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An Orthocerid Cephalopod From the Cherokee Group of Marion County, Iowa

RICHARD ARNOLD DAVIS¹ AND CARLYLE B. CAMPBELL²

Abstract. Specimens of *Pseudorthoceras knoxense* (McChesney) occurring in the lower part of the Cherokee Group in Marion County, Iowa, possess body chambers. The shell of these body chambers is distinctly thickened with the thickest portion of the callus on the venter. No reasonably complete peristome is preserved, but growth lines on the body chamber indicate the presence of only a broad, shallow reëntrant and a broad, shallow salient.

The orthocerid cephalopod *Pseudorthoceras knoxense* (McChesney, 1859) Girty, 1911, has been treated in a taxonomic fashion by numerous authors (*e.g.*: Miller, Dunbar & Condra, 1933, Flower, 1939, Miller & Youngquist, 1949, and Unklesbay, 1962). These authors agreed that only the phragmocone of the species was known; Furnish, Glenister & Hansman (1962), however, reported specimens of this species occurring near Knoxville, Marion County, Iowa, which do possess body chambers. The purpose of this study is to present more data relevant to these Marion County cephalopods with especial emphasis on the nature of the body chamber.

All specimens discussed herein have been deposited in the repository of the Geology Department of the University of Iowa, Iowa City, Iowa.

COLLECTING SITE

Virtually all of the specimens examined for this study were collected by Campbell from a strip mine covering the central portion of the southern half, NW $\frac{1}{4}$ sec. 26, T. 76 N., R. 19 W., Marion County, Iowa (A on index map, fig. 1). Closely similar specimens are also present in another strip pit nearby (NE $\frac{1}{4}$ sec. 29, T. 76 N., R. 19 W. — B on index map).

The floor of the mine in section 26 is sandstone, which is overlain by a coal bed approximately 3 ft. thick. Above the coal are 10 to 20 ft. of calcareous, carbonaceous shale containing calcareous, ferruginous sandstone layers which are randomly spaced, commonly lenticular, and each about 2 in. thick. Overlying the shale is a carbonaceous limestone bed about 1 ft. thick; this, in turn, is succeeded by more shale.

The cephalopods herein considered occur in the uppermost 3 ft. or so of shale beneath the limestone, along with other nautiloids, some gastropods, pelecypods, strophomenid- and acrotretid-type brachiopods, and fish teeth.

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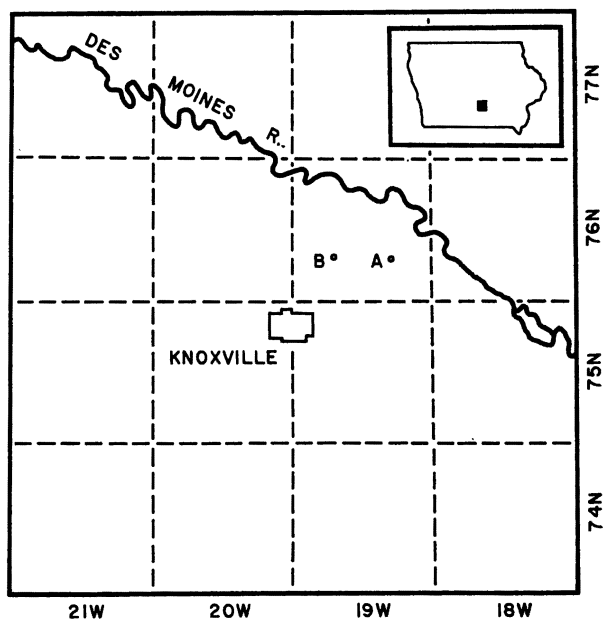


Fig. 1. Index map of Marion County, Iowa

Because of the paucity of published stratigraphic studies on the area, it is not possible, at present, to locate the rock exposed in the mine in section 26 any more precisely than in the lower part of the Cherokee Group.

MATERIAL

Approximately 200 cephalopod specimens, in various states of preservation, were examined.

