the natives called by that name. This word 'baccalaos' 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 'Meestaire 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.

gain on descent to the level of 700 metres, to 13°C. (23°.4 F.). The amount of heat lost by the air during its passage across the mountainous region by radiation, and contact with the snowy peaks, cannot be determined. It is, of course, much greater in winter than in summer, and depends also on the speed with which the current of air travels.

Owing to the width of the mountain-barrier, the main result is complicated by local details; regions of considerable precipitation occurring on the western slopes of each important mountain-range, with subsidiary drier regions in the lea. The last of these regions of precipitation is that of the Rocky Mountain range properly so called, in descending from which a further addition of heat is made to the air, which then flows down as a dry and warm current to the east. GEORGE M. DAWSON.

Ottawa, Canada, Dec. 31.

The Taconic controversy in a nutshell.

The New York geologists encountered a great group of metamorphic, apparently successive and conformable strata, extending from the Hudson River eastward into New England (1836–42).

Emmons claimed they were all older than the Potsdam, and named them all Taconic. His colleagues of the New York survey, and their friends of the Canadian survey, regarded them all later than the Potsdam, and applied to them the terms of the New York system up to the Medina (1842).

Fossils were discovered in some of the eastern belts of this metamorphic series, and announced by Hall and others in 1842, rather indicating the whole series was post-Potsdam.

Emmons re-examined the whole, and called attention to an unconformable overlying of the Hudson River and calciferous upon the older slates of the true Taconic, and distinctly re-asserted the pre-Potsdam age of the Taconic system, from which he figured primordial fossils (1844). He was supported by Billings and Barrande, and by Colonel Jewett of Albany, but as time passed he was ostracized from geological circles.

The authority of Barrande, however, was sufficient to convince the opponents of Emmons on the New York and Canadian surveys, and they expressed a willingness to abandon the use of the conflicting term, 'Hudson River group' (1862).

The Canadian geologists, however, fertile in the invention of devices of stratigraphic nomenclature, renewed the contest by two flank movements, — one the Huronian phalanx, aimed at the lower strata; and the other, the 'Quebec coffin,' aimed at the overlying strata, thus rallying the whole discomfited cohort (1855–61). Emmons died in the midst of this movement.

As time passed, the term 'Hudson River group,' besmirched and hesitating, was re-habilitated by being shifted to new ground, — that of the Lorraine shales (1877).

In Wales, Barrande had discovered the 'primordial zone' in Sedgwick's 'Cambrian;' but, as the Sedgwickian term was then under as strong a ban in England as 'Taconic' was in America, Barrande's term was adopted in England, and also transferred to the equivalent strata in America.

Gradually, in other places outside the Hudson valley, the primordial fauna came to light, the strata taking other Canadian names, — St. John's and Acadian; these terms becoming current in the United States.

Finally the existence and fossiliferous character of a great series of strata, occupying exactly the position, claimed by Emmons, and mapped by him under the term 'Taconic,' lying below the Potsdam sandstone, has been demonstrated, and is admitted by all geologists.

The term 'Quebec' not being approved, and 'Huronian' seeming to collide, the later English term, 'Cambrian,' is applied in America to this very horizon to which Emmons had given the name 'Taconic.'

Some of the opponents of Emmons, re-enforced lately by active, younger men, revive the fossiliferous character of some of the eastern belts as new matter, adding many interesting and valuable details, and begin again to fire at the old fort, long ago abandoned by Emmons, insisting that Emmons is still intrenched there (1872–85).

It seems to me that any fair-minded geologist, finding primordial fossils in the strata mapped by Emmons as Taconic, lying below the Potsdam, would at once admit the strata to be Taconic; just the same as, if he found non-Taconic fossils in an area not claimed as Taconic, except by a mistake in a preliminary definition (corrected by its author), he would at once admit those strata were not in the Taconic, and were not intended to be so described.

The same mistake was made by Emmons at first as by his opponents. None of them imagined they had to deal with two different and unconformable formations. The strata were all either Taconic or Hudson River. Emmons approached them from one side, the primordial, and his opponents from the opposite direction. Each had evidence to support his claim; and, viewed from his own stand-point, each was right. It is unfair to Emmons, and to American geology, to insist that this preliminary mistake should consign to oblivion the great fact that in America, and by an American geologist, was first discovered the primordial zone of geology.

If the Taconic is to 'lose its identity' because a portion of the original described strata prove to be post-Potsdam, what shall become of the Hudson River, by the same reasoning, if it be treated with honesty, when nearly all the strata covered originally by it prove to be pre-Potsdam? If the strata can fairly be divided between the conflicting claims, as the structural geology of the region seems to require, it would be for the honor of American geology to so divide them. It seems, however, that the extreme anti-Emmons partisans will not grant such a division, but insist on the utter destruction of every thing that smacks of Taconic. N. H. WINCHELL.

Relics from an Indian grave.

On the Conejo plateau in Ventura county, Cal., and about fifteen miles from the coast, a conical hill rises to the height of a hundred feet, with a base of several hundred feet. On the south side of this elevation, and stretching more than half around it, is the remains of an old Indian town. At the top of the hill is a circular depression, indicating the spot where once stood the 'sweat,' or council-house, of the tribe that occupied this site. Near the centre of the crescent-shaped village is the place where the dead were buried. Early last month the writer examined this burial place, which yielded about a hundred and