

seem to have thought it a favourable opportunity for aggrandising themselves at the expence of those neighbours whom the aggressions of Mahmoud had left exhausted and exposed: a century and a half was consumed in this unprofitable scramble, and when the Mohammedans returned to the charge they had to encounter only princes who were yet loosely seated on the spoils of their predecessors, and were disputing amongst themselves the appropriation of the booty.

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## IX.

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### *Observations on the Climate of Subathu and Kotgerh.*

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BY LIEUT. P. GERARD, BENG. NAT. INF.

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AS Meteorology is now considered by scientific men in Europe of great importance in every point of view, and of late years is become a subject which has excited an unusual degree of interest; it has occurred to me that the following Weather Journal comprising a period of nearly sixteen months, from the 17th of September, 1817, to the end of December, 1818, may not be deemed unacceptable to those who devote a portion of their time and attention to this particular branch of science.

The observations made have been principally taken at Subathu and at Kotgerh with some others at intermediate places of encampment during the march, or a temporary halt; and as the journal in detail may seem too voluminous for publication, I beg to offer an abridgement of it.

The abridgement notes the highest, lowest and mean of each day in every month, inclusive of the observations taken during a temporary halt for the period above-mentioned : and for reference, a list of the places with their heights above the level of the sea, and their latitudes and longitudes will be found at the end.\*

The difficulty at all times experienced of being able to procure proper instruments in India for keeping a correct and regular Meteorological Journal has been a great drawback in the present instance ; and the uncertainty of obtaining them from Europe in an efficient state has necessarily confined the observations for the most part to the Thermometer: but considering all things ; the peculiar nature of this mountainous, elevated and highly interesting tract of country, and the want of thermometrical registers in this parallel of latitude, being the first complete set ever offered, it is to be hoped that it may not be found unworthy of attention.

The observations at Subathu have been limited, with very few exceptions, to the interior of a house which has an exposed situation, and will give a very good mean, while those at Kotgerh have been taken outside, in the shade, exposed to the wind, so as to shew the true temperature of the atmosphere. After procuring and putting up a Barometer at the latter place, observations of the Thermometer were taken inside as well as out, marked "Attached and Detached" in the column. The Barometer used was unexceptionable in every respect, being a good tube filled with mercury, accurately boiled over a slow charcoal fire, and after extracting by

\* I am indebted to my brother Captain A. Gerard, late Surveyor to the Board of Commissioners in the Ceded Provinces for the latitudes, longitudes, and heights, of the different places above alluded to.

this tedious, troublesome, and not unfrequently vexatious process (but not without breaking some tubes before succeeding) all the air bubbles and filth, was inverted into a cup of mercury to which was affixed a scale graduated into inches, tenths and hundredths parts. It may therefore be depended upon, and great care was observed, at the time of taking the observations, whether of the Barometer or Thermometers.

It is necessary to state that the mean of observations taken at intervening places where a temporary halt was made, has been deduced from the highest during the day, and the lowest the following morning, being the only mode left for ascertaining a correct mean of the place for the day.

Subathu is a small fort and military post occupied by the 1st Nasrî or 6th Local Battalion or Hill Corps, in North Latitude  $30^{\circ} 58'$  and East Longitude  $76^{\circ} 59'$ , about 4,205 feet by barometrical observation above sea level, and about 3,000 feet above the protected Sikh states in the plains of Hindustan. It is situate in the Pergunnah of the same name and was comprised in the state, Thakurai or Lordship of Keunthal, but at the termination of the war with the Gûrkha power was ceded to the British Government.

The horizontal distance from the plains of Hindustan is 10 miles, being separated from them by two intermediate ranges of lower hills; from the Himalaya or snowy chain about 65 miles the nearest point; from the River Setlej or Satrudra 24, and from Kotgerh 40.

It is a sort of flat or table land having mountains in the neighbourhood in height from 4600 to 8000 feet above the sea. It is open and exposed, being low and near the plains, and in some degree is liable to the effects of the hot winds which blow from the plains during April, May, and June, although the intermediate ranges are considerably more elevated. It is on the right bank of a branch of the small river Gambhir which lies to the

South West and flows 1,100 feet below it, distant about one mile in a straight line. It is very steep towards the South West, and North East sides and to the South East and North West is a range, the former rising in elevation, and the latter gradually sloping towards the river Gambhir which is about three miles distant. The hills in its immediate neighbourhood are almost destitute of wood while at some distance they are covered on their northern faces with large common pine trees, bushes and shrubs.

The neighbourhood considering all things and the oppression and treatment experienced by the inhabitants under the Gurkha rule is populous, and the surrounding flats and slopes are highly cultivated. The country is studded with numerous, though for the most part, small villages, few of them containing more than from 4 or 6, to 12 or 15 houses or families, and these have increased to an astonishing degree since it became a military post and subject to British jurisdiction.

The appearance of the country is pleasing to the eye of a stranger though differing widely from that of the interior. The climate of Subathu enjoys an agreeable temperature, the mean being from  $65\frac{1}{2}^{\circ}$  to  $60^{\circ}$  though during May and June it is hot, but seldom or ever becomes what is called oppressive in a house. Taking it all in all it is very healthy throughout the year. Fever and rheumatism are the predominant complaints, but with respect to the former compared to the plain, cases are remarkably few, more particularly so during the periodical rains which commence between the 20th and end of June, and sudden changes or in damp weather; and the latter in the cold season. When the winter is rigorous, snow falls in January and February to about the depth of four inches, but seldom lies on the ground above two or three days, it being too low and exposed, and the sun's rays being too powerful.

Hoar frosts commence in November, and vanish about the beginning or middle of March; in severe seasons during part of December, January,

and the early part of February, standing water freezes to considerable thickness. The rainy season generally speaking is heavy and terminates sometimes about the middle or end of September, and at others not till the 10th or 20th of October. The surrounding country is much cultivated and agriculture carried on to a considerable extent and this is rapidly on the increase wherever the inhabitants from the adjacent states, who are often obliged to fly from the oppression and tyranny of their petty rulers, can obtain arable lands sufficient for the maintenance of themselves and families.

