

OUTLINE OF THE GEOLOGY OF THE OREGON
QUADRANGLE¹

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Acknowledgment.—In the summer of 1923, under the auspices of the Illinois Geological Survey, the writer made a geological study of the Oregon quadrangle, a brief resume of which is here presented. A more detailed report will appear in the near future in regular bulletin form, published by the Survey.

Location.—The Oregon quadrangle comprises an area of approximately 235 square miles in the northern part of Illinois, about midway between Rockford, Freeport, and Dixon. It is mainly in Ogle County, but includes a narrow strip of territory in southern Stephenson and Winnebago counties.

Drainage.—Rock River enters the quadrangle at Byron, near the middle of the eastern border, and flows through the southeastern quarter of the area, past Oregon at the south margin. The well developed drainage of most of the area is directly tributary to this voluminous master river and its few large affluents within the quadrangle, with the exception of a few headwaters of Pecatonica River along the northern border.

Topography.—Dissection by the numerous streams has progressed until most of the area is in topographic late youth. The greatest dissection, which locally has reached a mature stage, is in a narrow belt on both sides of Rock River and throughout a broader belt along Leaf River, a comparatively small stream that flows easterly across the middle of the area to join the Rock a short distance below Byron. The greatest local difference in elevation is about 250 feet near Oregon, which is not much less than the maximum relief of approximately 300 feet for the entire quadrangle. The least dissection is in the southwestern portion, where an area of several square miles is still an undissected till plain.

Striking contrasts are exhibited in the topography of this quadrangle, and between it and that of much of the

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surrounding territory. This is an area of advanced stream dissection in the midst of an expansive, slightly dissected till plain. Flattish upland rock ridges, thinly mantled with glacial drift, whose preglacial surfaces truncate the underlying strata, are present. Rock River flows for some distance in a youthful valley, locally a deep gorge, whereas Leaf River, its tributary of much less volume, occupies a mature valley in the same type of formations. Some other streams flow in places in broad open valleys but elsewhere their courses are entrenched in narrow rock gorges. A conspicuous topographic element, without homologue in this area, is a broad east and west depression, the Oregon Basin, in the vicinity of Oregon.

It is obvious from this brief outline of the salient topographic features of the quadrangle that its physiographic history has not been simple, but that the present surface has been produced by the successive action and interaction of several geologic processes. In brief, the present topography is dominantly that of surfaces stream-carved from rock of variable resistance and diversified structure, which throughout much of the area has been only slightly modified by deposition of glacial drift, with some conspicuous features due to drainage changes that resulted from the later invasion of the bordering territory by ice-sheets. Certain details have been impressed upon the major features by post-glacial activities.

Stratigraphy.—The rocks which crop out in this quadrangle consist of indurated sedimentary formations of the Ordovician system, and unconsolidated deposits of Pleistocene and post-Pleistocene age. The former range from lower to upper Ordovician, and the latter from Illinoian to the present. In descending age order the exposed formations are:

- Recent: alluvium, dune sand, talus.
- Late Wisconsin: valley trains, alluvium.
- Early Wisconsin: alluvium, loess (?).
- Post-Illinoian: loess.
- Illinoian: till, fluvio-glacial deposits.

Upper Ordovician: Maquoketa shale.

Middle Ordovician: Galena dolomite.

Platteville limestone.

Glenwood sandstone.

St. Peter sandstone.

Lower Ordovician: Shakopee dolomite.

The oldest rock known by actual observation to underlie this part of the state is the upper Cambrian, or Potsdam, sandstone. It does not appear at the surface but has been encountered in a few of the deeper city wells.

Above the Potsdam sandstone is the Prairie du Chien series, which is commonly divided in this general region into three formations—Oneota limestone at the base, New Richmond sandstone, and the Shakopee dolomite at the top. The lower two formations do not crop out in this quadrangle. The Shakopee is exposed in a single restricted area on the crest of a sharp plunging anticline. Its most striking characteristic at this place is the number of sudden changes in lithology in the vertical succession of the beds. This can be illustrated by listing the principal lithologic types in the exposed 13 feet of the section. They are 1) dense, dull, platy limestone, 2) finely to coarsely crystalline limestone, 3) fucoidal limestone with poorly preserved fossils, 4) magnesian limestone, 5) cherty dolomite, 6) limestone or dolomite with well rounded grains of quartz scattered through it or segregated in irregular patches, 7) calcareous sandstone composed largely of the same type of sand, and 8) thin, variegated shales.

The well-known St. Peter sandstone is extensively exposed along the crests of folds in the vicinity of Oregon, and a few small outcrops are present elsewhere. It has commonly the same lithologic characteristics that are typical of it throughout the general region, but differs in some details, as, for example, the local concentration of iron.

Almost everywhere in this quadrangle the St. Peter is overlain by the Glenwood sandstone. This is a bluish-green rock composed in the main of fine, angular quartz sand through which is scattered a variable percentage of typical St. Peter sand grains. The persistent color and

distinctive texture make this formation an excellent horizon marker. A slight unconformity appears to exist at its base. A few miles east of Oregon the typical Glenwood is supplanted laterally by a series of beds, transitional between the typical St. Peter sandstone and the typical Platteville limestone, which consists of alternating thin limestones, ordinary sandstones, vermicular sandstone, clay, and shale. One section of these transitional beds is 40 feet thick.

