	73.4	111.9	67.0	17.8	77.2	8.3	67
September	97.7	74.1	85.9	102.7	67.1	109.9	62.6	23.6	70.5	9.3	63
October	93.9	61.2	77.5	99.1	53.1	105.6	46.3	32.7	55.1	9.5	55
November	82.6	48.6	65.6	88.9	41.6	93.9	32.5	34.0	41.7	8.9	57
December	71.7	41.7	56.7	78.3	35.6	86.6	29.2	30.0	35.1	7.2	64



June is the warmest month with a mean temperature of 93.6°F , mean daily maximum temperature of 106.6°F and mean monthly highest maximum temperature of 115.2°F , while January is the coldest month with a mean temperature of 54.7°F , mean daily minimum temperature of 41.4°F and mean monthly lowest minimum temperature of 34.7°F . The highest temperature recorded was 120.3°F in May and the lowest 27.8°F in January.

A more detailed picture of the annual march of temperature is shown by the five-day normals of maximum and minimum temperatures and mean temperature (average of maximum and minimum) plotted in Fig. 2. It is seen that the warmest days occur towards the end of the first week of June and the coldest days in the first week of January. While the highest daily maximum temperature occurs towards the end of the first week of June, the highest daily minimum temperature occurs towards the last week of that month. This is because the increased clouding in the latter half of June reduces the day maximum temperature while the minimum temperature increases due to less radiational cooling during night. Similarly, while the lowest daily maximum temperature occurs in the last week of January, the lowest

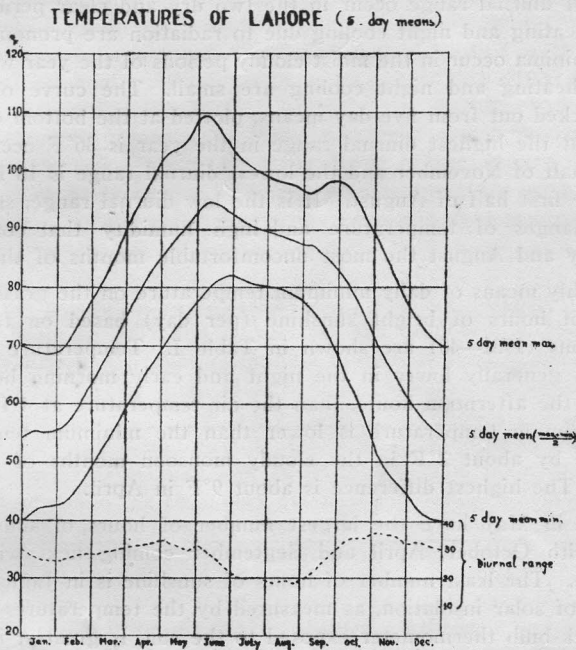


FIG. 2

daily minimum temperature occurs in the first week. This again appears to be due to more cloudiness in the second half of January than in the first half. There is a very rapid rise of temperature from the first week of February till about the middle of May and a very rapid fall of temperature from the middle of September till the end of November. In July-August, the day-to-day variation of temperature is very small, the mean temperature ranging from 93°F to 87°F. The maximum temperature curve shows a small subsidiary maximum in the last week of September. This is due to a marked decrease in cloud amount with the withdrawal of the monsoon, and the consequent rise in day temperatures. The minimum temperature shows, however, a rapid fall from the beginning of September, so that the mean temperature does not show a subsidiary maximum. Over most of India under the sway of the monsoon, there is a secondary maximum of temperature in October with the clearing of skies.

The mean annual range of temperature (difference between mean monthly highest maximum and mean monthly lowest minimum) is 80°F. It may range from 70°F to 90°F in individual years. This range is nearly the highest in India and is about four times the annual range at a coastal station like Cochin or Trivandrum with a moist maritime climate. The monthly mean diurnal range of temperature is shown in Table 1 and Fig. 1. The diurnal range is 27°F on the mean of the year. The curve of monthly diurnal range has two maxima and two minima. (The principal maximum diurnal range of 33 to 34°F occurs in October-November while the secondary maximum range of 31°F is in April and May. The lowest monthly diurnal range is 18 to 19°F in July-August, the secondary minimum range being 25°F in February. The two

maxima of diurnal range occur in the two dry and clear periods when the day heating and night cooling due to radiation are pronounced and the two minima occur in the moist cloudy periods of the year when both the day heating and night cooling are small. The curve of diurnal range worked out from five-day means, plotted at the bottom of Fig. 2, shows that the highest diurnal range in the year is 36°F occurring in the first half of November and the lowest diurnal range is 18°F occurring in the first half of August. It is the low diurnal range, small day-to-day changes of temperature and high humidity that combine to make July and August the most uncomfortable months of the year.

Monthly means of daily minimum temperature on the grass and the number of hours of bright sunshine (per day) based on ten years' observations (1931–40) are shown in Table I. Temperature near the ground is generally lower in the night and early morning hours, and higher in the afternoon hours, than the air temperature at 4 feet. The grass minimum temperature is lower than the minimum temperature at 4 feet by about 2°F in the cloudy monsoon months of July and August. The highest difference is about 9°F in April.

Days in May have the largest number of hours of sunshine (10 hours) with October, April and September coming next with about 9½ hours. The least number of hours of sunshine is in January. The intensity of solar insolation, as measured by the temperatures recorded by a black-bulb thermometer exposed to the sun, is greatest in March to May. The difference between the maximum temperature recorded by the black-bulb thermometer and the maximum air temperature in shade may be as much as 60 to 65°F in the summer months.

Humidity

Monthly mean values of relative humidity calculated from hourly observations available for a few years are shown in Table 1. August has the highest mean relative humidity—67 per cent.—and May the lowest—36 per cent. The monthly relative humidity variation shows two maxima and two minima, the main and secondary maxima being in August and January, respectively, and the main and subsidiary minima in May and October, respectively. The relative humidity has a large annual and diurnal range. In the afternoon hours in April-May and October-November it may sometimes be as low as 5 per cent., and sometimes even less, while in the monsoon season and in the early morning hours in winter it may often be 100 per cent. The nature of diurnal variation of relative humidity is opposite to that of temperature. The diurnal range of relative humidity has variations similar to that of temperature, the highest diurnal range (about 50 per cent.) occurring in October-November and the lowest range (about 30 per cent.) occurring in July-August.

The high humidity in July and August combined with the high temperature is responsible for the discomfort felt in these months. Wet-bulb temperature has been regarded as a measure or index of comfort or discomfort of climatic conditions. With wet-bulb temperature above 78°F, continuous hard work is not considered possible. The mean wet-bulb temperature at Lahore is about 80°F in July and August. Mean daily maximum wet-bulb temperature is 83°F in July and August, 80°F in June and 79°F in September. It can, therefore, be said that

the afternoon hours in June and September, and generally the whole day in July-August, are uncomfortable and unsuitable for continuous hard work. July and August are the worst months in this respect when the maximum wet-bulb temperature exceeds 85°F on some days. Such days are most uncomfortable with the risk of heat strokes occurring. The monthly means of daily maximum wet-bulb temperature in April to October are plotted in Fig. 1. It is interesting to note that while the highest mean dry-bulb maximum temperature occurs in June the highest mean wet-bulb temperature occurs in July and August. ✓

Rainfall

The normal rainfall data for Lahore based on data up to 1920 are given in Table 2. July and August are the rainiest months and November the driest. The normal annual rainfall is 19.62 inches. Of this, 14.85 inches, or nearly three fourths of the annual total, occur in June to September. In July and August alone 10.81 inches, slightly more than half the annual total, occur. The annual variation of the monthly rainfall shows two maxima and two minima. The main maximum is in July-August and the secondary maximum in January-February, when about 2 inches of rain occur. The total rainfall during December to March, which is of great importance to the wheat crop in the Punjab, is 3.21 inches and is caused by the "western disturbances."

TABLE 2.—RAINFALL OF LAHORE

Month			Mean monthly total (inches)	Mean Number of rainy days	Max. rain in 24 hrs. (inches)	Max. rainfall in the month (inches)	Min. rainfall in the month (inches)
January	..	..	1.05	2.1	2.25	3.91	..
February	..	..	0.94	2.2	2.43	3.83	..
March	..	..	0.86	1.9	2.33	5.37	..
April	..	..	0.54	1.6	1.12	2.46	..
May	..	..	0.70	1.4	3.00	4.38	..
June ✓	..	..	1.68	2.9	4.94	7.54	..
July ✓	..	..	5.48	5.8	7.66	16.47	0.32
✓ August	..	..	5.33	5.8	5.06	20.39	..
September	..	..	2.36	2.6	6.61	10.72	..
October ✓	..	..	0.25	0.6	2.04	2.27	..
November ✓	..	..	0.07	0.2	0.66	0.66	..
December	..	..	0.36	1.0	1.54	2.51	..
ANNUAL TOTAL			19.62	28.1	..	..	..

The monsoon rains commence at Lahore in the third or fourth week of June and cease in the second or third week of September. The rainfall in this season is generally associated with thunderstorms and occurs spasmodically with the occasional extension of the deflected Bay monsoon current from the east and south-east advancing up the Gangetic Plain. Under the influence of depressions from the Bay of Bengal moving west or north-west across the country the monsoon current strengthens considerably causing moderate to heavy rain. Very heavy falls occur only when well-formed depressions move into or near the Punjab. During winter rainfall is generally light.

The total number of rainy days (i.e. days with 10 cents or more rain) is 28, of which 17 are in June to September, 7 during December to March, 3 in April-May and 1 in October-November. The maximum rainfall recorded in 24 hours in the last 70 years (1872—1941) has been 8.27 inches in July, 1924. The highest total rainfall in a month has been 20.39 inches in August.

Fig. 3 shows the yearly total rainfall at Lahore for the 63 years—1879 to 1941. The normal line corresponding to 19.6 inches has been drawn for comparison. It is seen that rainfall varies considerably from year to year. It was within 10 per cent. of the normal in 17 of the 63 years. The highest annual rainfall was 37.62 inches in 1882 and the lowest 6.21 inches in 1899. In the last 10 years (1932—1941) the rainfall has been below normal in 8 years, the average for the ten years being 15.4 inches, which is 4.2 inches below normal. This appears to have led to the belief that the average rainfall of Lahore has decreased permanently in recent years. It is therefore of interest to note that during the 13 years' period—1895 to 1907—rainfall was below normal in 10 years, the average for the 13 years being 15.2 inches, 4.4 inches below normal.

Wind

On the whole the winds at Lahore are light. Calm conditions are frequent during the night and early morning hours, particularly in the winter months. They are least frequent between mid-day and 4 p.m. The half year, March to August, with a mean wind speed of about 4 m.p.h. is more windy than September to February with a mean wind of 2-3 m.p.h. June and July are the most windy months. The minimum wind is in the night and early morning hours throughout the year and the maximum wind between mid-day and 4 P.M. The mean wind direction is NNW during October to March, NNE in April and May, and easterly in June to September. During October to May winds have a feeble easterly component in the night hours and a westerly component in the day hours. In June to September winds are from ESE in the early morning hours and are from E to ENE in the rest of the day.

Weather Phenomena

Apart from rain, the most important weather phenomena affecting the climate of Lahore are the duststorms and thunderstorms. Duststorms occur occasionally during April-September, mainly in May and June. They generally occur in the afternoon, with skies covered with thundery clouds and are often accompanied by slight thundershowers and squalls in which the wind speed may sometimes reach up to 60 miles per hour. The typical duststorm arrives as a moving wall of dust, accompanied by fall of temperature and rise of relative humidity, which is a welcome relief in the severe summer days. The autographic records (Dines anemogram, micro-barogram, thermogram and hygrogram) of a duststorm at Lahore on 14th May, 1941, are shown in Fig. 4. Thunderstorms occur mostly in June to September, July and August being the main thunderstorm months. They occur sometimes in February to May but are rare in October to January. Thunderstorms in July and August are generally accompanied with rain and a fall of temperature and rise of relative humidity.

