Fisk. (S. A.)

ANALYSIS OF

SIGNAL SERVICE STATISTICS

WITH REFERENCE TO

COLORADO CLIMATE,

BY

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By Samuel A. Fisk, M.D., Denver, Colo.

Three years ago the writer suffered from an attack of acute, lobular, catarrhal pneumonia. This was the second pneumonia that he had had in two years, and the third in twenty years. By the advice of specialists in Boston and New York, he came to Colorado, and, although he was regarded as an "unfavorable case," he is now in the possession of health, and it is with thankfulness that he presents the following remarks as a "first-fruits offering:"

It has seemed desirable that, if possible, some reliable and authentic statistics should be presented to the profession and to the large class of consumptive invalids, in regard to the salutariness of the climate of the eastern slope of the Rocky Mountains for persons suffering with pulmonary troubles.

Drs. Denison and Solly, of our Society, have made some valuable investigations in this department, and the writer offers his remarks, which by the request of the Society he has put into their present shape, as in some measure supplementary to their efforts. He wishes at the same time to acknowledge his indebtedness to the Signal Service Bureau at Washington and in other places, and especially to Sergeant Neal, of the Denver station, for the kindly manner in which they have furnished him with the data for the following accurate and reliable tables.

In selecting places for comparison he has chosen the well known resorts for phthisical patients, and has put them in justaposition with each other and with the localities where phthisis abounds. Augsuta, Ga., has been selected as being the nearest Signal station to Aiken, S. C., from which place it is only a few miles distant. He wishes to emphasize, as

a leading thought of what he has to write, the value and importance of this analysis by comparison. It seems to him as important as a statement of absolute facts in regard to the climate of our mountain slopes.

TABLE I.

SIGNAL STATIONS.	I Elevation.	II Barometer.	III Relative Humidity.	IV Grains moisture in cubic foot air.	V Mean Precipitation.	VI Mean Temperature.	VII Prevailing Wind.
Augusta, Ga.	183	30 142	69 2	4 56	48 98	64 2	N E
Jacksonville, Fa.	43	30 030	69 0	5 38	55 94	69 2	N E
Boston, Mass.	142	29 840	18 5	2 66	49 47	48 5	W
Newport, R. I	34	29 950	74 3	3 07	50 20	50 3	S W
New York City	164	29 857	70 2	3 02	42 70	51 3	N W
Philadelphia, Pa	52	30 584	68 8	3 17	41 89	53 2	S W
Chicago, Ill.	661	29 317	69 2	2 77	35 47	49 3	S W
St. Paul, Minn	811	29 133	67 3	2 23	29 59	43 9	S E
Denver, Colo.	5294	24 778	45 8	1 81	14 77	49 1	S
Santa Fe, N. M.	7046	23 263	41 4	1 61	14 17	48 5	E
Salt Lake, Utah	4348	25 644	40 3	1 76	17 52	51 8	S E
Los Angeles, Cal.	350	29 647	65 8	3 77	18 97	59 8	W

In the study of climatology, as applied to the cure of phthisis, there are certain conditions, certain qualities of the air, certain meteorological phenomena, certain soil formations which are well recognized as being favorable to the cure of pulmonary troubles. While our knowledge of them is largely empirical, dependent, like much else in medicine, upon clinical experience; and while, further, we have often been governed in our conclusions by the law of *per contra*, yet in many cases the operations of these causes, in producing favorable results, have been explained and applied.

A study of climatology involves, therefore, an investigation and testing of climates by these recognized principles. It involves, further, an analytical comparison, for even if a given climate does not fill the bills in every particular, it may, at least, possess such a predominance of desirable qualities as to make it, by comparison, the climate *par excellence*. It is in accordance with this view that the following data have been collected and compiled, and it is in conformity with these ideas, and using, so far as we are able, an unbiassed judgment, that we shall proceed to analyze the facts.

ELEVATION.

What effect does elevation have upon the human system, and how is phthisis affected by it? The atmospheric pres-

sure is diminished, and in consequence of it the amount, by weight, of oxygen in a given space is likewise diminished. As the vital functions are governed, to some extent, by physical laws, the effects upon the system of diminished atmospheric pressure and oxygen can be formulated. Our space will not allow of our doing so, and we must content ourselves with stating results.