The Platteville limestone crops out generally in the vicinity of Oregon, Byron, and Leaf River, where in the main low anticlines have been eroded. It is composed principally of limestone with a variable content of magnesium carbonate. The lower part of the formation can be identified readily by its buff color in natural exposures and its stratigraphic relations to the Glenwood and St. Peter sandstones. It is difficult in many places to distinguish the upper portion from the lower beds of the overlying Galena dolomite, especially if the outcrop is a small isolated one of beds not far from the contact of the two formations. There are, however, certain dependable contrasting characteristics by which most of the exposed beds can be confidently identified. A diagnostic feature is its content of fossils, which are more or less common throughout the formation, but are so abundant and of such variety at some horizons as to constitute a "fossil sea floor." Gastropods, pelecypods, and brachiopods are most common, with corals, cephalopods, ostracods, and trilobites somewhat less abundant to rare. Evidence has been discovered that the formation lies unconformably in places upon the St. Peter sandstone.

The Galena dolomite is the uppermost bed rock over the greater part of this quadrangle. Partial sections only are exposed in any of the outcrops, most of which are roadside or gully ledges a few feet thick, although continuous sections of considerable thickness occur in some ravines, gorges, and quarries. A diagnostic feature is the fossil *Receptaculites*, which ranges from a short distance above the base of the formation to well past its middle portion, with some horizons marked by its abundance. Other fossils are scarce, but locally the beds con-

tain numerous shell fragments or poorly preserved shells or imprints of shells. Much chert is present in portions of the formation, as scattered nodules along the bedding planes or in thin well-defined nodular beds. Certain strata are characterized by pores and pits up to a few inches across, which give rise to a rough, peculiarly fretted surface. Rusty calcareous sand, in separate particles or loosely adherent, partially fills most of the pits on weathered surfaces or throughout the fresh rock. In places these beds have disintegrated into a friable mass that resembles loosely cemented sandstone.

The youngest indurated formation is the Maquoketa shale, which occurs in this area as a single outlier on the summit of Bunker Hill, in the extreme northwestern corner of the quadrangle. About 70 feet of shale with intercalated thin beds of more or less fossiliferous limestone constitute the exposed section.

Beyond doubt the Niagara dolomite, which caps a series of hills to the west, formerly covered this area, but the last vestige of its outcrops has been destroyed.

The mantle rock immediately overlying the bed rock is very largely glacial drift, which is almost entirely of Illinoian age. No till of an earlier or later epoch is known to occur in this quadrangle. Some outstanding characteristics of the Illinoian drift are, 1) the large amount of gravel and sand in many parts of it, 2) the depth of leaching and oxidation, 3) its thinness throughout much of the area, and 4) the rough conformity of its surface in many places to the contour of the underlying bed rock.

The drift is not uncommonly a sandy and gravelly till. Large masses of stream-deposited gravel and sand are locally present in it. Numerous other large bodies of sand and gravel occur upon the surface of the till as kames and eskers. Both the included gravels and the superficial deposits are especially abundant in the Oregon Basin and in Leaf River Valley. The eastern portion of the largest esker in the state, the Adeline esker, is in the western part of Leaf River Valley in this area.

Since its deposition the till has undergone extensive chemical changes. It is deeply oxidized, and limestone fragments as well as the calcareous portion of the rock

flour have been leached from the upper several feet. That peculiar and distinctive product of long-continued weathering of till, gumbotil, is exposed in several places beneath the mantle of loess.

The maximum thickness of the drift in this quadrangle remains to be determined from a study of well records, but a striking feature of the area is the abundance of rock outcrops wherever slopes have been washed or gullied. In many places the bed rock is only thinly veneered with till, and on many ridge crests the present thickness of the till is not more than a few feet. Over much of the quadrangle the original thickness of the drift was not adequate to mask the topography of the rock surface, so that pre-Illinoian valleys and divides can be traced in the existing topography.

Borings show that the flattish uplands west of Rock River are underlain by loess to a depth of 15 or more feet. The thickness is much less on slopes, but this undoubtedly is due in large part to wash and creep during and subsequent to deposition of the loess. Traces of an old soil bed and fragments of vegetation are present between the loess and the underlying weathered Illinoian till.

The only recognizable deposit of Early Wisconsin age in this area consists of alluvium deposited in the eastern part of the Oregon Basin. It was made by streams that were blocked by outwash from the Early Wisconsin ice-sheet when it covered the region east of this quadrangle. Some of the loess may have been deposited during this epoch, but the amount is probably relatively insignificant when compared with the pre-Early Wisconsin loess.

The late Wisconsin deposits consist in the main of valley train material that partially filled Rock Valley and of alluvium that was deposited in tributaries which were blocked by the drainage down Rock River. Other streams have made their normal deposits up to the present time. Winds have whipped up some of the sand into low dunes in Wisconsin in recent times, and meager talus slopes have been formed along some of the cliffs.

Structure.—The structure of the formations in the Oregon quadrangle departs markedly in many places

from the simple gently dipping to slightly flexed structure which is generally considered to be typical of northern Illinois. Axes of sharp narrow anticlines with accompanying broad shallow synclines cross the area in a westerly to northwesterly direction. A characteristic feature of these anticlines is the narrowness of the folded zone and the steepness of the dips in this narrow zone. Gently dipping limestones will suddenly exhibit dips of 20° or more. In one instance the dip changes sharply from a few degrees to more than 40° . In another instance the St. Peter sandstone unexpectedly appears with steep dips, in the midst of gentle north-dipping Platteville limestone. Between these folds the strata are commonly only very slightly tilted or horizontal. These few examples indicate the character of the deformation in the Oregon quadrangle.