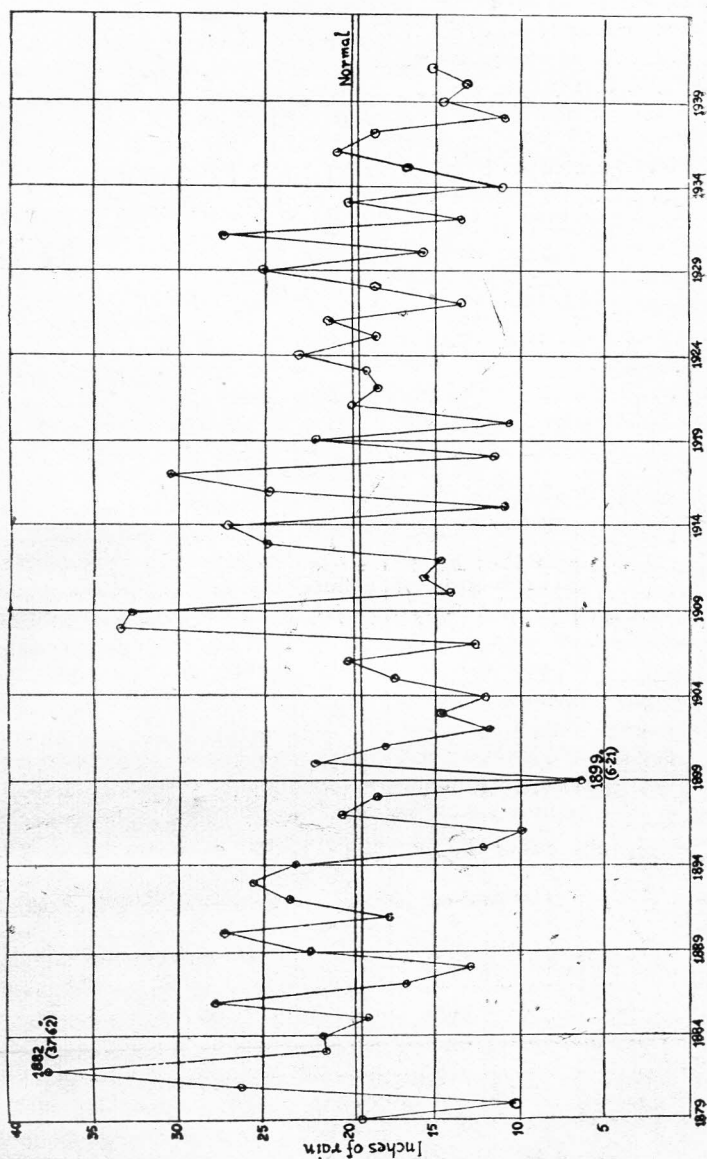


FIG. 3. LAHORE RAINFALL
1879-1941

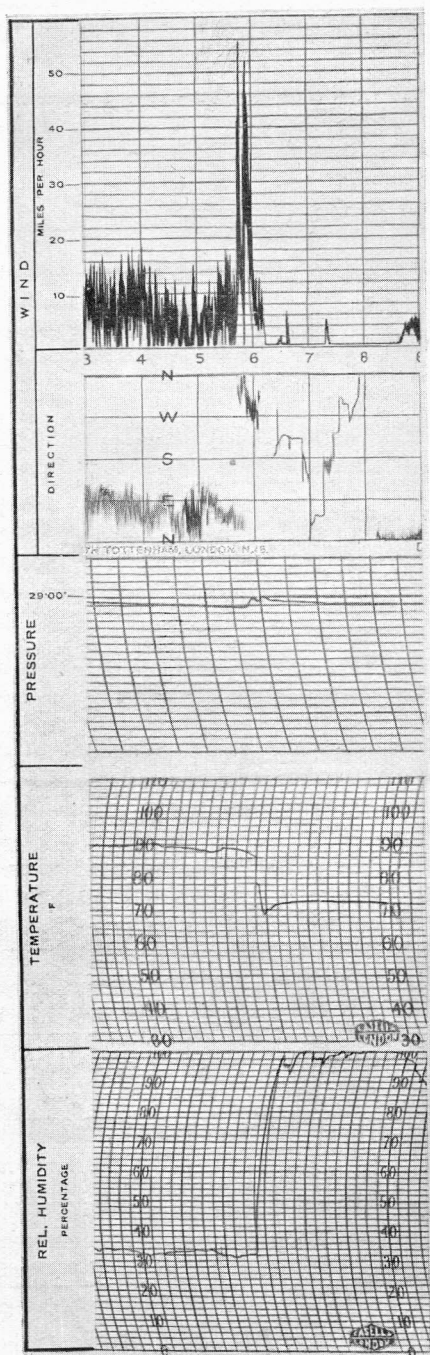


FIG. 4
Duststorm on 14th May, 1941
17-45-18-00 hours

THROUGH THE HIMALAYS—FROM SIMLA TO TIBET

By RAJA RAM, B.SC. (LONDON),

Emerson College, Multan

I have had several occasions of hiking in the Himalayas but the longest trek I ever had was our recent trip from Simla to the Frontier of Tibet. At 12 o'clock on the 5th of July, 1939, we stood, six of us, on the ridge at Simla ready to start. We had spent the last two days in strenuous preparations. The day turned out to be bright and Simla was so cool and nice after the grilling heat of Multan. The thought of four hundred miles by foot almost seemed to be a legend. For a moment I felt disinclined to walk one step. But Tibet was calling and the muses of the road seemed to beckon us all with a broad smile. Once on the road the magic of Wander-Lust (the malady of most of us) began to work its way. Soon we turned ourselves to the easy ascent and the broad curves of the Hindustan Tibet Road.

The road from Simla to Narkanda, a distance of 39 miles, is fairly beaten. There is a steady, though gentle, ascent all the way up to Kufri and then level bits alternate with a slight ascent here and there. Part of the way the road is bare and the sun strong, but we were in excellent spirits when we arrived at Narkanda on the 7th. Our feet, however, told a different story. The first day's trudge to Theog had brought blisters disabling one of the party who had to ride part of the way. Blisters could not, however, damp our enthusiasm and they failed to appear when they failed to disturb. Alone of the party I had the distinction of walking 421 miles without a blister. The secret lay in my thick stockings and my rather old but very comfortable shoes.

Narkanda is a beautiful place situated at an altitude of 9,120 feet. It looks backward to Simla and forwards to Kulu and Rampur Bashahar. At that height, which commands in the background a lovely view of the snow-clad Dhoula Dhar, the serried ranks of the lower hills on both sides present a wonderfully picturesque view. Here the Hindustan Tibet Road bifurcates into its Lower and Upper links. The Lower link leads down to Rampur Bashahar and then joins up with the Upper link near Sarahan, the summer capital of the Bashahar State. By the Lower link the distance between Simla and our destination, the Shipki Pass (situated beyond the frontier of Tibet), is just 200 miles. By the Upper link, sometimes known as the Brigg's Road, the distance is 221 miles, but though slightly longer it is much the more charming.

We reinforced our supply of rations at Narkanda and decided to go by the Upper link on the outward journey. Eleven miles of lovely road through a forest of firs and deodars brought us to Baghi, which is situated in the Rampur State.

From Baghi onwards to the end our Journey lay through the Bashahar State. Baghi commands a view of the valley from its eminence and looks down on the Rohru Sub-Division of the State. A few streams flow far away, down in the valley, and look like shining ribbons.

Next morning we had a long, though shady, march of 16 miles to Sungri. Here another road leads down to Mussourie. Many stages on the way are more or less like Sungri where there is a Rest House, some P.W.D. quarters and no more habitation. But thanks to the authorities of the State, there are adequate arrangements for the supply of such necessities as charcoal, firewood, milk, flour, and sugar at all the stages. I should not have said sugar, for the only day when we fell short of our stock, we could not get more than $1\frac{1}{2}$ *pao*, although we drained out the entire stock of the supplier. One should, however, be on guard against travelling without notice, for in that case no supply may be available. The State authorities are generally good enough to circularize the stage mates who make all arrangements in advance. But when once a programme has been drawn up it becomes a tyrant that must be obeyed, for if one cannot stick to schedule one might have serious difficulty about necessary supplies.

The next stage is Bahli, 12 miles away from Sungri. In this part of the country the road is almost level and the green hillsides are shot with terraced fields of golden wheat. Another favourite crop is white and black Seol, a kind of minute cereal. On our way to Bahli we first came across the apricot trees which grow in such abundance in the State. The fruit is rather wild, but the natives generally make use of the stone. They take out the seed from the stone and crush oil out of it with the help of crude oil-presses. This oil is used for purposes of cooking in place of *ghee* or butter. A sharp descent from Bahli brought us down to Tatlesh, where there is a beautiful Forest Rest House. For the first time since we left Simla we were at an altitude of a little over 5,000 feet. We felt so warm and had a regular bout of bathing in the hill stream nearby. By this time we had come to realize the tonic value of these cold baths. After a day's march we generally arrived footsore and weary and although we slept at night like logs of wood, some of us felt almost half-dead in the morning. A cold bath, however, served as a real tonic; the whole body seemed to arise and awake and we realized how a bath could be really refreshing. As the journey progressed we tried much colder baths at higher altitudes and the colder they were, the more thoroughly we enjoyed them.

Ordinarily we started in the morning at about 9 o'clock after breakfast. We usually broke journey on the way at lunch time. The servant made a little fire with the cones of the pines in the heart of the forest and preferably near some spring or hill torrent. We had thus a nice hot lunch in the sweet company of nature. After lunch we rested for a few hours in the forest and marched off in the afternoon to have a late tea at 6 p.m. the next stage.

We had to break this routine only once and felt pretty uncomfortable that day. From Tatlesh to Daran Ghati there is a stiff climb of about 5,000 feet. We meant to start early as usual, but we received news that a bridge on the way had been washed away. We sent a message post-haste to the road inspector asking him to make some arrangements for us and the mules to cross over. We got his word at 4 p.m. that the road was clear. As we did not hear from him earlier, we were banking on a halt, and ate a care-free and a heavy lunch at 2 p.m. We were illprepared to leave immediately

after we got the message, but we thought that we should rather not waste a day. We thus started off well after 4 p.m. The sun was strong and the road bare and we had an awful time climbing up that afternoon. Presently, evening came on and then night, and still Daran was far away. What was worse the latter part of the journey lay through a thick forest and darkness deepened as we approached those heights. At last, when the patience of some of us was sorely tried we suddenly reached the top of the hill and that was Daran. We were told that the D.F.O. was camping there and we made straight for his camp. Chilled and frozen we jumped at his offer of tea and made short work of plate after plate of *pikauras* that were served hot and fresh. When he asked us to wrap ourselves for fear of cold, there was a regular scramble for his blankets and coats! The gentleman must have marvelled at our appetite when having done ample justice to his tea, we immediately fell upon a hearty and substantial dinner with renewed vigour.

Daran commands an excellent view of the valley, but the morning was clouded and the scene was obscure. We marched off as usual after breakfast and because of a longer halt on the way we arrived rather late at Sarahan, the summer capital of the Bashahar State, beautifully situated at a height of 6,914 feet. Here the verdant hills slope down to the valley where the Sutlej roars away its swift course. Sarahan has been the traditional capital of the State right from that day in the hoary past when a grandson of Lord Krishna occupied the place after having slain a demon who had imprisoned a beautiful Princess. The town itself is a brief affair with a population that swells into a little over a thousand in summer. The important buildings are the Raja's palace and the State Temple dedicated to Maha Kali.

Beyond Sarahan the country puts on a new complexion altogether. The land is less fertile and more rocky. The people speak a different language but they are an improved physical type. The physique of men and the complexion of women show a distinct improvement as we travel beyond Sarahan. The population on both sides of Sarahan is mostly composed of Kanets who have been recently admitted in the fold of Rajputs and Kolis, who are a class of Untouchables. There are also Baris, Chumars and others. A good many families in the State, however, claim pure Rajput blood. A few miles away from Sarahan we also came across the First Buddhist Prayer Flag on a breezy hilltop. As we advanced, the Buddhist influence increased until at Chini, four stages away, the Tibeto-Buddhist culture seemed completely to predominate.

From Sarahan the road marches along the Sutlej and for most of the way either lines its banks or overlooks it. Between Sarahan and Chini, the farthest sub-division of the State, there is a beautiful Rest House at Nichar. The place is approached through a lovely deodar forest where for miles the road looks almost like an avenue. The Rest House is situated in the midst of an extensive orchard and is notorious for the growth of a poisonous grass which is fatal to all animals. One of our mules ate that grass and stood dazed in the morning as if struck with lightning. It seemed to doze away and experts thought it should be pierced in the ear to keep it off from sleep which would mean death. They also made the poor animal run at an infernal speed to

neutralize the effects of poison. In the meanwhile the purge had its effect and though the animal was disabled for a few days it survived all right. On our way back a similar incident took place and the eating of the grass proved fatal for a pony. It ate the grass overnight and expired in the morning.

A few miles this side of Chini we passed through the clustering hamlets of Roghi, a grape producing centre. Roghi exports several thousand rupees worth of grapes to various places in the State and also manufactures a local variety of grape wine. It is interesting that fruit trees like apples, pears, plums, and cherries flourish at an altitude of over 9,000 feet. I believe the Bashahar State has not cared to exploit the soil for purposes of fruit growing, but perhaps the places are so remote and the transport so expensive! Beyond Chini the forest abounds in fruit-bearing pine trees and dry fruit is the only fruit commodity exported from the State.

A hundred and seventy miles from Simla and situated at a height of 9,460 feet, Chini is a delightful place. It is situated in the central Himalayas and commands a lovely view of the sacred Kailash Peak. On a clear and sunny day one can see the Kailash Peak (over 19,000 feet) stand stiff and erect behind the snowy ranges, almost like a flag-staff. The people believe that the peak is never covered with snow even in winter. It is possible because of its sheer precipitous formation. We find the last State orchard at Chini, which is also the last outpost of civilization. Beyond Chini right up to the border there is no Post Office and letters are delivered once in a fortnight.

From Chini to the frontier of Tibet the country is inhabited by people of the same caste denomination, but they are all Buddhists. The approach to all villages is heralded by piles of stones inscribed with the sacred Buddhist texts, the most favourite being the sacred formula "Om Mani Padmini Hung." These stones are generally stacked on the road a little this side of a regular entrance to a village. There also stand at the entrance small pyramidal structures which are supposed to guard the place against evil spirits. The people are intelligent, though highly superstitious and their Buddhism is of a purely Tibetan hue. Unlike Lahoul in the Kulu Valley, which is another Buddhist cultural zone, the Lamas here are generally well-read and fully conversant with the sacred texts. A number of them have been to Lahasa and received their training there. The sacred books are all read in Tibetan and explained in the native dialect which changes almost after every 15 miles. Buddhism has not, however, completely superseded Hinduism and often the Rajputs profess a belief in both. For one thing they believe in sending the remains of their dead to Hardwar.

The country beyond Chini is situated in the dry zone of the Himalayas but in the midst of this desert of rock and stone there are beautiful oases at Kanam, Poo and Namgia. Here the native intelligence of hillmen has diverted the hill torrents into channels of irrigation and converted the slopes of the hills into green and smiling fields. At Kanam there are two separate monasteries for the Lamas and the Jumos or the nuns. The Lamas and the Jumos join the services of the Church and attend to their normal duties in life. The Lamas

officiate at all religious ceremonies and the Jumos may be seen working in the fields and serving even as coolies. This brings me to the practice of Polyandry. Polyandry still prevails in these mountainous parts and all the brothers generally marry one wife. This, incidentally, explains the large number of Jumos that are to be found there. The institution of Polyandry is perhaps an economic necessity. There is not much cultivable land and the holdings are very small. Any further sub-division will make these holdings entirely useless. A feeling is now growing up among the younger generations that Polyandry should be abolished but the pressure of circumstances and the prejudice of the older generation are operating strongly in its favour.

Poo was, until recently, the headquarters of a Christian Mission. It is a centre of trade and serves as a clearing house for goods imported from Tibet. The imports include wool, pashmina, zambas (a kind of felted shoes), patti, and chuk-tuk (a kind of heavy woollen quilt woven more or less like a carpet).

The last stage in the journey is Namgia, another beautiful village situated a little farther from the junction of the Sutlej and the Spiti Rivers. A hill-track leaves from Namgia to Spiti through the Nungo and Chungo valleys which are a favourite haunt of the shikaris.

