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REPORT

ON THE

TOPOGRAPHY, BOTANY, CLIMATOLOGY,

AND

Diseases of Surprise and Goose Lake Valleys.

By

GEORGE M. KOBER, M.D., U. S. A.,

*Fort Bidwell; Modoc County correspondent of the Board. Supplemented by extracts from Reports of W. MATTHEWS, M.D., U. S. A., WM. H. PATTERSON, M.D., Cedarville, and JOHN M. FORREST, M.D., Alturas, Modoc County.*

Reprinted from the Ninth Biennial Report of the State Board of Health.



SACRAMENTO:

STATE OFFICE . . . . . JAMES J. AYERS, SUPT. STATE PRINTING.

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# I. REPORT ON THE TOPOGRAPHY, BOTANY, CLIMATOLOGY, AND DISEASES OF SURPRISE AND GOOSE LAKE VALLEYS.

By GEORGE M. KOBER, M.D., U. S. A., Fort Bidwell; Modoc County correspondent of the Board. Supplemented by extracts from Reports of W. MATTHEWS, M.D., U. S. A., WM. H. PATTERSON, M.D., Cedarville, and JOHN M. FORREST, M.D., Alturas, Modoc County.

In my description of the topography of this section, I shall confine myself to two important valleys of Modoc County, geographically known as Surprise and Goose Lake Valleys.

*Surprise Valley* is situated on the eastern slope of the Warner Mountains, extending almost north and south, about sixty miles in length and from six to eight miles in width. A high divide on the north separates this valley from Warner Valley, Oregon; on the west from Goose Lake Valley; on the south a long cañon connects it with the sagebrush plains of Nevada, and on the east a lower range of mountains separates it from Coleman and Long Valleys in Nevada. It is a monoclinical valley, of moderately inclined beds of a plutonic outflow. The strata dip towards the Sierra Nevadas, westward; the elevation of the valley above the sea level is four thousand six hundred and eighty feet. The Warner Mountains, like the great Sierra Nevadas, of which they are doubtless a portion, have a slate base, and superimposed are strata of quartz. Sandstone also abounds near the surface, and forms the greater portion of the lower range of hills. The average elevation of these mountains is about six thousand feet, although some of the peaks, as Mount Bidwell, attain the respectable height of nearly eight thousand feet above the level of the sea, and remain snow-clad until the middle of July.

Surprise Valley is destitute of timber, but the numerous ravines and cañons traversing the mountains contain fine forests of pine and cedar. The soil is composed of disintegrated basalt, sand, and clay, and is very fertile. Below this soil is found a bed of gravel of variable depth. Most of the wells are sunk through a deposit of gravel, from fifteen to thirty feet in depth, when "hard pan" is reached, which may be a clay bank or a peculiar sandstone formation.

The valley contains three lakes, of about equal size, known as the Upper, Middle, and Lower Lakes, their combined area being about one hundred square miles. These lakes have no outlet, and desiccation has concentrated the salts in all of them. The water is intensely alkaline to the taste. They are shallow for a considerable distance from the shores, and receive their water supply from the numerous streams of the Warner Mountains. The Middle and Lower Lakes have been known to dry up completely during several dry seasons, revealing a deposit of fine alkaline mud, which, when desiccated, looks white; and in the distance the former lake bed presents the appearance of a beautiful sheet of water. The water, doubtless, contains a large percentage of magnesia, sodium, soda, chlorine, sulphuric acid, and carbonate of lime. It is needless to observe that the lakes are

not habitable by fishes, their only animal population being crustacea and the larvæ of insects.

The east side of the valley affords but very few water channels, as the eruptive hills or table lands are rather low, and do not condense much snow and moisture. Owing to this fact, and the comparative absence of erosive action, the eastern half, unlike the western half of the valley, has no rich alluvial deposits, and the soil is strongly impregnated with alkaline salts towards the lake, while the higher portions are composed of a mixture of sand and clay, which supports a more or less luxuriant growth of artemisia (sagebrush).

The town of Fort Bidwell is located about eight miles from the southern boundary of Oregon, and the same distance from Nevada, in latitude 42° 10' north, longitude 43° 12' west. The site is at least two miles north of the upper lake, on a gravelly slope which gradually ascends towards the foothills. A beautiful mountain stream drains the locality. This stream near its terminus, however, becomes sluggish, and in the course of time has deposited an immense amount of debris, and thus formed a peninsula, which extends for a mile and a half into the lake. The character of this land is essentially a "swamp," covered with typha latifolia. Numerous small ponds and sloughs are also observed. With this exception, the lower lands on the north and west side of the lake are natural meadows, and yield an excellent quality of grass. Some families live in these meadows, their wells being only from five to eight feet in depth. The higher lands are well adapted for agriculture, and in some localities require artificial moisture. Numerous fruit trees, consisting of apples, plums, pears, and peaches have been successfully cultivated and yield fine crops in the order named.

The town of Lake City is situated on the foothills, near the southwestern end of the upper lake; Cedarville at the mouth of a beautiful cañon west of the middle lake, and Eagleville near a cañon west of the lower lake. In these and other localities, the mountain streams have washed immense deposits into the lake, and thereby formed deltas of variable extent, according to the erosive power of the streams. Numerous farms are scattered throughout the valley, but more especially along the western half of the valley. The combined population of the valley is about three thousand. The scenery, notwithstanding the shallow shores of the lakes, presents many elements of beauty, combining, as it does, mountain and water scenery with a clear atmosphere and a good sprinkling of verdure. No wonder that the early pioneers of California, in their overland travel across the sagebrush plains of Nevada, upon their emergence through "49 Canon," were suddenly impressed with its beauty, and named it "Surprise Valley."

*Goose Lake Valley* is located on the western slope of the Warner Mountains, and is about fifty-five miles in length, and twelve miles in width; elevation above the level of the sea, four thousand eight hundred feet. The valley extends nearly north and south, and is bounded on the east by the Warner Mountains, already described; on the west by eruptive hills of no great elevation, which, sixty miles further west, are known as the "lava beds," and former stronghold of the Modoc Indians. To the north, the valley is cut off by the watershed of the Chewaucan, and to the south by that of the Pitt River. It contains a fine sheet of water, known as Goose Lake, which is thirty miles in length, and about ten miles in width. The lake is shallow for a long distance from its northern, southern, and eastern shores, and has no outlet, but a slight elevation would connect it with the watershed of the Pitt River in the south. It receives its water supply from

numerous mountain streams, notably from the Warner Range on the east, which maintain it in a more or less fresh condition. The water is slightly alkaline to the taste, but the lake abounds in fishes and water birds. The lakes of Oregon, Nevada, and California diminish in alkalinity as we approach the Sierra Nevadas. Goose Lake has never been known to dry up, although, during prolonged dry seasons, and, in fact, to a limited extent every Summer and Autumn, the water falls sufficiently to expose a vast tract of land on the southern and northern shores.

The scenery of this valley and lake presents many elements of beauty. The soil and geological formation is similar to that of Surprise Valley, with perhaps a larger admixture of clay. The best soil is found on the eastern half of the valley, or west slope of the Warner Mountains, owing, doubtless, to the erosive action of the elements and mountain torrents on the volcanic rocks which abound in this range. The soil of the west side of the valley is a mixture of clay and sand, impregnated with alkali, and supports a luxuriant growth of sagebrush. Along some of the watercourses on that side the soil is more fertile. The principal settlement is at Davis Creek, on a gradual slope towards the southeastern shores of the lake. Here the action of Davis Creek has formed a peninsula, which extends two and one half to three miles into the lake. This hamlet is about twenty-five miles in a northeastern direction from Alturas, the county seat. Another thrifty settlement, known as Willow Ranch, is located about fourteen miles north of Davis Creek; and still another settlement on New Pine Creek, ten miles north of the latter place, and close to the Oregon boundary line. The various mountain streams, especially those in the localities mentioned, have carried immense deposits into the lake and formed numerous deltas. This new formation is more or less marshy, and portions of it are covered with tules, but the land lying somewhat higher, is good meadow land, and the higher tracts, as in Surprise Valley, are specially adapted for the production of cereals, requiring not infrequently irrigation, especially for garden produce. Numerous settlements are scattered throughout the valley, some occupying the low lands, but most of the settlers have built their premises on the western slope of the Warner Mountains. It will be observed that Surprise Valley is bounded with low mountains on the east and high mountains on the west, while the inverse condition obtains in Goose Lake Valley. In consequence thereof, the latter valley receives a larger precipitation of snow and moisture, and is more exposed to the prevailing winds from the west. The arrangement of the mountains, the consequent water supply and fertility of the soil, also influences the settlement of the two valleys. While in Surprise Valley most of the settlements are in the west half of the valley, the majority of the people in Goose Lake Valley have selected the eastern half. The combined population is probably over two thousand.

Both valleys contain numerous thermal springs, especially Surprise Valley; some of these are very justly believed to possess medicinal properties. The alkaline taste and temperature of the water, 100° Fahrenheit, point to desirable properties in the treatment of rheumatic affections. Unfortunately no analysis has been made.

In this connection I wish to invite attention to the desirability of placing sufficient funds at the disposal of the State Board of Health or the State Analyst to furnish reliable analyses of such springs, wherever located throughout the State, in order that the physician, ever active in the interests of the people, may at least be enabled to give an honest opinion, when asked, about the "internal use" of such waters.

I need scarcely mention that an analysis of the alkaline lakes in Surprise Valley might benefit the resources of the State by inducing enterprising capitalists to utilize these waters in the manufacture of chemicals.

## II. BOTANY OF SURPRISE AND GOOSE LAKE VALLEYS.

List of plants collected and analyzed during the Summer of 1878, in the vicinity of Fort Bidwell, California, by Assistant Surgeon W. Matthews, United States Army:

### *Ranunculaceæ.*

- Thalictrum Feudleri*, woods near sawmill.  
*Ranunculus Cymbalaria*, near hospital.  
*Ranunculus glaberrimus*, wet ground on mountain side, beyond Horan's Ranch.  
*Ranunculus Nelsonii*, near spring, behind officers' quarters.  
*Ranunculus Californica*, foothills.  
*Aquilegia truncata*, valley near stream, south of reservation.  
*Delphinium decorum*, beyond sawmill, and elsewhere.  
*Pæonia Brownii*, foothill, behind officers' quarters, and common elsewhere.

### *Berberidaceæ.*

*Berberis repens*, common in the woods everywhere; has similar medicinal properties to *Berberis Aquifolium*—Oregon Grape.

### *Cruciferae.*

- Erysimum asperum*, near sawmill.

### *Violaceæ.*

- Viola aurea*, foothills.  
*Viola Nuttallii*, foothills, and near post.  
*Viola cucullata*, common in damp places.  
*Viola Beckwithii*, a variety with lower petals, partly blue, on dry, sandy ground, north of the village.

### *Caryophyllaceæ.*

- Stellaria longipes*, wood along Willow Creek.  
*Stellaria borealis*, wood along Willow Creek.  
*Arenaria Douglassii*, wood along Willow Creek.

### *Portulaccaceæ.*

- Claytonia Chamissonis*, near stream west of post.  
*Lewisia Rediviva*, on dry ground north of village.

### *Malvaceæ.*

- Malvastrum*.

### *Linaceæ.*

- Linum perenne*, in the Government pasture.

### *Geraniaceæ.*

- Geranium Carolinianum*, along the streams.

### *Rhamnaceæ.*

*Ceanothus velutinus*, common in the woods and on the mountain sides, and forming the most tangled underwood on the warmer mountains.

*Ceanothus prostratus*, common in the woods and on the mountain sides, and forming the most tangled underwood on the warmer mountains. More common than the *ceanothus velutinus*.

### *Leguminosæ.*

- Hosackia Purshiana*, in shady places.  
*Dalea*.  
*Astragalus Purshii*, common in dry situations.  
*Lathyrus Nevadensis*, Goose Lake Valley.  
*Lapinus albicaulis*, foothills.  
*Lapinus rivularis*, foothills.



