In one specific case (1879) the figures support the proverb admirably; the rainfall of 3.37 inches during the autumn of 1879, which is the lightest in the record, is followed by the warmest winter, with a mean temperature of 38.6°. But the rainfall of the subsequent autumn, 5.73 inches, which also was very light, was followed by one of the coldest winters. As was to be expected, the records give no confirmation of the Indian proverb, and yet we must believe that Doctor Rush or his adviser believed in it as having some foundation in experience. Possibly some one or two notable cases had recently occurred to establish this idea in their minds. But we see that this old Indian rule has neither practical nor scientific value. The special case of 1879, with a possible similar case previous to 1789, or say two cases in a century, merely illustrates the tendency of mankind to generalize from insufficient data. The progress of sound knowledge is hindered by adhering to a belief in such errors, but is fostered by awakening to the absolute necessity of a careful study of reliable statistics.

HYGIENE AND CLIMATOLOGY.

The relation between climate and disease is often treated of under the title of nosology, or the geographic distribution of disease, or the classification of diseases and climates. The modern expansive student of geography speaks of the geography of disease. In a recent publication by Prof. R. DeC. Ward[1] he treats this subject under the title "The hygiene of the zones". His article gives a brief survey of the relations between weather and climate on the one hand, and the more important diseases on the other. Twenty years ago, in view of the great advances then being made in hygiene, it may have been proper to say that, with suitable precautions, man can make any climate endurable. It has been shown that the spread of certain diseases is often entirely a matter of personal intercourse and contamination, so that neither the origin nor the spread of such diseases is due to climate directly, tho it may be so by reason of some indirect relationship. There are, however, certain potent climatic influences, and their study is as important to the whole community as it is to the medical profession.

The author discusses briefly the general effects of warmth and cold, high altitude and low, pure air, moisture and dryness, especially desert air, pure and aseptic; ocean air, pure and dust-free; winds, fogs and clouds, and sunlight.

Comparing old notions and new beliefs, Professor Ward says:

> The causation of disease is now no longer sought directly in meteorological conditions, but in the effects, more or less direct, of these conditions upon the micro-organisms which are the specific cause of the disease. Atmospheric conditions may help or may retard the development of the micro-organism, and may strengthen or weaken the individual's power of resistance against the attacks of the germ, as well as affect his susceptibility. Thus new views have replaced the old. Winds used to be regarded as the chief agents in spreading epidemics; now it is known that disease can not be carried far by winds, for the micro-organisms do not long maintain their power in the free air and under the sun. Rain has been supposed directly to control the distribution of diseases; now we believe that precipitation acts only indirectly, through drinking water, or through its control of the dust in the air. Dust from dry soil may contain the germs of infectious diseases, and aggravate affections of the respiratory organs. Harmful exhalations are no longer believed to be given off by the soil, but the condition of the soil as to moisture and temperature may affect the development and diffusion of certain micro-organisms. Some parallelism has been discovered between the prevalence of certain diseases, such as diarrhœa and typhoid fever, and soil temperatures or the ground-water level.

PALE GREEN SKY TINTS.

In Nature for January 24, 1907, page 295, Mr. Arthur W. Clayden of Exeter, England, gives the following explanation of the green tint often seen in that country in the sky during early twilight, but much more rarely seen in the sky at dawn. As these sky tints and colors are excellent indications of the condition of the air as to moisture, we hope that observers may be found here and there in America who have the instruments and leisure to make an accurate record of the location and intensity of the various tints. We have found the pale green closely associated with the delicate patch of pink or rose which is often seen above the sun after sunset and which is supposed to mark the presence of considerable vapor at a very high altitude in a very fine state of subdivision.

