

They should be maps in which the various features of surface are clearly, carefully, and fully drawn. I do not mean maps full of names, but full of features. To illustrate: Where are the Alps? The Alps are in Switzerland; and the schoolboy finds on his map 'Alps' printed on the south side of that portion labelled 'Switzerland.' A good map would show at least four ranges there; and proper maps of Austria, Italy, and France, would teach him that 'Alps' is a generic term with at least thirteen applications in southern Europe.

Norway and Sweden appear on most school-maps with but one or two rivers, because, I suppose, there is no long and large stream there important enough to have its name memorized; but what an idea does such a map give of that country? I can count over sixty rivers there on a map in Andree; and enough of them should be drawn, even if without naming, to show the true character of the surface.

Similar instances could be given by the dozen. But I want to take up another point. When are we to see a geography with an index? Studying geography by the topical method, an index is well-nigh indispensable. By any method, twice as effective work can be done if the material can be viewed from the stand-point of the kind of feature, production, occupation, or race, as well as in relation to this or that political subdivision.

I do not think it too much to insist on, that every ocean, sea, gulf, bay, strait, channel, lake, sound, harbor, canal, river, waterfall, bight, firch, bayou, roadstead, etc.; every land feature, every product, occupation, language, religion, form of government, town and political division,—in short, every thing namable that has been mentioned in the text or appeared by name in the maps,—should be indexed by page or section, and, in case of map features, with latitude and longitude.

Why, even in Morden's 'Geography rectified,' published in 1693, there is a copious index, not to mention later works (1809, 1831) likewise favored.

With an index to aid him, a scholar can classify, compare, and infer; and the value of the text-book would be doubled.

Nor would it be difficult to mention other ways in which our geographies could be improved. But if we can first have some better maps and an index worthy the name, we shall have gained much. I hope you will not be content with a few leaders. The matter is one of no slight importance. Perhaps, if our publishers read Prince Kropotkin's article in the December number of the *Nineteenth century*, they would be inspired to do better. Let us hope they will.

C. H. LEETE.

New York, Dec. 31.

The temperature of the moon.

Mr. Langley does not seem to have examined my condition for determining the moon's temperature with sufficient care. It is true that in the equation a moon of maximum radiating power was assumed; but it had been first shown that the temperature of such a moon must be the same as that of any other, provided the relative radiating and absorbing powers are the same, as is usually assumed. The equation is between the absolute rate of radiation and absorption of heat, in which r , the relative radiating power, enters as a factor on the one side, and a , the relative absorbing power, on the other. If these are equal, of course they can be omitted, which is the

same as using unity as the relative radiating and absorbing powers, and so the same as assuming that the moon has a maximum relative radiating and absorbing power. The relative radiating and absorbing powers, and the proportion of heat reflected, do not, therefore, come into the condition at all. It cannot be said with propriety that the moon loses heat by reflection, as stated by Mr. Langley; for the reflected heat has not been appropriated by absorption, and therefore cannot be said to be the moon's heat. It has come to the moon's surface and been rejected, and it has nothing to do with its temperature. The condition which determines the static temperature is, that the rate with which heat is radiated must be exactly equal to that with which it is absorbed. When this is the case, there can be neither increase nor decrease of temperature.

But perhaps this matter will be more readily comprehended by looking at it in a less mathematical way. We have a moon, say, with a surface of maximum relative radiating and absorbing power, and with a temperature below the static temperature corresponding to the rate with which it is receiving heat. With this temperature, the absolute rate with which the moon radiates heat is less than that with which it is receiving and absorbing it, and the difference goes toward raising the temperature of the body. But as the temperature increases, and with it the rate of radiating heat, though not proportionally, it after a time rises to that temperature at which the rate with which heat is radiated from the moon is exactly equal to that with which it is received and absorbed by it, and its temperature then remains stationary. This, expressed in a mathematical form, is the equation of condition.

But now suppose that the moon's surface is such that it radiates and absorbs heat at only half, or any other proportion, of the rate that one of maximum relative radiating and absorbing power does. Our condition is still satisfied; for although the moon's surface now is radiating heat at a rate which is only half, or any other assumed proportion, of what it was before, it is also absorbing at only the same rate, whatever it may be, and there is no change of temperature needed to satisfy the condition of static temperature. Hence, so far as the static temperature of the moon is concerned, it is no matter what part of the heat received is absorbed, and what reflected; these being complementary to each other, and both together equal to the heat radiated by a moon of maximum relative radiating power, under the condition of a static temperature. Of course, our condition for determining the temperature is not applicable where there is a rapid increase or decrease of temperature.

WM. FERREL.

Washington, Jan. 4.

Yankee.

In a paper upon the origin of 'Yankee Doodle,' read lately before the New York historical society, Mr. George H. Moore states that the word 'Yankee' is pure Dutch. 'Yankin,' he says, in the vocabulary of the early New York Dutch, meant 'to grumble, snarl, or yelp,' and its derivative noun meant 'a howling cur.'

But where did the New York Dutch get the word? I think from the Indians. Peter Martyr says that Sebastian Cabot named the coasts of Newfoundland and thereabouts the land of baccalaos, because in the seas he found a multitude of large fish which

the natives called by that name. This word 'bacca-laos' was used by the Basque fishermen, and meant 'codfish;' and, if the natives used it, it was only after they had learned it from the Basques.