Declivities of ranges and mountains, unobstructed by rocks, which are cultivated, are cut and laid out with a considerable deal of labour into ledges or sloping fields of all dimensions, shapes and sizes, resembling the steps of a ladder placed in a slanting position, supported mostly by embankments of earth, and sometimes of stone. All flats or pieces of table land are cultivated, and those on the banks of rivers, and streams are chiefly planted with rice for the sake of water for irrigation. The rice crops are luxuriant and yield an abundant and profitable return to the farmer. The best rice is uncommonly cheap and reckoned superior to any of a similar kind produced in the plains near this quarter.

The productions about Subathu are various;—such as Indian corn, cotton,<sup>a</sup> opium in a small quantity, rice of several kinds, wheat, jow (barley,) koda or marwa,<sup>b</sup> various pulse, the several species of bathu,<sup>c</sup> úgal,<sup>d</sup> a small quantity, sounk,<sup>e</sup> kachálu or pinálu,<sup>f</sup> and gagtí or gandbialí,<sup>g</sup> kangní,<sup>h</sup> chenna,<sup>i</sup> bajra,<sup>j</sup> ginger, a great article of export trade, superior to that in the

<sup>a</sup> Somewhat different to that which is cultivated in the plains.

<sup>b</sup> *Paspalum Scrobiculatum*. <sup>c</sup> *Amaranthus Anardhana*, these grains do not attain that perfection low down which they arrive at in the interior. <sup>d</sup> *Panicum Emarginatum*. <sup>e</sup> A small grain not unsimilar to the chenna, (*Panicum Miliaceum*.) <sup>f</sup> Both esculent roots, the former being the *Arum oolocasia* and the latter being or something resembling the *Arum campanulatum* or *Dioscorea fasciculata* or *Dioscorea* of Roxburgh. <sup>g</sup> *Panicum italicum*. <sup>h</sup> *Panicum Miliaceum*. <sup>i</sup> *Holcus Spicatus*, this grain is only produced in the lower parts of the state of Hindúr.

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plains, and scarcely inferior in point of size and quality to that which is produced in China; two kinds of bhang or hemp in a limited quantity, tobacco, lahsan or garlick, haldí,<sup>a</sup> til,<sup>b</sup> sero or sarson,<sup>c</sup> chillies or red pepper, with a few others including some common vegetables, hardly necessary to notice and differing little from those cultivated in the plains of Hindustan. Besides, there are apricots,<sup>d</sup> peaches, walnuts<sup>e</sup> exported in great quantities, a few apples, wild pears, raspberries of two kinds, yellow and pale white, strawberries, small and insipid having no taste or flavour, phút,<sup>f</sup> a large and oblong kind of melon, barberries of a purple colour, large and plentiful; darús, a small species of pomegranate, which is gathered, split or broken in pieces, the fruit taken out, and the shells,<sup>g</sup> in a dry state exported to the plains in great quantities as an article of commerce, and kaephal,<sup>h</sup> with some other wild fruits.<sup>i</sup>

Kotgerh,<sup>j</sup> a small village and military outpost occupied by a detachment of the 1st Nasíri Battalion in Latitude 31° 19' and Longitude 77° 30' is situate on the left bank of the Setlej on the slope of a range which rises to the height of 10,656 feet above the level of the sea crowned by Wartu or Haltu fort now dismantled and in ruins, separating the dell

<sup>a</sup> Turmeric (*Curcuma longa*.) <sup>b</sup> The seed of the *Sesamum* from which oil is expressed. <sup>c</sup> A species of mustard (*Sinapis dichotoma*) of the seed of which oil is made; the leaves of this plant, when young, are eaten by the natives as a vegetable.

<sup>d</sup> Smaller, not so good, and less abundant than in the interior.

<sup>e</sup> The Kernel of which is often made into oil.

<sup>f</sup> *Cucumis momordica* of Roxburgh.

<sup>g</sup> Used for dying a yellow colour and when mixed with other ingredients produces a blue die.

<sup>h</sup> *Amyris heptaphylla*.

<sup>i</sup> The indigenous fruits, generally speaking, especially in the interior, are large and upon the whole pretty good and might be greatly improved by ingrafting.

<sup>j</sup> On the site of the present house occupied by the Officer commanding the post formerly stood the village of Danthat. The cantonment itself is about 150 yards off adjoining the small village of Liptari and the village of Kotgerh, a little above which was the residence of the Rana or chief, is about 100 or 150 yards beyond and below the sipahis huts.

of the Setlej from the Pabar, Jumna and Tons, and the other great river to the South East.

The cantonment of Kotgerh is 6634 feet above the sea and the difference of level between it and Subathu is 2,429 feet which answers to a mean decrement of temperature of nearly nine degrees.—The Setlej is distant about four miles in a straight line to the North West running below it about 4000 feet, a steep descent the whole way. The distance from the plains of Hindustan is about fifty miles, and the nearest point of the Himalaya 25.\*

It enjoys a delightful climate throughout the year. The rains commence about the 20th or 25th of June and continue to the end of September, and sometimes to the middle of October. They occasionally terminate about the 15th or 20th of September and are more heavy and protracted than in the plains. This is followed by what may be called autumn, which lasts all October and for the greater part of November, according to the mildness of the season ; after which winter with all its horrors sets in. The temperature of the rainy season is quite pleasant, often chilly, and when the sun breaks through the clouds rarely rises to 72° in the house, but this degree in a humid atmosphere, where evaporation is checked, feels sometimes close.