Mr. Clayden states:

> The color of the sky at any time is made up of two components: *A*, the light from the upper regions; *B*, that reflected from the small particles in the lower air. The *A* component is always blue, and its spectrum shows a deficiency in red and yellow rays. Its light passes between the particles of the lower air and therefore forms a background upon which they are projected. The spectrum of the *B* component is variable. When the sun is well above the horizon the light is white, and the variations in the deepness of the blue of a clear sky are due to differences in the relative proportions of *A* and *B*. As the sun nears the horizon the *B* light begins to lose its more refrangible rays, and the absorption extends toward the green and yellow as the sun goes down.
>
> Now if we take two equally brilliant spectra, cut the red, orange, and yellow from one and the violet and blue from the other, and then mix the residues we shall obviously have all the colors necessary to make white light with a double allowance of green. An eye receiving the whole will see pale green. This, I take it, is the origin of the green colors of the sky. The *A* component is deficient in the less refrangible rays, which are supplied by the *B* component, and the two spectra overlap in the green, showing an excess of that color.
>
> Occasionally, but rarely, the two are exactly complementary over a limited stretch of sky, and then white patches are seen amid the colors of the sunset which are easily distinguished from clouds. They shade off on one side into tints of green where the spectra overlap, into yellow where the *B* component is in excess, and into blue where the *A* light preponderates.
>
> When the sky is clear it is no uncommon thing to see a considerable expanse of green, shading on the one side into pale lemon-yellow where the overlap of the spectra is considerable, while on the other side it shades through a narrow border of silvery tint where the balance is exact into a delicate rosy hue where there is a general deficiency in the central rays.
>
> Green tints are by no means always to be seen, and I think the foregoing explanation shows why—their production depends upon such an adjustment between the brightness of the two components that they shall be approximately equal. The white patches are rarer still, as they require exact equality in brightness and correct apportionment of color.

The Editor has seen it stated that the extensive area of pale green in a clear sunset sky is due to the combination of the blue light that comes from the upper atmosphere and the rosy tint reflected by particles in the lower atmosphere, as blue and red combined give various shades of green; but if patches of white are also to be observed then this explanation fails and Mr. Clayden's becomes more probable. The whole subject of twilight colors was discust by Prof. Wilhelm von Bezold in a famous memoir on the twilight, published by him in 1864, in Poggendorf's Annalen, and reprinted a year ago in his collected papers (Gesammelte Abhandlungen, * * * W. von Bezold, Braunschweig, 1906).—EDITOR.

AERIAL EXPLORATION ABOVE THE OCEAN.

At the formal opening of the Scottish Oceanographical Laboratory, at Edinburgh, on Wednesday, January 16, 1907, the Prince of Monaco presided, and we quote the following from the account of his public address before the Royal Scottish Geographical Society, on the evening of January 17, as reported in Nature, January 24, vol. 75, p. 308:

> In the course of his address the Prince said that in the last few years the improvements in the manufacture of steel had made it possible to fly kites at great heights, carrying self-registering apparatus. Also the india-rubber industry has enabled balloons, carrying self-registering apparatus, to be sent to altitudes hitherto inaccessible. Through the liberality of the German Emperor a great establishment had been set up at Lindenberg for the systematic investigation of the upper-air meteorology. This was over the land. In 1904 the lecturer had become interested in the subject and he began to make plans for investigating the

[1] The Hygiene of the Zones, by Robert DeC. Ward, reprinted from the Bulletin of the Geographical Society of Philadelphia, Vol. IV, January, 1906.