The frontier of Tibet lies a couple of miles beyond Namgia. It is a remarkable testimony to the peaceful relations between India and Tibet that there are no armed sentries to guard the frontier between the two countries. There is not even a stone to mark the boundaries, let alone fortifications. The dividing line is a small hill torrent known as the Hoop-Sung Khud, situated at a height of over 10,000 feet. Hoop-Sung is a compound of the words Hoop and Sung which means "a draught of water to purify." The tradition has it that a certain Raja decreed that when the merchants entered India after their stay in Tibet, they should drink a little water to purify themselves. The Tibetans maintain the same proposition in their favour.

When we reached the frontier, a slight drizzle came on. There lay a very stiff climb of 2 miles between us and the Shipki Pass which was our ultimate destination. We decided, however, to go up in wind and rain, and after an arduous climb reached the top late in the afternoon. Unluckily, there is no shelter hut on the top and we had to get back immediately on account of the strengthening rain. The Pass is barely a few furlongs long and is situated at a height of about 12,500 feet. It serves as an arterial trade route between India and Western Tibet. Right above it tower the snow-clad Himalayan peaks and at its foot the Sutlej rolls its majestic course. Almost from Sarahan upwards the Sutlej had been our constant companion, its sweet music cheering us through that wilderness of rock and stone. We were so unwilling to part with it as it flowed down the valleys of Western Tibet to its source, the Mansrover Lake.

The homeward journey to Sarahan was a delightful routine, but it was not entirely uneventful. Right near the end when we were marching off to Sarahan we suddenly heard the hills echoing with a confused music of the horns, the conches, the bugles, and the bag-pipes. Occasionally we heard the beating of the drums. We were wondering why the hills had put on a festival air. As we advanced we came upon

a regular procession and discovered that the mighty god Bisaru who was on a visit to his maternal uncle, the god Maheshwara of Bhaba, was returning to his native shrine at Gaura. Bisaru is the god of rain. It appears that no rain fell at Bhaba and an invitation was sent to Bisaru who came in state followed by about 300 of his votaries. He stayed at Bhaba for three days and Bhaba had a much-wanted shower. During this time the members of the god's party were being feasted on a lavish scale with meat and drink. The god was now speeding back to his home. At intervals the procession would stop and the god would dance or was rather made to dance and the whole company joined. At Sarahan a few godlings came out to receive Bisaru who camped out with his men. The whole party was entertained to a festival of music and dance by the natives of the place and, as usual, the god and his men joined. It was refreshing to think that these hill-gods, though they are no less mighty, are so human. Many stories which circulate through the echoing galleries of the hills prove the strength and prowess of these hill-gods with Bisaru at their head.

A few miles down Sarahan, we took the lower link of the Hindustan Tibet Road on our return journey. On our way to Rampura we passed some of the most fertile parts of the State. Rampura itself is situated on the bank of the Sutlej and is almost cooped up between the river and the hillside. It has a population of over 4,000 in winter but it shrinks very much in summer, when the Raja shifts to Sarahan. Its crowded streets and tenements are brilliantly set off by its beautiful palace which overlooks the whole town. A big fair is held here sometime in November when a brisk trade takes place in various products of the State. Beside the palace, there is a Buddhist Library which is a scene of great activity at the time of the fair when hundreds of monks come at the invitation of the Raja from all over the State and recite the sacred texts.

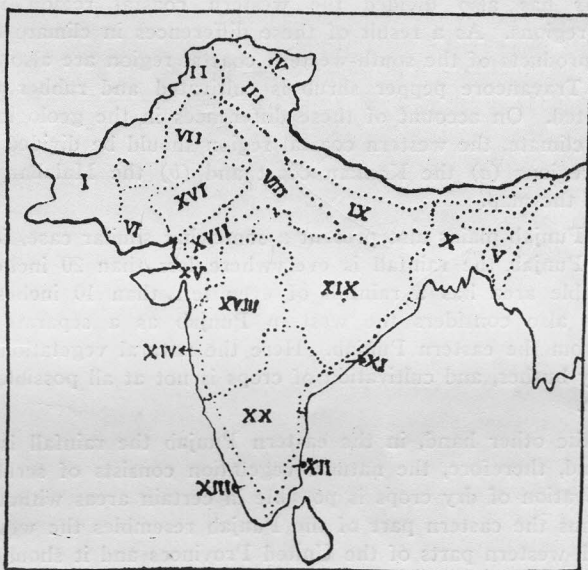
Beyond Rampur we passed through miles of paddy near Nirth and entered the British territory near Thanedar. Thanedar is well known for the orchards of Mr. Stokes which produce some of the finest varieties of apples. After a month or so of hill-wandering it was a delight to meet Mr. Stokes and hear him talk on religion in a very interesting manner. On our way up to Narkanda we had a good look at Kotgarh from the roadside, but we were sorry that we could not go down to see the place. Kotgarh is a flourishing centre of the fruit trade and has good prospects in future. From Narkanda we got back to Simla in due course arriving there on the 8th of August. All told, we had done 421 miles in 34 days. As we stood on the ridge at Simla that Tuesday afternoon we really wondered that there would be no more stages to cover and no more walking to do. We seemed to forget that the small bit of the Simla Mall was perhaps the gayest road in the world to walk on.

THE NATURAL REGIONS OF INDIA

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VERY few books have been written on the regional geography of India and even in these books the regional division of India has not been adequately dealt with. In most of the books, no attempt has been made to divide India into natural regions. Of course in Dudley Stamp's book *The Indian Empire*, India has been divided into natural regions. But some of these natural regions are open to objection.



The Natural Regions of India:

I. Baluchistan Plateau; II. North-Western Hilly Region; III. Himalayan Region; IV. Kashmir Plateau; V. Eastern Hilly Region; VI. Sind Plains; VII. Western Punjab Plains; VIII. Eastern Punjab and Western United Provinces plains; IX. Middle Ganges Plain; X. Lower Ganges and Brahmaputra Plains; XI. Northern Circars Region; XII. Carnatic Coastal Region; XIII. Malabar Coastal Region; XIV. Konkan Coastal Region; XV. Gujarat Region; XVI. The Desert; XVII. Rajput Upland; XVIII. Deccan Lavas Region; XIX. North-Eastern Deccan Plateau; XX. Southern Deccan Plateau.

Thus Dudley Stamp has divided the coastal region, west of the Indian plateau into two natural regions (a) the Gujarat region and (b) the West Coast region. The entire west coast region has certainly the same physical features, but in geological structure, the northern part of west coast differs from the south-western coast as is apparent from the geological map of India. In the northern part, the rocks essentially consist of the Deccan lavas. Besides this difference in the geological structure, the northern part of the western coast also differs in climate, for in the northern part the rainfall entirely occurs in the monsoon season and thus there is no rainfall for seven months. On the south-west monsoon, rainfall is also received during the months of the south-west monsoons, rainfall is also received during the months of November and December. However, considerable rainfall is also received here in the months of April and May. During these months the winds are on shore and the rainfall is over 10 inches along the south-western coast. This rainfall is termed 'mango showers'. Thus here there are only three months when there is no rainfall. On account of these differences in climate, Kendrew in *The Climates of the Continents* has also divided the western coastal region into two climatic regions. As a result of these differences in climate the agricultural products of the south-western coastal region are also different. Thus in Travancore pepper shrub is cultivated and rubber trees are also planted. On account of these differences in the geological structure and climate, the western coastal region should be divided into two natural regions (a) the Konkan coast and (b) the Malabar coast as shown in the map.

The Punjab plains also present a somewhat similar case, for in the western Punjab the rainfall is everywhere less than 20 inches and a considerable area has a rainfall of even less than 10 inches. Again Kendrew also considers the western Punjab as a separate climatic region from the eastern Punjab. Here the natural vegetation consists of thorny bushes, and cultivation of crops is not at all possible without irrigation.

On the other hand, in the eastern Punjab the rainfall is over 20 inches and, therefore, the natural vegetation consists of scrub forests and cultivation of dry crops is possible in certain areas without irrigation. Thus the eastern part of the Punjab resembles the western and the south-western parts of the United Provinces and it should be considered a part of this natural region, whereas the western Punjab should form a separate natural region.

Again, in Stamp's book, the central India plateau has been considered as a separate natural region. Like the north-eastern plateau the central India plateau is made up of archæan rocks. It also receives rainfall between 40 and 80 inches and hence it also resembles the north-eastern plateau in natural vegetation. It is, therefore, not quite clear why central India plateau should be considered as a separate natural region. The presence of the Mahadeo hills and Maikal range does not appear to be a sufficient reason for the formation of this region into a separate natural region. The central India plateau should therefore be considered as a part of the north-eastern plateau. However, it may be considered as a separate sub-region just as Eastern Ghats and Godavari Valley have been considered as separate sub-regions.

Again, the Rajput upland region also presents a similar difficulty, for in this region the whole of the Malwa plateau has been included, although it is made up of Deccan lavas. It is true that the division of a country into natural regions is not so easy, but as this region is very different in its geological structure, the inclusion of this region in the Rajput upland region is contrary to the very definition of a natural region. Besides, the Malwa plateau also resembles the Deccan lavas region in the distribution of rainfall for this plateau also receives rain between 20 and 40 inches and, therefore, this region should be included as a part of the north-western Deccan lavas region.

In a like manner the division of the Himalayan region into two natural regions is open to objection. The Himalayan region has been divided into two natural regions (a) The Himalayan region above a height of 5,000 feet and (b) The Himalayan region below a height of 5,000 feet. The main basis for this division appears to be altitude. No doubt, in the Himalayas the temperate-zone starts from an altitude of 5,000 feet above sea level. But there are various climatic zones above this height. Thus below a height of 9,000 feet the climate is of the cool temperate type and above a height of 9,000 feet and up to 12,000 feet the climate is of the cold temperate type, while the Alpine zone starts from a height of above 12,000 feet. So that on the basis of altitude, the Himalayan region should be divided into many natural regions. Such a division hardly appears to be necessary. Perhaps the only way out of this difficulty is that the whole region may be considered as one region, with a mountain type of climate.



THE DEVELOPMENT OF THE FRUIT INDUSTRY IN THE PUNJAB

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THE Honourable Chaudhri Sir Shahab-ud-Din, President of the Punjab Provincial Co-operative Fruit Development Board, remarked at the seventh annual gathering: "I have constantly emphasized that there are great possibilities of the development of the fruit industry in the Punjab, as the soil is fertile, vast irrigation facilities are available, and the climate is very able to suit all kinds of fruits. Moreover, the farmer in this Province is hardworking and laborious. Naturally, the Canal Colonies, if developed for the fruit industry, will compare favourably with the best gardening colonies of the world."

Position

The Punjab extends from the upper Jumna to the Indus and also includes Dera Ghazi Khan and part of the Mianwali District, situated to the west of the natural river boundary. With Kashmir State and the North-West Frontier Province it occupies the north-western corner of the Indian Empire.

Soil

All horticulturally advanced countries pay great attention to soil, relief and climate. The Punjab for the most part is a vast alluvial plain and has deep soil suitable for fruit farming.

Relief

The relief in relation to fruit distribution can be classified as follows:

(1) The Himalayan Region comprising the Kangra and Kulu Valleys at an altitude varying from 5,000 to 7,000 feet is suited to deciduous fruit.

(2) The Salt Range Plateau which forms the north-western angle, has a few tracts where springs supply the water for cultivation of almonds, plums, peaches, apricots, etc.

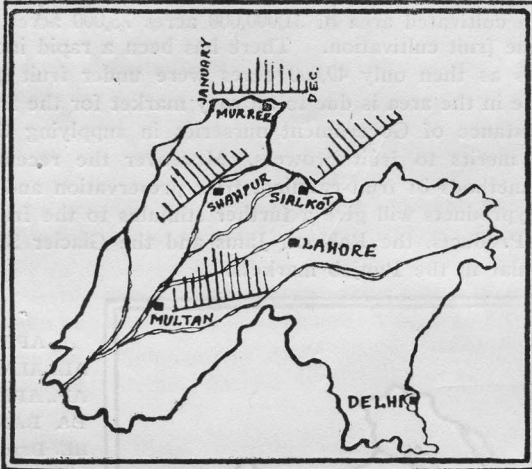
(3) The Submontane tract where the height varies from 500 to 2,000 feet and the average rainfall is more than 30 inches, the sub-tropical fruit belt of the western plain emerges in the belt of the deciduous fruit.

(4) The Western Plain is a region of extensive irrigation, where the citrus fruits, the loquats, etc., grow well.

(5) The South-western Semi-desert region around Multan and Muzaffargarh is known for dates, mangoes, etc. The fruits grow in tracts where water is available.

Climate

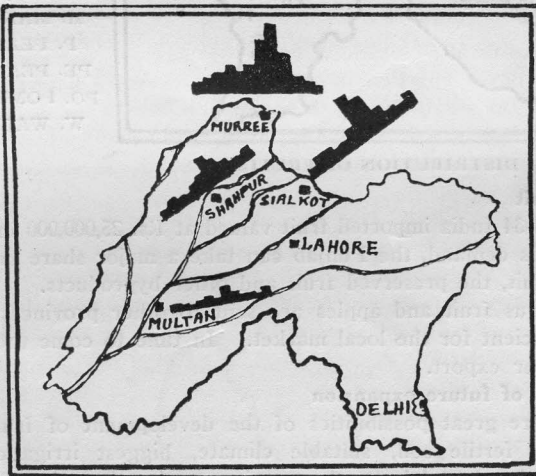
The high temperature focus in the Punjab is Multan, where the range of temperature is 40°F and the average July temperature is



TEMPERATURE IN A YEAR

95°F . The rainfall is 7 inches from July to September and $1\frac{1}{2}$ inches from December to March.

Except to the South the rainfall increases in every direction from this focus.



RAINFALL IN A YEAR

Climate Regions

In relation to fruit the Punjab has the following climatic regions:

(i) The temperate type of climate in the mountain valleys of Kangra, Kulu, Simla and Murree has mild summers and severe winters. In this region pears, peaches, plums, apples, apricots, etc., grow well. Still in the higher regions litchies and strawberries predominate.