When collected, most of these were found with their long axes oriented parallel to the stratification, but with no preferred orientation within that surface; other individuals were found with their long axes at nearly every angle to the stratification. Most specimens are considerably flattened throughout most of their length, but the amount of deformation appears to vary with the inclination from the vertical. Most individuals are extensively broken, with the surface which lay uppermost in the rock more fragmented than the lower. Most of the fragmentation is, presumably, post-burial, as a result of compaction of the matrix; one piece of shell (SUI 12483), however, has an acrotretid-type brachiopod attached adapically of the last septum, thereby indicating pre-burial fragmentation. This same specimen and a number of others also bear similar brachiopods on the exterior of

the phragmocone and/or body chamber; no particular area of the circumference seems to be more favored, and the brachiopods occur to within 20 cm. of the apical end of some specimens, but are, when present, more numerous near the adapertural end of the specimen.

A score or so of the individuals examined retain at least a portion of a recognizable body chamber, but only two of these (SUI 12483 and SUI 12486) bear even a portion of a peristome. Only about a dozen specimens retain the protoconch, although a number of others probably lack fewer than 10 or 15 apical camerae. None of the specimens with a recognizable body chamber also retains the protoconch, although one individual (SUI 12485) is probably missing less than 15 camerae. The condition of the breaks at the adapical ends of many specimens suggests that breakage occurred at or after the time of collection, but in many other individuals the breaks must have occurred prior to collection, for the broken ends are or were covered with matrix. No specimen examined, however, exhibits anything resembling a septum of truncation; therefore it is presumed that ontogenetic decollation did not occur in these forms.

THE CEPHALOPODS

The largest nearly complete specimen (SUI 12486) has a body chamber circumference of about 25 cm. and would have been roughly 70 cm. long (about 35 apical camerae are missing). Another specimen (SUI 12484), more fragmentary than the previous one, is estimated to be about 35 cm. in circumference.

The overall shape of the Marion County specimens is longiconic and, except for the characteristic dorsal flexure of the first few camerae, orthoconic. The diameter of the conch expands uniformly with length so that the apical angle is approximately 6°. Specimens which were oriented perpendicularly to the stratification are circular in cross-section, as are the apical portions of flattened specimens.

Camera-length increases more or less uniformly in an adapertural direction. The ratio of camera-length to diameter decreases from about $\frac{1}{2}$ near the apical end to about $\frac{1}{15}$ near the body chambers of large individuals.

As the characteristics of the phragmocones of the Marion County specimens correspond to previously mentioned taxonomic descriptions of *Pseudorthoceras knoxense*, these will not be dealt with any further herein.

A completely preserved body chamber of a large individual would be 10-15 cm. long. As only two individuals examined have

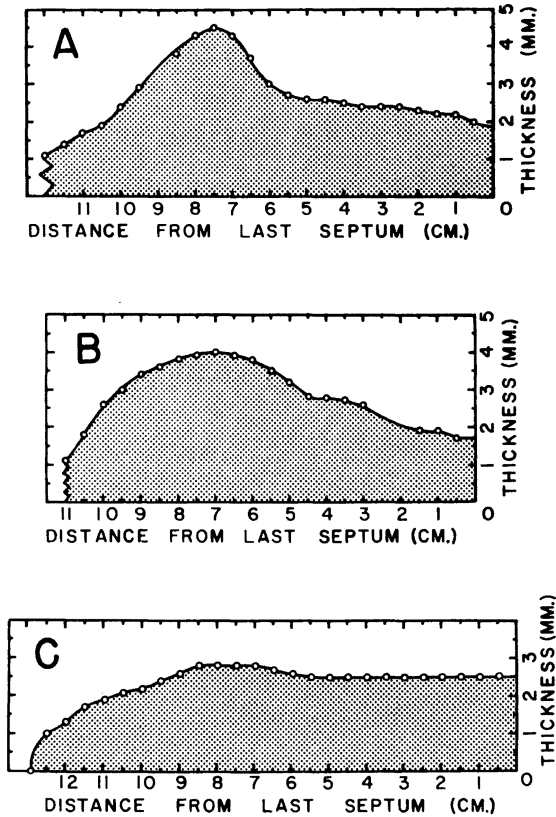


Fig. 2. Longitudinal profiles of shell thickness of the body chambers of:
 A. SUI 12485
 B. SUI 12484
 C. SUI 12483 (Note: The points 12.0 and 12.5 cm. from the last septum in 2C are offset toward the reader 1 cm. from the majority of the profile, and the point 12.9 cm. from the last septum is offset another 2 cm. toward the reader.)

any part of a peristome preserved, and as these exhibit only a small portion of the peristome circumference, the nature of the mature aperture has not been established. Growth lines on the body chamber display only a single, broad salient and a single, broad reëntrant, presumably dorsal and ventral, respectively.

