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CURRENT NOTES ON PHYSIOGRAPHY.

THE MISSISSIPPI IN SOUTHEASTERN MISSOURI.

THERE is a narrow belt of lowland in southeastern Missouri that is separated from the broad lowland flood plain of the Mississippi by a low upland known as Crowley ridge. Marbut gives an interesting explanation of these features ('The Evolution of the Northern Part of the Lowlands of Southeastern Missouri,' Univ. of Missouri Studies, I., 1902, No. 3, viii + 63 p., 5 pl., 2 maps). The two lowlands have been eroded by the Mississippi and the Ohio rivers, whose confluence originally lay south of Crowley ridge. A series of changes, well worked out by the author, resulted in two successive captures of the Mississippi, whose flood plain was at a higher level, by the Ohio, whose flood plain was at a lower level. The first capture was at the head of Crowley ridge; and here the river ran long enough to open a flood plain thirty miles wide. The second capture was fifteen miles farther northeast, at the head of a smaller upland called Benton ridge, where the new twenty-mile course of the great river has been so lately assumed that it is still a narrow gorge without bordering flood plain. Crowley and Benton ridges are, therefore, in a certain sense examples of that peculiar class of hills which results from the isolation of the terminal part of a ridge between two rivers when a new point of confluence is developed, upstream from the former point; the notable feature of this case being the unusual length of the first (Crowley) isolated portion of the ridge. This origin of the ridge had been suggested in general terms by earlier writers; but to Marbut belongs the credit of demonstrating the changes involved and of explaining closely the processes by which they were brought about.

LAKES IN THE GLARNER ALPS.

THE origin of the small lakes in the higher valleys of the Glarner Alps, southeast of Zurich, is discussed in a doctorate thesis of the University of Basel by S. Blumer ('Zur Entstehung der Glarnerischen Alpenseen,' *Eclog. geol. helvet.*, VII., 1902, 203–244, 4 pl.). He concludes that the lake basins are all closely associated with the former glaciation of their valleys. Most of the basins are described as relatively insignificant depressions due to glacial erosion in an old valley floor; but some of them are enclosed, in part at least, by torrential fans, and others are associated with underground discharge in limestones.

This essay shares with many others a plan of treatment that seems, in view of recent studies of glacial erosion, to give a too limited consideration to the problem in hand. It is tacitly implied that the rock barriers next below the basins have not suffered any significant amount of erosion; and hence that practically the whole measure of glacial erosion is seen in the depth of the basins above the barriers. Many recent studies indicate, on the other hand, that both basins and barriers in glaciated valley floors have suffered severe erosion, and that the excess of erosion in the basin over that on the barrier is a relatively small fraction of the total erosion by which the valley trough—the glacial channel—as a whole was deepened. The origin of lake basins in glaciated districts therefore calls for a general study of the entire valley in whose floor the lake occupies only a 'relatively insignificant depression'; just as the origin of a pool in a dry river bed involves the explanation of the whole river channel, and not merely of the pool alone. It may also be noted that the torrential fans by which so many of the Swiss valleys are obstructed, in some cases to the point of barring lakes, are best explained as indirect consequences of glacial erosion; the stream in the over-deepened main valley being unable to sweep away the abundant detritus washed in by the over-steepened side streams that leap down from their hanging valleys. In a word, the study of Alpine lakes demands a more general treatment than it is given in Blumer's essay.

THE LAKES OF WALES.

THE deficiency just pointed out is largely remedied in 'A Bathymetrical and Geological

Study of the Lakes of Snowdonia and Eastern Carnarvonshire' by T. J. Jehu (*Trans. Roy. Soc. Edinb.*, XL., pt. 2, 1902, 419–467, 8 pl.). Twenty-six pages are given to an account of the lake basins, illustrated by contoured maps and true-scale sections. The lakes are of two kinds: the larger ones lying in the main valleys, the smaller occupying cirques (cwms). After discussing the origin of the lakes, it is concluded that they are relatively subordinate results of the glacial erosion by which the valleys of the Welsh mountains have been strongly scoured. As seems to be generally the case in such regions, the main valleys are preglacial, but now 'the more important valleys are at places over-deepened as compared with the lateral valleys and * * * have a trough-like form with flat bottom and steep cliff-like walls.' Tributary streams often cascade into the main valleys. Cirques, with or without lakes, occur at the valley heads. "If the glaciers have thus * * * eroded the channels along which they flowed, the excavation of rock basins below the general level of the valley floor * * * need no longer excite surprise or be looked upon as anything more than subordinate incidents in the general history of ice erosion."

It is suggested that 'the lakes occupy in their respective valleys just those positions in which the glaciers might be expected to have carried on most actively the work of erosion,' and these positions are said to be next above narrows, presumably due to harder rocks, where the glacier would be retarded in its flow; but this last point seems open to question. The erosion of a lake basin in a valley floor just above a hard-rock narrows would not be inconsistent with a maximum erosion further up the valley where the glacier was thicker, for erosion might depend on the maximum pressure of the ice, rather than on its retardation. The height of hanging lateral valleys should be considered along with the depth of lake basins in determining the places of greatest glacial erosion in main valleys.

W. M. DAVIS.

RECENT ZOOPALEONTOLOGY.

TRIASSIC ICHTHYOSAURS FROM CALIFORNIA AND NEVADA.

ICHTHYOSAURS are so rare in America and Triassic ichthyosaurs are so rare everywhere, that these discoveries in Nevada and in Shasta County, California, are particularly welcome. Professor John C. Merriam* describes very fully the *Shastasaurus* of the Upper Triassic of California from considerable portions of seven individuals, together with many isolated bones and teeth representing nearly the whole of the skeleton, but lacking the very important distal portions of the paddles. These remains are placed in six species. From the Middle Triassic of Nevada, the *Cymbospondylus* of Leidy, including three species, is more fully defined and characterized.

RELATION OF THE OSTRACODERM AND ARTHRODIRAN FISHES.

DR. OTTO JAEKEL contributes a new discussion† of this group decidedly at variance with the views of Smith Woodward and Dean. He unites the Arthrodira and Ostracodermata, which have been separated by Cope, Smith, Woodward and Dean, into the single order of Placoderms. Among the Ostracoderms he believes that the Pteraspids have retained a larval character, whereas the Asterolepids have become somewhat more specialized. The Coccosteid arthrodires including *Coccosteus, Dinichthys* and *Titanichthys,* have attained a higher organization, and, owing to their freer motions, have a completely segmented skeleton provided with limbs, which enables us to compare them with other vertebrates. He gives a partial restoration of *Coccosteus,* the chief feature of which is the prominent pelvic girdle, the existence of which has been questioned by Dean. The Coccosteids exhibit parallels with the ancient types of sharks and crossop-

* 'Triassic Ichthyopterygia from California and Nevada,' University of California Publications, Bulletin of the Department of Geology, Vol. 3, No. 4, pp. 63–108, pls. 5–18.

† 'Coccosteus und die Beurtheilung der Placodermen,' *Gesells. naturf. Freunde zu Berlin,* 20 Mai, 1902.