*Rosaceæ.*

- Rosa Californica, common.  
 Prunus subcordata, foothills.  
 Prunus emarginata, foothills.  
 Prunus Andersonii, foothills.  
 Prunus demissa, foothills.  
 Purshia tridentata, foothills, near hospital, etc.  
 Cercocarpus ledifolias, sides of mountains.  
 Géum triflorum, shady places in the mountains.  
 Potentilla anserina, in the bottom lands.  
 Potentilla gracilis, in the bottom lands.  
 Crataegus rivularis, valley of stream one half mile west of post.  
 Amelanchier canadensis, borders of all streams in and near the mountains, etc.  
 Amelanchier alnifolia, borders of all streams in and near the mountains, etc.

*Saxifragaceæ.*

- Tellenia parviflora, hill behind officers' quarters.  
 Ribes divaricatum, southwest corner of Government pasture.  
 Ribes cereum, rocks at bridge on road to sawmill.  
 Ribes sanguineum, deep woods on mountains, one thousand to two thousand feet above valley.  
 Ribes aureum, along the mountain streams, and in the fields east of the village.

*Onagraceæ.*

- Oenothera biennis, parade ground, etc.  
 Epilobium paniculatum, near streams.  
 Epilobium minutum, near streams.  
 Gayophytum romosissimum, dry situations.  
 Godetia viminea, foothills, near hospital.  
 Boisduvalia densiflora, fields east of village.

*Cornaceæ.*

- Cornus Californica, banks of streams, common.

*Caprifoliaceæ.*

- Symphoricarpus racemosus, in mountains.

*Rubiaceæ.*

- Galium triflorum, common, near streams.  
 Galium boreale, common, near streams.

*Compositæ.*

- Archillaea millifolium, in grassy places.  
 Artemisia ludoviciana, in desert places, common forms of "sagebrush."  
 Artemisia tridentata, in desert places, common forms of "sagebrush."  
 Cnicus occidentalis, foothills, near post.  
 Troximon glaucum, on parade grounds, etc.  
 Taraxacum dens-leonis, on the bottom, between the post and the village, some old residents say, "in 1878, that it was unknown here three or four years ago. Appears to become more frequent every year." (Kober.)

*Ericaceæ.*

- Pyrola picta, in deep pine forests, one thousand to two or three thousand feet above the valley.  
 Pyrola aphylla, in deep pine forests, one thousand to two or three thousand feet above the valley.

*Primulaceæ.*

- Dodecatheon Meadia, two or three varieties in moist open situations in the hills.

*Asclepiodaceæ.*

- Gomphocarpus cordifolias, seen only in one locality on hillside, just north of creek, about a mile and a half southwest of hospital.

*Gentianaceæ.*

- Gentiana affinis, on Lassen's Creek, Goose Lake Valley.  
 Frasera albicaulis, Goose Lake Valley.

*Polemoriaceæ.*

- Phlox cæspitosa, foothills.  
 Collomia grandiflora, foothills, west of post.

*Hydrophyllaceae.*

*Hydrophyllum capitatum*, in ravine, half a mile west of post.  
*Nemophila parviflora*, at the spring in rear of officers' quarters, and many other places.  
*Phacelia cirinata*, near Jopp's ranch, etc.  
*Phacelia Menziesii*, foothills, immediately west of officers' quarters.

*Borraginaceae.*

*Heliotropium carassavicum*, foothills.  
*Lithos permam pilosum*, on bottom lands and foothills.  
*Mertensia sibirica*, woods, common.  
*Eritrichium Californicum*, near race track.  
*Echinus permum Redowskii*, on roadsides in the village.

*Solanaceae.*

*Petunia parviflora*, parade ground, hospital grounds, etc.

*Scrophulariaceae.*

*Collinsia parviflora*, common in valley and foothills.  
*Pentstemon duerstus*, Government pasture, a dwarf variety, found near the summit of Mt. Bidwell.  
*Pentstemon confertus*, foothills, about a mile and a half southwest of post.  
*Pentstemon laetus*, foothills, about a mile and a half southwest of post.  
*Mimulus manus*, foothills.  
*Mimulus luteus*, Jopp's hot spring and other places.  
*Mimulus primaloides*, summits of Warner Mountains.  
*Veronica Americana*, in the pasture between the post and village.  
*Veronica serpyllifolia*, in the pasture between the post and village.  
*Castilleia parviflora*, mountains.  
*Castilleia mineata*, Government pasture, etc.

*Labiatae.*

*Scutellaria nana*. This very rare plant was found on the first bench of the foothills, about a mile southwest of post.

*Chenopodiaceae.*

*Chenopodium album*, in cultivated grounds.

*Orchidaceae.*

*Cypripedium candidum* (?), perhaps a variety of *C. candidum*, found only in a very limited locality, just south of the road to Goose Lake, about two hundred yards beyond the old sawmill.

*Liliaceae.*

*Fritillaria pudica*, seen about the first of April in the valley, various parts near post, and early in June on the summit of the mountains.  
*Scilla esculenta*, near the lake.  
*Smilacina stellata*, in moist woods.  
*Smilacina racemosa*, in moist woods.

### III. CLIMATOLOGY OF SURPRISE AND GOOSE LAKE VALLEYS.

#### 1. *Temperature.*

Table No. 1 covers a period of twenty years, and may be regarded as an established standard of the climate of this beautiful mountain valley of California. It is my impression that the climate of Goose Lake Valley does not materially differ from that of Surprise Valley, except that it receives a larger amount of precipitation of moisture, in the form of snow, during the Winter months.

It will be observed that the mean temperature for twenty years is 50.3° F. This, however, should not mislead the reader, since a close analysis will at once indicate that the amount of heat is by no means equably distributed, and this would be still more apparent could the columns and

pages of individual observations be presented here. October, as regards temperature, is the typical month of the year. The mean temperature of this month for twenty years differs but two degrees from the mean annual temperature for the same period.

The highest temperature observed in any one month was 100° F., in July, 1876; and the next highest 99°, in August, 1870 and 1879. The lowest temperature in any one month was 19° below zero, in February, 1884. Absolute range during a period of twenty years, 119°. July and August are the hottest months in the year, and January, February, and December the coldest months. Frosts occur late in the Spring and early in the Fall.

A study of the tables, especially of No. 3, will indicate that a striking peculiarity of this climate is the extreme range of temperature, particularly noticeable during the months of July, August, September, and October. A daily variation of 50° is not uncommon, and even a daily range of 62° has been observed in August.

This excessive diurnal variation is intimately connected with the dryness of the atmosphere. The absence of watery vapor permits the surface of the earth to be rapidly heated by the rays of the sun, and likewise favors rapid radiation after the maximum is reached. As a result, we have often very warm days, and excessively cool nights—a very important feature of this climate from a sanitary point of view. In my discussion of some of the prevalent diseases of the community, I will have an opportunity to point out the relations of cause and effect. It may be, because the greater portion of my professional life has been spent at mountainous posts on the middle and northern plateau, where extreme ranges of temperature are especially observed, that I have become oblivious to other conditions by assuming that the great changes in temperature are the chief cause of a certain class of diseases. I shall endeavor, however, to present the facts and opinion unbiased, not doubting for a moment that elsewhere other factors may and do enter into the production of disease, and that I may be entirely wrong in my interpretation of the relations between this climate and some of the prevalent diseases.

## 2. *Precipitation.*

An analysis of the meteorological tables with reference to the amount of precipitation, will indicate that the "rainy season" during the Winter and Spring months is fairly well defined, and the amount of precipitation in the form of snow is frequently excessive.

During the Summer and Fall, or the "dry season," the amount of precipitation is hardly appreciable; whole months often pass without bringing us a shower. Dews are rarely, if ever, observed. When it is sufficiently cool at night to condense the little moisture that is in the atmosphere, without precipitation in the form of rain or snow, it is deposited in the shape of frost.

The dryness of the atmosphere is partly accounted for by the elevation, but more especially the geographical location of the valley, since the prevailing winds from the west naturally condense most of their moisture upon the western slope of the Sierra Nevadas; but there seems to be a remarkable drying power in the atmosphere of California, as shown by the frequent absorption of clouds. I have observed time and time again, even during the dry season, an ample supply of clouds and a good prospect for rain, only to be disappointed by the thirsty air.

Table No. 3 shows the relative humidity from July 1, 1885, to June 30,

1886, saturation being one hundred. The months of June, July, August, September, and even October, show the lowest relative humidity, and these are also the warmest months, and characterized by extreme daily ranges of temperature. The rainy season begins in the second half of October, and the relative humidity continues to rise until January, and then gradually decreases; exceptions are, however, frequently noted. It will be observed that the mean humidity for the year is only 57.7 per cent. Professor Parkes observes, p. 88, Vol. II: "The most agreeable amount of humidity to most healthy people is when the relative humidity is between seventy and eighty per cent. In chronic lung diseases, however, a very moist air is generally most agreeable and allays cough."

In the article on catarrhal affections, it will be shown that the greatest frequency of these disorders coincides with that of the greatest relative humidity, which, during the months mentioned, may for a few days amount to complete saturation.

### 3. *Wind.*

The prevailing direction of the wind is south and west, and is seldom observed to blow from other points, although during the severe cold weather, the wind usually comes from the north and northwest. As will be seen from Table No. 4, it is rarely violent in force, yet a gentle breeze can be nearly always observed. The maximum velocity for twenty-four hours generally occurs shortly after midnight and noon. It comes from the south during the day and from the west during the night.

### 4. *Electricity.*

Observers of this phenomena must have noticed a sensible increase in the number and violence of thunder storms on this coast within the past few years; this is especially noticeable during the present year, many of them nearly equaling an eastern thunder storm in the display of atmospheric electricity.

Two cloudbursts occurred in the Warner Range of mountains near Lake City and Eagleville, during the month of July, 1886, the water rushing down; carrying with it a large amount of debris, rocks, trees, etc.

TABLE No. 1.

*Meteorological Report of Fort Bidwell, California, from July, 1866, to June 30, 1886.*