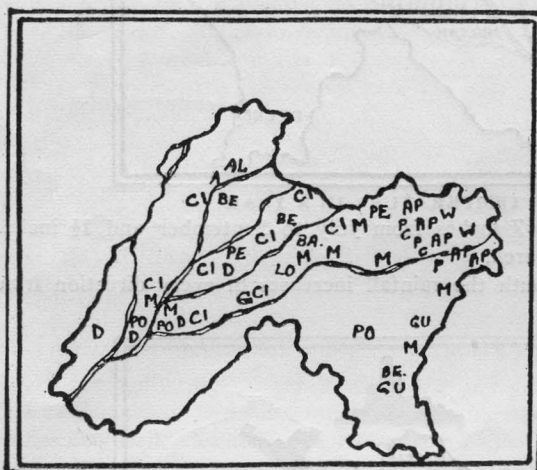
(ii) The dry salt range is well known for almonds, plums, etc.

(iii) The plain of the Punjab on the whole enjoys the sub-tropical type of climate with greater extremes to the west and south-west, and milder summers and winters in the submontane region. In this climatic

region the tropical and sub-tropical fruits such as mangoes, guavas, loquats, pomegranates, dates, figs, bers, falsas and the citrus fruit are grown.

Area under fruit cultivation

Out of a cultivated area of 31,000,000 acres 75,000 acres to-day are devoted to the fruit cultivation. There has been a rapid increase from 1928 onwards as then only 49,000 acres were under fruit gardens. A rapid increase in the area is due to an easy market for the fruits grown, and the assistance of Government nurseries in supplying the trees of outstanding merits to fruit growers. Moreover the recent introduction of the methods of fruit-canning, fruit preservation and the manufacture of byproducts will give a further stimulus to the fruit industry. The Kissan Products, the Rahman Jams and the Glacier Squashes are already popular in the Punjab markets.



DISTRIBUTION OF FRUITS

Trade in fruit

In 1933-34 India imported fruit valued at Rs. 25,000,000 in her ports. To meet this demand, the Punjab can take a major share in supplying the fresh fruit, the preserved fruit and other byproducts.

The citrus fruit and apples are sent to other provinces, still they are not sufficient for the local market. In time to come there may be a surplus for export.

Possibilities of future expansion

There are great possibilities of the development of fruit industry. Gifted with fertile soil, suitable climate, biggest irrigation system, cheap and abundant labour, the province under the scientific guidance of Fruit Development Board will double the area, now under fruit cultivation. Thus the wealth and health of the Punjab people will improve. The Punjab Fruit Development Board has the following scheme for future expansion, if the finances permit:*

1. Encouraging model gardens in the districts.
2. Development of byproduct industries.
3. Creation of a reference library on horticultural literature.
4. Conducting horticultural tours.
5. Establishing business relation in India and abroad.

* Annual Report of the Punjab P. C. Fruit Development Board.

AGRICULTURAL REGIONS OF THE PUNJAB

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THE province of Punjab may be divided broadly into seven agricultural regions, as shown on the map. They are:

(a) **North-Eastern Mountain Region**, comprising the districts of Kangra and Simla, and the narrow hilly strip of Ambala, Hoshiarpur and Gurdaspur.

(b) **North-Western Potwar Plateau**, lying north of the Salt Range and comprising the districts of Rawalpindi, Attock and Jhelum.

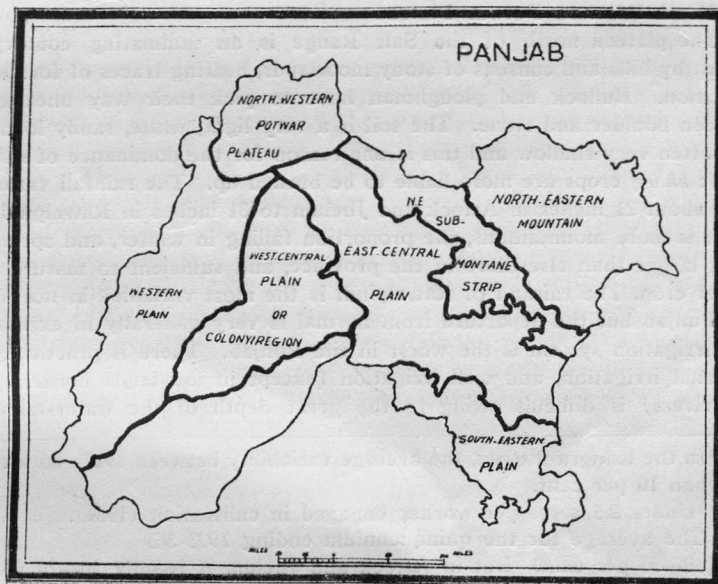
(c) **North-East Submontane Strip**, comprising most of Ambala, Hoshiarpur and Gurdaspur, Sialkot, Jullundur, Ludhiana and part of Gujrat.

(d) **East-Central Plain**, consisting of the old-settled districts from Jumna to Jhelum, including Karnal, Ferozepore, Lahore, Amritsar, Sheikhupura, Gujranwala and part of Gujrat.

(e) **West-Central Plain**, or the colony region, comprising the newly settled districts of Montgomery, Lyallpur and the major portions of Jhang and Shahpur.

(f) **South-Eastern Plain**, between the Jumna and the Sutlej, comprising the districts of Rohtak, Gurgaon and Hissar.

(g) **Western Plain**, the tract lying west of Jhelum-Chenab-Trimab-Panjnad line, comprising the districts of Mianwali, parts of Shahpur and Jhang, Muzaffargarh and Dera Ghazi Khan.



(a) North-Eastern Mountain Region

Along the northern boundary of the province lies the western portion of the great Himalayan chains. The north of Gurdaspur, Hoshiarpur and Ambala districts and the whole of Simla are embraced in its spurs, while, in between, the district of Kangra lies right athwart the range, two of its cantons being in trans-Himalayan country. The rainfall is reliable* and abundant—45.96 inches in Simla—but the soil is stony and the surface often precipitous, so that much labour is involved in terracing and preparing land for cultivation. The population depends more largely upon sheep breeding than arable farming. Owing to the small amount of cultivated land the pressure of population upon it is high. The holdings in Kangra and Simla are the smallest in the province.** The principal crops are wheat, maize and rice, these together occupying 70 per cent. of the cultivated area in Kangra and 57 per cent. in Simla. Pulses, barley and buckwheat are other significant crops. Rice is grown on flat lands above river-beds, the water being conducted to the embanked fields by an elaborate system of canals or *kuhls*, led out of the mountain streams. This is the only form of irrigation in this region and is much valued. Maize is grown below 8,000 ft. Wheat ascends to 8,000 or 9,000 feet and at the higher levels is reaped in August. Barley is grown at still greater heights. The chief pulse is *kulathi* (*Dolichos Biflorus*), eaten by the very poor. Buckwheat is common on poor stony lands. Kangra grows all the tea which appears in the statistics for Punjab, but it occupies only 1.2† per cent. of the cultivated area of Kangra. It may now be possible to revive this industry. Fruit-growing offers another important possibility. Potatoes have already been introduced near the hill-stations.

The population is thin and is spread out in isolated homesteads and scattered hamlets. No village communities in the proper sense exist. The physical nature of the country has prevented the growth of compact groups, each holding a well-defined area of arable and pasture land.

(b) North-Western Potwar Plateau

The plateau north of the Salt Range is an undulating country broken by hills and consists of stony moorlands, bearing traces of former glaciation. Bullock and ploughman have to pick their way uneasily between boulder and stone. The soil is a very light, white, sandy loam. It is often very shallow and this is one reason for the dominance of *rabi* crops: *kharif* crops are more liable to be burned up. The rainfall varies from about 21 inches in Attock and Jhelum to 31 inches in Rawalpindi, which is more mountainous, the proportion falling in winter, and spring being larger than elsewhere in the province, and sufficient to mature a winter crop. The rainfall of Rawalpindi is the most variable‡ in northern Punjab but the departure from normal is very generally in excess. The irrigation system is the worst in the Punjab. There is practically no canal irrigation, and well irrigation (except in low-lands bordering the rivers) is difficult owing to the great depth of the water-table.

*In the Kangra district, the average variability between 1917—36 was less than 10 per cent.

**Under 2.5 acres per worker engaged in cultivation (1931).

†The average for the quinquennium ending 1935-36.

‡40—50 per cent. But in Attock and Jhelum it is only 10—20 per cent.

Agriculture is, therefore, almost entirely dependent upon the rainfall, and cropping is naturally precarious except in those small areas near the rivers, where extra water is available from floods or wells. Even in years of good rainfall when every available plot is sown, the country still looks rocky and bare. The holdings are fairly large varying from 5 acres in the east to 10 acres in the west. The chief crops are wheat and bajra which together occupy 55.3 per cent. of the cultivated area in Rawalpindi, 72.2 per cent. in Attock and 71.8 per cent. in Jhelum. Other significant crops are fodders and pulses, with the addition of gram in Attock and maize in Rawalpindi. A few acres round each well are cultivated with market-gardening crops.

The villages in this area have originated as strongholds rather than agricultural settlements scattered round; these strongholds were the small hamlets of the non-warlike population. The agricultural population consists almost entirely of Mohammedans, men of splendid physique, but not as a rule good agriculturists. The reason for this is that they have only within comparatively recent years emerged from the pastoral state and they have yet to acquire that talent and foresight in agriculture which comes from experience. The almost entire absence of irrigation makes life a stern struggle with nature. But the bracing climate due to a long cold weather and to a comparative freedom from moist enervating heat, which is India's bane, has given the people a sturdiness and vigour of character which makes many of them more than a match for their difficulties. It may be reasonably hoped that with the spread of agricultural education this region will not lag behind in advancing the agricultural resources of the province.

The *chachh* tract in the north of the Attock District provides a notable illustration of the capacity of the people to utilize their environment. A fertile lacustrine plain,* about seventy miles long, and not ten miles broad, it is one of the most intensively cultivated lands in the province, and has an agricultural unity of its own. "It recalls the richest and most intensively cultivated strip in Europe, the country along the Bay of Naples, where a family can be maintained on 2½ acres."† Wheat, maize, sugarcane, vegetables and tobacco are the chief crops, but snuff tobacco is the most valuable. Farming is of a very high standard, so that the average yield of 100 acres of land is 188 acres of crop.

(c) North-East Submontane Strip

This region stretches in a long strip along the Himalayas. Its principal feature is that here agriculture depends upon rainfall, aided to a varying extent by wells. Nature is usually bountiful, and the yield per acre of all the unirrigated crops is highest in the province. The rainfall varies from 25 to 40 inches and the dry crops are generally secure. Wheat and even sugarcane can be grown without irrigation. The rainfall is relatively reliable. The average variability is under 25 per cent.

*Before the Indus cut its way through the Attock Hills, it, with the Swabi Tahsil of the Peshawar District, formed a vast lake. Tradition even now speaks of it as a marsh, and the older inhabitants affect to derive the name *chachh* from "chhab" which is said to mean a marsh. (*District Gazetteer, Attock* 1930.)

†Darling, Panjab Peasant in Prosperity and Debt, 1932, p. 85.

The only irrigation is in the form of wells, the number of which increases towards the south-west and north-west as the rainfall becomes scantier. The construction of these wells is facilitated by a high water-table. The country is naturally rich and the soil is quite fertile. Wheat, maize, sugarcane and fodders are the principal crops of this area, which together occupy more than sixty per cent. of the cultivated area.

Owing to the fertility of the soil and the ubiquity of drinking water the population is the densest in the Punjab and the holdings are correspondingly small, usually between 2.5 and 5 acres. So the natural advantages to agriculture are to a great extent neutralized by the great density of population and the resulting sub-division and fragmentation of holdings. Throughout the area the yield per acre is high but the yield per head is low.

On account of high sub-soil water-level and a heavy rainfall, the climate during the monsoon rains becomes unhealthy both for man and cattle. Man lacks vigour and industry. The predominant tribe, the Rajput, is notorious for bad husbandry. A large number of cattle are lost through disease.

In parts of Ambala and Hoshiarpur Districts much fertile soil has been lost in recent times because of erosion, following the destruction of hillside forests. A narrow sandy belt traversed by innumerable non-perennial streams, the *chos*, fringes the Swaliks.

(d) East-Central Plain

This region consists of the old-settled districts of central Panjab, very thickly populated. There is great pressure on soil and the holdings are generally small and fragmented though larger than region (c).^{*} Both canal and well-irrigation are well developed and to a large extent mitigate the effects of a capricious rainfall and a dense population. The rainfall averages between 15 and 25 inches and is fairly variable. It is more often in defect of the normal than above it. Good markets abound and there is an elaborate network of railways and roads. The two principal urban centres and market towns of the province, Lahore and Amritsar, lie in this area. Outside the canal colonies there is no part of the province where the land is more eagerly sought.

Wheat is the principal crop of the *rabi* season, and cotton and fodder of the *kharif*. A good quantity of rice is also grown in the western parts of this area and gram in the eastern portion. Market-gardening is making steady progress near the towns.

Prevalence of well-organised village communities is an important characteristic of this region. Villages are compact. The land is generally held by small landlords who have full proprietary rights. Great landlords are conspicuous by their absence. Neither the Mohammedan Emperors nor the Sikh rulers ever allowed the local chiefs, such powers as belonged to the Taluqdars of Oudh or the zamindars of Bengal.

(e) West Central Plain or the Colony Region

This is the newly settled and agriculturally the most progressive region of the province. Here agriculture has taken a marked turn from subsistence to commercial farming. Until about 40 years ago, this region

^{*}The work of consolidation is, however, progressing apace.

was almost valueless owing to rainfall being insufficient to mature crops. The rainfall is less than 10 inches towards the south-west of the region and even this is much variable. But situated between large rivers almost the whole area has now been commanded by canals, most of which are perennial. A large number of wells supplement the canal water where necessary. The former Government waste-lands have been colonized by selected agriculturists from the more congested areas of the province. They have been settled on "squares" or "rectangles" of land, from 25 to 27½ acres in area, and new carefully planned villages have been built. The land is held individually and directly from the State.

The holdings are large and compact which lead to great efficiency in cultivation. They are generally between 7.5 and 12.5 acres. There is greater use of improved machinery and implements and a better response to scientific methods. The result is that the agricultural outturn of this region is usually, though not invariably, greater than the outturn of the rest of the province.