During the months of April, May, and June, that period of the year so scorching and oppressive in the plains of Hindustan, the climate is cool and agreeable in the shade, and within doors, a cloth coat rarely feels uncomfortable, but the sun is very hot, and although the mean temperature of the climate at Kotgerh does not exceed that of London by above five

\* Mani-majra the nearest town in plain level, about one mile from the foot of the hills, is not less than 1200 feet above the sea.

or six degrees yet the heat of the sun's rays is very powerful. It is thickly wooded on three sides, amongst which is a variety of pines and oaks, rhododendrons and almost every tree, shrub and plant in the neighbourhood peculiar to, and natives of Europe, with many others unknown, amongst which are a variety of aromatic plants and shrubs.\*

In December, January, and February, snow falls and lies in shaded places to the northward from one to three feet in depth. It sometimes falls as early as the middle and end of November, and also in the beginning of March but never lies on the ground. The winters here resemble those in Europe but are less severe. Frosts commence before the middle of October, but notwithstanding that the effect of elevation is equivalent to geographical latitude, yet owing to the much greater altitude of the sun's rays in the former, they have considerable power even in winter, and the snow in exposed situations melts away in a few days of sunshine although the air remains very sharp, and frosty nights prevail during the greater part of March. It is worthy of remark that the flakes of snow are extremely large, larger than ever I remember witnessing them in Europe.

Spring at Kotgerh and at similar elevations may be said to commence about the middle or latter end of March, but this greatly depends on the nature of the season, and to continue all April. May is often rude and disagreeable; if rainy, fires and woollen clothes are indispensable to comfort. The harvest or reaping season commences in May and terminates about the end of June. The jow or barley is the earliest, and the wheat or kanak, and úwa jow are fully a month later. In more elevated situations it is backward, and the wheat is often not housed till sometime

\* There is a species of small reed bamboo which attains the height of eight or twelve feet growing all over the higher mountains. It is used for a variety of domestic purposes and if introduced into Britain might prove an advantageous acquisition to the peasantry as well as to gardeners and others.



after the rainy season has fairly set in, the consequence of which is that many of the crops never ripen, and the natives from necessity are obliged to reap them while partially in a green and immature state, (the ear being full,) for the sake of preserving the whole from injury and destruction.

The natives seem to be perfectly aware that snow contains properties which increase the value of the crops.

The following are the grains and other productions at Kotgerh and in its neighbourhood. Several kinds of rice chiefly of the coarser sort, jow, (barley,) úwa jow,<sup>a</sup> wheat (kanak,) phaphara or phaphar,<sup>b</sup> úgal,<sup>c</sup> chaberí or jaberí,<sup>d</sup> opium in great quantities for export trade,<sup>e</sup> three species of bathu,<sup>f</sup> black, red, and white, kachálu or pinálu, and gagti or gan-

<sup>a</sup> *Hordeum coeleste*.      <sup>b</sup> *Panicum Tartaricum*.      <sup>c</sup> *Panicum Emarginatum*.      <sup>d</sup> The grain of this differs little in appearance from that of the phaphar and úgal.      <sup>e</sup> From the seed of the poppy the natives express oil, which, being sweet and pleasant to the taste and an excellent substitute for ghee, (melted butter) is mixed with their food and eaten; the oil is also used for burning. The quality and inebriating properties of the hill opium are greater than that produced in the Sikh states below; it is consequently considered superior and is in great demand in the Punjab. It fetches an enhanced price at the different marts in the plains to which it is taken, and is produced at less expense and with less labour; that in the plains requires irrigation which is never applied to it in the interior of the hills, owing to the constant moist state of the soil. It may in some few places on the banks of the Setlej and other rivers where the heat is intense. The pernicious effects of this drug so much in repute amongst the native population in India are well known. The natives of these mountains, especially the females, on the most trifling occurrences apparently which thwart their views and inclinations not unfrequently commit suicide by swallowing a piece of this drug. It may not be out of place here to mention, since the cultivation of the poppy seems to begin to attract the attention of a few individuals in Britain, that the seed at the elevation of Kotgerh and even at greater heights is sown in October, and the young plant after arriving at the height of a few inches is buried in snow during the winter months. Previous to this, it is well weeded and cleaned, and, when the snow is all melted and winter terminated, it sprouts up rapidly and comes to perfection in April and May according to the nature of the season, when the natives are busily occupied in incising it with a small iron instrument called nehirna and collecting the milky substance which oozes out. If the incisions are made in the afternoon, the substance is frequently collected the following morning and sometimes not till the second day. The process appears to be very tedious and troublesome from the inefficiency of the instrument employed which differs somewhat from that in use in the plains, and seems less applicable to the purpose for which it is intended.      <sup>f</sup> *Amaranthus Anardhana*; the leaves of these when very young and tender or about a few inches high are used as a vegetable by the inhabitants. At this height and even higher, in appearance, they exactly resemble the lal and green sag (culinary herbs) of Hindustan.

dhialí,<sup>a</sup> a small quantity of coarse tobacco, two kinds of bhang or hemp,<sup>b</sup> various pulse, a small quantity of cotton and ginger on the banks of the Setlej, and other rivers and streams, Indian corn in a very limited quantity, kangni,<sup>c</sup> chenna,<sup>d</sup> marwa or koda,<sup>e</sup> til,<sup>f</sup> serú or sarson.<sup>g</sup> The fruits are apricots,<sup>h</sup> peaches, cherries, small and very acid apples, pears, a few grapes, mulberries, filberts, walnuts,<sup>i</sup> bymf or bymbí a hardy species of apricot or peach (the stone of this fruit much resembles that of the common apricot which is abundant throughout the hills) with strawberries, large, and of an excellent flavor and taste, red, pale, yellow and several kinds of black raspberries, two or three kinds of barberries besides

