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(NUMBER II)

ATLANTA

1953

	Thickness
Limestone, brownish gray; fine-grained; thin layers of brown limestone, which weathers to light gray	1′
Limestone, purple and gray splotched; medium-grained	2′
Limestone, greenish gray; brownish splotched; medium-grained, fluted surface	2′
Limestone, red and green; mottled; fine-grained; weathers with pitted surface	2′
Limestone, medium gray; brown splotches; medium-grained; massively bedded	2′
Limestone, red and green alternating layers; fine-grained; massively bedded	6′
Unexposed	6′
Limestone, medium gray; fine-grained	1′
Limestone, red and green mottled; fine-grained; massively bedded	4′
Limestone, green; medium-grained; massively bedded	4′
Limestone, red and green; mottled; fine-grained; massively bedded; small amount of jasper present	10′
Limestone, green; medium-grained; massively bedded	4′
Limestone, medium gray; fine-grained; contact of brightly colored zone and dull gray zone	8′
Limestone, medium gray; fine-grained; massively bedded; weathers to light gray	19′
Limestone, medium gray; fine-grained; weathers to dark gray	54′
Total	167′

References

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ECOLOGICAL SIGNIFICANCE OF A MISSISSIPPIAN BLASTOID*

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Emory University

Introduction:

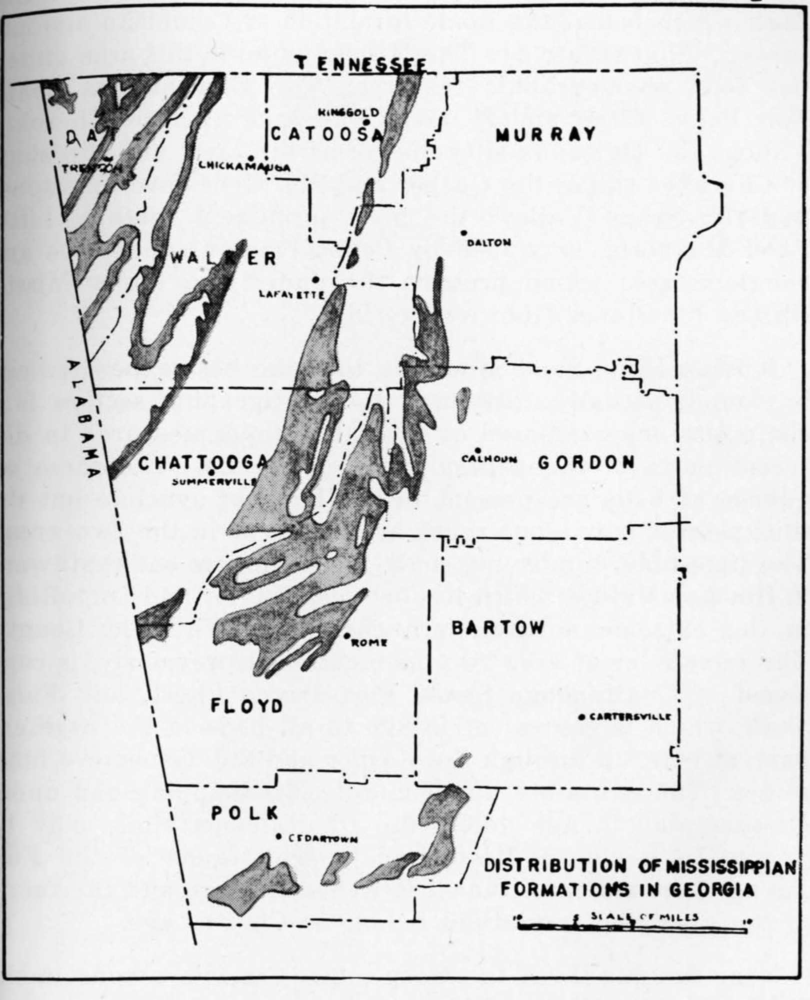
Examination of a map of Northwestern Georgia prepared by Butts and Gildersleeve in 1948 for the Georgia Department of Mines, Mining, and Geology shows the areal distribution of the Mississippian strata in Georgia. Plate 1 has been prepared by deleting all geology except the outcrops of the Mississippian so that its extent can be more easily shown. The areas underlain by strata of this age can be roughly divided into three parts. Part one in the extreme northwestern corner of the state, occupying parts of Dade, Walker, and Chattooga counties, may be better described as the Lookout Syncline Area in which the Mississippian rocks occur along the flanks of Sand, Lookout, and Pigeon Mountain and are protected from weathering by the overlying resistant sandstones and conglomerates of Pennsylvanian Age. Part two occupies portions of Catoosa, Murray, Walker, Chattooga, Gordon, and Floyd Counties. The linear arrangement of the outcrops parallel the strike and structures of Taylor Ridge, Armuchee syncline, and Lavendar Mountain. Part three is restricted to Polk County where the Mississippian is represented by the Rockmart Slate.

