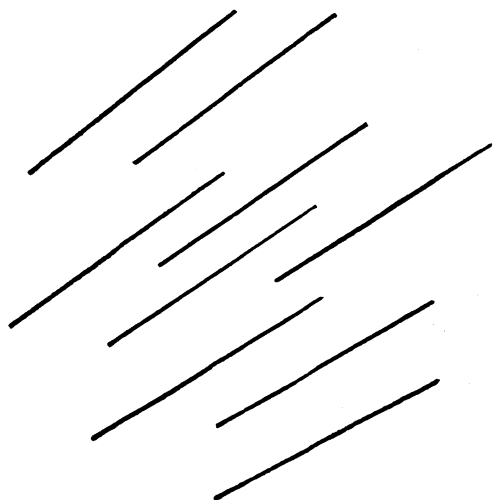


of the one eye with which they are looked at)\* are taken by us to be vertical lines. This illusion is illustrated in Fig. 1. The lines of the figure are all drawn through a common point about three inches beyond the corner of the paper. If one eye be put in the position of this point (the other being closed), and if the paper be held horizontally about on the level of the eye, the lines will all seem to stand upright. The reason is that when one eye only is used, we have very small ground for knowing how such a line is situated in the plane determined by it and by the nodal point of the eye, and hence we take it to be a vertical line *faute de mieux*, because by far the greatest number of lines which strike the retina in this meridian are vertical lines. With many lines, the illusion is stronger than with one, because every group of vertical staves that we have ever seen has looked like this, and it has probably never happened to us to see a group of lines lying on the ground in just this position.

That this is the correct explanation of the phenomenon of the lights is confirmed by the fact that, upon looking at the reflec-



\* *Am. Jour. of Psychology*, I., 101 and James' *Principles of Psychology*, II., 95.

tion with the head inclined through an angle of ninety degrees, the illusion wholly disappears. One can no longer believe that it is possible to see the stream of light otherwise than as lying flat upon the surface of the lake. In this case the image of the line of light falls along the eyes, from one to the other, or just as a line would do which went from right to left if the head were in its normal position. Such a line we have no tendency to see vertical, and hence we now see the streak of light where it really is on the surface of the water. With the head wholly inverted, the line becomes vertical again, but less strongly so than when the head is in the customary attitude.

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#### CURRENT NOTES ON PHYSIOGRAPHY.

##### THE TERTIARY PENEPLAIN IN MISSOURI.

THE prevalent opinion that the 'mountains' of the dissected Ozark plateau in Missouri are old geographical features meets welcome contradiction in an essay by Keyes, State Geologist (Missouri Geol. Survey, viii., 1894, 317-352). The relatively even upland surface of the plateau is explained as a peneplain of denudation; and the dome-like form of the plateau today is regarded as the result of elevation since the close of the Tertiary. The general upland plain is dissected by steep-sided or canyon-like trenches, in which the process of deepening is still continued. "The last elevation is not yet ended, and the changes of level in the region are probably going on now as rapidly as they ever have in the past geological time" (p. 352). While the strata are nearly horizontal in the Ozark plateau, they are tilted in the Ouachita mountains, south of the broad valley of the Arkansas river, in the State of that name. Keyes regards the relatively even crest lines of the Ouachita ridges as representing the same peneplain as that of the Ozarks; the broad valley of the Ar-

kansas being a trough of erosion between the two highland areas, 'due partly to structural peculiarities, but it is also due largely to other conditions,' the latter not being specified. "As a unit, the Tertiary peneplain was bowed up from the Red river to the Missouri."

It has for some time been desirable to fix the date of the Ozark peneplain, but unfortunately the evidence by which a Tertiary date is here assigned to the completion of the peneplain and a Post-Tertiary date to its uplift and dissection is not fully stated. The narrowness of the valleys may, however, certainly be taken to 'emphasize the fact that the Ozark uplift of to-day is essentially modern.'

#### HIGH LEVEL GRAVELS OF KENTUCKY.

THE rolling limestone uplands of the blue-grass region of Kentucky, rimmed around by sandstone escarpments on the south, and dissected by deep narrow valleys of streams that flow to the Ohio on the north, are strewn over at various places with gravels and sands. The distribution of the gravels is discussed by A. M. Miller, of Lexington, Ky. (*Amer. Geol.*, XVI., 1895, 281-287). These loose materials are water-worn and bedded, and are derived mostly from the harder rocks of the enclosing escarpments; they are found chiefly near existing valleys. Miller concludes that within comparatively recent times the rivers were flooded to a height of 300 to 350 feet above their present channels. In explanation of such flooding, a glacial obstruction of the Ohio is considered as a possibility, but satisfactory evidence is not found in favor of it. 'Submergence' of unspecified nature is also mentioned without reaching any definite conclusion about it.