I. *Effect on circulation.*—It is known that an increase of elevation accelerates the pulse rate. This increase has been stated as two beats for every 1000 feet. This means an increase in the rapidity of circulation or the bringing of the blood to the lungs to be aerated, a greater number of times *per diem.*

It also means an increase of the flow of blood to the diseased portions of the lung. This may aid in the throwing off of the product of disease, as is evidenced by the increase of expectoration; or in its absorption, as is shown by clinical experience; or in encapsulating it.

On the other hand we must recognize the fact, that when these results do not follow upon an increase of elevation, that bad ones do, and that the destruction of tissue and the extension of the disease is rapid, and hæmorrhage ensues.

Experience, however, has shown that where the extent of the disease is not great, and where the affection is incipient, and recovery may reasonably be expected, that a residence at a considerable elevation is beneficial, even where an hereditary taint exists. If heart lesions are present, an increased elevation is, of course, to be avoided.

II. *Effect on Respiration.*—Experience shows that the respirations are quickened and that the inspirations become deeper and the chest expansion greater. This seems to be due to the following facts, but the extent of their individual action is difficult to estimate: 1. An increased demand for oxygen, due to the increased rapidity of circulation. 2. To the diminished osmose, due to the diminished atmospheric pressure. 3. To the obstruction to the transpiration of the air through the brochi, due to diminution of pressure. 4. To the effect of diminished atmospheric pressure upon the large extent of chest walls and lung area. 5. And possibly to the diminished amount of oxygen in the air, though this cause is questionable, as even under a great diminution of atmospheric pressure, the amount of oxygen present is greatly in excess of the amount absorbed by the lungs.

The great advantage, as it seems to us, is derived from the increased depth of the inspirations, and the greater expansion of the lung. If Ruehle's assertion be correct that *" The diminished respiration in the upper part of the lungs and the exaggerated respirations in the lower part, resulting from this cause, serve to explain the very general fact that pulmonary consumption almost always begins at the apices of the lungs. But there is probably still another cause in the peculiar position of these parts. They project from three to four cm. above the clavicles, and this projecting portion, being situated outside of the chest, is subjected to the pressure of the external air. The supraclavicular region sinks in during inspiration, and consequently the inspiratory expansion of the apices is less than of other parts of the lung." If, then, this assertion be correct, we can easily understand the benefit derived from a lessened atmospheric pressure upon the apices, and from the greater depth of inspiration, which would expand the collapsed cells and start a healthy activity in these parts.

III. *Immunity from Consumption of Elevated Regions.*— While the mortality from consumption at sea-level is about thirty per cent. of all deaths, the deaths from consumption originating in Colorado was only a total of fourteen deaths for four years and a half. This accords with other statistics which show that an elevation of from 4,000 to 6,000 feet, affords an almost absolute immunity from this disease. This factor indicates then, the benefit of elevation as a prophylactic measure, and also its bearing upon cure, by the law of *per contra.*

IV. *Ozone.*—Although positive experiments are wanting to show that the amount of ozone in the atmosphere is increased by elevation, yet such is considered to be the fact. We know the oxydizing power of ozone and its action in purifying the air of the products of decomposition; whether it has any direct action in burning up such products in the lungs must still be regarded as problematical, but certainly it must be acknowledged that simply as an agent in purifying air it plays a part in the cure of consumption.

V. *Effects of an aseptic atmosphere.*—In these days of Koch's experiments and of the recognition of the bacillus tnberculosis, we must acknowledge the remedial influence of an aseptic atmosphere in the cure of phthisis. Tyndall has demonstrated the prevalence of germs floating in the

*Note—Ziemssen—Vol. V., pages, 486 and 487.

air at lower levels and the absence of germs at the "Belle Alp Hotel," at an elevation of 7,000 feet. Is not this known absence of germs at high altitudes a strong reason for recommending such altitudes to consumptives?

Resume.—of the benefits derived from elevation: From the foregoing it is evident that the benefit that consumptives may look for from an increase in elevation are dependent upon the absorption and elimination of the products of inflammation; the expansion and use of collapsed and unused portions of the lungs; the immunity from consumption; the ozone in the air and the aseptic atmosphere, combined with the conditions of humidity, temperature, etc., that we shall have occasion to speak of presently.

The extent of elevation desirable is shown to be that of immunity and of freedom from germs, or anywhere from 5,000 to 7,000 feet.

Now turning to Table I, column 1, gives the elevation of the barometer above sea-level, and column 2 gives the mean barometric register for a series of years. From this we see that Santa Fe and Denver, or, in other words, the eastern slopes of the Rocky Mountains furnish the elevation and atmospheric pressure that we have found to be advantageous in the cure of phthisis.