Stratigraphy:

The sediments in these areas are not all alike lithologically, but differ to a marked degree from one area to another. On Lookout Mountain, in area one, a stratigraphic column would show thick zones of limestone and some thin shales. This same sequence is also present in the northern part of area two (Plate 2). However, in the southern part of area two, the strata are predominantly shale. Area three is composed of shale and slate and has not been satisfactorily correlated with the horizons of the other two areas. This paper will be confined for the most part to a study of area two.

*Read at the meeting of the Georgia Academy of Science, Agnes Scott College, April 18, 1952.

PLATE 1



DISTRIBUTION OF MISSISSIPPIAN FORMATIONS IN GEORGIA

The stratigraphic sequence of Mississippian formations in the Ringgold, Catoosa County Area are shown on Plate two. Along the eastern flank of White Oak Mountain, beds of Mississippian age dip about 15° to the east and strike in a northeast-southwest direction. They overly strata of Silurian age and are intersected farther to the east by a major thrust fault which brings the Rome formation of Cambrian age into juxtaposition (Plate 3). The Mississippian in this area underlies four physiographic features. The Chattanooga Shale, Fort Payne Chert and St. Louis limestone underlie Cherokee Valley; the Golconda siltstone forms the crest and dip slope of Cherokee ridge; the Gasper and Ste. Genevieve limestones underlie Salem Valley; the most prominent feature, Little Sand Mountain, is capped by Pennsylvanian sandstones and conglomerates which protects the underlying upper Mississippian limestones from weathering.

It is on Little Sand Mountain that the best exposures can be found, actually, however, the stratigraphic section is a composite one composed of several sections measured in different parts of the general area (Plate 2). The same sequence of beds are present in the Lookout syncline but the thickness of individual zones are different in the two areas. The limestone, sandstone, shale facies fingers out southward in Houston Valley, which lies between Taylor and Dick Ridge in the extreme northwestern corner of Whitfield County. The remainder of area two, as mentioned previously, is composed of Chattanooga Shale, Fort Payne Chert, and Floyd Shale which is equivalent in age to all beds in the northern part, at least up through the Gasper and Ste. Genevieve limestones. The strata are upper middle Mississippian and upper Mississippian in age unless the Chattanooga shale may be proved to be lower Mississippian. The fauna of the Fort Payne chert indicates that it is Keokuk in age and the fauna of the overlying formations belong to Chester age.

Near the middle of the Gasper-Ste. Genevieve zone in the northern part of area two and in area one there occurs a greenish-gray argillaceous limestone about 8 feet thick. This zone is thinly-bedded, platy, and weathers readily to a yellowish soil. It is sandwiched in between massive, bluish-gray limestones which have either a crystalline or oolitic texture. Because of the silty conditions prevailing in the sea during