<sup>a</sup> These edible roots are cultivated in great quantities all over the hills but are more general in the interior and constitute in no small proportion the winter food of the people; the leaves of them are also eaten as vegetables. <sup>b</sup> These plants grow most luxuriantly and attain a respectable height, but are chiefly cultivated in this part of the mountains for domestic purposes. The quality of the hemp is good and might easily, under proper management and care, by giving encouragement to the cultivators, be produced to any extent for export trade and is not unworthy of the notice and attention of private speculators. It is chiefly cultivated at and about all villages and also grows spontaneously in vast quantities. To come to great perfection, it seems to require a rich and well manured soil. To the South East in the mountainous parts of Gerhwal, Hemp is a staple article of commerce. The seed of these plants is partly expressed into oil; and partly, as well as almost all other grains and pulse, eaten by the inhabitants in a parched state. An intoxicating preparation called Chirras is extracted from the leaves of the bhang by means of rubbing them forcibly between their hands, to which the natives of all ranks and classes are much addicted. In appearance it is not unsimilar when extracted to old opium. It is exported in considerable quantities and used by mixing and smoking it with tobacco. The same attention might be applied to the extraction of the gum of turpentine and to the manufacture of pitch from the inexhaustible pine forests with which the mountains are covered. It is only in the vicinity of the lower hills that any regard is given to its extraction and is collected in a very small quantity, but, in the course of time, both these articles might prove of great value in a commercial point of view. There are other natural productions unnecessary here to notice, besides those enumerated above, to which speculators might apply some of their resources with advantage and profit to themselves. <sup>c</sup> *Panicum italicum*. <sup>d</sup> *Panicum miliaceum*. <sup>e</sup> *Paspalum Srobiculatum*. <sup>f</sup> In a small quantity only at this height. The oil expressed from the seed of the til is sweet and an excellent substitute for salled oil, the only objection to it is, its rather nauseous smell, but when used this is not perceptible. <sup>g</sup> Made into oil and the leaves when tender are also used by the natives as a vegetable. <sup>h</sup> The fruit is gathered when perfectly ripe; the stones broken and the kernels taken out and expressed into an excellent oil for burning. Although the kernels from their extreme degree of bitterness, one would suppose, are hardly palatable, yet I have frequently observed the natives prepare them in such a manner as to permit of their being eaten with their food. <sup>i</sup> Having thicker shells than those produced in the lower hills; many of these trees on elevated places attain a great size.

the common purple hazelnuts, black and red currants, horse chesnuts,\* and other wild fruits, the indigenous productions of the country.†

Two species of oats in the interior of the hills grow spontaneously amongst the wheat and barley fields, and also on waste lands, but the grain is so small that the natives make no use of it, and they seem to be ignorant that it is excellent and nourishing food for cattle, goats, and sheep.

Two hardy species of rice are cultivated on elevated situations and both are subject to occasional falls of snow. They grow luxuriantly unassisted by irrigation. These I believe are yet unknown in botany and the introduction of them into Britain, and elsewhere into Europe might prove a valuable and important acquisition. They are both of the coarser sort.

Kotgerh is in the Pergunna of Sundhoch, one of the divisions of the independent petty state of Kotguru and was ceded to the British Government for a military post on the conquest of the hill provinces, or shortly

\*These, together with chamús, a root found in the forests and waste lands in many elevated parts along the skirts of the Himalaya, and which are likewise the food of the beasts of the forest, the natives, from necessity in times of scarcity and famine are obliged to substitute for food. Both these have a very bitter taste, and to make them palatable, the natives prepare them in the following manner; they are first opened or cut into pieces, then steeped or soaked in water for sometime which deprives them of their bitterness: they are afterwards dried in the sun and pounded or ground into a flower, made into cakes and eaten in other ways. This circumstance alone sufficiently shews the precarious and miserable subsistence of the wild and uncouth race of people who inhabit the most elevated and savage parts on the hither side of the Himalaya. The fruit of the Bymi or Bymbi, whose natural climate is cold and elevated, and where it appears to thrive admirably well, when arrived at a proper state of maturity, is pulled, dried in the sun, and also eaten as food in much the same manner as horse chesnuts and chamús. It is like a prune, but retains its yellowish colour, is sweet and has not an unpleasant taste.

† A few common vegetables, such as cucumbers, a small kind of onion, radishes, and a few others are cultivated by the people. There are besides, several species of wild culinary herbs, in common use amongst the natives, to be found in the forests at different seasons of the year. At the height of 12,000 or 13,000 feet, for instance along the top of the Chashil range, a small species of wild onion or leek is very plentiful.

after the termination of the war with the state of Nepal in this quarter in 1815.

The natives of this part of the country are subject to the goitre or large swelling in the neck. The complaints most prevalent among them are fevers and rheumatism.

The aspect of the country in the neighbourhood differs materially from that of the lower mountains near the plains, the ranges are more regular and the mountains are lofty and abrupt. It is extremely steep on all sides. The villages are few and small in most places, and the population is scanty and scattered, but does not seem to be on the increase.\* The quantity of waste land which is considerable, evidently appears to have been cultivated at an antecedent period, and indicates beyond a doubt that the country was better peopled formerly than it now is. Most of the villages are more or less in ruins, and some of the houses though still standing are deserted and remain unoccupied. This may be accounted for partly from the tyrannical measures resorted to by the Gurkha chiefs to keep the people under due subjection.

Immediately after the rains cease the Zemindars or farmers, whilst the soil is in a moist state, begin to plough, and commence sowing wheat, barley and úwa jow. These being the principal grains on which the inhabitants at this height are dependant, are buried in snow during the winter months. When much more falls at the elevation of Kotgerh the produce of these grains is very considerable; but when it does not, and the

\* Population being stationary may be easily accounted for by the prevalence of female infanticide, of the revolting custom of Polyandry and the promiscuous intercourse of the sexes from the early age of eight or ten (female chastity being unknown) together with slavery, a traffic formerly in the plains of Hindustan to considerable extent more especially so from the lower hills. The former throughout the states subject to British authority, as far as we know is of rare occurrence and the latter is certainly less extensive than it was formerly. It is therefore to be hoped that population will begin to augment.

soil is not amply supplied with a sufficient quantity of rain during the latter part of February and early part of March, the crops are poor and not unfrequently are followed by great scarcity and sometimes though seldom by famine, when the natives are reduced to an extreme state of poverty and wretchedness. In places more elevated, the grain suffers considerable injury from too severe a winter, while lower down and on the banks of the river Setlej, the wheat and barley crops yield but a small return even in good seasons to the husbandmen. This however greatly depends on the quantity of rain which may fall during the season. The low lands and flats on the banks of rivers and streams are more adapted to the cultivation of coarse rice which thrives remarkably well and produces a plentiful return to the farmer.\*

After the different grain crops on the high lands have attained the height of two or three inches the natives in the interior make a practice of spreading manure over them which they say is the means of materially increasing their value.