HUMIDITY.

The amount of moisture that a cubic foot of air is capable of holding depends on the atmospheric pressure and its temperature. The greater the pressure and higher the temperature, the greater the capacity of the air for moisture. When the air is saturated, a diminution of temperature causes a precipitation. It is on this principle, by means of observations of the wet and dry bulb thermometer, that the amount of moisture in the air, or the relative humidity of the air is ascertained. Taking one hundred as the saturation point, the relative amounts of moisture to a cubic foot of air will be indicated by figures ranging from 0—100. We have seen, however, that these observations are subject to variations, according to the variations of temperature, and they are further subject to error, according to the various exposures of the thermometers. Consequently, while tables founded upon the *relative humidity* will give an approximative estimate of the moisture of the air sufficiently accurate as a basis of comparison, we have also added tables giving the absolute amount of moisture, or the number of grains of moisture contained in a cubic foot of air.

I. *Effect of Humidity on Consumption*—The Seventh Annual Report of the Register-General for Scotland, showed that the death rate from phthisis diminished in proportion to the dryness of the site.

*Dr. H. I. Bowditch, of Boston, has shown that phthisis is prevalent in damp soils in the Uuited States. It is also common in Holland and other countries liable to damp fogs and an atmosphere saturated with moisture. †Ruehle says, "It appears that moist air favors consumption," and the Dittsonian lecturer, ‡Dr. C. T. Williams, writes, "As to to the desirability of moist climates for consumptive patients the evidence is decidedly against their use in the treatment of ordinary chronic phthisis."

II. *Evaporation Dependent on Humidity.*—We further know that the amount of heat that a man can endure depends on the rapidity of the evaporation from his skin, and lungs, which is more rapid in a non-saturated air. Cold too, is more readily borne in a dry air and feels less sharp.

III. *Diathermacy.*—Moreover, the diathermacy of the air, or its power of transmitting heat, is greater in a dry air, as the solar and terrestial radiations are more rapid.

Resume.—From all of the foregoing it is apparent that a moist atmosphere is a breeder of phthisis, and that a dry one is an important factor in its cure. Turning now, to our tables, (Table I, columns iii and iv.) we see that the Rocky Mountain slope furnishes, in addition to a desirable elevation, a comparative degree of absolute and relative humidity of the air, a comparison, which, as between Denver and Jacksonville, is almost 1:3.

PRECIPITATION,

Closely connected with atmospheric moisture, in a consideration of climate, is an investigation of the mean annual amount of precipitation in rain and snow. It has a bearing upon our subject in several ways.

1. Of the amount of precipitation, a part is lost by evaporation and thus tends to increase the humidity of the air; a part sinks into the soil and disappears, though if the soil be a humus or clayey soil, it increases the injurious sub-soil moisture; and the remainder is drained off in the rivers. It is evident that the less the precipitation the less will be the effects from these causes.

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*Reynolds, vol. iii, p. 548.
†Ziemssen, op. cit., p. 491.
‡Denison's Rocky Mountains, p. 67.

II. It is well known that pneumonia and other pulmonary troubles are prevalent in those places where the "spring thaw" throws a large amount of moisture on the air, and we know that in our Rocky Mountain homes, in places outside the mountains themselves, there is no such a thing as a "spring thaw," for the amount of snow-fall is so slight that snow never remains on the ground; we scarcely ever have enough for a respectable sleigh-ride, and when it comes it melts so rapidly, and is drunk up so eagerly by our thirsty porus, sandy soil, that the air is not chilled or damp, and the ground is seldom muddy.

III. Further than this, the amount of precipitation has a bearing upon our subject as showing, approximately, the ability of the invalid to lead an out-of-door life; but we shall have occasion to speak of this further on, and in conclusion we would simply emphasize the fact that our sandy soil carries off the precipitation rapidly, and that at the best we have (*vide* table 1, column v.) only an average of fourteen inches of rain and snow-fall on our Rocky Mountain inhabitable slopes, or one-sixth of what they have in Florida, or a half of that of Minnesota.

TEMPERATURE.