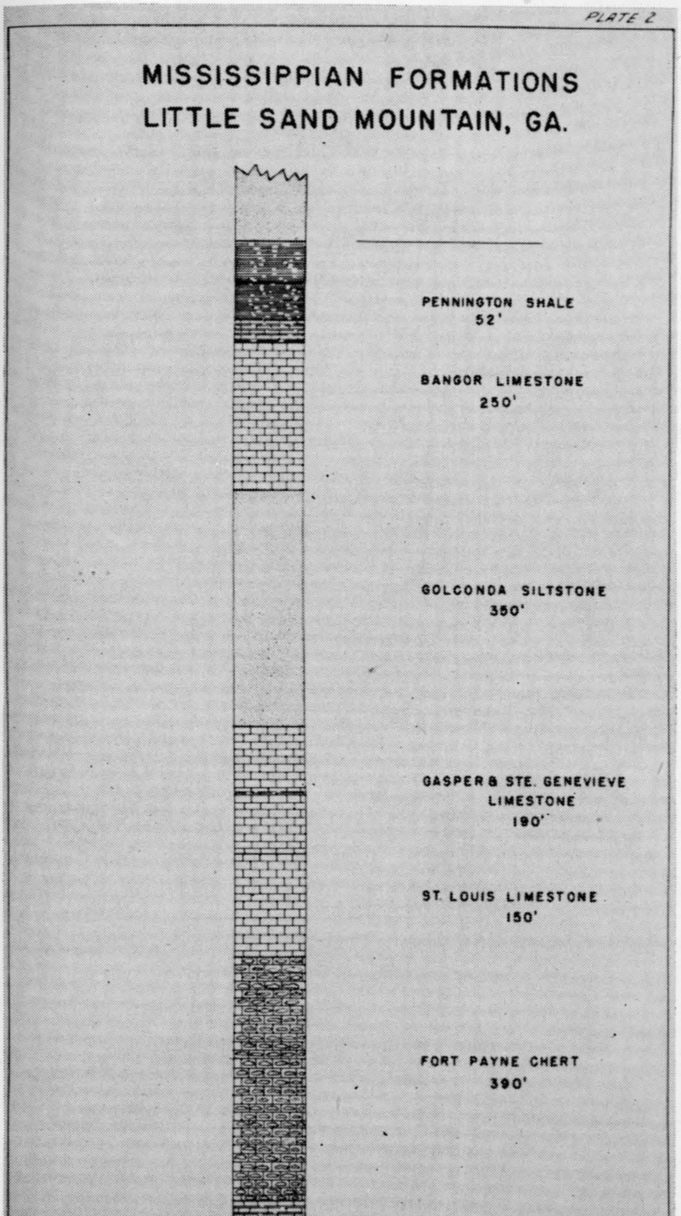
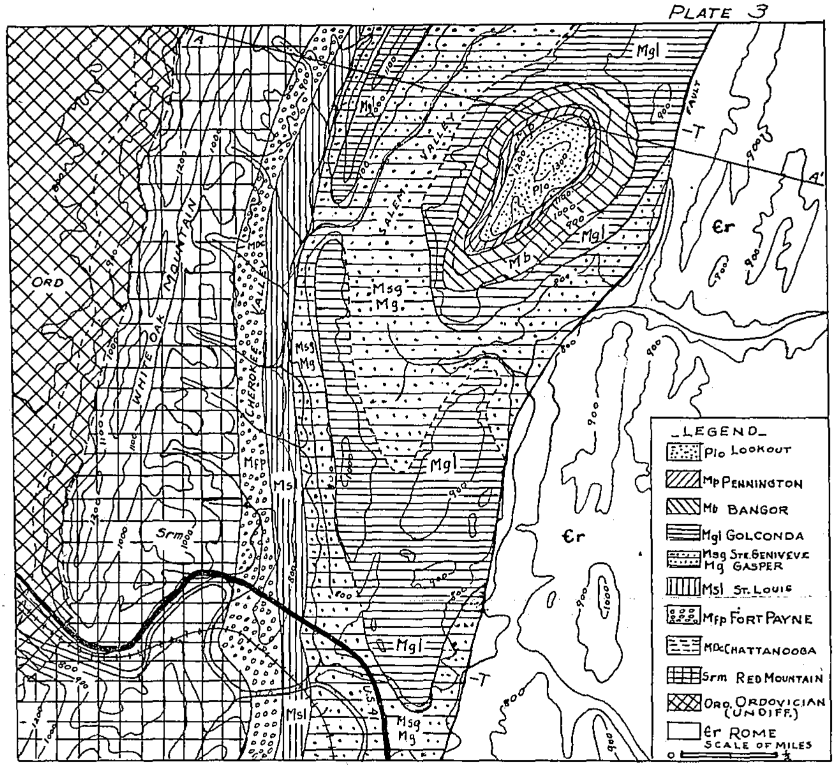
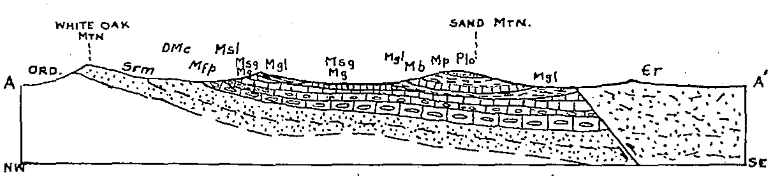