Bullocks are the only animals used in all stages of agriculture in these mountains on the hither side of the Himalaya and all grain is trodden by them in the same manner as in the plains of India with their mouths muzzled. The grain after being cut, is bound into small sheaves and allowed to lie, and dry in the sun for some time, after which it is stacked,† and subsequently spread into circular flats paved with stones and trodden out as above-mentioned.

The same sort of rude light plough in the plains of Hindustan is also used in the hills, and the other implements of husbandry are few, and of little value.

\* Bamboos and some of the tropical fruits grow on the banks of the Setlej and the climates are very diversified according to the elevation above sea level.

† This is only applicable to rice on the banks of the Setlej, &c. after it has been cut down.

The fields where the mountains are abrupt and steep, are cut into inclined terraces of all sizes and descriptions supported by stone walls resembling the steps of stairs, one above the other. On the banks of the Setlej and other rivers, where the principal produce is rice, the fields are invariably partitioned into flats to allow of the water required for irrigation, to cover the whole surface.

The seasons of Kotgerh are reversed as regards the plains of Hindustan or nearly correspond with those in many parts of Europe: that is the harvest is fully a month or six weeks later than at Subathu, which is a month behind that in the plains of India. We begin to sow Europe vegetables in February and March, and plant potatoes in March, April, and May. The reaping season on the banks of the Setlej in the neighbourhood of Kotgerh, where the heat is extremely great and oppressive, is, if any thing earlier than that about Subathu, and in situations of the same height above the sea. The crops of wheat and barley are more exuberant and productive about Kotgerh than they are in the lower hills and úwa jow, which is little inferior in point of quality and substance to wheat, will not thrive at a less elevation at least the natives do not cultivate it.

The wheat, barley and úwa jow crops are succeeded by phaphara, úgal, chaberí or jaberí and the several kinds of bathu. These are cut down and taken in before winter commences.

I have purposely omitted giving the mean temperature of each month in the present journal as the observations are broken and irregular from the circumstance of being frequently obliged to move. But not pretending to great correctness, the mean temperature of the year at Subathu and Kotgerh deduced from subsequent registers will be found at the end of the abridgement or table.

It is necessary to state that the observations taken at Subathu (with few exceptions) are from the 17th of September, 1817, to the 17th June, 1818, inclusive, from that period to the 10th of November at Kotgerh and the subsequent ones partly at intermediate places, and partly at Kotgerh which duty obliged me to visit occasionally.

*An abridged Table of Thermometrical Journal kept at Subathu and Kotgerh, &c. shewing the Highest, Lowest and Mean Temperature of each day in every month.*

1817.	September.			October.			November.			December.		
Day.	Highest.	Lowest.	Mean.	Highest.	Lowest.	Mean.	Highest.	Lowest.	Mean.	Highest.	Lowest.	Mean.
1				71,7	66	68,8	79	64,7	71,8	57,2	55	56,1
2				72	66,5	69,2	75	57	66	58,2	55,3	56,7
3				70,5	65,6	68	80	62,5	71,2	59,5	56	57,7
4				70	64,6	67,3	79,5	60	69,7	60	57	58,5
5				70,6	65	67,8	78	61	69,5	61	54	57,5
6				72,5	66	69,2	77	56,5	66,7	62,7	54	58,3
7				71	65,8	68,4	88	57	72,5	62,7	55	58,8
8				70,5	64	67,2	86	57	71,5	64	53,8	58,9
9				70	64	67	91	59	75	60	52	56
10				72,5	65	68,7	84,5	61,5	73	61,2	52	56,6
11				72	65	68,5	87,5	62,5	75	59	51,2	55,1
12				71	65	68	73	60,5	66,7	58	52	55
13				90	69,5	69,7	76,6	57	66,8	59	53	56
14				77	66	71,5	64	62,6	63,3	55,4	51	53,2
15				74	62,5	68,2	63,7	60	61,8	51,4	47	49,2
16				70	68	69	62,5	60	61,2	54	45,2	49,6
17	72,2	70,3	71,2	71	61	66	62,3	59,5	60,9	55	46	50,5
18	75,3	69,2	72,2	70	62	66	62,3	59	60,6	56	47,3	51,6
19	77,2	71,2	74,2	69	63	66	62,5	59	60,7	65	44	54,5
20	73	69,5	71,2	69,5	64	68,7	61	58	59,5	59	37,4	48,2
21	71,3	69	70,1	70	63,5	66,7	60	56	58	60	37	48,5
22	71,5	66,6	69	70	63	66,5	58,3	56,7	57,5	60	41	56,5
23	69,7	65,8	67,7	70	64	67	58,5	56	57,2	50,6	45,2	47,9
24	71	65,6	68,3	69	63	66	58	54	56	53	38	48
25	71	69	70	82,5	65	73,7	57,5	55	56,2	55,5	47	51,2
26	72,5	68	70,2	89	68	77,5	59	55	57	50	51	50,5
27	73	70	71,5	94	70	82	57,5	55,7	56,6	56,6	49,5	53
28	75	71	73	89	71	80	57,5	54	55,7	67	49	53
29	73,2	70	71,6	92	76	84	57	53,7	55,3	58	50	54
30	72	67,5	69,7	88	69	78,5	68	55	56,5	56	50,3	53,1
31				84	62	73				54	48	51