| MONTHS.      | TEMPERATURE. |      |      |      |       | Prevalling<br>Wind | Rainfall in<br>Inches | TEMPERATURE. |      |      |  |       | Prevalling<br>Wind | Rainfall in<br>Inches |
|--------------|--------------|------|------|------|-------|--------------------|-----------------------|--------------|------|------|--|-------|--------------------|-----------------------|
|              | Mean.        | Max. | Min. |      |       |                    |                       | Mean.        | Max. | Min. |  |       |                    |                       |
|              | 1866-67.     |      |      |      |       |                    | 1867-68.              |              |      |      |  |       |                    |                       |
| July         |              |      |      |      |       |                    | 75.6                  | 96           | 51   | S.   |  | .10   |                    |                       |
| August       | 71.3         | 94   | 54   | W.   | .12   |                    | 75.6                  | 93           | 61   | S.W. |  | .28   |                    |                       |
| September    | 65.4         | 90   | 37   | N.W. | .00   |                    | 62.4                  | 88           | 52   | S.W. |  | .56   |                    |                       |
| October      | 51.0         | 77   | 28   | S.   | .20   |                    | 49.3                  | 71           | 29   | S.W. |  | .16   |                    |                       |
| November     | 43.1         | 72   | 25   | S.   | .76   |                    | 37.3                  | 59           | 26   | W.   |  | .72   |                    |                       |
| December     | 35.4         | 47   | 19   | S.   | 1.16  |                    | 52.7                  | 55           | 9    | S.W. |  | 1.64  |                    |                       |
| January      | 32.4         | 51   | 15   | N.   | 2.40  |                    | 10.2                  | 40           | — 18 | N.   |  | .70   |                    |                       |
| February     | 31.3         | 48   | 12   | N.   | .96   |                    | 14.9                  | 43           | — 18 | N.   |  | .08   |                    |                       |
| March        | 26.6         | 51   | 0    | N.   | 1.34  |                    | 33.3                  | 58           | 14   | W.   |  | .80   |                    |                       |
| April        |              |      |      |      |       |                    | 42.7                  | 69           | 30   | W.   |  | 1.20  |                    |                       |
| May          | 59.3         | 77   | 43   | S.   | .00   |                    | 52.8                  | 83           | 30   | N.W. |  | .50   |                    |                       |
| June         | 68.6         | 92   | 44   | S.   | .12   |                    | 61.9                  | 85           | 35   | S.   |  | .82   |                    |                       |
| For the year | 48.4         | 94   | 0    | S.   | 7.06  |                    | 47.4                  | 96           | — 18 | S.W. |  | 7.56  |                    |                       |
|              | 1868-69.     |      |      |      |       |                    | 1869-70.              |              |      |      |  |       |                    |                       |
| July         | 71.2         | 95   | 50   | S.W. | .00   |                    | 73.1                  | 94           | 51   | S.W. |  | .14   |                    |                       |
| August       | 71.8         | 93   | 57   | W.   | .00   |                    | 71.0                  | 97           | 50   | S.W. |  | .02   |                    |                       |
| September    | 61.6         | 87   | 45   | W.   | .04   |                    | 60.7                  | 85           | 36   | S.W. |  | .90   |                    |                       |
| October      | 53.3         | 79   | 28   | S.W. | .01   |                    | 50.5                  | 78           | 31   | W.   |  | .00   |                    |                       |
| November     | 40.3         | 66   | 19   | S.   | .16   |                    | 43.0                  | 74           | 24   | S.W. |  | 2.37  |                    |                       |
| December     | 35.0         | 65   | 16   | S.W. | 1.80  |                    | 31.4                  | 57           | 10   | S.   |  | 2.30  |                    |                       |
| January      | 32.1         | 51   | 10   | N.W. | 3.80  |                    | 31.6                  | 55           | 2    | S.W. |  | 2.71  |                    |                       |
| February     | 30.8         | 44   | 5    | S.   | .08   |                    | 35.9                  | 61           | 6    | S.   |  | 2.30  |                    |                       |
| March        | 41.0         | 67   | 23   | S.   | 1.40  |                    | 35.7                  | 63           | 4    | S.W. |  | 1.60  |                    |                       |
| April        | 49.6         | 85   | 30   | S.W. | .96   |                    | 49.7                  | 78           | 18   | S.W. |  | 1.41  |                    |                       |
| May          | 60.4         | 87   | 41   | S.W. | .14   |                    | 58.4                  | 91           | 27   | S.W. |  | 1.43  |                    |                       |
| June         | 70.8         | 97   | 54   | S.W. | .04   |                    | 64.9                  | 89           | 33   | W.   |  | .68   |                    |                       |
| For the year | 51.5         | 97   | 5    | S.W. | 8.43  |                    | 50.5                  | 97           | 2    | S.W. |  | 15.86 |                    |                       |
|              | 1870-71.     |      |      |      |       |                    | 1871-72.              |              |      |      |  |       |                    |                       |
| July         | 76.4         | 96   | 44   | S.   | .76   |                    | 72.9                  | 92           | 43   | W.   |  | .76   |                    |                       |
| August       | 74.2         | 99   | 38   | S.   | .05   |                    | 72.9                  | 91           | 39   | W.   |  | .02   |                    |                       |
| September    | 64.8         | 88   | 33   | S.W. | .00   |                    | 61.6                  | 84           | 28   | W.   |  | .40   |                    |                       |
| October      | 49.4         | 79   | 22   | S.W. | .03   |                    | 49.4                  | 79           | 22   | S.W. |  | .20   |                    |                       |
| November     | 39.1         | 67   | 21   | S.W. | 1.05  |                    | 35.8                  | 61           | 15   | S.W. |  | 1.58  |                    |                       |
| December     | 21.7         | 47   | — 8  | S.W. | 4.55  |                    | 35.1                  | 53           | 12   | S.W. |  | 3.25  |                    |                       |
| January      | 31.3         | 46   | 5    | S.   | 1.22  |                    | 31.2                  | 50           | 7    | S.W. |  | 1.16  |                    |                       |
| February     | 33.7         | 52   | 17   | W.   | .92   |                    | 37.4                  | 56           | 7    | S.W. |  | 3.97  |                    |                       |
| March        | 37.0         | 58   | 4    | W.   | 1.00  |                    | 40.2                  | 60           | 21   | S.W. |  | 1.32  |                    |                       |
| April        | 45.0         | 70   | 9    | W.   | .00   |                    | 40.5                  | 68           | 19   | S.   |  | .77   |                    |                       |
| May          | 50.8         | 84   | 22   | W.   | 1.94  |                    | 57.6                  | 82           | 28   | S.   |  | 1.82  |                    |                       |
| June         | 70.2         | 94   | 31   | W.   | .16   |                    | 67.7                  | 89           | 40   | S.   |  | .06   |                    |                       |
| For the year | 49.5         | 99   | — 8  | W.   | 11.68 |                    | 50.2                  | 92           | 7    | S.W. |  | 15.31 |                    |                       |

## METEOROLOGICAL REPORT OF FORT BIDWELL—Continued.

| MONTHS.            | TEMPERATURE. |      |      | Prevailing Wind | Rainfall in Inches | TEMPERATURE. |      |      | Prevailing Wind | Rainfall in Inches |
|--------------------|--------------|------|------|-----------------|--------------------|--------------|------|------|-----------------|--------------------|
|                    | Mean.        | Max. | Min. |                 |                    | Mean.        | Max. | Min. |                 |                    |
|                    | 1872-73.     |      |      |                 |                    | 1873-74.     |      |      |                 |                    |
| July .....         | 70.5         | 93   | 38   | S.              | .00                | 73.8         | 96   | 43   | S.              | .14                |
| August .....       | 69.2         | 93   | 45   | S.              | .26                | 70.7         | 94   | 38   | S.              | .21                |
| September .....    | 56.9         | 83   | 29   | S.              | 1.18               | 61.5         | 85   | 24   | S.              | .40                |
| October .....      | 50.8         | 75   | 27   | S.              | .46                | 44.8         | 76   | 12   | S.              | .63                |
| November .....     | 32.1         | 52   | 9    | S.              | 1.69               | 40.2         | 57   | 20   | S.              | 1.14               |
| December .....     | 32.1         | 46   | 7    | S.              | 1.94               | 24.8         | 41   | -15  | S.              | 3.29               |
| January .....      | 35.4         | 50   | 15   | S.              | 2.22               | 27.7         | 48   | 5    | N.              | 1.51               |
| February .....     | 27.8         | 42   | 4    | S.              | 1.66               | 25.1         | 49   | 1    | S.              | 1.07               |
| March .....        | 41.2         | 67   | 13   | S.              | .60                | 30.8         | 50   | 9    | S.              | 1.05               |
| April .....        | 42.5         | 72   | 15   | S.              | 2.06               | 43.8         | 67   | 25   | S.              | 1.12               |
| May .....          | 51.5         | 80   | 27   | S.              | .78                | 55.4         | 80   | 30   | S.              | .64                |
| June .....         | 64.1         | 85   | 32   | S.              | .10                | 59.1         | 86   | 34   | S.              | 1.06               |
| For the year ..... | 47.8         | 93   | 4    | S.              | 12.95              | 46.5         | 96   | -15  | S.              | 12.26              |
|                    | 1874-75.     |      |      |                 |                    | 1875-76.     |      |      |                 |                    |
| July .....         | 75.5         | 95   | 48   | S.              | .05                | 74.7         | 94   | 41   | W.              | .00                |
| August .....       | 57.0         | 86   | 45   | S.              | .27                | 72.3         | 92   | 39   | W.              | .05                |
| September .....    | 61.0         | 85   | 31   | S.              | .00                | 65.2         | 87   | 39   | W.              | .00                |
| October .....      | 51.1         | 76   | 26   | S.              | .37                | 59.2         | 87   | 32   | S.              | 1.80               |
| November .....     | 36.3         | 51   | 16   | S.              | 1.37               | 38.4         | 65   | 25   | S.W.            | 2.62               |
| December .....     | 30.2         | 52   | 10   | S.              | .13                | 37.2         | 61   | 20   | S.              | 1.54               |
| January .....      | 26.9         | 43   | -4   | S.              | 2.10               | 30.0         | 63   | 2    | S.              | 1.88               |
| February .....     | 28.4         | 46   | 0    | S.              | .07                | 34.8         | 76   | 12   | S.              | .32                |
| March .....        | 33.6         | 55   | 18   | W.              | 2.15               | 38.8         | 80   | 9    | W.              | .80                |
| April .....        | 50.7         | 78   | 12   | W.              | .45                | 50.4         | 80   | 18   | W.              | .53                |
| May .....          | 55.1         | 75   | 30   | W.              | 1.30               | 54.0         | 80   | 25   | S.E.            | .98                |
| June .....         | 63.1         | 88   | 29   | W.              | 1.00               | 67.3         | 97   | 33   | S.              | .43                |
| For the year ..... | 47.4         | 95   | -4   | S.              | 9.26               | 51.7         | 97   | 2    | W.              | 10.95              |
|                    | 1876-77.     |      |      |                 |                    | 1877-78.     |      |      |                 |                    |
| July .....         | 67.4         | 100  | 39   | S.W.            | .11                | 72.0         | 96   | 46   | W.              | .10                |
| August .....       | 61.2         | 90   | 38   | S.              | .00                | 69.3         | 95   | 42   | W.              | .35                |
| September .....    | 62.2         | 91   | 39   | S.              | .00                | 61.6         | 91   | 40   | W.              | .10                |
| October .....      | 49.4         | 87   | 20   | S.              | 3.48               | 51.9         | 80   | 20   | S.W.            | .80                |
| November .....     | 32.0         | 56   | 12   | S.              | 4.32               | 44.7         | 66   | 27   | W.              | 3.03               |
| December .....     | 26.0         | 54   | 5    | N.              | .25                | 33.9         | 57   | -2   | S.W.            | .35                |
| January .....      | 26.4         | 65   | -10  | N.              | 2.00               | 29.6         | 45   | -4   | S.W.            | .75                |
| February .....     | 38.0         | 69   | 13   | S.              | 3.30               | 35.7         | 53   | 16   | S.W.            | 4.65               |
| March .....        | 43.2         | 80   | 18   | S.              | 3.28               | 45.1         | 70   | 20   | S.W.            | 2.35               |
| April .....        | 47.0         | 82   | 26   | S.              | 2.14               | 48.9         | 79   | 25   | S.W.            | 1.05               |
| May .....          | 50.7         | 80   | 32   | S.              | 4.66               | 55.4         | 83   | 30   | S.              | .82                |
| June .....         | 60.8         | 87   | 38   | S.              | 2.00               | 68.1         | 90   | 40   | W.              | .20                |
| For the year ..... | 47.2         | 100  | -10  | S.              | 25.54              | 51.3         | 96   | -4   | S.W.            | 14.45              |