PLATE 2
MISSISSIPPIAN FORMATIONS
LITTLE SAND MOUNTAIN, GA.
PENNINGTON SHALE
52'
BANGOR LIMESTONE
250'
GOLCONDA SILTSTONE
350'
GASPER & STE. GENEVIEVE
LIMESTONE
190'
ST. LOUIS LIMESTONE
150'
FORT PAYNE CHERT
390'
CHATTANOOGA SHALE
10'

PLATE 3



GEOLOGIC MAP OF SAND MOUNTAIN AREA CATOOSA CO., GA.



STRUCTURE SECTION A-A'

the deposition of the impure limestone of this stratigraphic interval, organisms capable of combating such an environment are to be expected.

Fossils belonging to four classes are present. Bryozoa of the **Fenestrellina** and **Phyllopora** types are extremely abundant. Next in abundance are the large blastoids which belong to the genera **Pentremites** but which represent a new species not previously described. The name **Pentremites gianteus** is here given to this species because of its abnormal size. Specimens are shown in plates 4, and 6 where it can be seen how much larger they are than the normal blastoid represented by **Pentremites welleri**, an average size member of this group. The other two classes found are dwarfed corals and dwarfed brachiopods which are so rare that they do not form an important part of the faunal assemblage.

The blastoid calices found in the overlying and underlying members of the Gasper and Ste. Genevieve are about 1.5 cm. in height, symmetrical, and associated with an abundant normal coral and brachiopod fauna. These lived in warm, clear, silt-free, probably deep marine water in which large quantities of calcium carbonate was being precipitated. This is shown by the purity of the associated massive limestones. As the environment changed to a shallow, muddy sea, abrupt changes in the fossils had to take place in order for them to become acclimated to the new conditions. The numerous species of blastoids, brachiopods, and corals present in the pure limestones could not tolerate this new environment.

In their place are found abundant specialized bryozoa and blastoids. Because of the silty conditions of the water, larger amounts of it had to be sieved in order to secure adequate food. Hence the blastoids became greatly enlarged in order to increase their food gathering brachioles and ambulacral grooves. The ratio between the size of the calyx and the rather small stem should be noted. This development must have taken place rapidly because the plates of the calyx are poorly sutured and often become flattened and distorted during burial. Frequently the base plates break off with the columnal which also increases the chances of becoming flattened. This characteristic is seldom encountered in other blastoids (Plate 5).