1818.	January.			February.			March.			April.		
Day.	High.	Low.	Mean.	High.	Low.	Mean.	High.	Low.	Mean.	High.	Low.	Mean.
1	55	49,2	52,1	45	39,7	42,3	52	47,3	49,6	62	58	60
2	59,3	49,4	54,3	43	41	42	48,2	45,6	46,9	64,4	58	61,2
3	59	50	54,5	46,2	42	44,1	47,3	45	46,1	65,4	58	61,7
4	57	49	53	44,3	43	43,6	48	45	46,5	65	60	62,5
5	58	51	54,5	48	42,3	45,1	53	44	48,5	63	58	60,5
6	59	52	55,5	42,3	41,8	42	56	47,4	51,2	66	58	62
7	57,2	51	54,1	45	38	41,5	57	49,5	53,2	69	61,3	65,1
8	57,2	51	54,1	46	41	43,5	57,4	51	54,2	68	62,3	65,1
9	58	51	54,5	51	42,7	46,8	57	51	54	71	63	67
10	57,2	51	54,1	49	45	47	58,2	51,4	54,8	68	61	64,5
11	55,2	49	52,1	47,2	45,2	46,2	61,3	52	56,6	63	59,4	61,2
12	55,3	47,2	51,2	49,3	45	47,1	63	55	59	64	58	61
13	54	49	51,5	52	46,5	49,2	63	58	60,5	65,3	58,3	61,8
14	52	50	51	53	47	50	65	58,3	61,6	68	62	65
15	51,3	49	50,1	52,3	50	51,1	68	59,4	63,7	70	62	66
16	52	46	49	54	50,3	52,1	69	61	65	67,8	62	64,8
17	52	46,2	49,1	55,2	52	53,6	69,5	62	65,7	68,3	60	64,1
18	48,2	45	46,6	60,2	53	56,6	68	62,3	65,1	71	62,7	66,8
19	49,3	45,3	47,3	60	55	57,5	68	62	65	72	65,4	68,7
20	50	44	47	59,2	55,4	57,3	67	60	63,5	73	65,6	69,3
21	44	40	42	56,5	53,3	54,9	67,3	60	63,5	74	63,3	68,6
22	49	40	44,5	55,2	53	54,1	67	59,5	63,2	72	66	69
23	50	42	46	55,4	52	53,7	69	61	65	72	64	68
24	52	43	47,5	53,4	50,3	51,8	67	62,5	64,7	73,2	62,4	67,8
25	51	43,7	47,8	48	45	46,5	68	63	65,5	74,1	67	70,5
26	58,5	43,4	48,4	50	44	47	62	54	58	74,2	66,3	70,2
27	51	46	48,5	48	45,4	46,7	62	55	58,5	75	66,2	70,6
28	51	44,8	47,9	53	45,5	49,2	59,3	54	56,6	77	69	73
29	44,3	42,3	43,3				60	52	56	75	70	72,5
30	43	42	42,5				62	54	58	70	68	68
31	43	40,3	41,6				60,4	56	58,2			

1818.	May.			June.			1818.	May.			June.		
	High.	Low.	Mean.	High.	Low.	Mean.		High.	Low.	Mean.	High.	Low.	Mean.
1	71	64,2	67,6	86	78	82	17	85	82	83,5	80,2	77,5	78,8
2				88	80	84	18	85	82,5	83,7	86	70	78
3				89,2	83	86,1	19	88	78	83	68	63,4	65,7
4				80	75,4	77,7	20	87	85	86	69,2	61	65,1
5	78	71,2	74,6	82	75	78,5	21	87	68	77,5	80	59	69,5
6	75,2	70	72,6	81	72	76,5	22				64	57	60,5
7	72	68	70	84	77	80,5	23	85	71,5	78,2	75	73	74
8	71,2	67	69,1	86	78	82	24	82	72,5	77,2	73	70	71,5
9	67,5	64	65,7	84,2	81	82,6	25	90	82	86	71	70	70,5
10	72	70	71	83,4	78	80,7	26				70,3	70	70,1
11	74,3	73	73,6	79,2	74	76,6	27	83	79	81	72	69	70,5
12	74,3	73	73,6	79,3	70,4	74,8	28	84,2	77	80,6	70	68,4	69,2
13	77	72,1	74,5	81,2	74,3	77,7	29	86	79	82,5	77	64	70,5
14	82	76	79	83	75	79	30	85,4	76,3	80,8	76,4	67	71,7
15	84	79,4	81,7	77,3	74	75,6	31	85	78	81,5			
16	84,2	81	82,6	83	74	78,6							



1818.	July.						August.					
	Inside.			Outside.			Inside.			Outside.		
	High.	Low.	Mean.	High.	Low.	Mean.	High.	Low.	Mean.	High.	Low.	Mean.
1	75	67	71							70,3	66,2	68,2
2	72	66,3	69,1							71,5	64	67,7
3	73,2	64	68,6							72,2	66,3	69,2
4	77,2	65,4	71,3							72	65,4	68,7
5	79	66,4	72,7							74,5	65	69,7
6	74	66,3	70,1							74,1	66,8	70,4
7	76,2	67,2	71,7							72,3	67	69,6
8				74	65	69,5				72	64	68
9				78	66	72				75	65	70
10				74	67	70,5				74	65	69,5
11				70	64	67				75,2	63	69,1
12				70,2	63	68,6				74,2	65	69,6
13				54	52,3	53,1				75	66	70,5
14				57,2	51,4	54,3				77	67	72
15				57	51,3	54,1				77,2	65,4	71,3
16				57	51,2	54,1				78	66,4	72,2
17				71,3	66	68,6				77,3	67,5	72,4
18				73	62	67,5				76	65,4	70,7
19				74	64,2	69,1				71	64	67,5
20				77,2	65	71,1				68	61	64,5
21				74,3	65,4	69,8				71	61,4	66,2
22				67	63,3	65,1				74	63,4	68,7
23				68	62	65				73	62	67,5
24				74	63,6	68,8				74,2	62	68,1
25				74	64	69				74,2	64	69,1
26				75,4	67,4	71,4				69	62,2	65,6
27				77	67	72				69	62	65,5
28				73	65	69				72	60	66
29				73,2	64	68,6				72	62	67
30				74	64,2	69,1				69,5	63	66,2
31				74,4	66	70,2				70	61,5	65,7

