

BURLINGTON GONIATITES.

A. K. MILLER.

ABSTRACT.

Goniatites are very rare in the Middle Mississippian or Valmeyer series of America. The Burlington formation of that series has, however, yielded five specimens which are described in this paper. These represent five distinct species, all of which are referable to the genus *Münsteroceras* and are closely related to forms known from the Lower Mississippian. One of the specimens is illustrated and the name *Münsteroceras mitchelli* is coined for it.

Locally goniatites are abundant in both the Lower and the Upper Mississippian strata of North America, but only a few are known from the Osage and Meramec groups which together constitute the Middle Mississippian or Valmeyer series—only one species has been listed by name from the Osage and only three species have been described from the Meramec. Therefore, the occurrence of several specific types in the Burlington formation of the Osage group seems worth recording, even though illustrations and detailed descriptions of all of them cannot be given at this time.

Keyes,¹ Keyes and Rowley,² and J. P. Smith³ list *Münsteroceras? osagense* (Swallow) as occurring in the lower Burlington limestone at Louisiana, Missouri, and Moore⁴ lists the same species from the lower Burlington, west of Osceola, Missouri. Keyes and Rowley⁵ and Rowley⁶ also list as "*Goniatites* sp.?" two other forms from the lower Burlington and one from the upper Burlington at Louisiana, Missouri, and Butts⁷ indicates that he found one or two goniatites of uncertain affinities in the New Providence shale of Kentucky and Indiana, which is the approximate stratigraphic equivalent of

¹ Keyes, C. R.: Paleontology of Missouri, Part 2: Missouri Geol. Survey, vol. 5, p. 221, 1894.

² Keyes, C. R., and Rowley, R. R.: Vertical range of fossils at Louisiana [Missouri]: Iowa Acad. Sci. Proc., vol. 4, p. 36, 1897.

³ Smith, J. P.: The Carboniferous ammonoids of America: U. S. Geol. Survey Mon. 42, pp. 14, 145, 1903.

⁴ Moore, R. C.: Early Mississippian formations in Missouri: Missouri Bur. Geol. and Mines, 2d ser., vol. 21, pp. 187, 206, 1928.

⁵ Idem.

⁶ Rowley, R. R.: The geology of Pike County [Missouri]: Missouri Bur. Geology and Mines, 2d ser., vol. 8, p. 42, 1908.

⁷ Butts, Charles: Descriptions and correlation of the Mississippian formations of western Kentucky: Kentucky Geol. Survey, Mississippian formations of western Kentucky, p. 14, 1917; and The Mississippian series of eastern Kentucky: Kentucky Geol. Survey, 6th ser., vol. 7, p. 57, 1922.

the Burlington limestone. In so far as I have been able to ascertain, these are the only published references to Osage goniatites. None of the specimens on which these records are based has ever been illustrated or described, and since *Münsteroceras? osagense* was originally described from the Chouteau limestone (Lower Mississippian), it is rather doubtful if the specific identification of the Burlington form is correct.

Last year, Mr. J. G. Mitchell, a graduate student at the University of Missouri, found a single goniatite in the upper portion of the lower Burlington limestone at Sweeney, Missouri. This specimen was kindly loaned to me for study by Prof. E. B. Branson, and I am describing it below as *Münsteroceras mitchelli*. Furthermore, during the summer of 1934 I visited the late Prof. R. R. Rowley, and he showed me in his private collection four goniatites from the Burlington limestone near Louisiana, Missouri. These represent four distinct species but all of them appear to be referable to the genus *Münsteroceras*. Professor Rowley informed me that Keyes had seen some of these specimens years ago, and that the published records of Burlington goniatites from near Louisiana, Missouri, mentioned above, were probably all based on these specimens. Since the specimens in Professor Rowley's collection will probably not be available for detailed study for some time, the following notes in regard to them seem to be worth publishing.

Only one of the Burlington goniatites in the Rowley collection shows the shape of its sutures, and it does not show the shape of the ventral lobe. Nevertheless, all four of the specimens appear to be rather closely related, all have moderately large, open umbilici, and their general physiognomy indicates that they represent the genus *Münsteroceras*, of which *M. parallelum* (Hall) of the Rockford limestone (Lower Mississippian) of Indiana is the genotype. One of the Rowley specimens is bounded adorally by a septum, the edges of which show that internally each mature suture forms three lobes and that externally each forms one pair of rounded lateral lobes and apparently a large ventral lobe—there is also a lobe on each of the intermediate (umbilical) zones. This specimen is about one inch in diameter and it is subdiscoidal or sublenticular in shape. It is composed of yellow chert, and Professor Rowley told me that it may have been picked up on the surface and not collected *in situ*. A second specimen is similar to the first but a little smaller and a little thicker. Neither of these specimens shows any sinuous transverse constrictions which

are so common in representatives of the genus *Münsteroceras*. This second specimen is preserved in white chert, and it does not show the shape of its sutures. However, its general form and its umbilicus are similar to those of the yellow chert specimen discussed above, and presumably these two forms are closely related and are congeneric.