## METEOROLOGICAL REPORT OF FORT BIDWELL—Continued.

| MONTHS.      | TEMPERATURE. |      |      |         |       | Prevailing Wind | Rainfall in Inches | TEMPERATURE. |      |      |  |       | Prevailing Wind | Rainfall in Inches |
|--------------|--------------|------|------|---------|-------|-----------------|--------------------|--------------|------|------|--|-------|-----------------|--------------------|
|              | Mean.        | Max. | Min. |         |       |                 |                    | Mean.        | Max. | Min. |  |       |                 |                    |
|              | 1878-79.     |      |      |         |       |                 |                    | 1879-80.     |      |      |  |       |                 |                    |
| July         | 71.9         | 93   | 41   | S.      | .25   |                 | 71.8               | 96           | 41   | W.   |  | .30   |                 |                    |
| August       | 73.9         | 96   | 44   | W.      | .37   |                 | 73.8               | 99           | 45   | S.   |  | .30   |                 |                    |
| September    | 61.0         | 89   | 36   | W.      | .70   |                 | 65.6               | 91           | 34   | S.   |  | .10   |                 |                    |
| October      | 50.4         | 78   | 22   | W.      | .30   |                 | 50.9               | 77           | 28   | W.   |  | .63   |                 |                    |
| November     | 42.8         | 66   | 18   | S.      | .25   |                 | 41.7               | 70           | 17   | S.   |  | 1.00  |                 |                    |
| December     | 32.0         | 57   | 6    | S.      | .20   |                 | 30.4               | 59           | —8   | S.W. |  | .95   |                 |                    |
| January      | 30.0         | 67   | 0    | S.W.    | 1.00  |                 | 31.2               | 60           | 1    | S.W. |  | 1.20  |                 |                    |
| February     | 41.1         | 61   | 15   | S.      | 2.86  |                 | 31.6               | 54           | 6    | S.   |  | 1.10  |                 |                    |
| March        | 46.1         | 84   | 22   | W.      | .95   |                 | 42.7               | 63           | 17   | S.   |  | .86   |                 |                    |
| April        | 50.6         | 77   | 26   | S.      | .90   |                 | 47.3               | 72           | 24   | S.   |  | 2.96  |                 |                    |
| May          | 49.2         | 76   | 31   | S.W.    | 1.40  |                 | 49.9               | 77           | 31   | S.   |  | 2.76  |                 |                    |
| June         | 62.5         | 90   | 38   | S.W.    | .15   |                 | 65.4               | 85           | 40   | S.   |  | .26   |                 |                    |
| For the year | 50.9         | 96   | 0    | S. & W. | 9.33  |                 | 50.2               | 99           | —8   | S.   |  | 12.42 |                 |                    |
|              | 1880-81.     |      |      |         |       |                 |                    | 1881-82.     |      |      |  |       |                 |                    |
| July         | 73.2         | 91   | 45   | S.      | .72   |                 | 71.7               | 95           | 48   | S.W. |  | .32   |                 |                    |
| August       | 69.9         | 89   | 41   | S.      | .42   |                 | 72.2               | 97           | 44   | S.W. |  | .10   |                 |                    |
| September    | 65.7         | 86   | 38   | S.      | .05   |                 | 64.7               | 90           | 42   | S.W. |  | .24   |                 |                    |
| October      | 57.8         | 78   | 26   | S.      | .50   |                 | 49.2               | 79           | 24   | S.W. |  | 3.55  |                 |                    |
| November     | 37.5         | 67   | 14   | N.      | .56   |                 | 41.2               | 65           | 22   | S.W. |  | 2.87  |                 |                    |
| December     | 38.8         | 66   | 20   | S.      | 1.83  |                 | 37.9               | 63           | 18   | S.W. |  | 3.40  |                 |                    |
| January      | 34.9         | 64   | 21   | S.      | 2.18  |                 | 33.9               | 64           | 4    | S.W. |  | 3.44  |                 |                    |
| February     | 41.8         | 68   | 16   | S.W.    | 2.40  |                 | 26.4               | 49           | —12  | S.W. |  | 2.82  |                 |                    |
| March        | 44.5         | 75   | 22   | N.W.    | .75   |                 | 37.3               | 64           | 20   | S.W. |  | 1.46  |                 |                    |
| April        | 55.9         | 80   | 35   | S.W.    | 3.02  |                 | 45.9               | 75           | 26   | S.W. |  | 1.72  |                 |                    |
| May          | 62.0         | 87   | 34   | W.      | 1.78  |                 | 56.0               | 82           | 29   | S.W. |  | .64   |                 |                    |
| June         | 65.4         | 90   | 39   | S.W.    | 1.59  |                 | 65.5               | 85           | 36   | W.   |  | .38   |                 |                    |
| For the year | 53.9         | 91   | 14   | S.      | 15.80 |                 | 50.1               | 97           | —12  | S.W. |  | 20.94 |                 |                    |
|              | 1882-83.     |      |      |         |       |                 |                    | 1883-84.     |      |      |  |       |                 |                    |
| July         | 73.4         | 92   | 36   | W.      | .16   |                 | 73.8               | 90           | 50   | N.W. |  | .00   |                 |                    |
| August       | 72.1         | 93   | 44   | W.      | .00   |                 | 69.0               | 87           | 43   | N.W. |  | .00   |                 |                    |
| September    | 61.9         | 85   | 34   | W.      | .48   |                 | 65.6               | 85           | 42   | N.W. |  | .00   |                 |                    |
| October      | 46.1         | 68   | 24   | W.      | 2.73  |                 | 47.8               | 76           | 27   | N.W. |  | 1.18  |                 |                    |
| November     | 35.4         | 62   | 8    | N.W.    | .92   |                 | 42.4               | 68           | 13   | N.W. |  | 1.14  |                 |                    |
| December     | 37.8         | 70   | —1   | W.      | 3.03  |                 | 38.0               | 71           | 18   | N.W. |  | 1.06  |                 |                    |
| January      | 29.4         | 54   | —18  | W.      | 2.04  |                 | 33.6               | 56           | 5    | N.W. |  | 1.14  |                 |                    |
| February     | 28.8         | 57   | —9   | N.W.    | .64   |                 | 31.0               | 68           | —19  | N.W. |  | 2.96  |                 |                    |
| March        | 49.3         | 76   | 27   | W.      | .76   |                 | 37.4               | 63           | 15   | N.W. |  | .72   |                 |                    |
| April        | 44.6         | 67   | 22   | W.      | 1.56  |                 | 44.2               | 77           | 28   | S.W. |  | .68   |                 |                    |
| May          | 55.6         | 78   | 27   | N.W.    | 1.30  |                 | 56.6               | 77           | 28   | N.W. |  | .40   |                 |                    |
| June         | 66.7         | 87   | 41   | N.W.    | .00   |                 | 58.4               | 81           | 37   | N.W. |  | 4.29  |                 |                    |
| For the year | 50.2         | 93   | —18  | W.      | 13.62 |                 | 49.8               | 90           | —19  | N.W. |  | 13.57 |                 |                    |

## METEOROLOGICAL REPORT OF FORT BIDWELL—Continued.

| MONTHS.            | TEMPERATURE. |      |      | Prevailing<br>Wind | Rainfall in<br>Inches | TEMPERATURE. |      |      | Prevailing<br>Wind | Rainfall in<br>Inches |
|--------------------|--------------|------|------|--------------------|-----------------------|--------------|------|------|--------------------|-----------------------|
|                    | Mean.        | Max. | Min. |                    |                       | Mean.        | Max. | Min. |                    |                       |
|                    | 1884-85.     |      |      |                    |                       | 1885-86.     |      |      |                    |                       |
| July .....         | 63.9         | 82   | 41   | N.W.               | .40                   | 70.6         | 90   | 49   | N.                 | .38                   |
| August .....       | 70.0         | 88   | 43   | N.W.               | .08                   | 72.4         | 94   | 53   | S.                 | .00                   |
| September .....    | 53.7         | 77   | 30   | N.W.               | 1.55                  | 64.0         | 88   | 33   | S.                 | .09                   |
| October .....      | 52.8         | 78   | 25   | N.W.               | .73                   | 57.6         | 86   | 28   | W.                 | .41                   |
| November .....     | 46.2         | 70   | 29   | N.W.               | .00                   | 41.1         | 74   | 20   | W.                 | 1.28                  |
| December .....     | 38.8         | 58   | 2    | N.                 | 4.10                  | 32.2         | 69   | 15   | W.                 | 1.05                  |
| January .....      | 35.7         | 57   | 3    | N.                 | 1.06                  | 32.2         | 55   | — 2  | S.                 | 5.91                  |
| February .....     | 53.2         | 66   | 21   | N.                 | 2.66                  | 42.8         | 64   | 21   | W.                 | 1.22                  |
| March .....        | 46.7         | 75   | 20   | N.                 | .12                   | 41.0         | 70   | 24   | N.W.               | .78                   |
| April .....        | 51.4         | 75   | 31   | N.                 | 3.45                  | 44.9         | 72   | 27   | S.W.               | 2.20                  |
| May .....          | 56.6         | 90   | 30   | N.                 | 1.99                  | 56.4         | 85   | 21   | S.W.               | 1.44                  |
| June .....         | 57.8         | 92   | 35   | N.                 | 2.78                  | 65.3         | 92   | 33   | W.                 | .78                   |
| For the year ..... | 52.5         | 92   | 2    | N. &<br>N.W.       | 18.92                 | 51.7         | 94   | — 2  | W.                 | 15.54                 |

NOTE.—The mean is from the standard thermometer. The maximum and minimum observations are made with self-registering thermometers.

TABLE No. 2.

*Showing the Mean Temperature of each Month for Twenty Years.*

|                 |      |                |      |
|-----------------|------|----------------|------|
| July .....      | 72.3 | January .....  | 30.3 |
| August .....    | 70.5 | February ..... | 33.5 |
| September ..... | 62.3 | March .....    | 39.7 |
| October .....   | 51.1 | April .....    | 47.1 |
| November .....  | 39.5 | May .....      | 55.2 |
| December .....  | 34.1 | June .....     | 64.7 |
| Mean .....      |      |                | 50.3 |



TABLE No. 3.

Showing the Mean Temperature at 7 A. M., 3 P. M., and 11 P. M.; the Greatest Daily and Monthly Ranges of Temperature, and the Monthly Mean Dewpoint and Humidity for each Month in the Year.

|                        | 1886. |        |           |         |          |          |         |          |       |       |      |      |              |
|------------------------|-------|--------|-----------|---------|----------|----------|---------|----------|-------|-------|------|------|--------------|
|                        | 1885. |        |           |         |          |          | 1886.   |          |       |       |      |      |              |
|                        | July  | August | September | October | November | December | January | February | March | April | May  | June | For the Year |
| 7 A. M.                | 49.8  | 43.7   | 39.5      | 38.6    | 34.7     | 31.2     | 25.4    | 33.4     | 29.0  | 35.2  | 44.3 | 51.4 | 39.5         |
| 3 P. M.                | 86.2  | 87.7   | 72.7      | 68.5    | 42.6     | 39.5     | 34.6    | 46.5     | 40.6  | 47.6  | 61.5 | 69.5 | 58.1         |
| 11 P. M.               | 71.4  | 71.1   | 56.4      | 52.4    | 38.4     | 35.5     | 30.3    | 40.6     | 33.4  | 42.7  | 54.9 | 62.7 | 49.4         |
| Greatest daily range   | 52.0  | 62.0   | 52.0      | 50.0    | 28.0     | 25.0     | 27.0    | 31.0     | 33.0  | 35.0  | 37.0 | 37.0 | 62.0         |
| Greatest monthly range | 56.0  | 67.0   | 63.0      | 67.0    | 44.0     | 42.0     | 55.0    | 48.0     | 49.0  | 42.0  | 62.0 | 54.0 | 67.0         |
| Dewpoint               | 50.1  | 47.2   | 39.9      | 29.5    | 33.3     | 30.9     | 25.8    | 28.7     | 25.3  | 28.7  | 30.6 | 33.0 | 33.6         |
| Humidity               | 51.0  | 48.4   | 24.1      | 41.5    | 82.4     | 83.7     | 83.7    | 64.5     | 66.7  | 62.0  | 45.7 | 38.2 | 57.7         |

TABLE No. 4.

This Table shows the Prevailing Wind, Direction, and Average Hourly Velocity (in miles and tenths) at 7 A. M., 3 P. M., and 11 P. M., for each Month in the Year 1885 and 1886.

|          | 1885. |        |           |         |          |          |         |          |       |       |       |       |              |
|----------|-------|--------|-----------|---------|----------|----------|---------|----------|-------|-------|-------|-------|--------------|
|          | 1885. |        |           |         |          |          | 1886.   |          |       |       |       |       |              |
|          | July  | August | September | October | November | December | January | February | March | April | May   | June  | For the Year |
| 7 A. M.  | N 3.4 | N 3.5  | W 3.2     | NW 2.0  | S 4.1    | W 3.8    | W 3.5   | W 3.8    | W 5.6 | W 4.5 | W 3.9 | W 4.0 | W 3.8        |
| 3 P. M.  | S 6.7 | S 5.0  | S 6.7     | S 4.4   | S 5.9    | S 5.0    | S 5.9   | S 6.4    | S 8.4 | S 8.4 | S 6.9 | S 7.0 | S 6.4        |
| 11 P. M. | S 6.8 | N 6.1  | W 6.4     | W 4.6   | S 4.9    | W 4.2    | W 5.5   | W 4.9    | W 5.2 | W 5.4 | W 6.1 | W 6.5 | W 5.6        |

TABLE No. 5.