1818.	September.								
	Barometer.			Thermometer Attached.			Thermometer Detached.		
	Inches. 100 parts	Inches. 100 parts.	Inches. 100 parts.	High.	Low.	Mean.	High.	Low.	Mean.
Day.	High.	Low.	Mean.	High.	Low.	Mean.	High.	Low.	Mean.
1							70	61,3	65,6
2							71	62	66,5
3							68,3	61	64,6
4							70	60	65
5							71,2	63,4	67,3
6							72,2	62	67,1
7							71	61	66
8							71	61	66
9							63	59,4	61,2
10							70	56	63
11							70,2	59	64,6
12							69,5	59,4	64,4
13							62	59	60,5

September.									
1818.	Barometer.			Thermometer Attached.			Thermometer Detached.		
	Inches.	Inches.	Inches.						
	100 parts.	100 parts.	100 parts.						
Day.	High.	Low.	Mean.	High.	Low.	Mean.	High.	Low.	Mean.
14							64	57	60,5
15	23,720	23,685	23,702	64	62,8	63,4	68	54,4	61,2
16	23,760	23,735	23,742	66	59	62,5	63,2	59,3	61,2
17							63,4	58	60,7
18							61,5	56,2	58,8
19							63	55,2	59,1
20	23,690	23,640	23,665	64,3	61	62,6	67	55	61
21	23,750	23,680	23,715	64,3	59,6	61,9	68	57,5	62,7
22	23,825	23,670	23,747	65,1	61,2	63,1	68	57,2	62,6
23	23,800	23,740	23,770	65,8	61,7	63,7	68,1	57	62,5
24	23,790	23,720	23,755	67,2	63,3	65,2	68,7	57,2	62,9
25	23,780	23,725	23,752	67,5	63	65,2	68,1	57	62,5
26	23,750	23,670	23,710	68	62,4	65,2	69	58	63,5
27	23,730	23,675	23,702	69,2	63,2	66,2	70,1	59,3	64,7
28	23,775	23,720	23,747	68,3	63,2	65,7	70,4	59	64,7
29	23,795	23,730	23,762	69	63	66	70,1	58,4	64,2
30	23,810	23,755	23,782	70	63,4	66,7	71	58,5	64,7

October.									
1818.									
1	23,770	23,725	23,747	69,4	63,4	66,4	70	59,2	64,6
2	23,755	23,700	23,727	70	64	67	70	57,2	63,6
3	23,780	23,720	23,740	70,3	66	68,1	70,6	61,4	66
4				70,2	65,6	67,9	70	60	65
5				70	64,3	67,1	69,2	58	63,6
6				67,7	64,4	66	66,2	57,4	61,8
7				65,3	61,2	63,2	63,2	54	58,6
8				66	59,3	62,6	65,6	52,2	58,9
9				65,3	58,4	61,8	65,4	51,4	58,4
10				64,3	58	61,1	64,5	51	57,5
11				62,5	55,8	59,1	64,3	51,4	57,8
12				62	55,4	58,7	63,4	50	56,7
13				62,3	55,4	58,8	64,6	51	57,8
14				63	55,4	59,2	64,5	52	58,2
15				62,6	55,4	59	63,2	52,5	57,8
16				62	54,5	58,2	64,3	51,6	57,9
17				61,5	55,3	58,4	63,6	50	56,8
18				60,3	54	57,1	63,6	48,5	56
19				58,5	52,2	55,3	62	46,3	54,1
20				59,1	52,3	55,7	62,3	47	54,6
21				58,4	52,4	55,4	61	48,2	54,6
22				58	51,5	54,7	61	45,7	53,3
23				57,6	51,2	54,4	60,5	46,2	53,3
24				57,7	51,4	54,5	61,7	46,5	54,1
25				57,4	51,4	54,4	61,5	45,6	53,5
26				59,3	51,8	55,5	63,6	48	55,8
27				59,3	52,6	55,9	63,3	49,5	56,4
28				58,7	52	55,3	62,6	47,5	55
29				57	50,3	53,6	61,8	46,6	54,2
30				56	49,8	52,9	59,3	44,4	51,8
31				56	50,7	53,3	58,7	46	52,3

November.									
Day.	Barometer.			Thermometer			Thermometer		
	Inches.	Inches.	Inches.	Attached.			Detached.		
	100 parts.	100 parts.	100 parts.	High.	Low.	Mean.	High.	Low.	Mean.
1				55.7	50.1	52.9	58.4	45.6	52
2				54.4	51.4	52.9	58.2	48.5	53.3
3				53.8	50.6	52.2	53	47.4	50.2
4				53.5	47.6	50.5	54.7	43.4	49
5				53.6	48.6	51.1	55.7	45.6	50.6
6				54	48.5	51.2	57.6	47.7	52.6
7				53.8	48.7	51.2	58.4	43.8	51.1
8				61	59.3	60.1	55.8	46.7	51.2
9				59.2	51	55.1	56.2	47.4	51.8
10				77.4	70.4	73.9		56.7	
11				71.6	55.4	68.5		46.5	
12				76	48.5	62.2		46.7	
13				58	52.2	55.1		49.7	
14				78.4	46	62.2			
15				81	41.2	62.6			
16				81.5	43.4	62.4			
17				83.6	41	63.8			
18				85.4	43.2	64.3			
19				83.0	43.8	63.7			
20				81.7	43.5	62.6			
21				82.1	41.4	61.7			
22				81.8	45.3	63.5			
23				82.5				50.6	
24				88.5	55.5	72			
25				91.8	60.5	76.1	47.8	38	42.9
26				48	47.3	47.1	44.7	40.2	42.4
27	23.765	23.700	23.732	52	39.3	45.6	40	36.3	
28	23.750	23.720	23.735	52.5	47.3	49.9	39.6	38.4	
29	23.775	23.725	23.750	52.3	47.6	49.9	42.5	36.7	
30	23.810	23.750	23.780	53.3	47.6	50.4	41.5	38.6	