A third specimen in the Rowley collection is only about one-half inch in diameter, and it is so thick that it is almost subglobular in shape. This specimen, which is preserved in white chert, is marked externally by prominent sinuous transverse constrictions. It does not show the shape of its sutures, but its umbilicus and the shape of its conch indicate that it is related to the specimen from the Chouteau formation (Lower Mississippian) of Pettis County, Missouri, which J. P. Smith⁸ described and illustrated as *M. osagense* (Swallow).

The fourth goniatite from the Burlington limestone near Louisiana, Missouri, is rather fragmentary and its inner whorls are not preserved. It has been broken into several pieces, but most of these have been preserved and glued together. This specimen, which is about one and one-fourth inches in diameter, is composed of white chert and it is not entirely free from the matrix. No trace of its sutures is visible, but on one side of it, at least, sinuous transverse constrictions are preserved. These are not as prominent as are those of the specimen just discussed, and also this specimen is thickly subdiscoidal in shape whereas that one is almost subglobular. The general physiognomy of this specimen indicates that it is related to *Münsteroceras mitchelli*, but it is much smaller than the holotype of that species and is almost certainly not conspecific with it.

The only other goniatites that have been described from the Middle Mississippian (Valmeyer) strata of North America are *Imitoceras? sciotoense* (Miller and Faber) from Scioto-ville, Ohio, *Goniatites? greencastleensis* Miller and Gurley from Greencastle, Indiana, and *Nomismoceras? monroense* (Worthen) from Waterloo, Illinois. All three of these came from beds that are Meramec in age, and they are not at all closely related to the Burlington goniatites discussed above. The Burlington forms are, however, congeneric with and closely related to forms known from the Rockford limestone of Indiana, the Chouteau limestone of Missouri, and the Marshall sandstone of Michigan—all of these formations are

⁸ Op. cit.: p. 119, pl. 24, figs. 8-12.

Lower Mississippian (Kinderhook) in age. In Europe the genus *Münsteroceras* is widespread, and its stratigraphic range as given by Schmidt⁹ indicates that it occurs in European strata that are the approximate time equivalents of both the Kinderhook and the Osage beds of America. The limestone beds in northern Africa that yielded the well-preserved representatives of *Münsteroceras* which Menchikoff¹⁰ has recently figured are almost certainly Kinderhook equivalents.

The fact that the Burlington goniatites are very closely related to those of the Kinderhook and not at all similar to those of the Meramec might be taken to indicate that the Osage group should be classed with the Kinderhook rather than the Meramec, as was done by Ulrich¹¹ in 1911, Schuchert¹² in 1924, and Moore¹³ in 1928. However, in this connection it should be born in mind that we know only a very few goniatites from both the Osage and the Meramec groups, and all but one of those that we know from the Burlington came from the lower portion of that formation.

DESCRIPTION OF FIGURED SPECIES.

Münsteroceras mitchelli, n. sp.

Conch ammonitic, thickly subdiscoidal, and moderately large—the holotype attains a maximum diameter measured across the umbilicus of about 75 mm. and it is septate throughout and therefore represents only phragmacone. Whorls are slightly compressed, flattened laterally, rounded ventrally, and rather deeply impressed dorsally. At the adoral end of the holotype the conch is about 35 mm. high, and about 32 mm. (estimated) wide, and the impressed zone is about 17 mm. deep and about 22 mm. wide. Umbilicus deep and moderately large—that of the holotype attains a maximum diameter of about 16 mm. Umbilical shoulders subangular; umbilical walls steep but stepped. Surface of outer volution of holotype.

⁹ Schmidt, Hermann: Die carbonischen Goniatiten Deutschlands: Jahrb. preuss. geol. Landesanstalt, Bd. 45, p. 547, 1925.