Showing the Number of Clear, Fair, and Cloudy Days, and the Number of Days on which Rain Fell during each Month in the Year.

|                               | 1885. |        |           |         |          |          | 1886.   |          |       |       |     |      |
|-------------------------------|-------|--------|-----------|---------|----------|----------|---------|----------|-------|-------|-----|------|
|                               | July  | August | September | October | November | December | January | February | March | April | May | June |
| Number of clear days.....     | 24    | 26     | 23        | 13      | 1        | 9        | 7       | 13       | 10    | 12    | 12  | 19   |
| Number of fair days.....      | 4     | 4      | 6         | 15      | 8        | 13       | 11      | 12       | 12    | 5     | 10  | 7    |
| Number of cloudy days.....    | 3     | 1      | 1         | 3       | 21       | 9        | 13      | 3        | 9     | 13    | 9   | 4    |
| Number of days rain fell..... | 5     | 2      | 2         | 5       | 24       | 11       | 20      | 10       | 10    | 14    | 10  | 6    |

#### IV. REPORT ON THE DISEASES OF SURPRISE AND GOOSE LAKE VALLEYS.

*Cholera infantum*.—My six years experience in this section leads me to believe that this affection is comparatively infrequent. I have observed a few sporadic cases during the months of July, August, and September, affecting especially bottle-fed children during the period of dentition; most of the cases are of a mild type, only one death due to cerebral complications. Dr. Patterson writes: "Cholera infantum is perhaps of average frequency, but I think of less than ordinary gravity. I cannot recall a fatal case in my practice. Cholera morbus and diarrhœa might be answered in the same words, and dysentery is unknown to me in practice here."

*Cholera morbus* is rarely met with, at least medical advice is seldom sought. I have observed it only in July, August, and September, and have been able to trace it generally to a large consumption of green apples, or some similar indiscretion.

*Diarrhœa* and *Dysentery*, especially the former, prevail to a considerable extent during the Summer months. The records of the post hospital show, that during the past sixteen years, two hundred and fifty-seven cases, or 15.6 per cent of the total number of diseases treated, were reported under this head. During the Summer months, especially in a dry mountain climate, the days are often excessively hot, the thermometer rising to 98° Fah. and higher in the shade, while the nights are always cool, and frequently chilly. Improper and insufficient clothing and exposure of the surface of the body to the chilly night air, is alone sufficient to account for these catarrhal affections. The influence of the fruit season and greater alkalinity of the water due to a lower stage, furnish additional causes.

*Smallpox* has not yet visited this locality. Should the community be infected at any time, I predict a serious epidemic, as the neglect to have the children vaccinated is widespread and simply shameful in this enlightened age.

*Measles*.—I have known of only a few sporadic cases prior to last February; they were all of a mild type, and no case resulted fatally. In February, March, and April of 1886 the disease assumed the proportion of an epidemic, affecting nearly every family in the locality. The disease was carried here from Susanville and other infected localities southwest from here. I treated over one hundred cases among the white population,

and many of the milder cases were treated by attentive mothers. There were no deaths and the disease disappeared completely in April. The poor Piute Indians fared very differently. The disease invaded their camp and attacked about ninety of their tribe, and at least seventeen men, women, and children perished from the disease. At the end of March I wrote: "If any evidence was needed to show the importance of general and individual hygiene on the influence of disease, it is illustrated by this fact, that while there was no death from measles among sixty-five whites attacked, in thirty cases occurring among the Indians, six—three adults and three children—or one in five, have thus far died. This condition is nowise due to imprudent treatment on the part of their medicine men, as they are not active, and most of the cases had received treatment at my hands." At the time I was inclined to attribute this frightful mortality to bad general and individual hygiene, exposure to inclement weather, and the irritating effects of their smoky habitations, but other factors may have determined the fatality. Dr. Patterson's experience is stated as follows: "In 1874 had some fifteen or twenty cases. In 1885 and 1886 there were probably two hundred and fifty cases from Lake City to lower end of the valley. The origin of the first epidemic, if it deserves the name, was clearly traceable to a family of immigrants, who brought the disease with them from the emigrant train on which they crossed the continent. Last epidemic appeared here by extension from the west, taking in everything as it traveled. Number of deaths, none in first, two in second (only one in my practice, however)."

*Scarlatina.*—In the Fall of 1880 I observed a few sporadic cases, whilst an epidemic was raging in the lower end of the valley, at or below Cedarville. The cases in this section were of a mild type, and yielded readily to treatment. In April, May, and July, 1885, the disease again appeared in a mild form. I treated twenty-four cases. There were no deaths, and only three of the cases presented serious complications. In April, 1886, a few cases occurred. The disease prevailed more extensively in and around Cedarville and Alturas. Two of my cases were brought here for treatment from Goose Lake Valley, infected from Alturas. Fortunately a strict quarantine prevented spreading of the disease. In the month of May two cases occurred, which were quite remarkable. Two young men, who had measles in March, returned after their convalescence to Warner Valley, Oregon, and remained at work for nearly a month, when they were brought to town with well developed scarlet fever. No other cases existed at the time in Warner, and there was no evidence of direct or indirect transmission.

Dr. Patterson writes:

Two epidemics of scarlet fever, one in 1880-1881, in which there were some twenty to twenty-five cases, with six deaths, five occurring in the practice of Dr. L. H. Kent and one in mine. Dr. Kent was unfortunate enough to have nearly all the cases occurring in families where the sanitary conditions were peculiarly unfavorable, and these seemed largely to determine the mortality. Origin unknown.

*Second epidemic* was that just passed in 1885-1886, in all probably forty cases (thirty-one of positive diagnosis, the others not typical cases, but believed to be due to the specific poison of scarlet fever). *Number of deaths* in my practice, two. There was a death in a case I never saw, but which I had reason to think was due to scarlet fever. Origin, brought from Alturas by the Boydston family.

In this epidemic, as in the other, the mortality was confined to the cases in which the sanitary conditions were bad. Both cases of mine occurred in French families, where the parents were poor and ignorant. Then, too, the boys had, just after great indiscretions in diet at the New Year holiday season, exposed themselves, while much heated by labor, to extreme cold by sitting down to rest in the snow, and then breaking through ice into the water below. As might be expected, the disease was in each case characterized by very malignant sore throat and high temperature. One boy died before the eruption appeared—the other shortly after.

*Diphtheria.*—In the medical history of the post for April, 1878, I find the following remarks: "There were many cases of diphtheria on the west side of the mountains (Pitt River Valley and Alturas), and numerous deaths therefrom during February and March. The disease did not appear in this valley until April first, six miles beyond Cedarville. It became more common in and around Cedarville, twenty-five miles from here. By the end of April the disease died out without affecting this locality, notwithstanding daily communication."

During my service here, I have observed the disease only twice, once in the Autumn of 1883, and again last May, confined in both instances to a single family. In September, 1883, it occurred in the household of a well to do farmer, who had erected a few years before a new dwelling, on a gravelly spot formerly used as a corral, little suspecting that the excrementitious matter had for years permeated and polluted the soil, and thus prepared a hotbed for disease germs. In the Fall of 1879 two cases of typhoid fever occurred in this family, affecting the father and his brother. There was only one child then in the family. In September of 1883 three of the children were affected with diphtheria, and subsequently the entire family. One of the children died from laryngeal complication. Another patient also afforded a striking illustration of the constitutional character of the disease. He was suffering at the time from a lacerated wound of the right hand, and the wound, simultaneously with the fauces, was covered with a diphtheritic membrane. The inhabitants of this house are well to do, intelligent, and cleanly, and there was no room to assume immediate or mediate contagion, unless the disease prevailed among the fowl. This family always had a larger amount of sickness than others, without apparent cause. The well was close to the house, and at least one hundred and fifty feet from the privy. Upon inquiry as to the nature of the site, etc., I was informed of its original use as a corral, cow shed, and hog pen. In view of all the circumstances, the occurrence of typhoid fever and diphtheria in this family can reasonably be connected with a local cause, viz., the water supply. There is nothing improbable in the assumption, that the animal refuse matter permeated the gravelly soil for a considerable depth, and with the recession of the subsoil water, the warm air of July and August entered the deeper layers of the soil and stimulated into activity, if not existence, disease germs which finally percolated into the well, in consequence of artificial irrigation. I am aware that it is the opinion of excellent authorities that a disease like diphtheria is incapable of originating *de novo* from defective drainage, soil pollution, atmospheric, or telluric influences, but that it is propagated by a *particulate* germ. To all such arguments I have but one answer, and that is, disease germs must have had an origin some time and somewhere. The occurrence of two so called filth diseases in a family without evidence of direct transmission of the disease, would indicate, at least, that the same soil and condition are capable of developing different disease germs. Of course neither the microscope nor chemical analysis can be invoked to demonstrate to the masses the presence of these germs, very much less of a specific germ, but that such subtle poisons do exist and are being evolved by unsanitary surroundings, the facts plainly indicate, and the amount of money expended by this family for professional services, together with the amount lost by reason of sickness, would have been sufficient to erect a new dwelling in a location not contaminated in the manner indicated.

Dr. Patterson's account of the epidemic of 1878 is very complete and pregnant with valuable facts. He writes:

Have seen quite a number of sporadic cases of diphtheritic sore throat, but only one epidemic of the typical disease, which was in 1878.

*Origin:* To me the evidence is almost conclusive that in this case the poison emanated from the large body of swamp land on the South Fork of Pitt River lying to the south and southeast of Alturas. In this county the wind but rarely blows in any other direction than from the south and west. Having premised these facts, let me enumerate from memory (my records of the epidemic having been destroyed by fire) some of the other facts which to me appear to support this theory:

*First*—Not a single case appeared to the windward of the swamp.

*Second*—Almost every child, and many of the adults living in Pitt River Valley to the leeward of the swamp, were stricken with the disease in February, March, or April of that year.

*Third*—The virulence of the disease was in direct ratio to the proximity to the swamp and the exposure to the emanations therefrom, modified, of course, by individual characteristics of the patient, and by his other surroundings.

To the northeast of the swamp, which is quite extensive, are three cañons or gaps in the Warner Range of mountains, separating Pitt River Valley from the lower end of Surprise Valley, by which the southwest winds passing over the surface of the swamp would reach the latter valley. (For verification see meteorological table.—G. M. K.) At the mouths of these cañons, and *there only*, in Surprise Valley, mild cases of diphtheria appeared toward the close of the epidemic, which was raging on the other side of the mountain range. The disease in Surprise Valley was *confined exclusively* to the families near the mouths of these cañons. In the town of Cedarville the only families affected were the two that lived directly at the mouth of the cañon, and at the mouth of each of the other cañons the one family nearest to it was the only one that suffered. (It may be well to add that none of these cañons are passable for ordinary travel except the Cedarville Pass.—G. M. K.) In all, there were thirteen cases in Surprise Valley, with no fatalities. On the Pitt River side there were, I think, twenty-one deaths among those in the immediate vicinity of the swamp, and none among the many cases at a distance of over one mile from it.

*Fourth*—The season was what we here style an "open winter," with considerable rain in February and March. The epidemic subsided shortly after the cessation of the rains, to reappear as shown in the following subdivision. (See meteorological tables.—G. M. K.)