The leading crops are wheat, Punjab-American cotton, fodder and toria. As the pressure of population is less, there is a considerable surplus for export.

The rural landscape presents a prosperous appearance—an illuminating commentary on the effort of man.

The region is well provided with markets at convenient distances which are connected with the villages by well-planned roads and railways. On account of these facilities of means of communication the colony farmer is in a much better position than his counterpart in the old districts.

(f) South-Eastern Plain

This region is devoted to a large extent to dry-farming. Only a small portion is irrigated by canals, and wells are also difficult to construct over a large part of this area owing to a very low water-table. The question of providing drought-resisting crops is of great importance in this region. The rainfall varies from about 15 to 30 inches. It is frequently unevenly distributed and is uncertain. Variability averages about 25 to 30 per cent. Insecurity of harvest is the dominant feature. Crop-growing being so uncertain, special attention has been given to cattle-breeding and this tract is noted for its breed of cattle.*

Bajra and fodder in *kharif* and gram in *rabi* are the principal crops. Barley is grown in Gurgaon.

Population is not dense, and so the holdings are quite big—about 7.5 to 10 acres in Hissar. In a year of bumper harvest there is a large export of grain, but it comes not more than once in five years, and before it comes three or four harvests may fail in succession. The shadow of drought is always there, and life is more a struggle with nature than an enjoyment of her bounty.

The villages of this region are comparatively large as water is scarce. Each village has a tank, quite close to the habitat. The land is divided between petty landlords.

On the east, this region, with a narrow belt of canal irrigation, is more akin to the United Provinces, and in the south to Rajputana, with

*It is the home of the celebrated Haryana breed.

widespread sand-dunes and a large number of camels employed both for ploughing and transport.

(g) Western Plain

The western Punjab is the poorest and the most backward region of the province. Here the people have hardly emerged from the pastoral state and still retain many of the customs of the nomads. They render implicit obedience to their tribal chiefs and religious leaders.*

The physical environment is very trying. The soil is sandy and infertile. In summer it is one of the hottest regions of the earth, and the rainfall is scanty, most capricious and quite insufficient for agriculture of any kind. The rainfall is less than 10 inches over most of the region. In Dera Ghazi Khan variability averages between 50 and 60 per cent.—the highest of any district in Punjab. "Half the country is burnt up by the sun and the other half drowned by the river, and the whole is waterlogged with debt."†

The land is divided amongst big landlords or Taluqdars—the natural result of political and economic insecurity. These Taluqdars are generally both improvident and extravagant, who would spend large sums of money on minor little ceremonies but will hesitate to spend any substantial amount on the improvement of land. The holdings are either too big or too small.

The small holder can barely live and the large barely works. Though mostly a thinly populated area, it is over-populated for any but the lowest standard of living.

✓ Agriculture is very precarious and is confined to the land moistened by river floods or inundation canals. There are tiny patches of cultivation round the wells which become very deep and very widely separated away from the rivers, and their function gets limited to providing water for camels and human beings. Wheat and gram are the chief crops for *rabi* and jowar and bajra for *kharif*. Some rice is also grown in the flooded areas. Large quantities of dates are produced.‡

An important characteristic of this region is that on account of poor yields subsidiary means of subsistence are of great importance. Cattle and horse-breeding are quite remunerative supplementary occupations. Pastoral farming is the most important in this region.

Villages in the ordinary sense are few and far between. The country is covered with little hamlets clustering round a well which is often but an oasis in the desert. The means of communication are very backward. Very few railways cross the Indus to the west and metalled roads are rare; only unmetalled trackways connect the various villages.

*Known as Pirs.

†Darling, *Punjab Peasant*, op. cit., p. 125.

‡In a large part of the area many people live for four months upon dates and so poor are some that in years of scarcity the very date-stones are ground into flour.

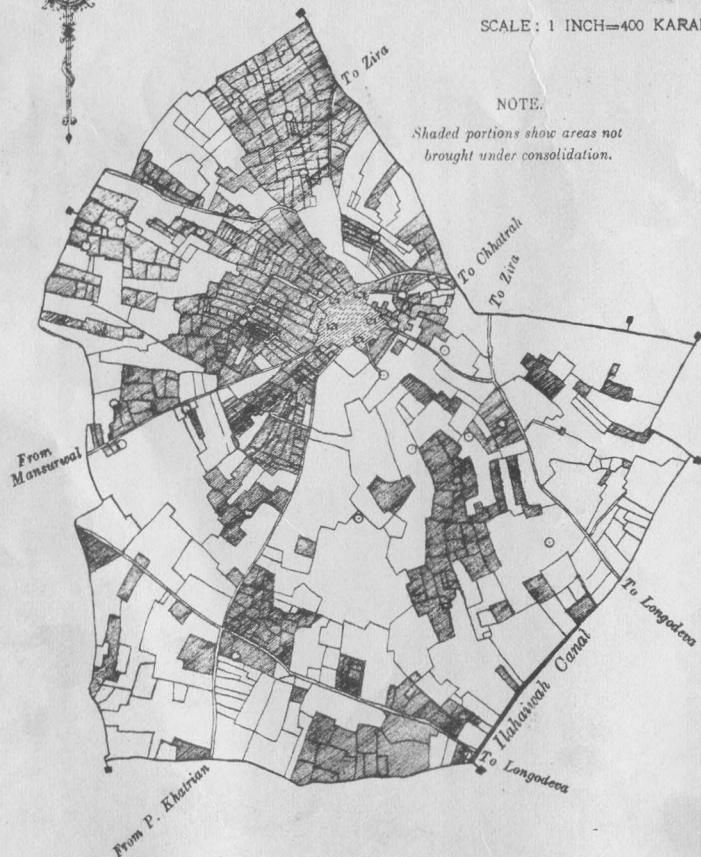


MAPS SHOWING SUNER VILLAGE, DISTRICT FEROZEPORE.

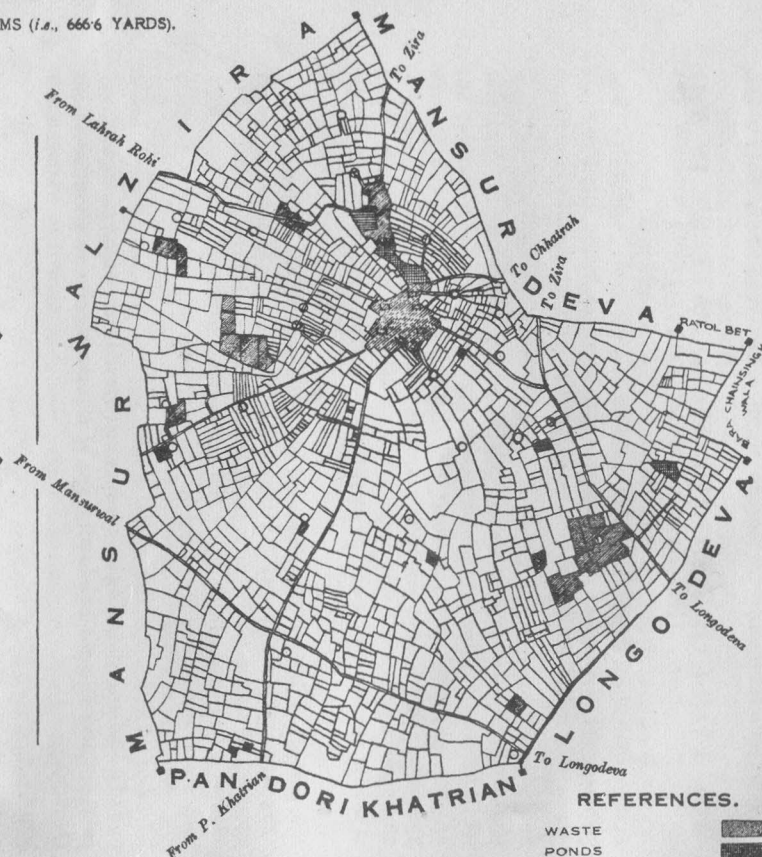
SCALE: 1 INCH=400 KARAMS (i.e., 666 2/3 YARDS).

NOTE.

Shaded portions show areas not brought under consolidation.



AFTER CONSOLIDATION.



BEFORE CONSOLIDATION.

REFERENCES.

WASTE	
PONDS	
GRAVEYARD	
WELLS	
ROADS AND PATHS	

THE EVOLUTION OF THE FIELD PATTERN IN THE INDO-GANGETIC DIVIDE

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THE history of land cultivation in the Indo-Gangetic Divide from its earliest beginning to the coming of Aryans, is fragmentary, vague and uncertain ⁽¹⁾. With the influx of Aryans, however, began an important phase of cultivation, *i.e.*, settled agricultural—important in the sense that their settlement and its associated culture had a far-reaching influence on the land and its problems. The ideas of ownership, joint or individual, the mode of occupation and division of land and, consequently, the field pattern in the Divide to-day can be traced back to the days of the Vedas and the Puranas ⁽²⁾. The pattern of a village and its fields, though based primarily on geographic considerations, has been affected to a large extent by historical, economic and social factors and it would be interesting to trace in brief these changes through the course of time.

An Aryan Village.—Since Aryans were essentially pastoral and agricultural in habit, they naturally settled down at or near to those places which afforded facilities for agriculture and cattle-rearing. The Vedic village was, therefore, a settlement in the midst of a well-watered plain or presumably at the side of a river which had a further advantage of being a natural line of communication and defence. The pattern of the village as can be gathered from scattered references ⁽³⁾ was of a definite fixed type. It consisted of (i) the 'grama' or the central hamlet, (ii) the belt of arable land around the 'grama', (iii) the belt of pasture land where the cattle of the village were allowed to graze, and (iv) the 'Arayana' or uncultivated jungle—the home of hermits and outlaws—which surrounded the village lands.

The villages were, therefore, inhabited islands in the midst of forests or scrub jungles, their site evidently depending upon the size and capacity of the group inhabiting them. Although the extent of a village was undefined, the arable land was carved out into fields—definite but unhedged blocks of land, separated from each other by bare strips of balks ⁽⁴⁾. The pasture land was communal and usually occupied that portion of the cleared space which was not so productive as the arable land.

The marked feature of the original layout of a village was the occurrence of the pasture ring round the cultivated land—an arrangement which was just the reverse of what is found now in nearly all the villages of the Divide. It indicates the nature and importance of pasture land as a transition zone for keeping the cultivated fields safe from the encroachment of forests or jungle and from reversion to original conditions.

The direct effect of the increase of population was the extension of the arable land in all directions—more so in a direction in which better soils prevailed. This meant an extension of the village pasture lands

and a progressive clearing of the forest ring. To this, there were three limitations which ultimately determined the size and shape of a village—(i) the physical factor—the effect of a stream, bank, hill or depression can well be imagined, (ii) the increasing distance from the home-stand, and (iii) the diminution of the forested area in these plains. The natural result, therefore, was the multiplication of a number of moderately-sized contiguous villages all along the fertile valleys of the rivers and streams of the Indo-Gangetic Divide.

The plan of the villages was greatly changed during the Hindu and Muslim periods of Indian History—a change probably due to the following causes. The whole of the Divide went through many vicissitudes, wars and invasions and it was not uncommon that even during the intervening periods of settled government, large tracts of land were laid waste owing to the rapacity of particular rulers and governors. These circumstances not only modified but greatly transformed the common village forms. The forest ring had already disappeared, since the greater part of land was either under cultivation or had been once cultivated and abandoned. The central hamlet grew into a fortress which served as a shelter not only to the human population but also to their stock, both against the free-booter and any revenue collector who happened to pass that way. The grazing ground for the cattle and therefore the pasture ring now occupied a position nearest the inhabited site while the cultivated area stretched in an haphazard arrangement round it. The changing forms of Government and their different systems of collecting revenue combined with the unsettled condition of the tract resulted also in the total alteration of the pattern of the fields. The demand of the state (which varied from 1/6 to 1/2 of the total produce of the land) largely determined the economic size of holdings which in its turn was limited by the working capacity of the cultivating family and their cattle. The growth of co-operation among tribal groups and the absence of any proprietary or other interest in land—since land has no value in itself—led to a further development of the idea of communal property, and the natural result of these circumstances was that field boundaries nearly or entirely vanished⁽⁵⁾.

Akbar's land revenue settlement, however, gave an impetus to agricultural progress in all parts of his Empire, particularly those areas which were better governed—in proximity to the capitals (Delhi—Agra)—or which were highly fertile due to the availability of an ample supply of water. The survey which preceded this settlement mainly ascertained the average amount of produce per *biga* (5/8 of an acre) for certain established kinds or classes of land and for each of the crops commonly cultivated. The average produce was ascertained by experimental reapings and weighings and the rates were fixed higher in the best and regularly yielding lands and lower in the poorer and more precarious soils. This recognition of types of land for agricultural purposes laid the foundation of the division of land into good, bad, or indifferent blocks. The same settlements also allowed some pasture or waste land to each village [usually as large as human voice could be heard across⁽⁶⁾], but since the revenue of the village was payable collectively by the residing tribe or group, the question of individual proprietary rights did not arise. The result of this reform was, therefore, the definition of the boundaries of villages while the actual division of

cultivated land into fields in spite of their soil classification, remained uncertain as before.

At this stage if we leave aside the valleys of the Jumna, Sutlej and the Ghaggar and confine ourselves only to that portion of the Divide which fringes the state of Bikaner an analysis of the field pattern discloses the full sequence of the growth of present villages. It is interesting to note that this sequence applies both to this area as well as to the older villages of the river valleys—the only difference being that while the former went through all those stages of colonization, expansion, revenue settlement, demarcation of boundaries, recognition of individual rights and division of land within a period of 100 years, the latter took 2,000 years to show the same results. It is, therefore, intended in the following pages to consider in detail the original condition of this tract before it was permanently settled and its subsequent developments, since this will not only give a continuous history of the growth of the field pattern but will also reveal the factors which have resulted in the evolution of the present field pattern in the Divide.