Dr. J. H. Bennett, in Reynold's (loc. cit.) says: "It was formerly supposed that warm climates were beneficial for consumptive patients. But it will invariably be observed that unaccustomed warmth is most injurious. What is really required is a cool, temperate climate, free from great alterations of temperature. On the other hand, Ruehle, (op cit.), says that the temperature of a country has "nothing to do with the prevalence of consumption." "A uniform climate whether, cold or warm, so long as it is dry, rarely excites consumption." Dr. Austin Flint calls attention to the fact that "the disease is oftener developed during the spring months and the hot months of summer," when either the moisture of the air or the debilitating effects of heat are present as factors.

We know that the effect of high temperature is to raise the body heat; lessen the number of respirations; quicken the pulse; lessen the digestive powers and the appetite; diminish the amount of urea, because of the diminished amount of food taken, and to depress the nervous system, especially if the heat be accompanied by moisture of the air.

We can fairly conclude, therefore, it seems to us, that a temperate, dry climate is the one to be sought by consumptives. Our tables have shown that the Rocky Mountain

furnish a dry air. The mean temperature (*vide* table 1, column vi.) is neither an extreme of heat or cold. But more important, we think, are the daily variations, which we shall have occasion to discuss further on.

WINDS.

The element that we wish to analyze in regard to the winds, are the direction and velocity:

I. *Velocity.*—A cold wind abstracts heat, and that in proportion to its velocity. So far as this element is concerned, it is evident from our tables that the velocity of the winds is much less in the Rocky Mountain region than in our eastern states, and, hence, that while the mean temperature is nearly the same, the chilling effect of the wind is much less. On the other hand, having a considerable greater velocity than that of Augusta, by which we mean Aiken, and Los Angeles, it has a proportionately greater purifying power, in bringing fresh air and fresh ozone, and in blowing away the products of decomposition.

II. *Direction.*—But of equal, if not greater importance, is the direction of the wind. The favorable and unfavorable directions vary for different places, according to their sites, and geographical locations. The east and north winds along our Atlantic coasts are known to be the trying winds, and our table shows that this is the prevailing direction for the winds at Augusta and Jacksonville.

The west wind, the cold, fog-bearing wind, is the trying one on the California shores, and our table shows that to be the prevailing one at Los Angeles.

The south wind is the salubrious one for the eastern slope of the Rocky Mountains, in Colorado, and our table shows that to be the balmy wind that blows.

Table I, column vii, gives the mean prevailing wind for five years. Table II, gives the mean for three years, showing how many times the wind was observed blowing in the several quarters of the heavens and also the mean velocity in miles, for each day.

TABLE II.—WINDS.

DIRECTION AND VELOCITY OF THE WIND.

STATIONS.	MEAN OF THREE YEARS.									Velocity.
	N	N E	E	S E	S	S W	W	N W	Calm	Daily
Augusta	57	154	68	118	86	109	94	120	304	79 ms
Jacksonville	77	282	120	116	102	180	83	76	60	159
Boston	70	59	88	72	85	155	286	186	60	238
Newport	113	80	51	73	112	299	183	164	28	236
New York	76	136	54	98	83	175	188	290	14	207
Philadelphia	123	157	92	40	102	162	179	208	9	256
Chicago	147	122	85	99	142	239	151	114	30	203
St. Paul	95	37	91	223	72	122	129	223	70	211
Denver	150	95	78	150	307	67	76	155	12	145
Santa Fe	139	109	157	100	78	142	59	119	201	152
Salt Lake	81	64	56	252	39	33	49	269	249	135
Los Angeles	104	155	80	58	55	208	274	53	142	103

CLEAR, FAIR AND CLOUDY DAYS.

We come now to our last general consideration and the one that seems to us, perhaps, the most important of all, for it in some measure embraces the most of the others, viz: a comparison of the number of clear, fair and cloudy days, in a year, at the different stations. In examining the tables it must be borne in mind that the results given are the means for five years and represent the means of four observations *per diem*, for that time. By the term cloudy is meant a day in which the sky is clouded from seven-tenths to its whole extent; fair is when the sky is from four-tenths to seven-tenths cloudy; clear is from absolutely clear to four-tenths cloudy. For our purposes, clear and fair days may be classed as one, and we shall arrive at our results by a comparison of the number of cloudy days.

Effect of Sunshine.—But little is known of the effect of sunshine on the human economy. We can theorize upon the influence of solar radiation, its heat and actinic rays, but we know nothing absolutely. However, it is certain that a life in the open air is a prime factor in the remedial agents of phthisis. Nothing can take its place. All authorities agree in this. Our tables show that on the Rocky Mountain slope there are, on an average, only forty odd cloudy days. Only one ninth of the year when a consumptive is compelled to stay cooped up in doors, because of stormy weather. For 320 days in every year he can be out and about, enjoying the life-giving, the dry, the bracing air. Does not this one element make Colorado, the consumptives El Dorado?

