The highest points of this cordillera are situated in the southern part of New South Wales, not far from the Victorian boundary line, and somewhat exceed 7,000 feet in elevation; the culminating point is Mt. Kosciusko, which attains 7,300 feet. The Snowy Range, which includes most of this elevated district, constitutes the watershed between the interior drainage of the Murrumbidgee and Murray Rivers and that of the Snowy River which empties into the ocean in Victoria near the boundary line between that state and New South Wales.

The plateau sustains a very scanty vegetation of dwarfed eucalyptus. The climate is very cold, the temperature sinking to — 20° F. in the winter, and the snowfall is extremely heavy.

The rocks consist chiefly of the rather closely folded Paleozoic sediments which occupy so much space in the Cordillera. Their age ranges from Ordovician to early Carboniferous, and tuffs and intrusive granitic rocks of various kinds are associated with the sediments.

The so-called Snowy Range is not really a range at all, but a plateau of comparatively gentle relief, a peneplain in fact, with elevation ranging from 5,000 to 7,000 feet, in which the Tumut, Murrumbidgee and Eucumbene Rivers have cut abrupt canyons, the depth of which in some cases amounts to 3,000 feet. That this uplift is of comparatively recent age is proved by the basaltic flows which, near Kiandra, cover the summit of the plateau. The basalt covers an old auriferous river channel which has been traced for 20 miles by means of mining operations, and which has a gentle northward grade. Sand, clay and lignite cover the thin stratum of auriferous gravel to a depth of 150 feet and capping this the basalt flow attains a thickness of about 100 feet.

GEO. OTIS SMITH,
Secretary.

DISCUSSION AND CORRESPONDENCE.

CONCERNING THE NATURAL MOUNDS.

WHAT has been said in SCIENCE recently (Nos. 530, 535 and 536, pp. 310, 514 and 551) by Mr. A. C. Veach and Professors Branner and Hilgard is of great interest to the writer, inasmuch as he has for some years been making observations on these mounds in Arkansas with the hope of reaching a satisfactory conclusion as to their origin. They have been observed along the western border of the Tertiary area, along the Arkansas valley, and in the northwestern part of the state. In outline, they are uniformly circular, and in size are rarely less than fifteen or more than thirty feet in diameter, and usually less than three feet in height.

The theories of surface erosion, wind origin and human origin have been applied to these with the conclusion that none of them will hold. The uniformity of size and circular outline could not result from surface erosion. For the same reason, as Mr. Veach points out, they could not be the product of wind deposition. Besides, they always occur on clay soil, out of which and upon which, according to the writer's observations, the wind does not form dunes. The fact that they frequently occur in the most undesirable places for human abode, being on ground where both the surface drainage and underdrainage is poor, is in itself sufficient argument against the theory of human origin. The spring and gas vent theory is not tenable in the Paleozoic region, for the reason that Mr. Veach has stated.

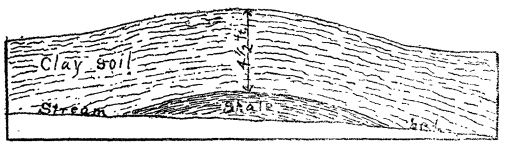
After being forced to abandon the above theories, one of origin by burrowing animals, such as the gopher or prairie-dog, was held for some time, but the examination of a large number of sections disclosed by grading along railroads, wagon roads and cutting ditches through farms furnished no evidence of the material having been worked over, as must have been the case if such were the origin. However, this theory is not yet entirely abandoned.

As to the ant-hill theory, there are at present in the Arkansas valley large numbers of ant-hills from three to four feet in diameter, and often as much as fifteen inches high. These are found on the very soil where the mounds occur. But if the ancestors or forerunners of the living ants were the builders of the mounds, they must have existed in

larger numbers and worked more industriously, for the present ant-hills are diminutive as compared with the mounds.

For some time the writer has entertained a theory very similar to that mentioned by Professor Branner. As above stated, these mounds are always on clay soil. In the Paleozoic region of Arkansas, they are on residual clay soils only a few feet deep, and of shale origin. As stated, the drainage where they occur is usually poor. These facts point to the action of ground-water within the clays or shales as being in some way responsible for the mounds. The action is thought to be one of the segregation of mineral matter, or as Professor Branner puts it, 'concretionary action on a large scale.' After the segregation, the volume may be further increased by hydration, oxidation and other chemical changes.

This idea was first suggested by a section of one of these mounds in the Arkansas valley that was brought to view by a small stream having cut its way through it and into the shale below, as shown in the figure. The uneroded portion of the mound was typical of



Section of a natural mound cut through by a stream.

the hundreds in the vicinity, and the general conformity of the surface to the arch of the shale would lead one to believe that the mound was due to the lifting of the shales beneath. While the writer has seen many sections through these mounds, this is the only one that discloses the shales, so that its value lies only in its suggestiveness.

In the Paleozoic region of Arkansas these mounds occur on at least three different beds of shale, two of which belong to the Lower Carboniferous, and the remaining one or more to the Coal Measures. These are all carbonaceous, clay shales. If their cause should prove to be a chemical one, induced by the action of ground-water, the question will present itself as to why they do not have a wide geographic distribution as well as a geologic one. The explanation would probably be found in the climatic conditions where the mounds occur. But this is scarcely worth speculating on till the origin of the mounds is determined.

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April 10, 1905.

THE BASALT MOUNDS OF THE COLUMBIA LAVA.

The recent discussion of various types of mounds of uncertain origin leads me to call attention to a form common in eastern Washington, which seems thus far to have escaped printed notice. Very conspicuous examples are found in the vicinities of Spangle and Medical Lake. Similar ones occur near Winona in the old bed of the Palouse River. Less striking examples are generally found along the crests of all the canyons hewn out by streams in the basalt, especially on the north walls. The general proportion of these mounds is about that of an upturned saucer, but occasionally more convex. The most conspicuous are about four feet high, about twice the height of the more usual ones. In diameter they vary from ten to twenty feet, or rarely more. The first generalization that forces itself upon one is that these mounds occur only where there has at one time been flowing water. They are conspicuous enough even at the top of Snake River canyon, though the river now flows on a bed two thousand feet below. Where these mounds occur along the crests of canyons there is usually but a single series of them. Where, on the other hand, they occupy the old beds of broad shallow streams, as at Medical Lake and near Spangle, there may be acres of them, rather evenly scattered, and often quite close together.

The soil of these mounds shows no appreciable difference from the surrounding soil of basaltic origin, and except in the rare cases where water stands about their bases, they do not support a vegetation more or less luxuriant than that of the surrounding soil. There is nothing, in short, in the structure of the ordinary mounds to give a clue to their origin.