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.

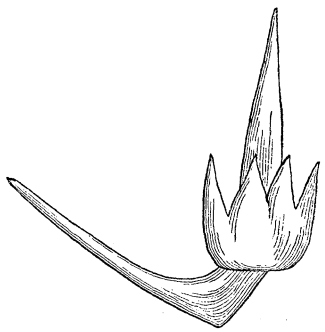
Relics from an Indian grave.

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

fifty skeletons deposited from one to five feet below the surface. The usual method of sepulture practised by the Santa Barbara stock of Indians prevailed here; namely, the knees were drawn up against the breast, and the corpse was buried face downward.

With the skeletons were found three ollas carved from crystallized talc, which were used for cooking-purposes; two large sandstone mortars, finely finished, used for triturating grain and acorns; a sandstone bowl about one inch deep and six inches in diameter; two conical pipes and several large beads of serpentine; several sheets of mica with hole drilled at the side; a broken tortilla stone; several balls of paint; and thousands of shell and glass beads, wampum, ornaments, etc. In a Haliotis shell (H. splendens) I found eight old fashioned flat brass buttons, with numerous specimens of wampum, manufactured from Olivella biplicata. The remains of a metal knife were discovered, which, with glass beads, buttons, and a portion of an old-fashioned water-bottle, shows that this place was inhabited since the advent of the white man, or within the past three hundred and forty-three years.

Probably the most interesting relic discovered was a metal fish-hook. It has a shank about four and a



half centimetres in length, with a point about three and a half centimetres long, which, from its shape, I should judge was of Indian manufacture. An Olivella shell was scalloped or notched, leaving it somewhat in the shape of a crown. The base was perforated, and the shank of the hook pushed through it. This was doubtless intended as an attraction to the fish. The species is Olivella biplicata, some of which are very white, and, at the end of a line, would be nearly or quite equal in brilliancy to the pearl oyster-shell used by the South-Sea Islanders for the same purpose. By the kindness of the publisher of *Science*, an engraving of the fish-hook is presented. It is in a somewhat restored form, the original being corroded to some extent by rust.

STEPHEN BOWERS.

San Buenaventura, Dec. 8.

New find of fossil diatoms.

Seeing a reference to diatoms occurring in clay strata in a railroad-cutting near Philadelphia, in two of the recent issues of *Science*, I wrote to Dr. Koenig, the discoverer, for a sample of the diatom-bearing clay. I received the clay promptly, and am delighted to be able to say, that, after a five-minutes' preparation, I had the pleasure of noting a very rich slide containing at least thirty species of diatoms; the forms corresponding chiefly to the recent fresh-water forms, but characteristically different, as relates to the association of the species, when compared with the forms occurring in the sub-peat deposits of the eastern United States.

My reason for making this communication is, that the value, interest, and importance of this new find of diatomaceous material has not been sufficiently emphasized in the two articles in *Science*, and might be overlooked by diatomists, and all who are on the constant lookout for new localities of fossil diatoms.

K. M. CUNNINGHAM.

Amoeboid movement of the cell-nucleus.

The study of the cell-nucleus has become a subject of such absorbing interest in biology, that we feel justified in asking a little of your space to make known what seems to us a promising field for investigation. During the last year, in studying the blood of Necturus, after its removal from the body and in the blood-vessels, we were struck with the great size and distinctness of the nucleus of the white corpuscles. But what seems especially interesting and important is the fact that the nucleus of the white blood-corpuscles exhibits a very marked amoeboid movement, both in the vessels of a curarized animal and on the microscopic slide. These movements are as vigorous and easily followed as are those of the cell-body; and often both the cell-body and nucleus are undergoing amoeboid movement at the same time, the movements of the cell-body and nucleus seeming to be entirely independent of each other. From the ease with which the white corpuscles are obtained and observed, from the size and activity of the nucleus and its distinctness in the living condition, it is confidently expected that the study of the white blood-corpuscle of Necturus will greatly assist in making more definite our knowledge of the nucleus, its so-called membrane, and the processes of its division.

S. H. and S. P. GAGE.

Anat. lab. Cornell univ., Dec. 25.

English sparrows.

In *Science*, Dec. 18, appeared some remarks on the English sparrows that do not at all agree with our experience here. We have many orchards and groves in and around our village. Many of us have provided boxes for wrens, martins, bluebirds, etc. Robins, cardinals, crimson-breasted grossbeaks, catbirds, etc., are innumerable around us. A few years ago some of our people, accustomed to watch the many kinds of birds that frequent our court house grove, asked me about 'a little bird that had just newly appeared in the grove.' They said that it was "driving all the other birds away. Not content with merely fighting and mastery, it drove the others clear out of the town." The people had been watching them for some days, and reported that half a dozen birds had actually made themselves the sole possessors of our melodious grove, heretofore so delightfully noisy with the songs of the many native birds. I suspected the cause, and, as soon as I saw the 'strange little birds,' pronounced them to be those 'winged rats,' the English sparrows. For twenty years I had kept several boxes for martins at my own place. About thirty pairs were making their homes at my doors. Suddenly I missed them, but the screech of a pair of English sparrows took