TABLE III.—CLEAR, FAIR AND CLOUDY DAYS.

SIGNAL STATIONS	Mean for Five Years.		
	Clear.	Fair	Cloudy.
Augusta	123	150	92
Jacksonville	126	152	87
Boston	105	145	115
Newport	108	140	111
New York	101	155	109
Philadelphia	114	139	112
Chicago	104	154	107
St. Paul	103	158	104
Denver	177	142	46
Santa Fe	174	148	41
Salt Lake	141	131	93
Los Angeles	164	148	51

We have tried to be candid and unprejudiced in analyzing these data. They are correct even if the conclusions arrived at be false. From them we have proven, we think, the efficiency, both absolutely and by comparison, of the climate of the eastern slope of the Rocky Mountains, in the cure of consumption. We have shown, we think, that it furnishes a desirable elevation; a small amount of relative and absolute moisture in the air; a small annual fall of rain and snow; a desirable mean temperature; a mean velocity of wind, neither excessive nor too small; a prevailing balmy and salubrious south wind; and lastly a large, an exceedingly large number of clear days in which the invalid can be in the open air. Surely these simple, but accurate statistics speak volumes.

SEASONS.

It seems to the writer that quite as valuable as the foregoing tables, would be accurate tables on these several points under consideration, but tables giving the data for the seasons of the year rather than the mean for several years. The space allotted to our article will not allow of our going into detail as much as we would like, and in addition, we are informed by the Chief Signal Officer that the data that we desire, cannot be copied for our use, because of "the reduction in the force" in his office. We shall content ourselves. therefore, with annexing, without much comment, the few facts that we have been able to collect. The writer would state that in selecting the year 1880 as the basis of comparison, it has been done at random and without reference to whether it was favorable or unfavorable to the facts that he wishes to elicit.

The following table will give us the relative and absolute

moisture in the air, for the places under consideration, for the four seasons. In this table R. H., stands for relative humidity; G. V. for grains of vapor to the cubic foot of air. The second part of the table has reference to the precipitation in inches of rain and melted snow for the same time.

TABLE IV.

SIGNAL STATIONS.	1880. Relative and Absolute Humidity.								1880. Precipitations.			
	Spring.		Summer.		Autumn.		Winter.		Spring	Summer	Autumn	Winter
	RH	G V	RH	G V	RH	G V	RH	G V				
Augusta	68	4.7	64	7.2	74	4.9	72	3.2	5.0	4.2	2.8	3.9
Jacksonville	66	5.5	69	8.0	75	5.6	70	3.0	3.5	5 9	9.5	3.5
Boston	61	2.5	70	5.4	67	3.0	69	1.5	2.6	3.5	2.6	3.8
Newport	71	2.7	76	5.9	75	3.5	76	1.9	3.9	5.0	3.4	3.6
New York	65	2.9	79	5.5	70	3.8	65	2.0	2.5	4.2	2.5	2.8
Philadelphia	61	2.7	66	6.1	68	3.0	72	2.1	2.1	4.8	1.5	2.6
Chicago	63	2.9	70	5.9	66	2.3	69	1.8	4.1	3.7	2.1	2.4
St. Paul	62	2.9	69	5.1	66	2.9	71		2.1	4.0	2.3	1.5
Denver	37	1.1	43	3.3	55	2.3	51	.9	0.5	1.3	1.0	0.2
Santa Fe	35	1.2	36	2.6	50	2.5	50		0.25	1.7	0.7	0.6
Salt Lake	41	1.5	25	1.5	33	1.6	50	1.3	1.6	0.3	0.7	1.1
Los Angeles	74	3.6	73	4.8	63	3.8	68	2.9	2.2		0.3	3.8

The table gives the mean for each month, in the three constituting the season. The spaces left blank have not been calculated. From this table it is seen that both the relative and absolute humidity, and the precipitation of rain and snow is very small on the Rocky Mountain slope in comparison with other places on the table; especially does this hold true for the winter and spring months, the trying months for consumptives in the east. This table confirms the results arrived at from our other tables and shows, in addition, that the Colorado air is the dryest, and the amount of precipitation is the smallest during those months of the year that breed and kill consumptives in our eastern cities.

