UNUSUAL OOLITE GRAINS FROM THE STE. GENEVIEVE LIMESTONE*

RAYMOND S. SHRODE
Illinois State Geological Survey, Urbana

In connection with other studies of Illinois limestone resources it was noted that a massive bed of oolite, 6 to 8 feet thick, in the upper part of the Ste. Genevieve formation in the quarry at Anna, Illinois, contained oolite grains and other grains of unusual character as compared to the common Ste. Genevieve type oolite grains, which are characterized by rounded centers, mostly of undeterminable origin surrounded by one or more annular calcite deposits. Pictures of a number of these unusual grains are included. No attempt is made to interpret the origin of the grains themselves, or their broader significance in relation to the mode of formation or subsequent history of the Ste. Genevieve formation, because the data now available are inadequate, but some interesting possibilities are self-evident from the pictures (figs. 1-6).

The specimens studied were prepared by sawing and grinding a plane surface on each, and etching the surface with dilute hydrochloric acid. This produced a semi-polished finish which revealed well the textural details of the specimens. Insoluble impurities projected above the surfaces of the specimens. The figures shown are made from photomicrographs taken by reflected light at magnifications of 12 to 30X, except as otherwise noted.

The unusual grains observed may be classified into five groups: (1) oolite grains with recognizable fossils as centers; (2) compound oolite grains; (3) grains composed of oolite rock; (4) oolite grains with clear crystalline calcite centers; and (5) partial or disrupted grains. The number of photomicrographs shown for each type of grains is not necessarily proportional to the numbers occurring in the samples studied.

Heinz Lowenstam of the Survey staff identified the fossils.

Description of Figures

Figure 1 is a photomicrograph of typical Ste. Genevieve oolite taken at a magnification of 10X. Some grains have large dark calcite centers surrounded by a single ring of calcite. Others have smaller centers with one or more annular deposits around the center. The dark areas between the grains are also clear crystalline calcite in this figure and other figures which follow.

Figure 2 shows grains of the type that have fossils as centers. In the upper left is an oolite grain composed of a foraminifera, possibly endothyra, surrounded by a single ring of calcite. In the lower left is a grain whose center is an arm plate of a crinoid having two annular deposits around it. Grains with crinoid arm plate centers are generally abundant in the Ste. Genevieve oolite. The grain in the upper right shows a longitudinal cross-section of a minute gastropod surrounded by a

*Published with the permission of the Chief, Illinois State Geological Survey.

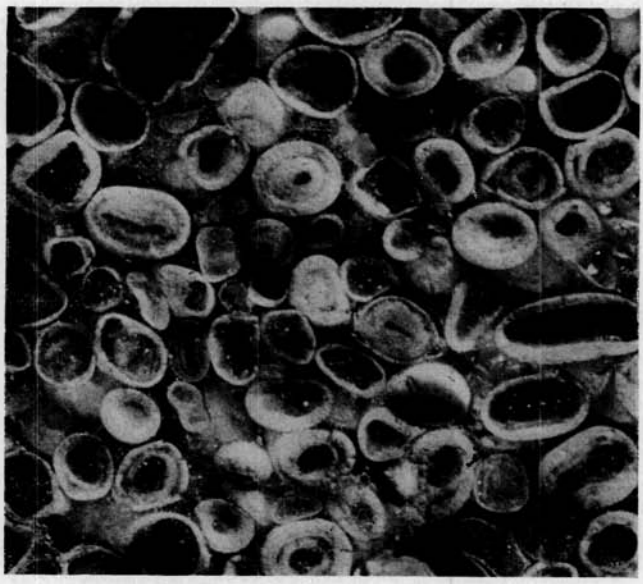

FIG. 1.—Typical Ste. Genevieve oolite.