No consideration is given to the possibility that the gravels may have been spread over the upland surface before the present canyon-like valleys were eroded, while the

whole region stood at a lower level than at present, but not submerged. This is eminently possible, for the aspect of the blue-grass region is strongly suggestive of baselevelling during a former lower stand of the land, and of dissection after elevation to the present altitude, as has been suggested by Westgate (*Amer. Geol.*, XI., 1893, 258-259). The prepossession that the upland gravels could not endure for so long a time as would be needed to carve the canyon-like valleys is not well supported. Old river gravels lie on rock benches enclosing the gorge of the upper Ohio; and in similar position on the valley slopes of the Meuse in its transverse path across the Ardennes; even the fine loess of the upper bench of the Rhine valley in the Schiefergebirge is older than the narrow gorge of that energetic river.

#### CLOUD-BURST TRACKS AND WATER GAPS IN ALABAMA.

A REPORT on the Coosa coal field by A. M. Gibson (*Alabama Geol. Survey*, 1895) gives a description of two great scars on Coosa mountain, produced by cloud-bursts that accompanied the tornadoes of July, 1872. On the northwest side of the mountain there is a washout sixty feet wide and three or four feet deep, extending down the mountain side. Trees, soil and rocks were all swept down, making great moraine-like heaps at the base of the slope. On the southeast side of the mountain there are several scars of even greater magnitude. From one of these rocks of all sizes were carried down to the low ground and there heaped over 'acres of ground.' One mass, estimated to weigh a hundred tons was carried half a mile (p. 28-30).

It is to be regretted that the sanction of State publication should be given a few pages later to an antiquated account of 'Big Narrows' in Double mountain. "Some convulsion of nature must surely have made the

break that let the waters enter here, it else seems impossible that this stream could have cut through such rocky masses by a gorge so narrow; and leaving so little sign of abrasion on the perpendicular cliffs" (p. 32). If there were really reason to regard this gap as the result of a convulsion of nature it would deserve to be carefully described; and such a rarity would become a mecca for geologists and geographers; but as there appears to be no sufficient ground for thinking it different in origin from the hundred other water gaps of the Appalachians, the people of Alabama ought to have a reasonable explanation of its method of production.

#### MASSANUTTEN MOUNTAIN, VIRGINIA.

A PRELIMINARY account of this peculiar sandstone mountain, rising from the limestone floor of Shenandoah Valley, is given by A. C. Spencer (Johns Hopkins Univ. Circ., No. 121, Oct., 1895, 13, 14). The mountain is of complicated synclinal structure, the resistant sandstone which forms its rim being bent into the form of a long, narrow, deep and wrinkled trough, whose bottom dips 1,000 feet or more beneath the surrounding valley floor. The greater part of the crest line of the mountain represents the much dissected Cretaceous peneplain of the Appalachian province; but certain points rise to greater elevations by as much as 500 or more feet. Passage creek, draining the northern portion of the valley enclosed by the mountain rim, is peculiar in cutting its outlet gap at the apex of the syncline, instead of to one side, as is commonly the case in Pennsylvania.

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#### CURRENT NOTES ON ANTHROPOLOGY.

##### ETHNOGRAPHIC SURVEYS.

It has been already mentioned in these notes (see SCIENCE, Feb. 10, 1893,) that an

ethnographic survey of Great Britain and Ireland had been instituted under the auspices of the British Association for the Advancement of Science. Already two preliminary reports have been made, and quite lately the Honorable Secretary of the Committee, Mr. E. Sidney Hartland, has published some explanatory notes about the plan, in the 'Transactions of the British and Gloucestershire Archæological Society.' These are very useful and suggestive, and together with the forms of schedule prepared by the Committee should be secured by students of ethnography as showing the well-matured methods of investigation decided upon by the high authorities in charge of the survey. They may be had by addressing 'the Secretary of the Ethnographic Survey, British Association, Burlington House, London, W.'

##### THE EARLY USE OF METALS IN EUROPE.

DR. JULIUS NAUE, the well known editor of the *Prähistorische Blätter* in Munich, contributes to the 'Revue Archéologique' an instructive article on the Hallstatt Epoch in Bavaria and the Palatinate, principally from his own researches.

His epoch is that of 'the first age of iron' and begins about 800 B. C. At its beginning bronze was much more abundant than iron, and the forms given it were graceful. The bodies were generally incinerated and placed in stone tombs. Long, leaf-shaped swords of iron were laid with the warriors, and ornamented vases of pottery beside them. Knives, daggers, pins, lance points and ornaments of both metals are common. The ethnographic conclusion is that these were Celtic tribes, probably the Licatii, of Latin authors. In agriculture they were skilled and in commerce had established distant relations.

Their contemporaries in the Upper Palatinate were less advanced, being addicted to human sacrifices and more warlike.