The next table that we shall offer is one of temperatures. We are not able to present this subject in just the form that we should like to, on account of our lack of data. The first series gives the maximum and the minimum thermometer, observed during the three months constituting the season; the second series gives the mean monthly range, and mean of temperature for the same seasons. While these tables show, as our previous tables did, a desirable mean temperature for the Rocky Mountains, they show a wide range; in fact, the widest range of any place in our tables.

This requires an explanation. We have seen that the Colorado air is a dry air; that the absolute amount of vapor to the cubic foot is very small; that the diathermancy of the air is great; conditions which favor rapid solar and terrestial radiation, so that, on the one hand, the heating effects of the sun's rays are soon felt, and on the other, the heat from the earth is soon radiated. Again, the air itself retains less heat and gives up its heat more rapidly, because of its dryness, so that this would be another cause for great variations in temperature. The great exposure of a sandy soil is another reason for the amplitude of the variations of temperature existing in Colorado. It must be acknowledged that these changes are not as severe nor as trying as in a damp climate. It must further be granted us that, however great the variations may be, the midday temperature, as a rule, is equable and adapted to an invalid's leading an out-of-door life. Unfortunately we cannot give tables as we had hoped to do, to prove this point. We insist, however, that even if the evenings and early mornings may be cold, the midday is balmy and soft. Moreover, the cool nights prevalent throughout Colorado, render it a delightful summer resort.

TABLE V.—THERMOMETRIC VARIATIONS, 1880.

Sig Stations	Spring.		Summer.		Autumn		Winter		Spring		Summer		Autumn		Winter	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Range	Mean	Range	Mean	Range	Mean	Range	Mean
Augusta . .	90	35	99	60	91	28	81	7	47	66	32	81	45	63	54	51
Jacksonv'le.	95	42	100	69	91	39	78	19	43	71	29	82	37	69	45	59
Boston . . .	92	12	101	47	93	3	59	-5	58	47	48	69	52	51	52	33
Newport . .	84	14	88	49	87	15	61	1	44	47	33	69	42	53	48	36
New York .	94	16	92	48	91	14	65	-6	54	51	36	72	45	53	52	36
Phila. . . .	96	20	95	51	91	10	67	-5	56	54	37	75	49	55	53	37
Chicago . .	85	19	95	52	85	1	63	-15	47	51	42	72	53	48	57	31
St. Paul . .	91	-7	98	47	90	-18	59	-27	59	46	43	69	62	42	67	21
Denver. . .	89	-10	96	39	89	-13	59	-11	66	48	48	69	60	44	72	29
Santa Fe. .	80	0	88	33	80	-11	56	-3	67	47	45	66	59	48	61	27
Salt Lake. .	78	5	95	40	88	3	49	2	51	45	51	68	51	49	44	31
Los Angeles	97	36	87	50	91	35	80	30	45	56	38	64	47	61	46	54

In conclusion we would say that we think that our investigation of these facts bears out our common experience in regard to the efficacy of a residence in Colorado as a cure for consumption. We must admit, however, that as a rule, patients with marked advance of the disease do not make a recovery here; but in those cases where the disease is taken

in hand early in its course, in such cases we may hope for good results from a change to the slopes of the Rocky Mountains.

There is much that could be written in regard to places on this eastern slope, for we know that there is a difference between them, and that they are not all equally good. We know from experience, too, that there is a surprising ignorance amongst physicians and people in the east in regard to Colorado, and that much of value could be written for them in regard to things that are every-day facts to us. Our space will not admit of our undertaking such a task at present, and we will let what we have written, which we have intended should be a conscientious analysis of reliable data, suffice. We feel that in simply putting these data on record, we are aiding somewhat the investigations that are constantly going on in regard to the climate of Colorado.

ADDENDA.

NOTE—Column iv of table I. is computed from column iii of the same table by means of Glaisher's tables, and is not taken from Signal Service Reports.

TABLE VI.—MEAN MONTHLY TEMPERATURE, 1:07 P.M.

(Local Time) at Denver, Colorado.

Year.	January	February	March	April	May	June	July	August	Sept	October	Nov	Dec
1880	45 9	37 6	44 3	56 7	67 2	78 5	79 9	79 6	71 3	56 8	30 3	35 8
1881	33 5	36 4	46 1	62 2	69	82 5	84 6	81 3	70	59 7	42 8	47 6
1882	37	46 2	52 3	55 5	59 3	73	81 6	81 4	73 9	59 4	46 5	43 2