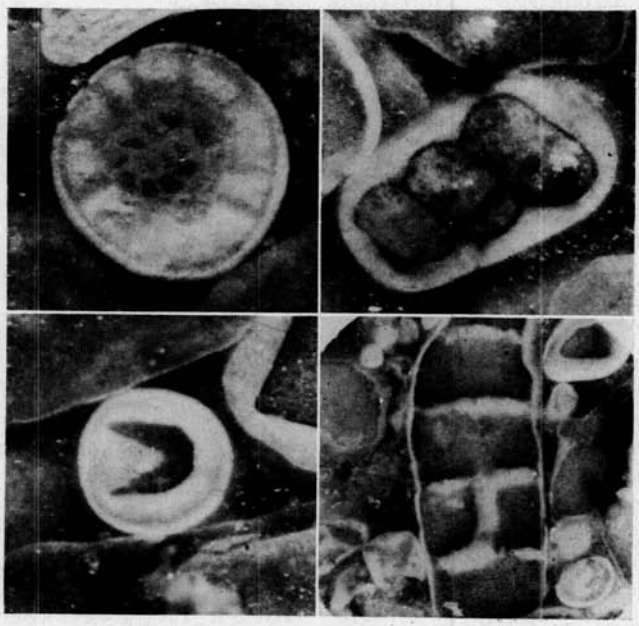

FIG. 2.—Oolites with recognizable fossil centers.

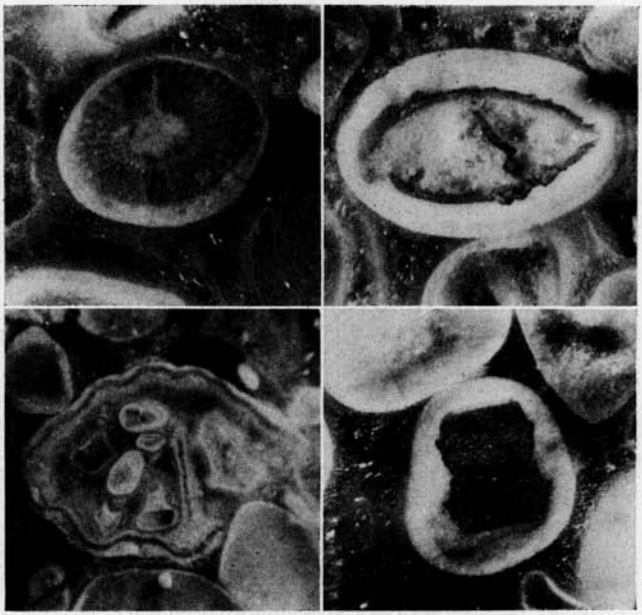

FIG. 3.—Oolites with recognizable fossil centers.

single thick calcite ring. The grain at the lower right is a fossil, not positively identified, but possibly a longitudinal section of a crinoid stem showing a residual central canal. Note the thinness of the calcite ring around this fossil. This last photomicrograph has a magnification of 12X as compared to 30X for the other grains shown.

Figure No. 3 shows more grains with fossil centers. In the upper left is a cross-sectioned coral with a single calcite ring. A transverse cross section of a brachiopod with a single thin white calcite ring is shown in the lower left. The interior of the brachiopod contains other smaller oolite grains. In the upper right is another brachiopod in longitudinal cross section surrounded by a thick deposit of calcite, as is likewise a piece of crinoid stem in the lower right, which is displayed in longitudinal cross section. All grains shown have a magnification of 30X.

Figure No. 4 shows in the upper left a compound oolite grain having two well defined centers surrounded by annular calcite deposits. A third center appears on the right side of the grain. The outermost thin calcite ring surrounds this third center as well as the rest of the composite grain. The other grains shown in the figure are oolite rock. They have no annular deposits around them and appear to have been derived from a consolidated oolite which was being eroded at the time the bed from which these specimens came was deposited. The oolite grains within the fragments of oolite rock are of the type previously described as usual for the Ste. Genevieve formation. The photomicrographs in

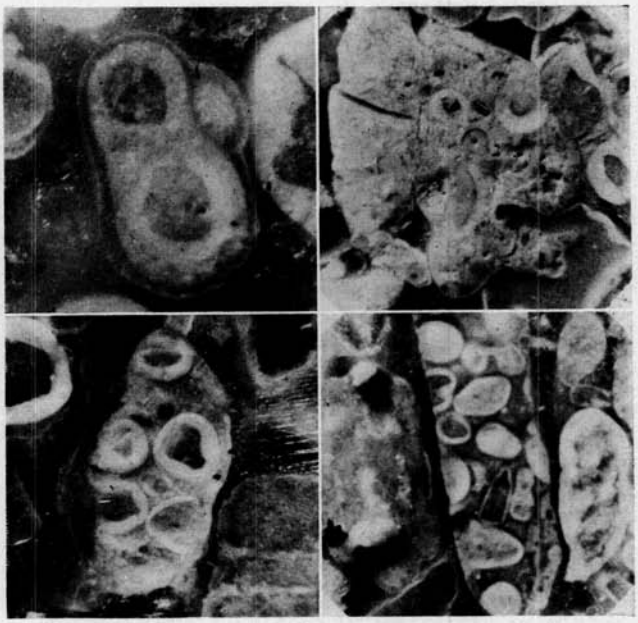

FIG. 4.—Compound colite grain and grains of oolite rock.