problem over the sea. To reach great heights it was necessary to attach to the line or wire a series of kites at intervals, and if no layers of calm air were encountered a very great height could be reached, and the kite kept there by the vessel moving with a speed of not less than seven meters per second. There were many difficulties on board ship due to complications of wind distributions in the different layers. After a season's work with kites in the Atlantic the Prince resolved to try the sounding balloons. The method first adopted was to use two light india-rubber balloons filled with hydrogen. The one carried the self-registering apparatus, while the other and more inflated balloon was attached to it, and aided the ascent to the required height. At this height the upper balloon burst, and the lower balloon with its instruments descended as a balloon-parachute, and hovered over the sea so long as the float at the end of the stray line touched the surface of the water. This could be seen at a distance of 8 or 10 miles. The bursting of the balloon was somewhat indefinite and an improvement was subsequently effected, by means of which the one balloon was released altogether at the desired height. This was done by means of a current from a small dry cell set in action when the pen of the barograph on the lower balloon touched a conductor set at the pressure corresponding to the desired height. Also by use of a formula taken in connection with the observed ascent of the system, the line of descent of the balloon-parachute could be approximately calculated and the ship steered for the place. By means of apparatus of this kind pressure and temperature curves had been brought back from a height of 7500 meters in latitude 78° 55′. In the high latitudes the experiments had been greatly interfered with by fog. The drift of air in still higher regions had been studied by means of pilot balloons, which had been followed through the telescope of a theodolite to heights of nearly 30,000 meters. These indicated that in latitude 80° north, at a height of about 13,600 meters, there were at times winds blowing with a velocity of 60 meters per second, or 130 miles per hour. The results of several cruises had shown that "if the principal states of the world were willing to diminish a little the expense of international quarrels by submitting them to the judgment of a tribunal less costly than that of war, and if they preserved more resources for the veritable interests of humanity, it would be possible with powerful means very soon to know the laws of meteorology, the key to which seemed to be found in the higher atmospheric regions."

FOEHN IN NEW SOUTH WALES.

We are indebted to Prof. Mark Jefferson of Ypsilanti, Mich., for the following reference to a work by John Dunmore Lang, D. D., "An Historical and Statistical Account of New South Wales", London, 1837; vol. 1, page 267, being an account of the great drought of 1827–1829.

Professor Jefferson remarks that the text appears to refer to a foehn wind heated dynamically in its descent from the Blue Mountains to the lowlands on the upper Hunters River. The author does not, of course, recognize it as a foehn—his book is dated 1837—but refers its heat to the interior deserts. It is reported as particularly destructive in a period of three years of drought.

In the year 1828 the failure of the crop in the upper parts of Hunters River, and in certain other districts of the territory, was not attributable to the drought at all, but to blighting northwesterly winds. In the course of that season, when the settlers had a second time begun to despair of their crops, there was a copious and seasonable fall of rain, the almost instantaneous effect of which on the vegetation of the country was truly astonishing. The wheat crop immediately revived and hopes were universally entertained of an abundant harvest. Just, however, as the wheat had got into ear a northwesterly wind, blowing as from the mouth of a furnace, swept across the country and in one hour destroyed many hundred acres of highly promising wheat. As I had occasion to visit the district of Hunters River in the discharge of clerical duty, immediately after this calamitous visitation, I made a few cursory observations on the subject which I embodied in a paper, of which the following is an extract.

"The disease called *the blight* undoubtedly arises from the northwesterly winds, which occasionally blow from the arid regions of the interior of this continental island, and exert a most destructive influence on vegetation of every description wherever they extend. These winds prevail to a greater or less degree every season, but it is only in particular seasons like the present, when, from causes unknown to us, they acquire a higher temperature and blow for longer periods and with greater violence than in ordinary seasons that they prove fatal to vegetation and blast the hopes of the husbandman; and this result will doubtless be accelerated if, as unfortunately happened this season, the vegetation is of that peculiar character which it uniformly acquires in a warm climate when heavy rain succeeds a long continuance of drought".

After pointing out the value of wind-breaks, even of common rail fence to a limited extent, Doctor Lang goes on to point out the exemption of that part of the Hunters River country nearer the sea. He states that it appears:

That in that [coastal] part of the district the blighting influence of the northwest winds is almost entirely counteracted by the proximity of the ocean, and the consequent diminution of temperature which that proximity must occasion. This result, however, is not produced by the mere mechanical effect of the sea breeze, which generally alternates with the land wind along this coast during the summer months; for when the northwest wind blows with sufficient violence to occasion blight in the interior, there is no sea breeze on the coast: but the ocean not only cools the atmosphere above itself, but refrigerates the air, counteracts the noxious influence of the land wind, and promotes vegetation to the distance of about twenty-five miles on [*from*] the coast.