*Fifth*—In confirmation of the theory that the disease may and does originate in decomposing vegetable matter, I give this incident of the epidemic: Mr. William Combs, proprietor of the "Combs Hotel" at Alturas, sought my advice as to how he might best protect his children from attack, it being almost impossible for him to remove them from home at that time. Acting on my suggestion, he abandoned the family rooms on the ground floor, and occupied instead the parlor and adjoining room on the second floor. His family escaped attack until June, when a great freshet occurred, causing Pitt River to overflow its banks and inundate the town site, filling all the cellars, wells, and privy vaults. His family had meantime returned to the family quarters directly over a cellar, now filled with water and decaying vegetables, which latter had been stored there while fresh for hotel use, but were now carelessly allowed to remain. Both of his children died of diphtheria, and all the adult members of his family were attacked by it, while none of the persons inhabiting other portions of the house were affected. The disease at that time was confined to those who lived immediately over the cellar mentioned, notwithstanding the very unfavorable sanitary conditions which then prevailed throughout the town.

From my sad experience in that epidemic, I cannot but believe that one cause of diphtheria is an emanation from decomposing vegetable matter. That there are other sources from which the diphtheritic poison originates, I do not doubt. My experience of the disease may be said to be confined to this epidemic.

*Croup, Membranous.*—I have seen but three cases of membranous croup in this country, two of these in connection with diphtheria in the family referred to. I do not pretend to be able to differentiate between diphtheritic and membranous croup, and believe in the unity of these affections. Dr. Patterson writes: "Infrequent in my practice, have had, I believe, two fatalities from it."

*Erysipelas.*—I have noticed quite a number of mild cases of idiopathic erysipelas in this valley, and have been led to the belief that the mountain climate may be a factor in its production. How far its comparative frequency depends upon a sudden arrest of the cutaneous functions, and the passage into the blood of the excretory products of the skin and consequent autochthonous septicæmia, I am unable to say. I have not observed traumatic erysipelas in my hospital practice, and quite rarely among the settlers; the antiseptic dressings employed may exert a salutary influence.

Dr. Patterson observes: "Erysipelas, of the cutaneous variety, rather

frequent, but probably not sufficiently so to deserve mention as being a peculiarity of this climate."

*Malarial affections.*—I find, in looking over my records, that I have reported a number of cases of intermittent and remittent fever—not a very large number, to be sure, but sufficient to attract attention. The number of cases treated among the troops, during a period of sixteen years, was one hundred and thirty-five, or 8.2 per cent of the total number of sick. This, in view of the marshy nature of some of the localities, would indicate that the cool nights of Summer do not favor the development of the bacillus malaria in sufficient numbers to prove a formidable foe. Indeed, my observations have impressed me with the belief that persons afflicted with intermittent fever elsewhere, recover in this climate. Quite a number of soldiers and civilians, although manifesting symptoms of the disease for a few months after their arrival, recovered completely. One case in particular was full of interest to me. The patient came from another locality, and in a few months was entirely free from ague; during the duck hunting season in the Autumn, he visited the tule swamps and returned with a chill; he repeated the visit two or three times, and each time had "one of his old fashioned chills;" finally, at my suggestion, which would have been offered before, only to determine the cause and effect with greater certainty, he avoided the marshes, and has not been affected with this fever since. I was informed by one of the pioneers of this valley that when the company of the Second California Volunteer Cavalry arrived here in July, 1865, a great many of the men were suffering from "chills and fever" contracted in the Sacramento Valley, where the company was mustered in, and that "after a few months they looked like a different set of men."

The few indigenous cases of malarial fever, which I have observed here, occurred in persons living in the low lands; they were by no means typical cases of intermittent or remittent fever, but, nevertheless, due to malarial poisoning. The majority of the cases treated by me were imported. In view of all the facts, as I review them, I consider malarial fevers extremely rare in this region, and the tendency in imported cases is to ultimate recovery.

Dr. Patterson writes: "Malaria, in the restricted sense, is but little felt here."

*Mountain fever (typho-malarial fever).*—In looking over my note books, I find that I have diagnosed a number of my fever cases, as "typho-malarial," and these are the cases commonly spoken of in this section as "mountain fever." I confess, that I experienced for some time considerable hesitation to regard this fever as anything more or less than a manifestation of the typhoid fever poison, but a study of the earlier symptoms especially, suggested a malarial element, which seems to modify the *materies morbi* of typhoid. Whatever the true nature of this mountain fever may be, the clinical picture essentially differs in many symptoms from "enteric" and remittent fever.

The disease is rarely ushered in by a chill, more often by chilly sensations, repeated two or three days in succession; there is always severe headache, occipital and frontal, and a severe aching in almost every part of the body; insomnia, or disturbed sleep, a peculiar furred tongue, sometimes yellowish and again bluish white, with clean red border and tip; not infrequently indications of a slight nasal or pharyngeal catarrh. The fever ranges between 101° and 104°, and in the first stage of the disease especially, shows marked exacerbations and remissions, suggestive of quotidian and remittent fever, and doubtless many of the milder cases are thus reported.

The pulse is usually full and frequent, between ninety and one hundred and ten. Epistaxis and abdominal symptoms in the early stage of the disease, are extremely rare; no eruption on the body, and in the majority of cases, constipation. Herpes febrilis are quite common. When the fever is well established, it continues for four and five weeks, with sudden and marked deviations in the temperature; there is also more sweating in the first stage than is observed in typhoid, and in my earliest experience actually interpreted the chilly sensations, fever and sweat, as symptoms of intermittent. In the graver forms, or protracted cases, abdominal and adynamic symptoms are well marked, but I have never noticed very profound cerebral symptoms.

I am not prepared to speak from personal experience of the anatomical lesions, as I have had no fatal cases. Dr. Hoff's clinical histories, published in the *American Journal of Medical Science*, for January, 1880, accord so closely with my observations, that I am fully prepared to accept his conclusions:

*First*—The fever of the Rocky Mountain region is a hybrid disease, the prominent features of which are typhoid—the modifying, intermittent; is in fact the typho-malarial fever of Woodward.

*Second*—It appears during or after exposure incident to field service, generally, though not necessarily in late Summer and early Autumn, and seems to bear no relation to typhoid infection, as now usually accepted by the profession.

*Third*—At its inception, this disease manifests itself as an intermittent of quotidian, tertian, or other form; this stage is followed (in about two weeks) by the typhoid stage, lasting in the neighborhood of four weeks, in which typical typhoid symptoms may be observed, modified to a greater or less degree by intermittent indications.

*Fourth*—The pathological anatomy of the disease, is that of typhoid fever.

*Fifth*—The treatment should be antiperiodic and antipyretic.

In regard to the origin of the fever, I have a few remarks to offer. In my observations I have been impressed with the fact, that many of the patients describe their feeling in the early stage, as having "caught cold," and there is usually some slight nasal, pharyngeal, or bronchial catarrh, but the constitutional symptoms, not unlike those of "catarrhal fever," are entirely out of proportion to the local affection. Whenever the patients report promptly for treatment, a mild cathartic, a Dover's powder, and five grain doses of quinine three or four times a day will mitigate the symptoms, and, in the majority of cases, arrest the disease; but in persons in the field or on the march, exposed to a hot sun in the day, and the chilly nights of a mountainous region, with no rest or special care, or when medical treatment cannot be at once had, the disease progresses, and after the expiration of two weeks the typhoid stage is reached, and quinine appears to have none but an antipyretic effect. *I have observed the disease in my field service to affect men who were absent for months from permanent settlements, in the uninhabited mountain regions of northern Idaho and south-eastern Nevada, where the presence of the specific germs of enteric fever could hardly be suspected to exist, and the question naturally arises, whence did the germ of typhoid fever originate in these cases?* Two sources have suggested themselves to my mind; one is, that many of our so called pure mountain streams are polluted by beaver dams and large game, not to mention horned cattle and other live stock in some localities traversed. Dr. Charles Smart, of the United States Army (vide *Am. Journal of Medical Science* for June, 1878), has analyzed the water of numerous mountain streams, and demonstrated the presence of a dangerous amount of organic matter, but this very competent observer appears satisfied that it is of vegetable origin, for he remarks: "That the organic matter was vegetable in character, was inferred from the absence of the sodium chloride which is

the invariable accompaniment of animal matter." Be this as it may, I have, within the past few years, drunk water from mountain streams which had a decided "cowy flavor," and as I have seen scores of these animals wading into the streams, my taste has probably not deceived me.

The second source is the possibility of the *materies morbi* being generated within the body, the result of certain changes of the blood, consequent upon the sudden suppression of the function of the skin. We know that this is an efficient cause for the production of numerous diseases, and that the poisonous effect on the blood acts as an irritant sometimes in one and sometimes in another part of the body, usually at the *locus minoris resistentiæ*. When this and the perforating ulcers of the duodenum, which complicate extensive burns, and which according to Curling result from the irritation due to the vicarious action of Brunner's glands in attempting to replace the deficient action of the skin—according to others, directly traceable to the formation of capillary embolism, is remembered, there is nothing unreasonable in the assumption that, in persons otherwise predisposed and subjected for weeks and months to a monotonous and faulty diet, frequent and excessive changes in temperature, and a water supply charged with organic matter, regardless of its origin, a hybrid disease should be developed combining the elements of a *septic* and *malarial* poison, and that the former may be generated within the body.

This may be at variance with the germ theory, although I do not think so, as the "germs" may be the products of the chemical changes of the blood. Many matters remain as yet unexplained. Thus, in surgical pathology, it is held that a septic condition of the wound is due to certain micro-organisms from without, and to exclude and destroy these germs is the object of the antiseptic art; yet we not infrequently see in *subcutaneous injuries* an extravasation of blood undergoing septic decomposition, especially in unhealthy subjects, and the question arises, how did the germs gain access here? The eight cases, or .5 per cent of the sick which occurred among the troops at this post during the past four years, were in recruits from Jefferson Barracks, Missouri, which appears to have been an infecting center of numerous military posts. The men generally arrived here in the second stage. My patients among the civilians were almost exclusively stockmen, who lead essentially an outdoor life, and frequently neglect the simplest rules of health, cleanliness of the body, and clothing.

Of course it is an easy matter, led by speculative considerations, to offer explanations as to the nature of "mountain fever," which fortunately is neither a frequent nor a fatal disease in this section; and whatever the origin of the typhoid element may be, the malarial element is most probably introduced into the system by the water, as my observations alluded to under malarial affections positively argue against the existence of malaria (aeriform) in this region, with the few exceptions pointed out.

It will be observed that the foregoing remarks apply particularly to a class of patients who inhabit, so to speak, a virgin soil, precluding the belief that local causes, such as soil pollution, are present to generate the typhoid element. In settled communities there is no necessity to look for extraordinary causes, such as I have suggested, as filth diseases go hand in hand with increased population.

These causes are fully set forth in the following remarks by Dr. Patterson, who, it will be noticed, has not attempted to separate mountain fever from his cases of enteric fever:

I regard mountain fever as a modification of typhoid, which has been, I think, the cause of more deaths in my practice than any other disease. I cannot approximate with any



precision the number of cases I have treated in this valley. It is certainly in the hundreds, including all the cases—grave and mild, typical and hybrid.

The mortality, I would judge, was about ten per cent. Hemorrhage from the mucous membranes occurred in probably twenty-five per cent of the cases, and in these the mortality was, of course, heavy, perhaps thirty per cent of them dying. These estimates are, of course, too indefinite to be of much value, yet I think they are pretty nearly correct.

The intimate relation observed between low water and typhoid in the epidemic form would naturally suggest the relation of cause and effect.

Low water operates in at least two ways:

*First*—By the concentration of the impurities carelessly allowed to accumulate in wells, and the consequent contamination of the drinking water. This I think the chief cause; the contamination being aggravated by the drainage from strata of soil in the well walls, now exposed to the action of the air, from which they are usually protected by the water. In many cases where wells go entirely dry, or become so foul as to be perceptibly and totally unfit for use, the people resort to the water ditches, which, flowing often in but trickling streams, for long distances through many impurities—corrals, pastures, public highways, cultivated and manured fields—are inevitably impregnated with these impurities.