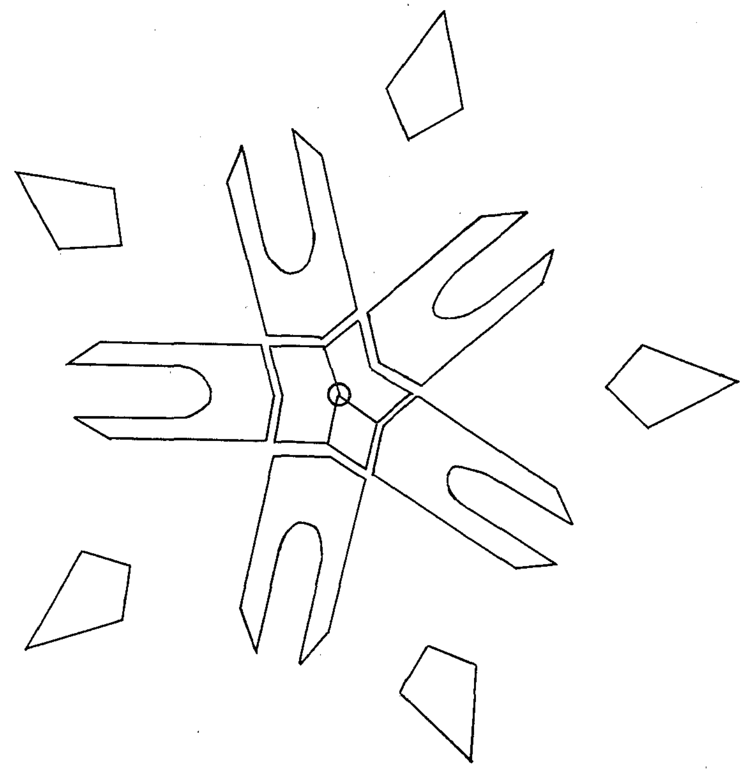
PLATE 4

1

2

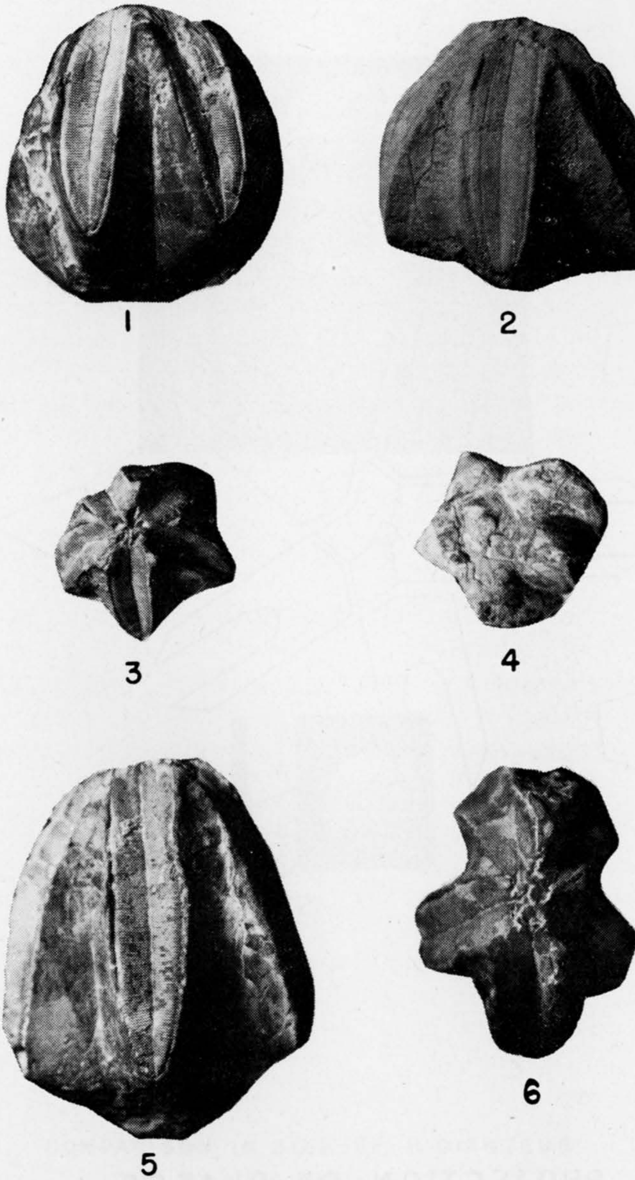
COMPARISON IN SIZE OF P. GIANTEUS
AND P. GODONI

PLATE 5



PROJECTION OF PLATES

PLATE 6



VIEWS OF P. GIANTEUS

Pentremites gianteus disappeared as suddenly as it had appeared. As the sea encroached during Gasper time and conditions similar to those prevailing during St. Genevieve time returned, the normal fauna returned and the fossils are are the same as those of the preceding time. The large blastoids had become so specialized to combat a given set of conditions that they could not compete in the new environment and therefore because extinct.

