

The sections of the Catalina rocks show a great variety of mineral composition ranging from quartzite to muscovite-schist and biotite-schist. There can be little doubt of their elastic origin, though they are now penetrated by layers of pegmatitic granite, which partake of the deformation.

These gneissic and schistose rocks are members of the series of pre-Cambrian schists for which I proposed the name "Arizonian." They are widely distributed in middle and southern Arizona and offer an inviting field for investigation.

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PHYSIOGRAPHIC SKETCH OF LEWIS COUNTY, N. Y.

THE county of Lewis, bounded on the northeast by St. Lawrence, on the west by Herkimer, on the south by Oneida and on the east by Oswego and Jefferson counties, extends from the 43° 25' of northern latitude for fifty-four miles northward and from the 75° 50' western longitude for nearly thirty-four miles to the east, and is naturally divided by Black River into two heterogeneous sections from a genetic point of view, an eastern section, made up to the greatest extent of igneous and metamorphic rocks, and a western one that chiefly comprises a sedimentary series.

Successive manifestations of dynamical forces upon the igneous rocks in the east, as the crushing of the granites into gneisses and the intrusions of syenites, as well as gabbros, into the gneissic series and into the crystalline limestone series, have affected also to some extent the sedimentary rocks in the west in such a manner as to slightly bend during post-Ordovician time Cambrian, Ordovician and (Lower) Silurian strata into a flat synclinal fold that plunges at a very small angle to the north-northeast, while subsequent erosion nearly completed one of its cycles by reducing post-Ordovician topography to a peneplain, remnants of which can still be traced in the most elevated portions of the western section.

During another cycle of erosion that was

never completed, but only brought about the partial destruction of the peneplain and exposed in succession the different members of the Ordovician, *i. e.*, the Black River and Trenton limestone, as well as the Utica-Frankfort slates and the Pulaski sandstone shales, at least one member of the Silurian, namely the Oswego sandstone, and, bordering the Ordovician in the east, the Potsdam sandstone of the Cambrian, a strike fault west of Black River, extending through the entire length of the county and possibly beyond, caused the disappearance of the Potsdam sandstone along the fault line, thus bringing the pre-Cambrian igneous and metamorphic series into contact with the Ordovician.

Succeeding the faulting of the region and the invasion of ice sheets of local character from the Adirondack, as well as from the Lake Ontario region, which led to the formation of two distinct sets of ground and terminal moraines, a second flood plain was established, adjacent to the former, but on a much lower level, which we might consider a base-leveled plain, as its uniformity of level is admirable for its entire extension from the utmost northwestern points of the county for over forty miles, as far as Forestport, beyond the southern boundary line of Lewis County.

Into this flood plain post-glacial erosion has sunk in several successions, of which two are more prominently marked by river-terraces, the channel that is now occupied by Black River, and has modified the topography of the regions east and west of Black River to such an extent as to impart to them the physiognomy of uplands and highlands, respectively.

At present the area under discussion is passing through a cycle of erosion that has started recently, speaking geologically, and conditions have been established that apparently favor the rejuvenation of the entire drainage system of the region and the carving into the sedimentary strata in the west along joint planes and into the igneous and metamorphic rocks in the east without special regard to basal structure, of those deep gulfs

and precipitous gorges that contribute so much to the charms and scenic effects of a region.¹ T. A. BENDRAT, M.S.

CONSTABLEVILLE, N. Y.

THE AMERICAN ASSOCIATION FOR THE
ADVANCEMENT OF SCIENCE
HANOVER MEETING, SECTION E,
JULY 1-3, 1908

At the Hanover meeting of the American Association for the Advancement of Science, Section E, Geography and Geology, held two sessions for the reading of papers and participated in the excursions to Mt. Ascutney and Corbin Park. Prior to the gathering at Hanover, a party of geologists, which varied in number from eight to ten, enjoyed a trip from Bellows Falls, Vt., to Rutland under the guidance of Professor J. E. Wolff, to the marble quarries at West Rutland with Mr. G. H. Perkins, state geologist, and from Rutland to Woodstock in company with Professor Wolff and Professor C. H. Hitchcock.

The scientific sessions began Tuesday, June 30, at ten o'clock and, with an intermission for dinner, continued till 4:30 P.M. Mr. Bailey Willis, vice-president, called the meeting to order. In the absence of the sectional secretary, Dr. F. P. Guliver, who was unfortunately too ill to attend, Professor J. E. Wolff consented to serve as secretary. After the opening of the afternoon session, Professor C. H. Hitchcock took the chair at the request of Mr. Willis and presided to the close of the session. The following papers were presented and discussed:

Local Geology of Hanover, N. H.: C. H. HITCHCOCK.

Professor Hitchcock after referring to his early work as state geologist and its continuation during forty years, described a large relief map of New Hampshire which he had prepared and from time to time brought up to date as geological investigations progressed. It is now colored to represent the state of knowledge in 1908. The accumulated collections and their arrangement in the Butterfield Museum of Dartmouth College were described, and attention was called to the device of connecting each specimen by an identical number with its locality shown in one of the eighteen sections, which had been prepared on a large scale to illustrate the relations of the rocks. Professor Hitchcock then stated in some detail

¹This article is a chapter of a report to be published on the geology of Lewis County, based on three seasons of field work.

the known and probable relations of the various igneous and metamorphic rocks of the Hanover quadrangle and showed a preliminary draft of a geologic map of that area. The strata being, so far as known, unfossiliferous, their age is inferred from comparison with related fossiliferous sections, which indicate that Cambrian, Ordovician and Silurian rocks may be present in the geosyncline that lies east of the Pre-Cambrian axis of the Green Mountains and extends into the western half of the Hanover quadrangle. The eastern half is a complex of intrusive and metamorphic rocks, on the western margin of a large area related to the zone of intrusions which traverses the middle of New Hampshire and culminates in the White Mountains. Passing on to the subject of glacial geology, the speaker described two sets of striæ, the one ranging south 10° west down the Connecticut Valley, the other southeast. Evidence that local glaciers occupied the valleys tributary to the Connecticut after the disappearance of the general ice sheet was briefly presented, and incidentally a map of Connecticut on a scale of 400 feet to the inch, prepared by the students of Dartmouth, was exhibited.

In discussion Mr. Willis stated that wide areas of schists and gneiss of New England, which were formerly considered to be Archean, are now generally classed as Paleozoic sediments and intrusives. These do not include the axis of the Green Mountains, which Professors Hitchcock and Wolff had described as Archean, but they cover all the province east of that range in Vermont, New Hampshire and Maine.

Recent Explorations in Mammoth Cave, with a Revised Map of the Cave: HORACE C. HOVEY.

Mr. Hovey stated that, of late, explorations in the unfrequented parts of Mammoth Cave have been pushed by several visitors, especially Messrs. Parrish and Einbigler, aided by the local guides. The results were laid before the author of this paper, who verified them by a personal visit in 1907; finding the newly discovered domes more grand than any previously known. These additions, and a number of minor corrections, had led him to prepare a new guide map, with an index and table of approximate distances, which he had now published and exhibited in connection with this paper. Dr. Hovey courteously presented copies of the new map of Mammoth Cave to those present at the meeting of the section.

The Warm Stratum existing at a Great Height in the Atmosphere: A. LAWRENCE ROTCH.

In 1901 it was discovered in Europe, by the use