December.									
1	23.820	23.730	23.775	52.1	48	50	40.3	37.7	
2	23.815	23.790	23.802	52.3	46.5	49.4		37.5	
3	23.840	23.780	23.810	51.4	46	48.7	40.5	39	
4	23.805	23.755	23.780	51.6	46.5	49	43	37.5	
5	23.800	23.770	23.785	52.5	47.7	50.1	46.3	39.6	
6	23.780	23.720	23.750	51.8	47.9	49.8	48.6	44	
7	23.765	23.720	23.742	51	47.8	49.4	43.3	41	
8	23.740	23.680	23.710	51	46.6	48.8	41	37.5	
9	23.725	23.700	23.712	50.7	46.4	48.5	45	38	
10	23.785	23.745	23.765	49.4	47.5	48.4	42.3	38.2	
11	23.840	23.770	23.805	48.6	43.8	46.2	43.8	37.8	
12	23.790	23.710	23.750	49.4	44	46.7	38.7	38.6	
13	23.720	23.670	23.695	46.5	41.5	44	37.6	33.3	
14	23.725	23.685	23.705	46.6	42.7	44.6	39	35.4	
15	23.790	23.740	23.765	47.5	43.3	45.4	40.6	37.8	
16	23.860	23.810	23.835	49.6	45.3	47.4	43	39.8	
17	23.860	23.805	23.832	49.8	46	47.9	43.5	36	
18	23.840	23.780	23.810	50.1	45.2	47.6	43.9	40.5	
19	23.820	23.780	23.800	49.8	47.4	48.6	46.3	44.3	
20	23.840	23.800	23.820	51.6	48.3	49.9	50.2	45.4	

## CLIMATE OF SUBATHU AND KOTGERH.

1818.	December.								
	Barometer.			Thermometer			Thermometer		
	Inches.	Inches.	Inches.	Attached.			Detached.		
	100 parts.	100 parts.	100 parts.	High.	Low.	Mean.	High.	Low.	Mean.
Day.	High.	Low.	Mean.	High.	Low.	Mean.	High.	Low.	Mean.
21	23,830	23,770	23,800	53,4	48,6	51	50,4	44,2	
22	23,780	23,730	23,755	54,5	49,8	52,1	45,9	45,5	
23	23,820	23,780	23,800	51,8	48,1	49,9	41,6	38,7	
24	23,865	23,840	23,852	50,5	47,7	49,1	46,3	37,9	
25							73,6	45	59,3
26							68,3	36,7	52,5
27							61,5	44,1	52,8
28							67,8	51,4	59,6
29							60,5	52,6	56,5
30							73	48,4	60,7
31							73	42,1	57,5

Note.—The Mean Temperature of the year at Subathu is 65°, and that at Kotgerh 55°.

*List of Places in the foregoing Weather Journal shewing the height above Sea level with the Latitude and Longitude of each.*

Names of Places.	North Latitude.	East Longitude.	Height above Sea level.
Subathu (Cantonment),	30° 58'	76° 59'	4,205 feet.
Harripur Village,	31 1	76 59	3,147 ditto.
Mamleg Encampment,	31 3	77 2	4,499 ditto.
Jathe Debe or Janti Debe Temple,	31 4	77 6	4,971 ditto.
Gunai Village,	30 54	76 56	Unknown.
Penjore Valley (Town),	30 47	76 55	1,800 feet.
Mansa Debi (Temple),	30 44	76 51	abt. 1500 or 1,600
Khar, Town,	30 46	77 39	Unknown.
Bassi, between Khar and Kaniki Serai, (Town),	30 42	76 24	ditto.
Kaniki Serai Town,	30 41	76 13	ditto.
Douraki Serai Village,	30 48	76 1	ditto.
Ludianah Cantonment,	30 55	75 51	900 feet.
On the right of the Gambar river below Subathu,	30 58	76 59	3,105 ditto.
Khardu, Village,	30 55	77 2	Unknown.
Nakih, ditto,	30 52	77 5	6,000 feet.
Tikar, ditto,	30 48	77 7	5,400 ditto.
Bijana, ditto,	30 47	77 8	5,991 ditto.
Kahan, ditto,	30 41	77 13	Unknown.
Dheret, ditto,	30 38	77 16	ditto.
Chamcha, ditto,	30 35	77 17	ditto.
Nahn, Town,	30 33	77 18	3,180 feet.
Baniti Debee (Math),	30 37	77 16	5,092 do.
Serahan on the Nahn Road,	Unknown.	Unknown.	Unknown.
Bursgarhi Debi Temple,	30 45	77 9	6,195 feet.
Man Kagoan, Village,	30 55	77 2	4,400 ditto.
Simla Encampment,	31 6	77 11	7,886 ditto.
Pagu place of Encampment,	31 5	77 19	8,017 ditto.
Theog Fort,	31 7	77 23	8,018 ditto.
Kotgerh House,	31 19	77 30	6,634 ditto.
Wartu or Hattu Fort,	31 14	77 31	10,656 ditto.
Datnagar Village,	31 23	77 36	3,200 ditto.
Rampur Town,	31 27	77 38	3,398 ditto.
Kepu Village,	31 21	77 28	3,000 ditto.
Nirtuagar ditto,	31 22	77 33	3,087 ditto.