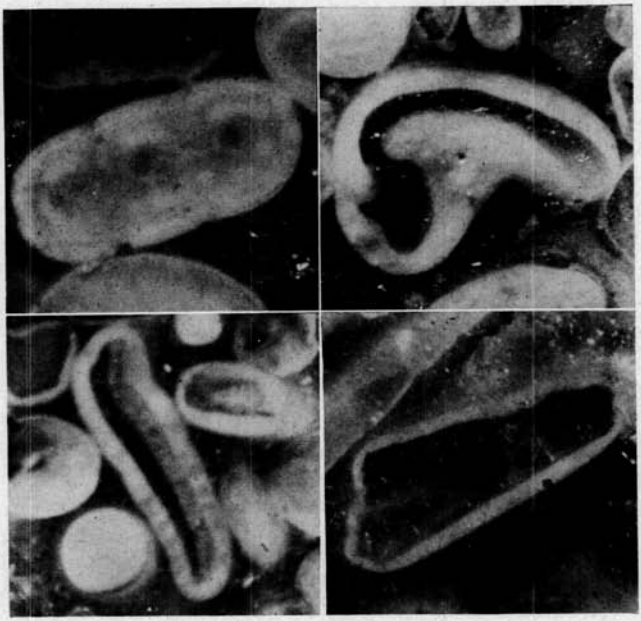

FIG. 5.—Compound oolite grain and grains with clear crystalline calcite centers.

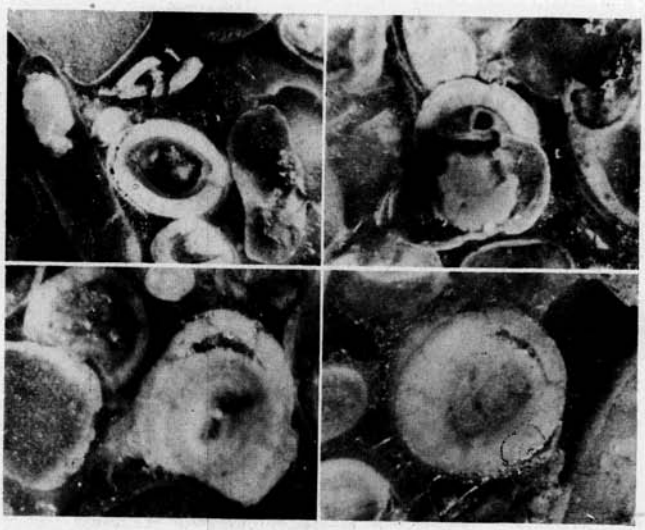

FIG. 6.—Partial grains and disrupted grains.

this figure have a magnification of 12X, excepting the upper left which has 30X.

Figure No. 5 shows in the upper left another compound grain with 3 centers, all enclosed by a calcite ring. The remainder of the figure illustrates oolite grains with clear calcite centers, which in the photomicrographs are dark gray or nearly black. The grain in the lower left is one whose center is only half crystalline calcite. The grain in the upper right appears to have had a brachiopod, shown in longitudinal cross section, as its center. The white calcite envelope on the concave side of the shell is of unusual thickness. The grain in the lower right is of interest because of its angular outline. The photomicrographs in this figure have a magnification of 12X.

Figure No. 6 shows the disrupted and partial grain type. In the lower left disruption of the exterior portion of the grain is evident, probably as a result of the growth of crystalline calcite, indicated by the dark area. The same phenomenon is shown in the grain at the lower right and in the upper left. Also in the upper left there appears the white calcite envelope of an oolite grain which has been broken and deformed and whose center is no longer evident. Partial grains, which appear to be the result of the solution of one grain at its contact with another, are well shown on the left side of the lower left picture. In the upper right picture, a series of two partial grains are shown. In the whole grain projecting silica casts a shadow on the surface. The photomicrographs in this figure have a magnification of 25X with the exception of the upper right which has 10X.