The shell of the body chamber in some individuals displays a distinctly thickened region (see fig. 2A and 2B); such a callus is presumably indicative of maturity (Furnish, Glenister & Hansman, 1962). SUI 12483 (fig. 2C), however, has only a slight body chamber shell thickening; presumably this individual had reached maturity so shortly before death that only a thin callus had been formed.

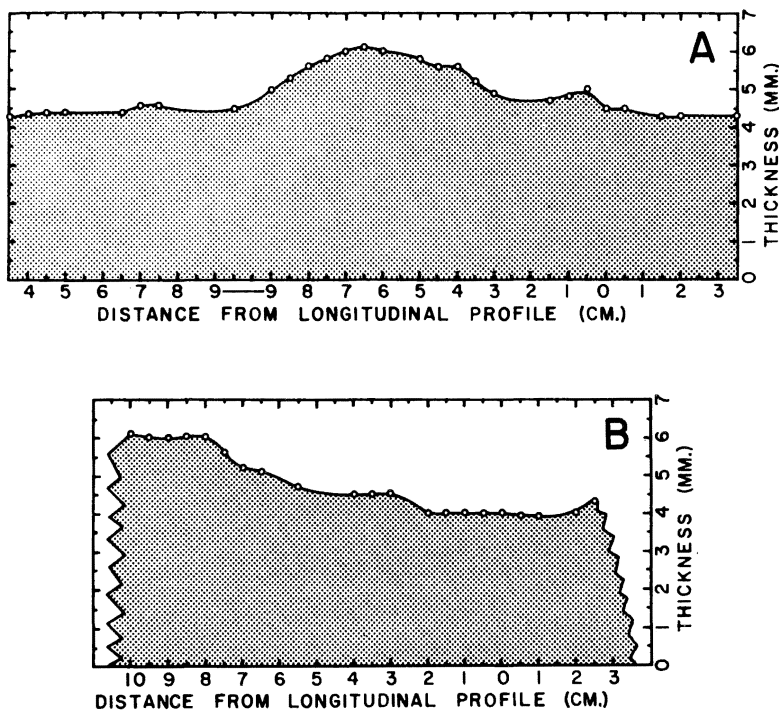


Fig. 3. Circumferential profiles of shell thickness, perpendicular to the corresponding longitudinal profiles at their thickest points:

A. SUI 12485 (looking adapically)

B. SUI 12484 (looking adaperturally)

As shown in figure 3, the callus is not of equal thickness all along the circumference, but, rather, is thickest on the venter and thinnest on the dorsum, as located by the position of the growth line reëntrant and salient, respectively.

Specimen SUI 12485 (fig. 2A and 3A) presents an anomalous condition: the dorso-ventral plane, as projected from the apical portion of the phragmocone over a distance of some 50 cm., lies about 50° out of alignment with the dorso-ventral plane, as determined by reference to growth lines and to the plane of symmetry of shell thickening. The twisting thereby indicated might be due to post-mortem deformation (all but the apical portion of the specimen was smashed) or might possibly be the result of rotation of the soft parts of the organism with respect to the adapical portions of the shell in ontogeny.

The biologic significance of the irregularities in the circumferential thickness profiles is, at present, unclear; possibly they were involved in muscle attachment. However, no muscle scars

were recognized as such in any of the body chambers examined, but, as some parts of interiors are only partially free of matrix, the absence of such muscle scars may be apparent rather than real.

Literature Cited

- Flower, Rousseau H., 1939. *Palaeont. Americana*, 2 (10): 214p., 9 pl.
 Furnish, W. M., B. F. Glenister & R. H. Hansman, 1962. *Jour. Paleontology*, 36 (6): 1341-1356, pl. 179-180.
 Miller, A. K., C. O. Dunbar & G. E. Condra, 1933. *Nebraska Geol. Surv., Bull.* 9, 2d series, 240p., 24pl.
 ——— & Walter L. Youngquist, 1949. *Geol. Soc. Amer., Mem.* 41, 218p., 59pl.
 Unklesbay, A. G., 1962. *Oklahoma Geol. Surv., Bull.* 96, 150p., 19pl.