During the first quarter of the 19th Century almost the whole of the central portion of the above-mentioned area was an uncultivated province. The pastoral tribes who were almost its only inhabitants drove their herds of cattle here and there in search of grass and water and had no fixed dwelling place. Some families of herdsmen had certain ponds and grazing grounds which they were in the habit of visiting in turn and so long as a family was strong no doubt it was left by the other pastoral families in the neighbourhood in possession of its favourite haunt, but such possession was not left long undisturbed and no family could point to any particular tract as having been long in its exclusive ownership. There was very little cultivation, and as the extent of virgin land was great, it was seldom that the same field was cultivated for any length of time by the same family, and furthermore, in the disturbed state of the country, the cultivator could not be sure that he would be able to reap the harvest he had sown (?).

With a settled Government and the better conditions which followed, the agricultural population of the older villages south of the tract began to press forward and to colonize the prairie; and as they had been accustomed to an agricultural rather than a pastoral life, they usually fixed upon some spot and founded a village in which they settled as permanent residents, supporting themselves by cultivating the neighbouring lands and by maintaining herds of cattle, which, however (unlike the original pastoral tribes), they did not drive far from their fixed residence—thus laying the foundation of regular cultivation within this portion of the area. One of their first cares was to provide for a supply of water by enlarging some neighbouring hollow so as to make it a permanent pond and the earth thus excavated was made into bricks and dried in the sun to be used for building and enlarging their houses. The neighbouring fields were rudely tilled and sometimes a *burj* or watch-tower was erected for the protection of crops. These original settlers often underwent great hardships from scarcity of water and food and from the depredations of their lawless neighbours who considered the presence of the colonists an encroachment on their customary grazing grounds.

Not only had the pastoral families no fixed limits to their wanderings, but the agriculturist colonists who settled at fixed points in the prairie land had at first no defined boundaries marking out the land occupied by them. The permission granted to them through their leaders by the state under whose authority they had founded their village had not allotted to them any defined area of land, but simply given them authority to settle at some fixed point in the tract and cultivate the surrounding land. In fact, the boundaries defining the British area and the native states of Bikaner and Patiala were not fully determined till 1838, when the British Frontier was generally marked out on the ground by masonry pillars and roughly mapped. This was the first state in the definition of rights and the division of land into separate territories.

Still, however, the rights of the various inhabitants of the tract, whether as between them and the state or as between themselves, were vague and undefined. The land was not demarcated into 'townships' or villages (in its proper sense), and probably the only parcels of land where boundaries had been roughly defined were the small plots of 50 to 200 acres, allotted to disbanded troopers who were intended to found a sort of military colony on the frontier. The unit of administration was not a definite block of land, but the collection of houses forming a permanent 'village' or the collection of persons forming a pastoral or agricultural community. The villages with their detached fields of various dimensions were surrounded by large tracts of waste land, capable of the maintenance of several large agricultural villages. In the preliminary survey of 1837 in the Sotar and Ghaggar valley, each village was assigned the land in its immediate neighbourhood and where the extent of inhabited country was large enough to allow of it, uninhabited tracts were marked off, to be allotted to new colonists, so that there might be a prospect of getting rid of the extensive scrubby land. Land was plentiful and of little value; hence, at this stage, boundaries were superfluous. The few cases where such a necessity arose, the boundary was fixed on the ground by pillars of mud and roughly mapped. The revenue survey of 1840-41 measured and mapped these boundaries correctly (by masonry pillars at corners) and with minor changes they have since then been maintained.

The second stage in the definition and rights in land was now reached; the land was all divided into strictly demarcated blocks, and with insignificant exceptions the inhabitants of one block were not allowed to exercise rights over another block, unless it had been specifically allotted to them. The pastoral families who had been accustomed to roaming over large tracts of country and the agriculturists who had cultivated anywhere in the neighbourhood of the homestead were no longer allowed to do so except within the boundaries of their allotment, or with the permission of those to whom another block of land had been allotted. Every inhabited village was given its township (mauza) or demarcated block of land, in which its inhabitants alone were allowed to exercise rights, and the uninhabited estates were granted from time to time under separate leases either to the inhabitants of neighbouring villages or to new colonists. By 1841 only such small portions of the area were undemarcated as had no permanent inhabitants and almost no cultivation. Not until 1857 were these gaps also filled up by further allotment.

The boundaries of these allotments or villages were mostly arbitrary. Hence they are usually quadrilateral in shape except in the very few cases where some natural feature, for instance a depression or hillocks of blown sand, necessitated curvilinear lines. The size of the unit depended largely on the number of original inhabitants of the village, their principal occupation—pastoral or agricultural—the nature of the soil—impoverished by or free from weeds or salts—and the will of the individual at the head of the first regular settlement of the area. The average area is approximately 3,000 acres but sizes vary greatly from about 27 acres (Chak Mohd. Usman, Fazilka) to 19,125 acres (Chak Chantab, Sirsa).

This demarcation of the land into township was the most important step in the making of the present land system; but for a considerable period thereafter the right of individuals within the township remained undefined and even the rights of the Government on the one side and the cultivators on the other were for a time somewhat vague. The next stage was therefore a close examination of the nature and extent of these rights. This was effected with increased distinctness in, and a clear appreciation of, individual proprietary rights by an equitable division of the village lands (in proportion to these rights). This new step was essential, since land was becoming more valuable in consequence of the limitation for the first time of the State demand for taxes to a moderate amount, the increasing value of agricultural produce and the slowly increasing development of the area as a whole.

The size, boundaries, position and arrangement of village lands being surveyed, fixed and mapped, by external authority, the forces acting within the boundaries of the villages came into play. The increase in population led to a closer dependence on land, extension of cultivation and assertion of proprietary rights. This affected the village lands in two ways: (i) the diminution of the pasture land which was encroached upon, firstly, by the growing size of the central hamlet and, secondly, by the extension of arable land; (ii) the breaking up of the cultivated land into smaller and smaller parcels of land.

(i) The pasture land or 'village waste' is very susceptible to condition of cultivation. The values of crops and their relation to the number of cattle (which is discussed later on under the sub-heading 'grazing conditions') suggest that, even in the driest part of the area where only certain fodder crops can be grown, the tendency is to encroach bit by bit the pasture land for cultivation purposes and the result is that to-day only a few villages have any appreciable extent of wasteland. The patches of wastelands round the village sites as shown in the map, clearly indicate how far the process has advanced since the time when the original village took its shape.

(ii) The question of the breaking up of cultivated land into the smaller patches which together make up the field pattern is a complex problem. The location, size and shape of village fields, and the extent to which the villages of different tracts have disintegrated, are not the result of one factor alone. The distribution and fertility of different types of soils, location of fields with respect to wells or water channels, suitability for certain crops, forms of tenure, laws of inheritance, local customs or the technique of cultivation, must all be taken into account. One of these factors may be predominant in certain cases—for instance

in Gihi Village (Rohtak District) the effect of a canal in creating a belt of very small fields and the disappearance of wasteland towards the canal is easily noticeable—but, in fact many or all of them act and react in such a way as to evolve various field patterns in different tracts of the area.

The pressure of population on the soil, and the working of the laws of inheritance (which requires an equitable distribution of land among the heirs) have resulted in splitting up of cultivated land into small holdings which at the present stage fail to conform to any reasonable economic standard⁽⁸⁾. This problem presents two distinct features. The first is that the holdings tend to become very small. The second is that individual holdings, whether large or small, tend to become broken up into a number of separate plots, often situated at a considerable distance one from the other. These two tendencies differ both in their origin and in their result and it is necessary to distinguish between them. The former is designated the 'sub-division of holdings' and the latter the 'fragmentation of holdings'⁽⁹⁾.

The 'sub-division' refers only to the size of holdings and must tend to occur in any thickly populated country when the number of persons dependent directly on land increases, but the tendency is found to bear a very direct relation to the laws of inheritance which are in force. Sub-division and resultant shrinkage in the size of holdings is specially encouraged by the fact that, for the cultivation of certain crops, the land is broken up into plots surrounded by the dykes and channels designed for the inflow and onflow of water. Such fields which are open and without hedges lend themselves to easy and speedy sub-division. The boundaries of fields are recognized by means of ridges (or 'mend') surrounding each plot, to each of which there are four such ridges. Since each plot is held by a different peasant (as will be explained under the heading 'fragmentation' below) a man can make out easily where his fields lie. After each sub-division the cultivator modifies the boundaries of his fields.

The shape of the fields seems haphazard and patternless—with the exception of the obvious fact that fields in Jemalpur Sheikhan being situated in a well-irrigated barren area are larger than those in 'Gihi' (comparing the scales of the two maps). The arrangement of the fields, however, in some villages shows clearly the effect of natural factors. For example, the fields in the vicinity of a river have a natural arrangement, the strips being arranged at right angles to the river. As soon as the region of river moisture is passed, the blocks often run quite in another form—perhaps transversely to other lines—so that the eye can at once tell where the river bed ends. It is obvious that if the lots were made by blocks or strips parallel to the river, the holding nearest the stream would be extremely precarious all along its length and so perhaps would the second; the third would be exceptionally good, because safe from erosion, yet well moistened by percolation, while the lot farthest from the river would be equally dry and hence indifferent in yield. By the simple process of making the strips at right angles to the river (up to the limit of the moisture zone on either side) everyone gets the benefit or the danger alike, since each holding will represent equally a sort of gradational scale of advantage from the small frontage liable to erosion to the dry land beyond reach of river percolation.

Sub-division of holdings in itself is not necessarily bad. It is inevitable in all countries having a population of peasant-proprietor ⁽¹⁰⁾. It effects equal division of property among the people and large farms are not always more desirable than small ones, unless they are justified by higher yields and better production. The revenue statistics ⁽¹¹⁾ suggest that the owners prefer to cultivate smaller parcels of land than they are obliged. It is probably correct to say that every owner of more than 25 acres lets parts of it to a tenant ⁽¹²⁾. There is no effort to carry out large-scale farming, even by those who can do it on their own land. Similarly, tenants seldom attempt to cultivate more than 25 acres, although more may be available. If anyone obtains a lease for a greater area he sublets a portion. The factors which thus mark the farming methods employed, the crops grown and to some extent the low standard of living and, consequently, smaller needs of the agricultural population. Low standard of living is both the cause and effect of the present state of things. How far it is one and not the other cannot in fact be judged with any precision. The peasant cultivates a piece of land of a size which just leaves a little margin of profit for his living when conditions are favourable or at least normal. With the slightest calamity, such as the deficiency or excess of rainfall this margin disappears and he has to live practically on nothing.

More important than the sub-division and size of holdings is the question of their fragmentation. Within the village communities there is a deliberate attempt to distribute plots among the settlers in different soil areas so as to allot plots of different degrees of fertility to each. The various classes of soil with vastly different advantages and disadvantages in each village community demands equalization of opportunities among a dense population by the distribution of plots of land in different blocks. This enables a large number of cultivators to share in the more fertile or protected blocks and reduces the risks from calamities for the individual cultivators. The village community also devised means of making holdings compact whilst still securing to each cultivator a share of all classes of soils. Thus the holdings may consist of long narrow strips radiating from the centre to the circumference of the village lands. Each strip is a holding, or rather a holding unit. In fact the practice of rotating crops could succeed in India, China and Japan only when each cultivating family had several kinds of land suiting the varying meteorological conditions experienced in different years, and this consideration is responsible also for the existing distribution of the fields ⁽¹³⁾. Indeed, it is very often forgotten that the peasant's holding is economic (when it is economic) simply because the plots of lands are scattered in different blocks. Where agriculture is so dependent on rainfall, the scattered distribution of the fields suiting different soil and meteorological conditions is a great advantage. Along with scattered distribution, the village community established a careful adjustment of individual and collective rights in arable land, meadows or pastures and irrigation channels, as demanded by the social necessities of a comparatively dense population.

From Maine ⁽¹⁴⁾ to Baden Powell ⁽¹⁵⁾ the economic and geographic conditions which explain the distribution of fields and compactness of village communities, have not been appreciated, and this explains many errors in various subsequent schemes of legislation ⁽¹⁶⁾. The peasant

instead of residing in his holding lives in a central *busti* although it may involve journeys of two or three miles for himself, for his cattle, and for his children who bring his mid-day meal to the field. It is better, however, to undertake these journeys than to have all the holding in one plot since, under the present agricultural conditions, the latter would only grow one crop and would thus involve greater risk or loss.

In the S. Eastern districts of the Divide, for instance, the villages cluster on the higher land which is under wheat or other spring crops, the low lying flooded fields beyond being preserved for wet *kharif* crops. Consolidation of holdings ⁽¹⁷⁾ would bring the cultivator no nearer his land, unless the village pattern were so changed that he could live in the lower fields, while it would have the disadvantage that the holding, instead of consisting partly of land suited to one crop and partly of land suited to the other, would be made up wholly of either of them. Over the greater part of the area, the difficulty of consolidation is one of water. The wells are usually in the village centre or comparatively near at hand—evidently because the presence of a good water supply determined the site of the village. A typical holding consists of a plot of land in the highly manured belt round the village, another in the middle zone—less highly manured, but possibly irrigable from the wells—and a third in the outlying zone which is unirrigated and given up to *barani* crops. Such a distribution gives the cultivator a good diversity of crops, and keeps him occupied all the year round. Thus the conditions which forced scattered distribution of fields on the people are seldom realized ⁽¹⁸⁾. It serves as an insurance against the risk of agriculture in that type of climate ⁽¹⁹⁾. So long as the dependence on the annual rainfall does not decrease, consolidation is a doubtful measure ⁽²⁰⁾. To sum up, the whole agricultural system has in fact been adapted to meet the predominant feature of the climatic conditions, *vis.* the uncertainty of rainfall. This has led the agriculturist to aim at security rather than high yields, and to frame his annual crop programme so as to eliminate the chances at total failure. This attitude may be seen in every phase of his operations in the growing of two crops, often to the detriment of the crop—in the habit of sowing mixed crops to the despair of the statistician—in his preference for hardy, though low yielding varieties, and in the land system in the distribution of the different classes of land so that at least one crop in the year shall be secure. It is not conducive to good agriculture, but it has enabled a large population to meet with success the vicissitudes of the seasons.

The economic aspect of the size and distribution of holdings has, therefore, made itself felt in various schemes suggested and in certain cases adopted in various parts of the Province of Punjab ⁽²¹⁾. Consolidation as can be seen from various official reports ⁽²²⁾ and statements ⁽²³⁾ works out well in those lands which are uniform with respect to the available water supply by a net-work of canals or a chain of wells all over the village lands. The evolution of the new field pattern—*i.e.* moderate-sized, well-shaped and demarcated fields arranged according to a definite plan with respect to wells or canals is, however, going on slowly and steadily. The accompanying map shows the state of things before and after the consolidation of holdings. It is interesting to note that the portions which are not brought under consolidation are mostly on that side of the village which is farther away from the canal.