If we add our knowledge of this zone to the overall picture of the Mississippian period in Georgia, some significant observations can be made. At the base of the Ft. Payne is a shaly zone which carries essentially the same byrozoa as those found associated with the large blastoids in the shale zone of the Gasper. Higher in the section, at the top of the Bangor, is another thin shale bed which has the same bryozoa and a comparable blastoid, P. **spicatus** which is not as large **as P. gianteus.** It would seem then that during the Mississippian at least three short intervals existed which were essentially the same in depositional characteristics and faunal environment.

When we consider the uppermost Silurian and basal Pennsylvanian with the Mississippian, we have evidence of transgression, regression, and later transgression of the sea. The uppermost Red Mountain, the Golconda, and the Lookout (all of which are near-shore or littoral deposits) alternating with limestones of the Fort Payne, the St. Louis, the Gasper and the Ste. Genevieve, and the Bangor and grading from one to the other through shale zones.

It seems probable that no great mountain making movement began at the close of the Silurian or at the close of the Mississippian in northwest Georgia. The Devonian is apparently absent because of non-deposition. The non-marine Pennsylvanian simply represents the withdrawal of the Mississippian sea. This was the final result of unrest which had been present throughout Mississippian time.

CENOZOIC FOSSILS IN A CONGLOMERATE INTERSTRATIFIED WITH PALEOZOIC ROCKS*

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Introduction and Location of the Area

Three quarters of a mile SSW of Van Wert, Polk County, Georgia, three beds of coarse conglomerate occur interstratified with dark-grey magnesium limestone stratigraphically below the Rockmart slate and presumably corresponding to the Newala Formation. The outcrop forms a small conical hill rising approximately fifty feet above the flood plain of a small creek. With the exception of a few blackjack oak and scattered low bushes, the knoll is barren of vegetation.

Description of the Occurrence

The limestone beds on the south slope of the hill dip 70° to the north, but the dip flattens rapidly northward and then reverses itself to create a shallow asymmetrical syncline approximately 100 yards in width. The conglomeratic beds are exposed on the southern slope of the knoll and are interstratified with the steep northerly dipping beds of limestone. The lower conglomerate is exposed in the cliffs, that form the western side of the hill, for about 40 feet down-dip where it disappears under residual soil.

Lithology

The conglomerate beds are separated by two to four feet of dark-gray limestone. The thickest and most strongly indurated conglomerate averages two feet in thickness and is the lower-most conglomerate exposed.

The pebbles consist principally of angular limestone and chert derived from the rocks which enclose the conglomerate. In addition, scattered sub-angular and angular fragments of phyllite, slate, and sandstone occur (Fig. 1). Well-rounded and frosted sand grains and clay make up the finer detrital materials. Calcium carbonate is the cementing agent and

*Read before Earth Science Section, Georgia Academy of Science, Mercer University, Macon, April 24, 1953.

