

ing the older and more artificial ones, and that there is ample hope for devising physical means of correlation that are more in harmony with the real nature of the problems involved.

Still more recently it has been suggested that the real basis of geological correlation should be found in the causes giving rise to and governing sedimentation. This involves primarily a classification founded upon mountain-making movements. It is proposed, therefore, to emphasize this factor as fundamental in the marking off of the leading subdivisions of geological time, and to define general stratigraphical succession in accordance with the cycles of orogenic development, calling the classification or fundamental principle of correlation a systematic arrangement by mountains, or orotaxis. It is believed to overcome many of the difficulties that are usually encountered in correlation, in that it enables successions of strata to be paralleled not only in provinces whose geological history has been similar, but in those in which it has been very different.

CHARLES R. KEYES.

CURRENT NOTES ON PHYSIOGRAPHY.

THE ROCKY MOUNTAIN FRONT.

MONOGRAPH XXVII., U. S. G. S., on the Geology of the Denver Basin in Colorado, by Emmons, Eldredge and Cross, gives some account of physiographic features amid its detailed description of geological structures. The mountain front, when seen from a distance, rises as if from the sea in a continuous but rugged slope. A closer examination shows that, after reaching a certain height, the frontal spurs ascend more gradually to the main crest of the range, which lies unexpectedly far back. The upper valleys are wide open, but descend into deep and narrow gorges towards the 'shore line.' This is taken to indicate a revival of stream action by up-

lift, after an advanced stage of denudation had been reached when the region stood at a lower level. The hog-back ridge of the upturned foot-hill strata (Dakota), with the longitudinal subsequent valleys behind it, is generally even and continuous. Zigzag turns are formed on occasional folds; lapses of the ridge are noted at Golden and Boulder, where the Dakota sandstone was not deposited. The moderate relief of the Plains is shown to result from extensive denudation; the uppermost members of the series are broadly stripped off, leaving wide valleys between uplands and mesas of significant relief to the cross country traveller, but broadly plain in comparison to the bold mountain front.

CASTLE MOUNTAIN, MONTANA.

CASTLE Mountain is an outlying member of the Front range of the Rocky mountains in Montana, between the Missouri and Yellowstone rivers. It is described by Weed and Pirsson (Bull. 139, U. S. G. S.) as a 'dissected volcano,' although the considerable cone that must have once risen here (as attested by lava flows and tuffs) has been almost completely denuded, and the existing mountain of massive granite is hypothetically represented as of laccolitic structure in the corrugated beds of the heavy stratified series; the granites being older than the effusive materials. As is so generally the case in the Rocky mountains, moderate deformation occurred after extensive denudation of the corrugated strata, and considerable stratified deposits now mark the sites of lakes thus formed; the plains of Lake Smith, west of Castle Mountain, being the local illustration of this geographical element. The volcanic eruptions were antecedent to the lacustrine period, as the lake beds consist largely of stratified volcanic tuffs. Glacial action is indicated by well marked moraines which are referred to two epochs.

The description of the lake beds above mentioned suggests a recurrence to a note in a recent number of SCIENCE. The lower beds, 200 feet of well-indurated clays, are covered with sandstones and conglomerates, 'much cross-bedded and greatly resembling the Pliocene lake beds so common in the mountain valleys of Montana.' The upper beds range from marls to conglomerates, varying rapidly in kind and composition. Is it not probable that these variable upper beds are largely of fluvial origin?

SCENERY OF YELLOWSTONE PARK.

'Some geological causes of the scenery of Yellowstone National Park' are discussed by A. R. Crook (Amer. Geol. XX., 1897, 159-167), but with inadequate attention to the action of ordinary erosive processes. Mention is briefly made of the uplift of various mountains, but their extensive denudation into existing forms is hardly referred to, except under the head of glacial action, which is given an excessive value. The extreme youth of the Yellowstone Canyon in contrast to the maturely sculptured valleys of its headwaters, one of the most striking features of the Park, finds no mention. Although punctuated here and there by geyser basins and surrounded by a frame of bold mountains, the monotony of the scenery over large rhyolite areas will disappoint many visitors who read exclamatory descriptions of this 'Wonderland of America.' The bicycle as a means of travel in the Park deserves notice to intending visitors of the hardier kind.

THE PHLEGRÆAN FIELDS.

THE Oxford University Geographical Studentship, held in 1895-96 by R. T. Günther, leads to an essay under the above title as the result of extended field work (London Geogr. Journ., X., 1897, 412-435). The area studied lies west of Naples—a region of 'crater-like hills and hollows, vol-

canic ridges and trachytic rocks,' known as the *Campi flegræi*, or Burning fields. It is associated with level stretches of fertile volcanic soil, spread by water or other agency and known as the *Campagna felice*. Volcanic activity, as a cause of topographic features, has here been manifested in a slow outwelling of fluid materials, forming heaps or streams of lava; or in explosive discharges, forming craters surrounded by circular ring-walls of débris. The older volcanoes are much altered by stream and marine erosion, as well as by later volcanic action. Twenty-six craters more or less completely preserved are described and classified according to relative age. The later craters are smaller and nearer the shore than the older ones.

In view of the well-determined occurrence of calderas, as a result of destructive volcanic action in contrast to the constructive action that produces typical craters, it is to be regretted that no consideration is given to the differences between these two serviceable types of volcanic forms.

W. M. DAVIS.

HARVARD UNIVERSITY.

CURRENT NOTES ON ANTHROPOLOGY.

THE PRESENT POSITION OF ETHNOGRAPHY.

THERE has lately been published, from the pen of Dr. Andrew Lincke, an interesting survey of the present position and recent contributions to the science of ethnography. Although his main attention is directed to the area of Germany, and particularly Saxony, he has also made an examination of what has lately been done for Asia and other parts of the world. His pamphlet of ninety-two pages is much more than a catalogue of books and papers. He undertakes to assign their respective value to those which he has himself read, and, although his notices are necessarily brief, they will be found useful indications to the reader and student. Dr. Lincke is himself well