How far this measure would be effective in bringing the *barani* lands, which means the greater portion of the area, to the new level is still a matter for conjecture.

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| Map No. 1.—Map of Jamalpur Sheikhan village (Hissar district) | The Board of Economic Inquiry, Punjab
No. 51 facing page 1. |
| Map No. 2.—Map of Gihi village | The Board of Economic Inquiry, Punjab
No. 2 facing page 16. |
| Map No. 3.—Fragmentation of Five Property Holdings in Jamalpur Sheikhan village | The Board of Economic Inquiry, Punjab
No. 51 facing page 84. |
| Map No. 4.—Fragmentation of Five Cultivating Holdings in Jamalpur Sheikhan village | The Board of Economic Inquiry, Punjab
No. 51 facing page 85. |
| Map No. 5. { Suner village, before and after consolidation | The Board of Economic Inquiry, Punjab
No. 48 facing page 1. |
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THE KULU VALLEY BETWEEN RAISON AND MANALI*

BY MISS BARBARA H. JACOB, B.A. (HONS.),

Forman Christian College, Lahore

KULU is a rich fertile valley in the far north-east corner of the Punjab, and till recently was forgotten and neglected, primarily because it is cut off from the outer world by lofty mountain ranges. It has lived its own slow, quiet and somewhat primitive life for years; now that civilization is gradually crossing these mountain barriers, this quiet, beautiful vale is beginning to show signs of modern activity. An industrial school, a paper-mill, a golf course and a modern swimming pool, combined with good fishing and shooting, all contribute to its slow awakening and development. With its many resources fully exploited, Kulu can reasonably be expected to take a prominent and important place in industrial India.

The physical relief of this country comprises mainly of high ridges with sharp crests and steep sides descending to the main life stream of the valley, the Beas, on both sides by spurs ending in escarpments and separated by numerous tributaries. These rivulets make a " beautiful and intricate pattern on the map like a bunch of ferns" In general, the topography of the valley can be summed up as follows: A rise on both sides of the valley of mountain slopes dotted with hamlets and villages, each surrounded by their own fields, cut in terraces for cultivation. Drier and steeper slopes provide pasture land for sheep and cattle. It presents slopes covered with a rich foliage and mixed forests of spruce and silver fir. These forests are found between 8,000 to 11,000 feet, while the lower slopes which are unsheltered and exposed to the sun are bare and rugged areas covered with patches of green grass. Along the river banks on deposits of alluvium and on moist landslips there are fine alder woods. In the distant, behind the lower ranges are snow-capped mountains which enhance the picturesque appearance of the valley.

The climate is healthy and invigorating, and specially lends itself as a good summer resort. The influence of relief on the climate is considerable. Its altitude keeps the mean temperature in summer at 78.7°F. The high mountain ranges enclosing the valley shut out to a great extent the heavy summer monsoon from the south-east. The total mean annual rainfall being 89.74 inches. The winter temperatures are severe on the higher altitudes and snow occurs even in the lowest parts; the temperature falling to approximately 35.8°F in the coldest months. The best seasons are Spring and Autumn, when the air is dry and crisp and temperatures are equable.

The main occupation of the people is agriculture. The alluvial slopes of the Beas Valley form excellent soil for field cultivation, and the peasant usually succeeds in getting a fair return for his efforts. The

*Being an abstract of a Regional Survey conducted during summer vacation, 1940.

chief crop is rice, which is grown on terraced fields up to a height of about 6,000 feet, and the others are maize, tobacco, hemp, wheat, barley, tea and fruits.

Kulu has much scope for future development. It has many resources which could be exploited to its advantage, but these still remain untouched, due mainly to its isolation by mountain barriers which make transport difficult and expensive. This environment has naturally influenced the inhabitants who are backward and still employ primitive methods in their economic activities. They are also illiterate, which is a great obstacle to their progress.

Some of the valley's potential wealth lies in its fertile, well-watered soil which is suitable for further development in agriculture. The slopes are rich in forests, while its mineral resources are also worthy of consideration. But these have remained undeveloped because of the steep slopes and the difficulty in regard to labour.

An industrial school has recently been established at Sultanpur and quite a good quality of woollen goods are produced. This industry also has much scope, because there are a number of sheep in the valley which with care can be improved. At present the sheep yield a very poor short staple wool, due principally to neglect from ignorance.

By far the most important industry is the fruit growing for which the climate is ideal. There are a number of orchards where English fruit is cultivated under the careful supervision of Europeans who have made their homes in the valley. Besides these, at Raisan, Manali and Dobbri there are indigenous wild apples, pears, peaches, apricots, plums, cherries, currants, raspberries and walnuts.

A great deal of apples are produced, but being of a delicate and extremely perishable nature, coupled with the difficulty in transport and export, a large quantity remains in the valley and goes to waste. This fruit alone can form the basis of a fruit-canning, drying and preserving industry in Kulu. With a little enterprise and effort and with facilities provided for transport the valley should flourish.



THE COUNTRY BETWEEN BANIKHET AND CHAMBA*

BY MISS NIRMAL ANAND, B.A. (HONS.),

Kinnaird College, Lahore

LAST year's trip to Dalhousie and Chamba was much more interesting and enlightening than any I had ever undertaken before. It showed a very close connection between nature and the development of human personality, and that of different natural factors on one another.

The topography of the area between Banikhet and Chamba *via* Dalhousie is very complex. It consists of some of the spurs of the main range of the Dhaulā Dhar, receding towards the plains between this range and the Siwaliks. Starting from the western part of the country surveyed, the rock consists mainly of mica schists, sandy rocks and slate; then, near the western end of the Telua Hill comes the gneissose granite which is a continuation of the rock of the main range of the Dhaulā Dhar and then, a few miles from Chamba, the rock again changes to micaceous and quartzose schists with slates.

As might be expected in such a mountainous country with heights ranging from 3,000 feet in the Chamba valley to 9,090 feet on the top of the Dainkund Hill, there are great variations in climate from the semi-tropical of the Chamba valley to a cool-temperate on the greater heights.

The country surveyed being below the point of maximum precipitation, rainfall increases with height and decreases towards the leeward slopes of the mountains—thus the heaviest falls of rain occur on the south-western slopes of the Dhaulā Dhar range decreasing towards the north-eastern slopes as far as the valley of Chamba. Dalhousie gets about 80 inches of rain in the year, whilst Chamba 37 inches only.

Temperature, decreasing with height, the resultant precipitation may be rain or snow according to its height. Thus the earliest and heaviest falls of snow occur on the highest point, the Dainkund Hill about the beginning of December, followed by Dalhousie, Khajiar, Banikhet, Balun and Kathlag, respectively—the latter as late as January. All these facts show the strong influence exerted by height, direction and slope of the mountains with regard to the winds. Temperature has a strong effect not only on precipitation but also on the melting of snow; the latter, however, is influenced by various other factors as well, such as the position with regard to the sun, the occurrence of valleys, forests or the bareness of hilltops. Slopes facing the sun enjoy a much more genial climate than those away from it. Thus 'Kiram,' one of the houses, situated on the eastern side of the Bakrota Hill is free from snow much earlier than 'Towers' or 'Ajitvillā' having a more northerly aspect of the slope.

In the same way, narrow valleys of small streams retain the snow for a much longer period. This is because of the sides of the valley itself casting shade upon each other and not getting the full benefit from the sun in the day but acting jointly in the radiation at night.

*Being an abstract of a Regional Survey conducted during summer vacation, 1940.

As forests affect maximum temperature by casting shade, check evaporation by acting as wind breaks and increase humidity by transpiration, they too help to retain the snow for a longer period. On the other hand, the exposed barren hilltops having the advantage of a much stronger sun are freed from the white cover much earlier. Thus, even though the Dainkund Hill receives the heaviest falls of snow, the melting is earliest and quickest.

The natural vegetation, as might be expected, is chiefly forests with only the high hilltops, such as those of the Bakrota and Dainkund Hills, being bare of trees. Broad-leaved trees such as the oaks are found in areas with richer soils and greater warmth. Conifers, such as the cedar, spruce and the silver fir are found in higher and colder parts. The 'chil,' another pine tree, occurs in the warmer regions with poorer soils. Thus the 'chils' are found round about Banikhet; ever green oaks higher up till they merge into the pine trees; a mile or two beyond Khajiar, the oaks again become important merging gradually into deciduous trees of a more tropical character towards the valley of Chamba.

In such a mountainous area, cultivation is not very important due to large parts being covered with dense forests, the slopes being too steep and the soil too poor to be really worth while to be worked on. However, by terracing the fields and using artificial manure, important crops of wheat, maize, potatoes, and vegetables are raised in all the parts where conditions of soil and slope are favourable. The richer soils on the old river terraces in the Chamba valley and other places with greater warmth and sunshine allow the cultivation of much better varieties of the crops already mentioned, besides other grain such as 'Karmi', 'Kodra' rice and also vegetables and fruit. Chamba is well known for its apples and pears though other fruit, such as apricots, plums, peaches and pomegranates are also grown. The fruit is not of as good a quality as that from Kashmir and Kulu due to the poor seeds used and partly because the people sell it before it is ripe enough.

Most of the higher parts, ranging from about 6,500 to 9,000 feet are too cold for the raising of two crops a year; but this is possible lower down in the case of wheat and maize. Cattle, sheep and goats are the chief animals reared for milk, *ghee*, butter and wool. They are weak on account of being fed exclusively on the poor grass, resulting from the salts being washed out of the soil due to heavy rains, and the oak leaves. Cattle are more numerous in the wetter parts near the hill station of Dalhousie whilst sheep abound near the drier parts of Chamba.

The occupations of the people, as might be expected are closely related to the agricultural, pastoral, mineral and forest resources. In the case of people living in the vicinity of Dalhousie and Chamba, local need is another determining factor. Generally speaking mining is not important due to the absence of mineral resources. The presence of slate has led to its quarrying near Dalhousie and Chamba. The demand for granite as a building stone is also responsible for quarrying, but this is mainly done on private sites.

Though hydro-electric power is generated from the Saho Nal, a tributary of the River Ravi, yet this has not proved helpful to industry due to the absence of metals. The forests have led to lumbering and the making of charcoal by bruning wood and constitute a very important source of income to the Chamba State.

'Pattu' making is an important industry in some of the villages, especially those of the Gaddis who also make good, heavy and warm, though a little bit coarse, blankets from the wool obtained from the sheep. The process of making 'pattu' is so laborious and the return so little that it will be matter of little surprise if the villagers, in the course of time, stop making it except for their domestic needs.

Selling of fruit and vegetables, independent of the shopkeepers, is another occupation of the hillmen. 'Kilta' making is a subsidiary industry. The 'kiltas' are the conical baskets made from canes brought from the valleys and used by hillmen for bringing charcoal, fruit and vegetables, etc., in them.

To-day, there is however a growing section of hillmen with a tendency to take more and more to private service in preference to the occupations mentioned above as service brings them ready money.

The most densely peopled parts are the hill station of Dalhousie, mostly occupied by visitors from the Punjab, and the town of Chamba, situated on an old river terrace to the right of the river Ravi, peopled by the hillmen.

The rest of the country is occupied by the peasants living in their isolated homesteads in the midst of their pleasant looking maize or potato fields. The houses are deserted and the fields left fallow in winter when the snow falls heavy in the higher parts and the peasants have to retire to warmer valleys.

The presence of abundant water in nullahs and superficial springs, together with the fact that the villagers are used to drinking all sorts of water, has led them to make their huts in various isolated spots. There are, however, other considerations which restrict the choice. Thus, in order to have sunny slopes to enable them to have the grain ripen early, northerly slopes are avoided and those favourable to the rising or setting sun preferred. In the same way gentle slopes to make ploughing easy are sought for. Black soils rich in humus are also a temptation as they need less manure, being already comparatively rich.



LEIAH*

By M. L. RENJEN, M.A.,

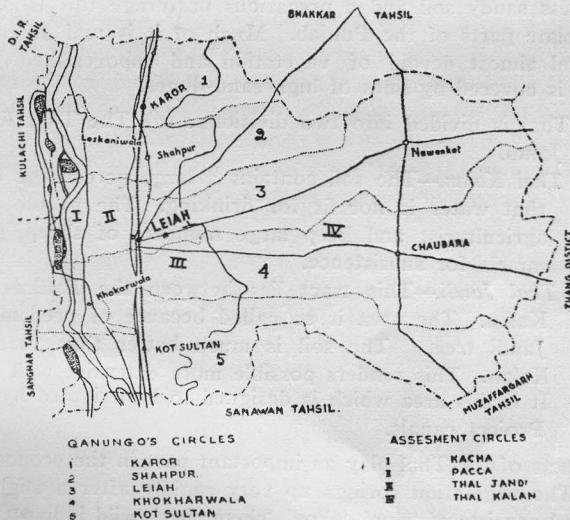
Forman Christian College, Lahore

L EIAH, the northernmost Tehsil of Muzaffargarh District, is roughly a miniature Punjab in shape, with an area of 2,414 square miles.

The most pronounced feature of its relief is the striking contrast between the barren and desolate uplands of the Thal in the east and the green riband of cultivated land along the fertile valley of river Indus to the west. The desolate uplands of Thal is the chief relief feature with poor and saline soils and lines of high sand-dunes.

The climate of Leiah is one of great extremes and is of the dry monsoon type. Winters are cold and bracing. From November to February it is very cold and severe frosts occur. In summer heat is stifling and oppressive. Duststorms are frequent in May and June. From May to September heat during the day time is intense and the temperature rises up to 80° F inside closed rooms, while it is known to have risen as high as 120° F. Due to cloudless skies and rapid radiation of heat, a cool breeze springs up regularly at about 11 p.m., making nights quite bearable. Rainfall is mostly in summer and is accompanied by thunderstorms. Winter is not absolutely dry. The average annual rainfall is about 9 inches. The climate on the whole is quite healthy except in the riverine tract.

LEIAH TAHSIL



* Abstract of a Regional Survey.