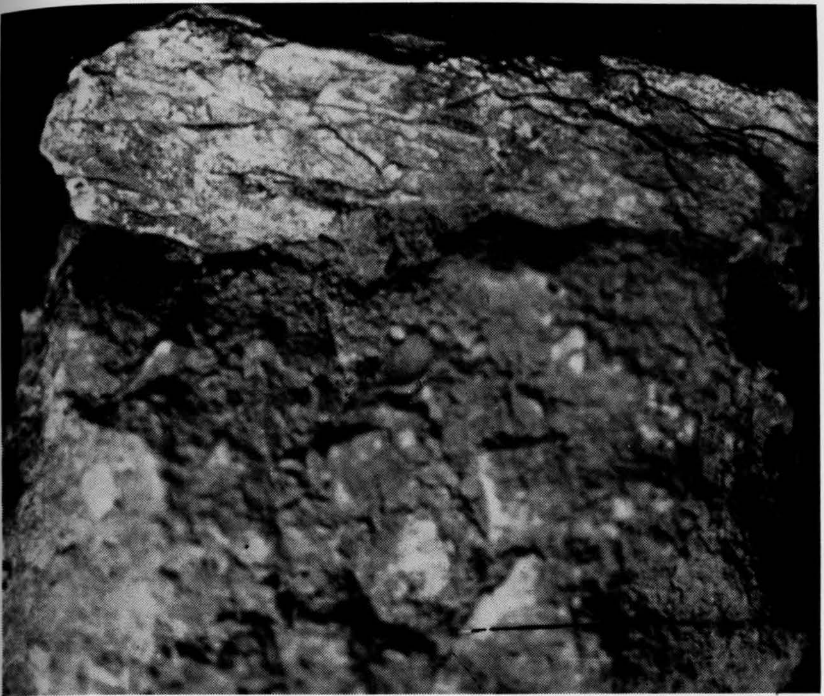

Figure 1. Hand sample of conglomerate showing the angularity and size variation of the incorporated fragments.

locally is as abundant as the detrital material (Fig. 2).

The calcium carbonate cement surrounds the least-weathered materials, but frequently penetrates and apparently replaces the slate and phyllite which show considerable weathering and oxidation of iron. Many concretionary and banded structures are present, usually surrounding an open space and rendering the rock vuggy and irregular. The inner surface of the cavities are characteristically lined with well-formed microscopic calcite crystals, oriented with the c-axis converging in the middle of the cavity. Occasional crystal growth completely fills the opening.

Although the limestone fragments show no evidence of solution or replacement the gastropod tests which occur sporadically throughout the matrix commonly show partial replacement by calcite. The replacement has apparently preceded from the interior outward and occasionally only the exterior

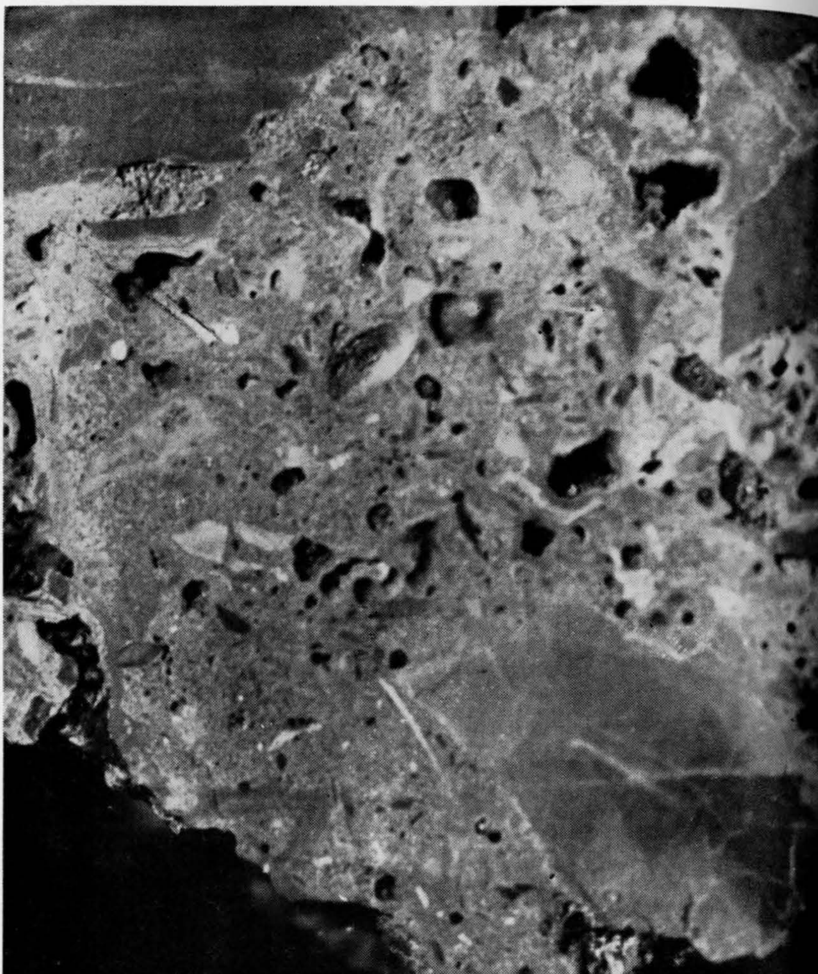

Figure 2. Sawed section of conglomerate: Fragments are limestone (light grey), slate (dark grey) and chert (white).

layer of the tri-layered test remains unreplaced. Partial or complete filling of the test is the rule. The filling is usually calcite, but in some instances may contain considerable clay.