*Second*—Exposure of the lake beds, with all their impurities, would, were it not for their location to the leeward of the settlements, be another source of the disease, I think, through the agency of malaria. (I use the word in its etymological sense, not in the more restricted one meaning the agency, whatever it is, that produces periodic fevers.) In this connection, I have always observed that irrigation to the westward of the home was, in my opinion, a frequent cause of typhoid. The trend of the land then favored seepage into the wells, and the prevalent winds carried the malarious exhalations directly to the dwelling places. It is one of the things I always look out for when called in these cases.

*Typhoid Fever*.—The records of the hospital for the past sixteen years show that in a total number of one thousand six hundred and forty-eight sick treated, not a single case of "enteric fever" occurred. This indicates the value of sanitation, and is doubtless due to the fact that the garrison is supplied with water from a mountain stream, conveyed in pipes to the fort, to the absence of wells, and the efficient care exercised in preventing soil pollution. The record also indicates that the disease is not *endemic* in this valley, and that when it does occur, local causes must be looked for. I have treated about forty cases among the settlers of this and Goose Lake Valley during the past six years, and with very few exceptions its prevalence coincided with the low stage of the water in the lakes, and consequent recession of the subsoil water. Professor Pettenkoffer's theory, that with the recession of the water the air penetrates deeper layers of soil and there stimulates into activity and multiplication disease germs, which were dormant so long as they were submerged in water, is perfectly applicable to the majority of cases observed by me.

I have described the gravelly nature of the soil in the two valleys, and in one of my monthly reports directed attention to the dangerous propinquity of the privies to the water supply, and firmly believe that in a large number of my cases, the excrementitious matter gradually polluted the soil and finally contaminated the water supply. A properly constructed and located privy and stable is a rarity on the frontiers. I have known large families to live on a farm for six years and over without a privy in any shape, and it is not surprising that the children should have selected, in the meantime, the most convenient spots for the deposit of human filth. The stables are not infrequently located on higher ground than the dwelling, with a natural drainage towards the house. The only wonder is that some of these families exist at all. Perhaps the system becomes in a measure habituated to these noxious influences, but when the cup is full to overflowing, they suffer the penalty for the violation of natural laws. Even the Piute Indians appear to have in many respects better sanitary ideas than their white brethren. While they are filthy, they change their camp at least two or three times a year, and in doing so, burn their hab-

itations, with all the filth and rubbish. Moreover, for the benefit of their health, they take a number of "sweat baths" during the year.

In my remarks regarding the excessive mortality which attended the cases of typhoid fever in Goose Lake Valley last Fall, I alluded to the well meant but pernicious habit of a dozen or more sympathizing neighbors visiting the patients at one time and crowding the sick chamber to its utmost capacity, and I repeat the statement here, since these reports are for the benefit of the people, that many of these poor patients died victims of mistaken kindness. Contrast, if you please, the fact that the garrison has had no typhoid fever during a period of sixteen years, and that within a stone's throw from the reservation typical cases of enteric fever have occurred; contrast then the police and sanitary condition of the two localities, and talk about the absurdity of sanitary measures, and that diseases, being a visitation of God, cannot be prevented.

Surely we have in this instance an array of facts sufficiently strong to convince the most obtuse or superstitious minds that sanitary science is based on correct principles, and that "an ounce of prevention is worth a pound of cure."

Perhaps I have given the impression that typhoid fever prevails extensively in these two valleys. I have treated twenty cases within the last two years, and should have added that this is the largest number treated by me during any similar period, and the disease cannot therefore be justly regarded as of frequent occurrence.

*Cerebro-Spinal Meningitis.*—I have never seen a case in this section.

*Consumption.*—With two exceptions, I have never known a patient to contract the disease in this climate, and these patients suffered from chronic catarrhal pneumonia. In one case, the immediate cause appears to have been a contusion or compression of the pulmonary tissue, the result of a horse rolling over his chest; in the other case, organic disease of the heart coexisted. I have observed a few patients in the incipient stage of consumption to be entirely relieved after a year's residence in this climate. A soldier who arrived here in the third stage, died shortly thereafter. In another soldier, who came to this post in 1883, the tubercular deposit underwent a rapid process of softening, and was expectorated. The disease, notwithstanding two distinct cavities in the lungs, appears to be stayed, for a time at least. Five cases, or 0.3 per cent of the sick, are reported among the troops during a period of sixteen years. Dr. Patterson writes:

Having practiced here for nine years before meeting with a case of consumption originating here, I came to believe and assert that residence in Modoc County was equivalent to exemption from this disease. The experience of later years leads to a slight modification of that belief. I have known of but four cases in all. The first, that of Mr. Parker, of Parker Creek, I believe to have been one of pulmonary consumption, but I have only a hearsay knowledge of it. He was not a patient of mine. The second was Mrs. C., of this place, in whom the tubercular diathesis was very well marked. The third was your own patient, W. P., and the fourth a half-breed Spanish boy from French's Ranch, who fell a victim to this disease, which is notoriously fatal to Spanish and other half-breeds.

I have had an experience of some half-dozen *imported* cases, and it appears to me that the very climatic influences which prevent its origin here, accelerate the progress of those already commenced; hence I think that none who have passed the pretuberculous stage should be advised to come here in hope of benefit.

*Rheumatism.*—The official records indicate that during a period of sixteen years one hundred and sixty-eight cases of rheumatism, or ten and two tenths per cent of the sick, were treated in the post hospital. During my entire service here I have observed probably a half dozen cases of acute articular rheumatism among the settlers, the majority being cases of mus-

cular rheumatism or myalgia, resulting, no doubt, from sudden changes of temperature and suppression of the cutaneous function.

Dr. Patterson writes: "Articular rheumatism, while not very infrequent, seems to bear no comparison at all in point of frequency with muscular rheumatism."

*Neuralgia.*—One hundred and four cases, or sixty-three per cent of the sick treated at the post hospital during sixteen years, were reported under this head. Neuralgia prevails more or less among the settlers, as a result of the causes just mentioned.

Dr. Patterson writes: "Neuralgia and nephritic ailments are very prevalent."

*Catarrhal Affections.*—Two hundred and forty-nine cases, or 15.1 per cent of the total number of sick treated at the post hospital during the last sixteen years, were reported under the head of catarrh and bronchitis; and reference to Table No. 6 will show that *tonsillitis* and *conjunctivitis* also furnish a large number of cases. Attention has been directed to the prevalence of *diarrhœa* and *dysentery*, and their relation to climatic conditions. It may be fairly assumed that the prevalent diseases in this community are catarrhal affections of the air passages, and of the alimentary canal, rheumatic and neuralgic affections. I have already expressed the opinion that I perceive in the extreme variation of temperature between midday and midnight, and suppression of the cutaneous function and consequent retention of effete material, a very effective cause for the production of disease.

Tables Nos. 1 and 3 indicate that a very prominent feature of this climate is the dryness of the atmosphere. In my experience catarrhal affections of the air passages usually go hand in hand with the greatest relative humidity. Whether the mucous membranes, habituated for the greater part of the year to a dry atmosphere, are directly irritated by the change, or whether wet feet or the process of "catching cold" already alluded to, plays the most important role, is difficult to say. But catarrhal affections of the mouth, nose, eyes, air, and alimentary passages may and do prevail during the dry season, and I have been forced to attribute their occurrence to sudden diurnal variations in temperature, the *materies morbi* produced thereby selecting the weakest spot for its elimination. Finally, the irritation of the alkaline dust may furnish an additional cause for their production.

Dr. Patterson writes: "*Bronchitis* is more frequent than pneumonia and pleurisy together. *Tonsillitis* is a very common affection, particularly in women. Influenza and catarrhal affections are quite frequent and often epidemic."

*Pneumonia.*—While catarrhal affections of the respiratory passages are quite common, the inflammation rarely extends to the pulmonary tissue. The number of cases of pneumonia treated among the troops during sixteen years was nine or 0.6 per cent of the total number of sick. I have treated probably forty cases within six years among the settlers with no fatal results. Most of the cases occurred in the Winter months, or the season of maximum humidity. In February, 1880, the disease prevailed extensively among the citizens of Surprise and Goose Lake Valleys. The rain fall for January and February was 4.58 inches. Prevailing winds S. and S.W. But the hygrometric condition of the atmosphere alone, is in my opinion, not a sufficient cause for its occurrence. Our soldiers while on guard duty are exposed to the inclemency of the weather, both day and night, and the comparative infrequency of the disease amongst them, would

suggest, that other predisposing causes, such as overcrowding in small and badly ventilated rooms; in short, bad air, improper food and clothing, with other debilitating influences, constitute important factors in the causation of pneumonia. Just such conditions go hand in hand in families, where ten or more persons cook, eat, and sleep in a single room, about twelve by fourteen feet. When this condition is due to poverty, I can but pity the poor inmates, but when it is, as I have observed it, a question between building a good barn and dwelling, we can simply regret their ignorance of the laws of health, and the low value placed upon human life.

It is of course true, that in the army, the patients usually report very promptly for treatment, and this may account for the infrequency of grave cases, and the prevention of inflammatory conditions, but even this furnishes a striking illustration of the correctness of that old adage, that "a stitch in time saves nine." I have often been called to see patients, who had been liberally dosed with Ayers' Pills, or Kennedy's Medical Discovery, for a week and ten days, when they were actually suffering with pneumonia, typhoid fever, or some other serious disease, and I am also satisfied, that this very class of persons in case of sickness in a horse or cow, will spare neither pains nor money to obtain professional advice.

*Pleurisy* is also extremely rare in this climate; only seven cases or 0.4 per cent occurred among the troops in sixteen years. I have observed but few cases among the settlers.

Dr. Patterson's experience leads him to write: "*Pneumonia* rather infrequent and yet at times it seems almost epidemic; mortality small. *Pleurisy* less frequent than pneumonia."

*Enteritis and Idiopathic Peritonitis.*—I have never seen a case of either of these affections in this section, and Dr. Patterson writes: "They are almost unknown to me."

*Diseases of the Liver.*—I have treated a few cases of jaundice due to catarrhal inflammation of the bile-ducts and duodenum. Functional derangements of the liver are not uncommon, especially observed in dyspeptic patients, which will be presently referred to. I have observed a few cases of hepatitis, due perhaps to excesses in eating and sudden chilling of the body when heated. Two cases of hepatic abscess occurred in my practice among the citizens, one followed in the wake of typhoid fever, and the other without any known cause, and I can recall but three cases of chronic interstitial hepatitis (cirrhosis) in intemperate persons.

*Dyspepsia.*—In this connection I desire to direct attention to the frequency with which a large class of our settlers suffer from different forms of indigestion. Apart from sudden changes in the weather, which may give rise to gastric catarrh, the most prominent cause must be sought in the quality and preparation of food. A large number of the farmers and stockmen subsist on "hog meat," fresh, salted, and smoked, yeast powder bread, biscuits, beans, potatoes, and dried fruit, often prepared in the most indifferent way and consumed in a very injurious manner. The stockmen frequently eat but two meals a day, and often partaking of a heavy supper, go to bed shortly thereafter. As a result "biliousness" is a very general complaint. The physicians only encounter the more stubborn cases, in which "Warner's Liver Pills" and "Safe Kidney Cure" have been unsuccessfully resorted to. As may be expected, the mischief in these cases consists not only in atonic dyspepsia, but also of a chronic gastric catarrh, with more or less hepatic derangements. In consequence of these conditions, abnormal chemical changes are developed in the blood, and the different forms of lithiasis (gravel) with hyperacidity of the urine are

frequently observed. A selection of proper food, and a better knowledge as how to prepare and eat it, would render the patent liver pills and kidney cures less popular and likewise reduce the doctor and medicine bills.

*Nephritis, Acute and Chronic.*—With the exception of three cases of acute desquamative nephritis in connection with scarlet fever I have not observed the Bright's diseases of the kidneys in this community. It is not improbable, however, that the chronic forms will manifest themselves as the settlers grow older, for I can scarcely conceive how these organs can fail to be affected when they are called upon to perform an extra amount of work, in dyspeptic cases especially. The comparative infrequency of nephritis compared with repeated changes of temperature and chilling of the body, I can only attribute to the fact that the *materies morbi* selects for its elimination the mucous membranes elsewhere.