If it should be asked, however, why the districts of Bathurst and Argyle are less subject to blight than the upper part of Hunters River, it may be stated in reply that the Argyle country is two degrees farther to the southward, and consists in great measure of elevated table land, situated within a moderate distance of the coast. The plain of Bathurst, on the other hand, is 2000 feet above the level of the sea, while the upper part of the district of Hunters River is almost on a level with the ocean.

These last sentences seem to establish the foehn character of the wind, it being without injurious effect on the highlands—Bathurst and Argyle—because it is not there a descending wind. It would be interesting to know whether it has been observed since. The drought was believed to have been the greatest in a generation.

THE HEAVIEST LOCAL RAINFALLS IN CALIFORNIA.

In the climatological report of the California section for February, 1907, is published a list of California stations having very large annual rainfalls. Most of these occurred during the year 1906, but a few in 1904. Concerning this table Professor McAdie remarks that while these amounts are very large they do not break the record for the greatest annual rainfall nor the greatest monthly rainfall in the State—which were, respectively, 137.58 inches in 1902, and 62.24 inches in February, 1902, both at the station Helen Mine, Lake County. Professor McAdie gives credit to Mr. George H. Willson, Local Forecaster at San Francisco, for the preparation of this table:

Stations.	1906.	1905.	1904.	Normal.	Length of record.
Helen Mine	129.69	68.03	114.72	93.51	6
Woodleaf	125.41	.....	.....	.....	1
Stirling City	125.08	44.02	.....	.....	3
Magalia	125.01	48.16	94.40	.....	3
LaPorte	124.46	.....	.....	78.08	13
Fordyce Dam	120.64	43.16	.....	.....	.....
Monumental	116.13	69.30	.....	.....	2
Bear Valley (Nevada County)	110.85	46.93	103.59	.....	.....
Pilot Creek	110.61	42.56	93.99	.....	.....
Brush Creek	106.25	50.63	91.98	.....	3
Blue Canyon	104.21	46.65	93.48	64.05	8
Nimshew	104.00	43.11	.....	.....	3
Branscomb	99.08	55.03	115.07	93.48	7
Emigrant Gap	98.15	40.10	.....	51.72	33
Bowman's Dam	97.45	64.49	135.70	.....	.....
Summerdale	95.25	36.80	61.22	48.80	11
Tamarack	94.35	.....	.....	.....	1
Georgetown	93.22	35.77	79.37	57.10	34
Crockers	90.62	35.30	.....	.....	3
Grass Valley	87.22	.....	.....	.....	.....
Boulder Creek	86.36	43.78	67.51	.....	.....
Iowa Hill	85.72	33.42	67.87	52.19	26
Upper Mattole	85.70	70.04	126.49	81.66	19
North Bloomfield	85.32	41.74	73.60	53.52	10
Gold Run	85.24	32.22	76.20	51.26	8
Colfax	85.21	.....	70.59	46.64	36
Nevada City	82.72	36.91	68.64	55.79	15
Zenia	82.21	46.92	105.87	78.76	5
Ben Lomond	81.64	45.51	67.87	.....	.....
Mount Saint Helena	81.54	49.89	92.87	.....	5
Blocksburg	80.84	.....	.....	.....	3
Towle	82.14	43.23	.....	51.68	21
Delta	79.40	52.66	90.31	60.10	22
Laurel	79.06	38.00	64.87	.....	.....
Shasta	70.93	44.52	75.76	49.90	11
Crescent City	70.27	50.91	107.61	70.28	13
Fort Ross	69.77	49.63	85.38	50.70	14
Glenwood	69.25	.....	.....	.....	.....
West Point	68.58	26.07	58.20	.....	.....
Quincy	66.92	.....	61.42	43.15	12
Greenville	66.45	24.26	61.74	40.87	13
Felton	64.17	37.06	54.14	.....	.....
Mercury	62.93	42.54	73.11	.....	3
Butte Valley	62.26	48.90	86.00	.....	3
Cuyamaca	59.91	66.10	26.81	33.32	8