Sailors are proverbially profane, and most likely these sailors of the olden time made use of the name of the Deity, much as sailors do at the present day. The Basque name for God is 'Yainkoa,' and no doubt it was frequently used by the fishermen; so frequently, indeed, that the Indians called the strangers by it, just as the little urchins of Havre and Dieppe now call the English tourists 'Meesteaire Goddam.'

The Indians employed the term to indicate a foreigner, and from them the early colonists learned it. It may afterwards have passed into a word or term of contempt, but it had its origin in the attempt of the Indians to pronounce the Basque word 'Yainkoa.'

TH. E. SLEVIN.

San Francisco, Dec. 26.

'Chinook winds.'

In an article by Mr. Ernest Ingersoll, on the Canadian Plains, in the last number of *Science*, the so-called Chinook winds of that portion of these plains adjacent to the base of the Rocky Mountains, are described as warm, dry winds 'sweeping up from the great Utah and Columbia basins.' In a previous number of *Science* (iv. 166) Mr. Lester F. Ward, in speaking of similar winds in the upper Missouri and Yellowstone valleys, says, "It is also a matter of record that the temperature on this latitude diminishes toward the east, and that colder weather prevails in Minnesota than in Dakota, and in Dakota than in Montana. The people attribute this to the occurrence of what they denominate 'Chinook winds;' i.e., winds laden with moisture, and moderated in temperature from the warmer regions of the Pacific slope." By the inhabitants of the region in which these winds occur, they are very generally explained as currents of air coming from the warm surface of the Pacific Ocean, and flowing eastward through the low passes in the mountains.

Having had occasion to note the character and effect of these peculiar winds while engaged in geological and exploratory work in the western part of the plains and in the mountains at different times during the last ten years, I may be pardoned for stating my belief that the above theories are unsatisfactory, and based on hasty or imperfect consideration of the facts.

As experienced, the Chinook is a strong westerly wind, becoming at times almost a gale, which blows from the direction of the mountains out across the adjacent plains. It is extremely dry, and, as compared with the general winter temperature, warm. Such winds occur at irregular intervals during the winter, and are also not infrequent in the summer, but, being cool as compared with the average summer temperature, are in consequence then not commonly recognized by the same name. When the ground is covered with snow, the effect of the winds in its removal is marvellous, as, owing to the extremely desiccated condition of the air, the snow may be said to vanish rather than to melt, the moisture being licked up as fast as it is produced.

Winter winds of this character occur over a tract of country stretching at least as far north as the Peace River (north latitude 56°), and at least as far south

as northern Montana,—a distance of about six hundred miles. In the corresponding portion of its length, the Cordillera belt is comparatively strict and narrow, the western edge of the plains being separated from the ocean by about four hundred miles only of mountainous country. In this circumstance, taken in connection with the moisture-laden character of the air along the northern part of the west coast, we find a clew to the correct explanation of the remarkable characteristics of the so-called Chinook wind. It is in effect, I conceive, precisely similar to that of the *foehn* of the Alps, and is due to the great amount of heat rendered latent when moisture is evaporated or air expanded in volume, but which becomes again sensible on condensation of moisture or compression of the air.

To meteorologists the phenomenon requires no further elucidation; but as it is one which attracts much attention in the west, owing to its important effect in removing the snow from the grazing-lands, the following more detailed notice, written by me with special reference to the Peace River country, may be of interest (quoted, with little alteration, from the Report of progress, geological survey of Canada, 1879-80, p. 77 B.):—

"The pressure in the upper regions of the atmosphere being so much less than in the lower, a body of air rising from the sea-level to the summit of a mountain-range must expand; and this, implying molecular work, results in an absorption of heat and consequent cooling. The amount of this cooling has been estimated as about one degree centigrade for a hundred metres of ascent when the air is dry, but becomes reduced to half a degree when the temperature has fallen to the dew-point of the atmosphere, and precipitation of moisture as cloud, rain, or snow begins; the heat resulting from this condensation retarding to a certain degree the cooling due to the expansion of the air. When the air descends again on the farther side of the mountain-range, its condensation leads to an increase of sensible heat equal to one degree centigrade for each hundred metres.¹ It is owing to this circumstance that places in the south of Greenland, on the west coast, during the prevalence of south-easterly winds, which blow over the high interior of the country, have been found, in winter, to experience a temperature higher than that of north Italy or the south of France, though the North Atlantic Ocean, from which the winds come, can at this season be little above the freezing-point. The wind well known in the Alps as the *foehn* is another example of the same phenomenon. It is thus easy to understand how the western plains may be flooded with dry air, but much inferior in temperature to that of the coast, notwithstanding the intervening mountain-barrier.

The data are yet wanting for an accurate investigation of the circumstances of our west coast in this regard, but a general idea of the fact may be gained. We may assume that the air at the sea-level is practically saturated with moisture, or already at its dew-point; that in crossing the mountainous region the average height to which the air is carried is about 2,000 metres (6,560 feet), and that it descends to a level of about 700 metres (2,296 feet) in the Peace River country. The loss of sensible heat on elevation would in this case amount to 10° C. (18° F.); the

¹ The figures are Dr. Hann's, quoted by Hoffmeyer in the Danish geographical society's journal, and reproduced in *Nature*, August, 1877.