*Catarrhal Affections of the Bladder* are not infrequent in patients afflicted with indigestion, and are usually induced by hyperacidity of the urine.

*Urinary Calculi.*—Notwithstanding that the different forms of lithiasis are common I have observed but one case of stone in connection with oxaluria and dyspepsia.

*Heart Disease.*—Functional derangements are not uncommon, especially in connection with flatulent dyspepsia, but I have seen very few organic lesions, and only one case of pericarditis. Dr. Patterson writes: "Functional disorders of the heart and liver are quite common, but I do not think there is any unusual prevalence of organic diseases of these organs."

*Infantile Convulsions.*—I have observed but three cases of this affection, confined to children of a single family, and occurring in connection with a high febrile condition in measles.

*Hydrocephalus* was noted in four instances.

*Whooping-Cough* was introduced into the community by a family of immigrants, in the Summer of 1883, affecting quite a large number of children; no deaths. It would appear that the disease was limited to the upper portion of the valley, certainly within ten miles from Cedarville. As Dr. Patterson says: "I am not sure that we have ever seen it here."

*Puerperal Fever* is extremely rare, if indeed it ever occurs. I have had no case in my own practice, unless I should mention a case of phlegmasia dolens, due to a mild form of uterine phlebitis, which occurred this Spring. Perhaps the germs are not sufficiently matured as yet. Dr. Patterson writes: "Puerperal fever is fortunately very rare. In all the hundreds of accouchments at which I have attended during the last fifteen years, there has not been one fatality from this or any other cause. I am not sufficiently egotistical to attribute this good fortune entirely to skill on my part. I regard it rather as evidence of a peculiar freedom from the dangers which commonly surround the patient in such cases. I do not think that in all I have met with more than ten or twelve cases of puerperal fever; these, however, let me add, have occurred chiefly within the last three years."

## CONSOLIDATED SICK REPORT, FORT BIDWELL, CALIFORNIA—1870-1886.

| Year  | 1870-71. | 1871-72. | 1872-73. | 1873-74. | 1874-75. | 1875-76. | 1876-77. | 1877-78. | 1878-79. | 1879-80. | 1880-81. | 1881-82. | 1882-83. | 1883-84. | 1884-85. | 1885-86. | Total. |        |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--------|--------|
| Mean strength   | 67.      | 79.      | 43.      | 65.      | 87.      | 114.     | 105.     | 67.      | 83.      | 103.     | 96.      | 67.      | 81.      | 95.      | 89.      | 86.      |        |        |
| DISEASES.   | Cases    | Deaths   | Cases    | Deaths   | Cases    | Deaths   | Cases    | Deaths   | Cases    | Deaths   | Cases    | Deaths   | Cases    | Deaths   | Cases    | Deaths   | Cases  | Deaths |
| Typho-malarial fever  |          |          |          | 1        |          |          |          |          |          |          |          |          |          |          |          |          | 8      | 1      |
| Malarial fevers.  | 14       |          | 9        | 6        | 4        | 22       | 16       | 6        | 7        | 2        | 3        | 2        | 8        |          | 6        | 8        | 135    |        |
| Tonsillitis and other diseases of this group*                     | 7        | 1        | 2        |          | 1        | 9        | 4        | 7        | 10       | 8        | 17       | 6        | 10       | 5        | 5        | 12       | 124    |        |
| Rheumatism  | 4        | 18       | 3        | 16       | 11       | 31       | 13       |          | 7        | 9        | 6        | 3        | 4        | 15       | 15       | 16       | 168    |        |
| Consumption   | 1        | 1        |          |          |          |          |          |          | 2        |          |          |          |          |          |          |          | 5      | 1      |
| Syphilis  | 1        | 1        |          | 1        | 1        | 2        |          |          | 1        | 1        | 1        | 3        |          |          |          |          | 15     |        |
| Gonorrhoea, inebriation, and other diseases of this group         |          |          |          | 2        | 10       | 13       | 14       | 13       | 19       | 42       | 13       | 9        | 12       | 7        | 20       | 13       | 188    |        |
| Catarah and bronchitis  | 2        | 1        | 3        | 5        | 13       | 27       | 5        | 15       | 52       | 32       | 31       | 6        | 5        | 17       | 10       | 15       | 249    | 1      |
| Pneumonia   |          |          |          |          | 2        | 1        |          |          | 3        | 2        | 1        |          |          |          |          |          | 9      |        |
| Pleurisy  | 1        | 1        | 1        |          |          | 2        |          |          |          |          |          |          |          |          | 1        |          | 7      |        |
| Diarrhoea and dysentery   | 4        | 29       | 2        | 19       | 13       | 49       | 26       | 5        | 17       | 9        | 20       | 12       | 3        | 8        | 14       | 8        | 257    | 2      |
| Neuralgia   | 4        | 6        | 10       | 12       | 4        | 7        | 3        | 6        | 4        | 6        | 8        | 6        | 7        | 11       | 4        | 6        | 104    |        |
| Headache, constipation, conjunctivitis, and other local diseases† | 12       | 1        | 12       | 28       | 35       | 48       | 26       | 13       | 35       | 47       | 31       | 14       | 21       | 19       | 11       | 13       | 379    | 1      |
| Total diseases  | 50       | 3        | 72       | 2        | 70       | 211      | 107      | 65       | 157      | 158      | 132      | 62       | 73       | 118      | 86       | 92       | 1,648  | 6      |

\* Tonsillitis is the most frequent disease of this group.

† Inebriation and gonorrhoea the most frequent diseases of this group.

‡ Headache, constipation, colic, conjunctivitis, and indigestion prevail in the order named, and constitute the majority of the diseases of this group.

## V. CONCLUDING OBSERVATIONS.

The consolidated sick report of the garrison for sixteen years has been introduced to show the character and relative frequency of the diseases of this locality, believing that the sanitary surroundings of the troops are so excellent that fair conclusions can be drawn as to the relations of climatic influences and the prevalent diseases.

This table shows that an aggregate of thirteen hundred and seven men furnished sixteen hundred and forty-eight cases of sickness and six deaths. This, at first sight, may seem a large percentage; but it is to be remembered that in the army a great many men are entered on the sick report who in civil life would scarcely think of consulting a physician; but being incapacitated from duty by reason of a headache, colic, indigestion, or the effects of inebriation, or some other indiscretion, are excused for a day or two, and naturally help to swell the sick report. It is safe to assume that in at least fifteen per cent of the cases reported, the remote etiology was pay day or some act of indiscretion.

We find, then, that catarrhal affections of the alimentary passages lead the list; next in frequency are catarrhal affections of the air passages; then follows rheumatism, malarial fevers, tonsillitis, and neuralgia, in the order named. Due allowance should be made for imported cases in estimating the relative frequency of malarial fevers. In my experience, most of the cases were affected prior to their arrival. The absence of typhoid fever and other zymotic diseases among the troops is especially noteworthy.

A study of the meteorological tables renders it highly probable that the prevalence of the catarrhal, rheumatic, and neuralgic affections can be fairly traced to climatic influences; but these diseases are trivial when compared with those engendered by climatic conditions elsewhere. Indeed, it seems to me that the very factors which enter into the causation of these diseases here—especially the great daily range of temperature, dry atmosphere, and elevation—are destructive to other disease germs, and perhaps fatal to the development of the bacillus of tubercle. Much has been said in the article on diseases to show that many of the prevalent diseases are entirely preventible; thus the catarrhal, rheumatic, and neuralgic affections can be guarded against by the selection of proper underclothing, shoes, attention to the skin, etc.

I have expressed my opinion freely under the various subdivisions, and a lengthy review seems quite unnecessary. It has been my painful duty to point out that the occurrence of typhoid fever and other filth diseases among the inhabitants was closely connected with their unsanitary surroundings, and sufficient has been said to indicate with precision that the mortality was largely determined by these unfavorable conditions. It is doubtless true that many of our good people would gladly avail themselves of sanitary suggestions if the evils complained of could be remedied without expense; but as the subject is one largely of education, it is sincerely hoped that the principles of public and private hygiene are taught in every school in the State, and especially in country districts. In cities the sanitary regulations and police are probably the most effective educators.

From personal experience, I can vouch for the healthfulness of this climate. I came here six years ago, when thirty years of age, and weighed one hundred and thirty-five pounds, my height being five feet ten and a half inches. Having had a severe attack of pneumonia when eighteen years of age, I was justly apprehensive in regard to my lungs, which

appeared to be my weak spot. To-day my weight is one hundred and seventy-four pounds, and I enjoy perfect health, notwithstanding the fact that I am at times overworked. This change I attribute largely to the salubrity of this beautiful mountain valley.

It is hoped that this report will contribute, in a small degree at least, towards the prevention of diseases in the State of California, with its wonderful climates and resources, and convince the population of sparsely settled and recent regions like ours that it rests largely with them whether a once healthful locality shall maintain its standard or be converted by acts of ignorance and carelessness into a hotbed of disease germs.

In conclusion, I desire to express my indebtedness to my friend Dr. Wm. H. Patterson, of Cedarville, for the prompt and efficient manner in which he responded to my request for information contained in the report on diseases; and also to Mr. T. J. Patterson, of the Signal Corps, U. S. Army, for the careful and efficient manner in which he carried out my wishes in the preparation of the meteorological tables. The records of the post hospital furnished all of the data, except for the year 1885-86, which were taken from the Signal Office. My acknowledgments are also due to A. G. Heyl, Hospital Steward U. S. Army, for assistance rendered in the statistical portion of the report.

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## SUPPLEMENTARY REPORT TO DR. KOBER

ON THE PREVAILING DISEASES ABOUT ALTURAS AND SOUTHERN END  
OF GOOSE LAKE VALLEY.

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By J. M. FORREST, M.D., Correspondent of the Board.

ALTURAS, August 10, 1886.

MY DEAR DR. KOBER: I have been practicing here nearly eight years. In that time I have not seen nor heard of eight cases of pneumonia in an estimated population of two thousand two hundred. I have seen only one case of consumption (Blurton) which I suppose to have originated here. I have seen two imported cases—one from the East and one from San Francisco.

Acute peritonitis and dysentery I have not met. Muscular pains and aches, common; some rheumatism; some neuralgia. Functional derangement of liver very common. Articular rheumatism rare; have not seen more than two or three cases. Digestive derangements very common, frequently considered kidney trouble by patients on account of copious deposits of urates. Organic disease of kidney rare. I know of only one case of diabetes mellitus, and two or three of Bright's disease in old men. I remember only two cases of erysipelas. I have seen only two cases of true diphtheria; they got well. They caught the disease in and from rooms where persons had died of diphtheria.

Malaria does not cut a figure in my practice. I know nothing of typhomalarial. Typhoid fever has been sufficiently common. My experience with it has been, those cases treated from the beginning get well. Those are *doubtful* which run on two or three weeks before a doctor is called in. Many cases get well without any treatment. I think it quite possible that



our continued fevers may be caused by a typical typhoid germ, and again by a germ resulting from putrid or decomposing animal matter. However, I have not time to enter into this. Measles has been a mild disease with us. Scarlatina has been hydra-headed. The first two cases I saw in the county were malignant and fatal; yet they were contracted from a member of a family all of whom had had the disease in a mild form, and got along (so reported) without medical treatment. The third case was an isolated one in the country; it got well. In our late epidemic, the fatal cases were *terrible* from the start, and were wholly beyond the control of medicine. Two cases, boys—little boys, playing together—presumably infected from the same source. One, malignant from the outset, died; the other, scarcely sick enough to remain in bed twenty-four hours. Influenza has been very common; quinsy, also. In connection with both have been some cases of follicular pharyngitis, simulating diphtheria. There have been three or four cases of croup—one was fatal—at a time when no disease was endemic or epidemic.

With careful hygiene, I believe typhoid and kindred fevers would be unknown in Modoc. We (the people) are largely to blame for the sickness in our midst. Privies and wells are too close neighbors. With a pure water supply and ordinary cleanliness, there would be no endemic disease in this portion of the county. I regret, my dear doctor, that this report is so meager.





