Some Mississippi Limestone Breccias in Northwest Putnam County, Indiana[1]

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Introduction

An unusual exposure of brecciated limestone is located 1.5 miles southwest of Fincastle in the NW¼ sec. 36, T. 16 N., R. 5 W. in northwestern Putnam County (Fig. 1). In a branch of Peters Creek, differential erosion has exposed resistant brecciated limestone at a small waterfall. The ledge of limestone at the falls is six feet thick. The lower part of the ledge is a rubble breccia which changes upward to a mosaic and then to a crackle breccia (5). At least one exposure of breccia has been reported near this area (2).

Limestone breccias are not well known in the Mississippian limestones of Putnam county. This may be so partly because of limited exposures or because of the transitional nature of the breccia zones from true angular blocks within a matrix to a "weathering phase" where fragments are nearly in their original position in the stratum. Field studies of the writer (1) and others (6) demonstrate that a number of breccias, mostly intraformational, are scattered through the middle Mississippian limestones.

The breccias (and conglomerates) can scarcely be recognized in the subsurface, except where cores are available. Where brecciation can be recognized on the outcrop, the stratigraphic horizon may be difficult to place because of the similarity both lithologically and faunally of the middle Mississippian limestones. Only from careful observation can small limited exposures be placed in the stratigraphic column.

Peters Creek Breccia

An excellent exposure of breccia is in the SW¼ NW¼ sec. 36, T. 16 N., R. 5 W., with several small exposures nearby. The thickness of the breccia bed is nearly six feet at the waterfall in a small branch valley of Peters Creek. Bedding is indistinct, but the associated limestones above and below are well bedded and nearly horizontal except for local rolls an arches. Over 90% of the blocks (phenoclasts) in the matrix are limestone. Some of the fragments are gray calcarenites and laminated limestones similar to rocks in the layers just below the breccia Sparing chert fragments are localized in the brecciated rubble. The size of the limestone blocks vary from a fraction of an inch to about six inches across. Shapes are mostly angular, but semi-rounded shapes are not uncommon. The matrix is fine grained crushed limestone, although some brownish-white calcite is scattered between the blocks. At least one stylolite was observed to cut through both fragments and matrix. Megascopic fossils are rare, but thin sections show fragments of microscopic fossils.

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Stratigraphy and Extent

The base of the breccia is in sharp contact with a thin wavy laminated layer of limestone four inches thick, similar to what has been called crenulated limestone (3). The laminae on the weathered surface have the appearance of clay varves. Pieces of this crenulated limestone are found in the lower part of the breccia. Below the laminated layer is a thin quartzose layer varying from zero to three inches thick, in which quartz crystals are common. Below the quartzose layer is massive gray limestone (calcarenite) interpreted to be of Salem age. Blocks of the calcarenite are also included in the breccia.

A few feet above the main breccia, a bed of fine-grained limestone (calcilutite) one to two feet thick shows minor brecciation. Above the calcilutite beds, variable limestone beds with shaly partings are representative of lower St. Louis lithology. Based mainly on the lithology and sequence, the age of the breccia is believed to be early St. Louis.

From the limited outcrops in the area which expose lower St. Louis limestone, it is postulated that the conditions which produced the brecciation in early St. Louis time extended into at least two townships. The exposures upon which the above is based are (1) Peters Creek area southwest of Fincastle in the NW¼ sec. 36, T. 16 N., R. 5 W.; (2) two miles southwest of Waveland in an abandoned quarry in the extreme southwestern part of Montgomery county, SW¼ sec. 34, T. 17 N., R. 6 W.; (3) Russelville quarry, SE¼ sec. 8, T. 16 N., R. 5 W. and surrounding territory and (4) two miles northeast of Portland Mills along Byrd Branch at the ford in the NE¼ SW¼ sec. 31, T. 16 N., R. 5 W.

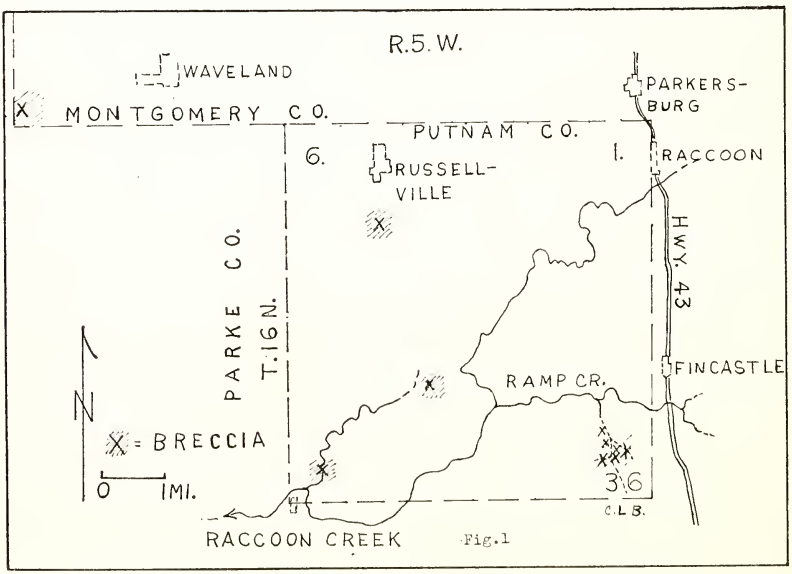

Fig. 1

It is not here suggested that the breccia is continuous over the whole area, but that many local breccias, pseudo-breccias, rubbly lime-

stones and laminated layers are associated with calcilutites in the lower St. Louis limestone of this area.

Probable Origin

Blocks in the main breccia bed are at varying angles in the matrix. The disturbance which crushed the strata probably took place soon after the induration of the limy muds, for the St. Louis sequence then follows upward without apparent break. Marine waters during early St. Louis time were shallow, as indicated by cross beds, ripple marks and shaly layers. No faults have been observed in the area. Few sinkholes and caves are in northwest Putnam county, though they are common in the southern part. Thus faults and cavern collapse are probably not the cause of the brecciation.

Two explanations for the origin of the breccias seem to fit the field data. (1) Submarine slump is probable, since there seems to be a relationship between the breccias and calcilutite-type rock. Submarine banks of calcarenite materials covered by basin muds could slump basinward to pile up a crushed mass of partially indurated calcarenite and calcilutites (7). General lithology of the lower St. Louis rocks favor this theory. (2) Storms over shallow marine waters cause waves which tear up sediments on the bottoms. Partially compacted lime-muds could thus be broken and reworked into brecciated structures.

Because of the widespread locations of the breccia outcrops at or near the same stratigraphic horizon, subaqueous slides are here favored over storms as the cause for the brecciation.

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