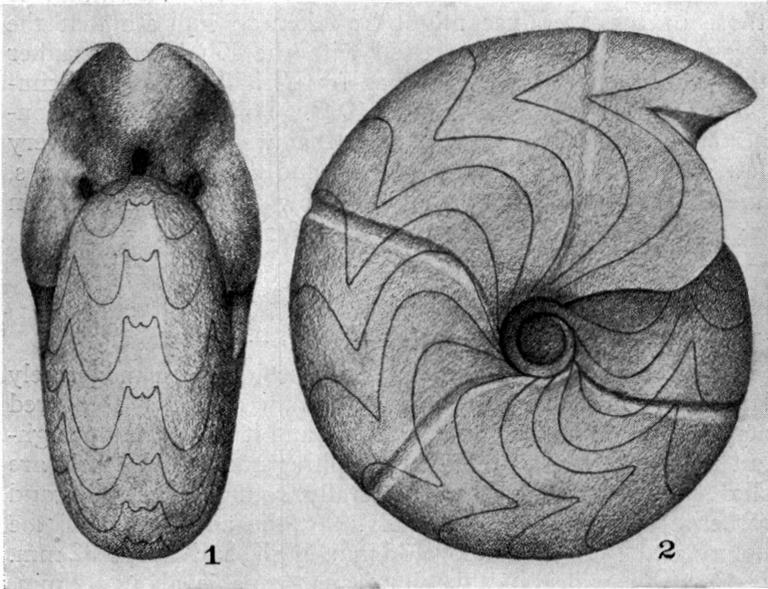
¹⁰ Menchikoff, Nicolas: Recherches géologiques et morphologiques dans le Sahara occidental: Revue Géog. phys. et Géol. dyn., vol. 3, fasc. 2, pl. 15, figs. 2a-4b; pl. 16, figs. 1a-2, 1930. [See also Clarioud, M. L., La série paléozoïque des territoires du Tafilalet (Maroc): C. R. Acad. Sci. Paris, tome 198, pp. 2270-2272, 1934.]

¹¹ Ulrich, E. O.: Revision of the Paleozoic systems: Bull. Geol. Soc. Am., vol. 22, pl. 29 (opp. p. 608), 1911.

¹² Schuchert, Charles: A Text-book of Geology, Part 2, Historical Geology, 2d ed., p. 335, 1924.

¹³ Op. cit.

an internal mold, marked by four sinuous transverse constrictions; these appear to be nearly straight on the ventral side of the conch and on the ventral portions of the lateral sides, but on the dorsal portions of the lateral sides of the conch they curve apicad rather strongly. On the outer volution of the holotype each suture forms a rather long and narrow ventral lobe and on either side of it a high U-shaped first lateral saddle, a deep V-shaped first lateral lobe, a broader



Figs. 1, 2. *Münsteroceras mitchelli*, n. sp. Ventral and lateral views, $\times 1$, of the holotype, somewhat restored; from the lower Burlington limestone at Sweeney, Cooper County, Missouri. Drawn by Dan Enich.

high rounded second lateral saddle, a deep narrowly rounded lobe which centers on the umbilical wall, a broad rounded internal lateral saddle which is located on the lateral side of the impressed zone, a rather small narrow internal lateral lobe, and a U-shaped saddle which is dorso-lateral in position and which extends to the rather long narrow dorsal lobe. The exact nature of the adapical portion of the ventral lobe of the sutures of the holotype cannot be ascertained with certainty, but it appears to be divided into three small lobes as shown

in the accompanying figures. The siphuncle is small, circular in cross section, and ventral and marginal in position.

Remarks.—The holotype and only known representative of this species is an internal mold that is only moderately well preserved and is slightly distorted. Satisfactory photographs of it could not be obtained, and the figures which accompany this description are drawings that are in part restorations. However, these drawings were made from photographs so their proportions are accurate; their construction was very carefully supervised; and, with the possible exception of the details of the subdivision of the ventral lobe, they are accurate and are entirely trustworthy—however, the sinuous transverse constrictions were inadvertently not shown on the ventral view.

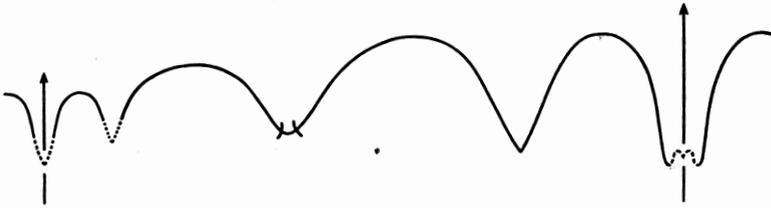


Fig. 3. *Münsteroceras mitchelli*, n. sp. Diagrammatic representation of one of the adoral sutures of the holotype, x 1.

This species is closely similar and therefore presumably closely related to *Münsteroceras oweni* (Hall) and *M. parallelum* (Hall) of the Rockford limestone of Indiana, but its conch is distinctly wider than is that of either of these Lower Mississippian species; also its umbilicus is smaller than is that of *M. oweni*, and its septa are farther apart than are those of *M. parallelum*. In general physiognomy *M. mitchelli* resembles very closely the form from the Lower Mississippian of northwestern Africa (between Ouarourout and Mazzer) that Menchikoff¹⁴ figured in 1930 and referred to *M. oweni*, and these two forms are probably closely related.

Occurrence.—The holotype and only known representative of this species was found about 30 feet above the base of the lower Burlington limestone in the large quarry operated by the Missouri, Kansas and Texas Railway at Sweeney, 2½ miles north of Clifton City, Cooper County, Missouri.

Holotype.—University of Missouri, catalogue number 6694.

STATE UNIVERSITY OF IOWA,
IOWA CITY, IOWA.

¹⁴ Op. cit., pl. 15, figs. 2a, 2b.