Leiah can be divided into the following natural regions:

- I. The Riverine Tract or 'kachhi'.
- II. Thal—a part of the Sind Sagar Doab.
- III. The Powah or Dhaha—a transitional region between the 'kachhi' and the Thal.

I. The Riverine Tract or 'kachhi' refers to areas lying under the high banks of the rivers and are flooded during flood season. The waters of river Indus are the lifeblood of this tract. River Indus has a wide, meandering course—the meanders are numerous and always shifting. During winter the size of the river considerably contracts, and shoals and islands appear. These provide good cultivable land for *rabi* crops. 'Kachhi' on the whole is a pleasant country and is dotted with a number of wells.

The outer portion of 'kachhi' towards the Indus is termed 'kacha'. This tract is a victim of the vagaries of the Indus. The summer floods are very high here and the area is mostly destitute of wells; cultivation depends on 'sailaba,' *i.e.*, the seepage of water during floods.

The tract lying between the main river channel and the Powah is called the 'Pakka'. This area is flooded by numerous channels of the Indus but the floods are less violent. Both *rabi* and *kharif* crops are cultivated. Irrigation is provided by persian wheels set up on the creeks, and by throwing dams in the river and diverting the water to the fields.

The most remarkable tree of this area is the date palm. The 'kachhi' contains no area depending solely on rainfall for agriculture but rainfall materially affects the area matured and its outturn.

In the neighbourhood of Kot Sultan, about 720 acres receive canal irrigation from the Kot Sultan inundation canal.

II. The Thal.—The barren and semi-desert area in the eastern and central parts of Leiah is called 'Thal.' Because of scanty rainfall, treeless sandy soil and a precarious pasturage this is one of the most desolate parts of the Punjab. Much of it is real desert, barren, lifeless and almost devoid of vegetation and impoverished in fauna. The area is covered by lines of high sand-dunes.

The Thal is divided into two divisions: (a) The Thal Kalan, and (b) Thal Jandi.

(a) *Thal Kalan.*—The soil contains a large percentage of salt so that water is not fit for drinking. The people are semi-agriculturist and keep large numbers of sheep, goats and camels for subsistence.

(b) *Thal Jandi.*—This tract lies between the Pakka and Thal Kalan. The area is so called because of predominance of Jandi tree. The soil is much better than that of Thal Kalan. This renders possible more extensive well irrigation. It is this area which is designed to be irrigated by the Thal Project canals.

Products of the Thal play an important part in the economy of the people. The vegetation springs up very rapidly after a slight shower of rain and consists of 'lana', 'phog', 'chemmbar', wild indigo ('nil buti'), sit, 'phuli', 'kartamma', 'harmal', 'pitpapra', toad stool, and mushrooms. Among the trees growing on wells are farrash, shisham, siris, ber and rohira.

III. The Powah and Dhaha.—To the west of Jandi Thal lies the strip locally known as 'Powah' and 'Dhaha'. This includes the tract within the range of high floods. The country is thickly dotted with wells. The area has great attraction for the cultivators because of higher spring level, manure facility, and the nearness of 'kachhi' for grazing purposes.

Population.—Over 90 per cent. of the population is of Muslims, who are mostly distributed in rural areas. They are mainly engaged in agriculture, weaving, camel, sheep and goat rearing. The total population of Leiah is 131,022 with a density of 54 persons per square mile. There are only two towns, Leiah (9,578) and Karor (3,491). Besides, there are 143 villages.

Agriculture.—The cultivable land is classified as follows: (a) Sailaba land. (b) Chahi sailab land, sailab land assisted by well irrigation. (c) Chahi land, irrigated by wells only. Chahi land is best suited from agricultural standpoint. Yields are higher and valuable crops like tobacco, cotton, and vegetables are cultivated. Wells are an insurance against famine. (d) Barani land, i.e. that dependent on rainfall to an unusual degree. Agriculture is very uncertain and haphazard. Both *rabi* and *kharif* crops like wheat, barley, gram, peas, oilseeds (tara mira and til), tobacco, turnips, vegetables, and cotton are cultivated.

Industries.—Leiah has been noted long since for a number of industries of a specialized nature. The Handloom industry gives employment to the largest number of persons, next to agriculture. 'Lungies', coarse shirtings and coating cloth are manufactured.

Leiah has been famed for the manufacture of *Khes*, an excellent form of a check cotton cloth, of great durability. About 30,000 'kheses' are manufactured annually.

Leiah is also noted for the excellent quality of well-felted blankets. Ivory carving, 'ban' making, rope making and mat making are other industries of the area. Ivory goods manufactured show a high degree of artistic skill.

Means of Communication.—Means of communication are poor on the whole. There is only one railway line, the Sind Sagar railway running through the tehsil from north to south. Roads are 'glorified camel tracks', except for short stretches of metalled roads within the municipal limits of Leiah and Karor. Camels are the chief means of transport in the Thal area.

Leiah is economically backward and its future development lies in the improvement of irrigation and facilities for transport and the reclamation of vast areas of waste lands in the Thal tract.



COLLEGE GEOGRAPHY IN THE PUNJAB

A Historical Sketch

BY M. L. RENJEN, M.A.,

Forman Christian College, Lahore

PROBABLY no subject in the field of higher education has undergone such a marked change during the past quarter of a century and particularly the past decade, as Geography. For many years it was a school subject and it has only recently entered the College and the University. Geography has been recognized to-day as a science "contributing fundamental truths to human knowledge."

People even to-day look askance when told that Geography occupies a place in the college curriculum. A large number of people to-day cannot imagine Geography as a college subject. They still regard it as a "deadly nausea" of facts, of 'locate' this and 'bound' that, a 'dull memorising' of heights of mountains and lengths of rivers.

The history of the development of Geography as a science is an interesting study no doubt, but it is no less interesting for the students of Geography in this Province to read something about the history of College Geography in our Province and to recall the names of those pioneers who are responsible for getting Geography its present status. It is also in the fitness of things that this brief survey should appear in the first issue of the first Geographical Review of our Province.

It was in the year 1924, that mainly through the efforts of Prof. E. T. Dean, of Forman Christian College, that Geography was introduced for the first time in the Panjab University as a college subject. Forman College was the first to introduce the teaching of Geography to Intermediate Classes. In 1924 Forman College admitted the first batch of 9 students to the First Year Class offering Geography and sent up this batch for the University Examination in 1926.

The first Board constituted by the Panjab University to frame the Syllabus included Principal A. S. Hemmy, Government College, Lahore; Bakhshi Ram Rattan, D.A.V. High School, Lahore, L. (now R. B.) Sohan Lal, Central Training College, Lahore, and Prof. E. T. Dean, Forman College, Lahore. Thus the Board had the services of the well-known geographer of the Province, namely R. B. L. Sohan Lal.

It is not out of point to mention here that the teaching of Geography in our schools owes a great deal to the efforts and the work of R. B. Sohan Lal, who kept the torch of Geography burning in those dark days when Geography was regarded unworthy of a place in our educational programme. And it was as a recognition of his services to the cause of Geography that his name was associated with the first Board constituted by the Panjab University.

For many years Forman College was the only institution teaching Geography to Intermediate classes. Later, a few more colleges, namely Islamia College, Lahore, Government College, Lyallpur, Emerson College, Multan, Government College, Lahore, S. D. College, Lahore, introduced Geography in the Intermediate classes.

The second step in the advancement of Geography in the Punjab was the introduction of Geography in the B.A. classes. This was done in the year 1934-35 mainly through the concerted efforts of Messrs. M. Nazir of Government College and E. T. Dean. In this connection the name of Principal H. L. O. Garret, the then Principal of Government College, Lahore, needs special mention for his whole-hearted support of Mr. Nazir's plans.

The Government College, Lahore was the first institution to get affiliation and start the teaching of Geography to the B.A. classes. The department was run by Mr. Mohd. Nazir, who was later on assisted for a few months by Mr. M. L. Renjen. After Mr. Nazir's appointment in the Central Training College, Lahore, Mr. Amar Nath Kapur has been in charge of the Geography Department in the Government College, Lahore. Mr. Kapur has rendered valuable services to the advancement of the subject in recent years.

The Government College, Lahore, admitted its first batch of B.A. students with Geography in 1936. The subject gained great popularity rapidly and the Department of Geography of the Government College attracted quite a number of students from several other local colleges, namely F. C. College, S. D. College and Kinnaird College for Women.

Mr. Nazir rendered valuable services to the subject, by his efforts to popularise the study of Geography.

In the year 1938, partly due to time-table difficulties and partly in view of the increasing importance of the subject, the Forman College authorities were persuaded by Mr. Dean to start their own classes in Geography for B.A. students. Forman College sent up its first batch of about a dozen Geography students in 1939, for University Examination.

Soon after this the Islamia College, Lahore, Kinnaird College for Women, Lahore, Emerson College, Multan, Government College, Ludhiana, Lahore College for Women, Sikh National College, Lahore, almost simultaneously started B.A. classes in Geography.

There has also been increasing appreciation on the part of the educationalists in the Province, of the great importance of the subject as one which not only broadens one's outlook on life and adds fundamental truths to human knowledge, but helps in the better appreciation of the peculiar problems of different people in different parts of the world. At present eight colleges are teaching Geography up to B.A. and twenty up to the Intermediate standard.

A survey of the development of Geography would be incomplete without a reference to the latest developments. I refer to the recognition by the University of Geography as a science subject for Intermediate Science and B.Sc. examinations and sanction of the University for the introduction of Geography for M.A. teaching and the introduction of the Inter-Collegiate Honours teaching. The credit for these recent accomplishments is due to the sincere and honest efforts of the Board of Studies in Geography, and in particular to Miss C. L. H. Geary, the late Miss G. W. Mason, Dr. Chaudhuri and Messrs. M. Nazir, A. N. Kapur and E. T. Dean.

In recent years the destinies of our subject have been in the hands of a band of sincere and devoted workers who have worked like a team with perfect understanding amongst its members for the advancement of the subject. The future of our subject in these hands is bright.

LIST OF LECTURERS IN GEOGRAPHY IN THE PUNJAB & NORTH-WEST FRONTIER PROVINCE

I. Training Colleges

Central Training College, Lahore :

M. Nazir, B.A., B.T. (Panjab), B.A. Hons. (London).

Lady MacLagan Training College for Women, Lahore :

Miss V. Edwards, B.A., B.T. (Panjab).

Sohan Lal Training College, Lahore :

R. B. Sohan Lal, B.A., B.T. (Panjab), F.R.G.S.

II. Colleges Teaching up to the B.A. Standard

Government College, Lahore :

A. N. Kapur, M.A., B.T. (Panjab), B.A. Hons. (London), F.R.G.S.
Farhat Ullah Khan, M.Sc., B.T. (Aligarh).

Forman Christian College, Lahore :

E. T. Dean, B.A., M.Sc. (Panjab).
Mrs. Henry Holland, M.A. Hons. (Edinburgh).
M. L. Renjen, M.A. Hons. (Aligarh).*

Islamia College, Lahore :

Abdul Haye, M.A. (Aligarh).
Sáad Akhtar, M.A. (Aligarh).

Kinnaird College for Women, Lahore :

Mrs. Henry Holland, M.A. Hons. (Edinburgh).
Miss Barbara H. Jacob, B.A., Hons. (Panjab).
E. T. Dean B.A., M.Sc. (Panjab).

Emerson College, Multan :

Raja Ram, B.Sc., Special (London).
Gauhar Ali Shah, M.A. (Aligarh).

Lahore College for Women, Lahore :

Miss C. L. H. Geary, M.A. (London).
Miss M. Singh, B.A. Hons. (Rangoon), B.T.

Government College, Ludhiana :

Ishwar Das Malhotra, M.A. Hon. (Edinburgh).

Sikh National College, Lahore :

Om Parkash Bhardwaj, M.A. (Aligarh).

III. Colleges Teaching up to the Intermediate Standard

Islamia College, Peshawar :

Mohd. Ashraf Khan Durrani, M.A. (London).
(also teaching Geography to the B.T. Class).

Sanatan Dharama College,† Lahore :

Onkar Nath Kapur, M.A. (Aligarh).

Government College, Lyallpur :

Ram Autar, B.A., B.T. (Panjab).

*Left in February 1942. Lecturer to be appointed.

†Affiliated for B.A. Examination also.

Lawrence College, Ghora Gali :

H. R. Smith, B.A. (Panjab).

Khalsa College, Lyallpur :

Sadhu Singh, B.Sc. (Panjab).

Bishop Cotton College, Simla :

R. K. Goldstein M.A. (Cantab.), Teachers' Diploma.

DeMontmorency College, Shahpur :

Iqbal Singh, B.Sc. (Panjab), Diploma in Geography (London).

Lawrence Royal Military School, Sanawar :

C. G. O'Hagan, B.A. Hons. (Oxon), I.E.E.

Government College for Women, Lyallpur :

Miss W. F. Jacob, B.A., T.D., Diploma in Geography (Nottingham),
F.R.G.S.

Islamia College for Women, Lahore :*

Miss P. K. Leigh, B.A., B.T. (Panjab).

Zamindar College, Gujrat :

Muhammad Khan, M.A. (Aligarh), B.T.

Doaba College, Jullundur :

Mohindar Pal Thakore, M.A., LL.B., (Aligarh).

IV. Colleges Providing Teaching in Geography, but not affiliated to the University

Queen Mary College, Lahore :

Miss B. Penny, B.A. (Oxon).

Aitchison College, Lahore :

M. L. Renjen, M.A. (Aligarh).

*Affiliated for B.A. Examination also.

OBITUARY

We regret to record the tragic and untimely death of Miss Grace Winifred Mason, Lecturer in Geography, Kinnaird College, Lahore, on October 20th, 1941, as a result of a riding accident.

Miss Mason was educated at Goodman Street and the Girls High School at Burton. She was awarded a scholarship at Cambridge where she took her B.A. in Geography in 1933. After leaving Cambridge she was Geography Mistress at Walthamstowe Hall, Seven Oaks, for three years. She came out to India in September, 1937, as Lecturer in Geography at Kinnaird College. She also lectured in Geography at Forman Christian College and participated in Honours teaching.

She took an active part in College Dramatics, and Adult Literacy Campaign and founded a school for the servants' children at her College.