Paleontology

At least two genera of gastropods, both belonging to the family Polygyridae, are present. No attempt was made to classify the forms as to species because structural modifica-

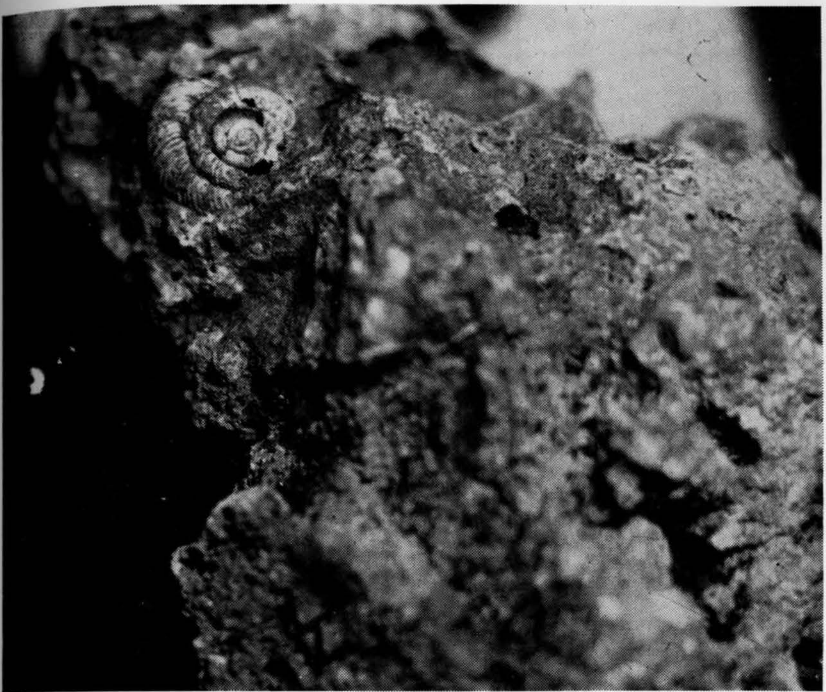

Figure 3. Partially filled and replaced land-snail test.

tion of the test within one species is frequently great. The two genera represented are Triodopsis and Mesodon, both of which have forms among the living land-snails, but range from Tertiary to Recent (Fig. 3).

Origin of the Conglomerate

The origin of the detrital material and the induration by the addition of calcium carbonate is an interesting problem. The limestone and probably the chert fragments are derived from the overlying limestone beds, which, on exposed under surfaces, spall rapidly producing many small, slab-like fragments.

Apparently solution took place along the inclined bedding plane for some distance down dip. Solution must have taken place largely at the expense of the underlying bed, whereas the overlying bed contributed the above described fragments. Fluting typical of solution beneath the water table was not observed and some of the clay appears to have been derived from the residuum of the underlying limestone.

During exceptional high-flood stages of the stream which once flowed in the valley, thin wafer-like fragments of slate and sandstone, and sand and silt were introduced. Subsequently the slow movement of downward perculating groundwater dissolved calcium carbonate from overlying limestones and reprecipitated it as calcite in the highly permeable conglomeratic filling. The land-snails, the tests of which are preserved, apparently lived among the debris thus deposited and upon death became incorporated in the indurated rock.

The steam now flowing across the flood plain enters it from a youthful valley ¼ mile east of the area described and is actively downcutting in the present erosion cycle. Thus, it would appear that the conglomerate was formed in a previous cycle.

Implications

This conglomerate-forming process would take place only in restricted areas; hence, its significance is somewhat obscure. It may be pointed out, however, that local conglomerate zones occur in limestones of otherwise uniform lithology. That the process may occur in any geologic period seems undeniable.

In areas such as the folded Appalachians, where warping and erosion alternated with deposition, similar events may have taken place many times. Later burial or continued warping would promote partial recrystallization thus obliterating evidence of age differential. This, then, may constitute a satisfactory answer to the problem of certain local limestone conglomerates found at many horizons throughout the geologic column.

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