

A NEW OCCURRENCE OF THE DEVONIAN ARTHRODIRE *HOLONEMA*¹

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ABSTRACT

A single, incomplete, paranuchal plate of the cranial shield of *Holonema* found in the Middle Devonian (Lower Givetian) Silica Formation (Traverse Group) of northwestern Ohio is described. The ornamentation of this plate suggests that it is closely related to a species of *Holonema* occurring in the Middle Devonian Rockport Quarry Limestone (Traverse Group) of northern Michigan.

INTRODUCTION

Although the Middle Devonian (Lower Givetian) Silica Formation (Traverse Group) of northwestern Ohio contains an abundant and varied invertebrate fauna, few vertebrates have been reported from this formation. Skeels (1962) described the fish *Dinichthys ohioensis* Skeels and *Pseudodontichthys whitei* Skeels from the formation. However, *P. whitei* has been shown to have been based on mandibles of the phyllocarid crustaceans *Dithyrocaris* and *Hebertocaris* (Dunkle, 1965; Rolfe and Denison, 1966; and Stumm and Chilman, 1969, p. 54). Consequently, *Dinichthys* is the only arthrodire genus that has been recognized in the Silica Formation. Two species of the genus have been reported: *D. ohioensis* Skeels by Skeels (1962, p. 1039-1043) and possibly *D. precursor* Newberry by Newberry (1890, p. 51-52). Skeels (1962, p. 1039, 1042-3) states that Newberry's material was from the Silica Formation. However, the exact horizon from which his specimens of *D. precursor* were collected is in doubt. Also, Ørvig (1969, p. 267, fig. 3A, B) figures a coccosteomorph arthrodire from the Silica Formation at Silica, Ohio.

An incomplete plate belonging to the arthrodire genus *Holonema* was collected by A. J. Mozola of Wayne State University, Detroit, Michigan, from unit 7A (Mitchell, 1967, p. 189) of the Silica Formation exposed in the north quarry of the Medusa Portland Cement Company, 2½ miles southwest of Sylvania, Lucas County, Ohio. The specimen represents a portion of the right paranuchal plate of the cranial shield and seems to be most closely related to the specimens of *Holonema* sp. described and figured by Case (1931, p. 172-4; pls. IV and V) and by Wells (1942, p. 654-5, pl. 97, fig. 4; and 1943, p. 264-6) from the Middle Devonian Rockport Quarry Limestone (Traverse Group) exposed at Rockport, Alpena County, Michigan. Wells (1942, p. 654; and 1943, p. 264-6) suggests that the specimens of *Holonema* from the Rockport Quarry Limestone are *H. rugosum* (Claypole) or a new species closely related to it. No subsequent studies have been made of the specimens of *Holonema* occurring in the Rockport Quarry Limestone.

This paper presents a description of the single, incomplete, paranuchal plate of *Holonema* found in the Silica Formation by A. J. Mozola. This plate provides additional information on the occurrence of this arthrodire, and also on the presence of sensory grooves and surface ornamentation on this lower Traverse species of this genus.

OCCURRENCE

Locality

North quarry of the Medusa Portland Cement Company, just west of Centennial Road and just north of Brint Road, 2½ miles southwest of Sylvania, S½, SE¼, sec. 7, T. 9 S., R. 6 E., Lucas County, Ohio.

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Horizon

Middle Devonian, Traverse Group, Brint Road Member of Silica Formation, unit 7A of Mitchell (1967, p. 189): 18 inches of "shale, calcareous, blue-gray, with an occasional argillaceous limestone lens. Contains much water-worn fossil debris. *Atrypa* sp., *Devonochonetes* spp., *Fistulipora vesiculata* (Hall and Simpson), *Megastrophia* sp., *Mucrospirifer prolificus* (Stewart), *Pholidostrophia* sp., *Protoleptostrophia* sp., *Strophodonta* sp. and many other species are abundant." This shale unit occurs directly above the "Blue Limestone" (units 1-6 of Ehlers, Stumm, and Kesling, 1951, p. 20) and is approximately 8 feet, 10 inches above the base of the Silica Formation, depending on the thickness of the "Blue Limestone."

SYSTEMATIC DESCRIPTION

Class PLACODERMI

Order ARTHRODIRA

Family HOLONEMIDAE

Genus *Holonema* Newberry, 1890*Type Species.*—*Pterichthys? rugosus* Claypole, 1883.*Holonema* sp.

(Fig. 1A-D)

Description.—Only a single, incomplete, paranuchal plate of the cranial shield and its impression are available for study. The impression measures 4.5 cm in width and 7.0 cm in length and shows a considerably greater surface area than does the actual plate (fig. 1C). The greatest length of the plate is 6.5 cm and the greatest width 4.5 cm. The thickness of the plate is constant (3.0 mm) except near the only margin of the plate which is preserved (left side of plate in fig. 1A-C), where the thickness increases abruptly to 7.0 mm. A sensory groove runs nearly parallel to the margin of the plate. The sensory groove occurs 11.0 to 15.0 mm from the margin and decreases from 1.5 mm to 0.7 mm in width as it approaches the margin. It is deeply set into the plate, being 0.9 mm deep at its widest point (fig. 1B).

The ornamentation of the plate, externally, consists of numerous small (generally about 0.3 mm in diameter) nonstellate tubercles covering the apices of ridges. The tubercles are in most cases elongate—broader than long—the tubercle length is considered to be the diameter of the tubercle measured parallel to the trace of the ridge), though some are circular to subcircular. The ridges appear to be in part longitudinal, paralleling the plate margin. However, the ridges all appear to radiate from a portion of the plate which is not preserved, a point which would lie below the bottom of the impression shown in fig. 1C. This point was probably the center of ossification. On the incomplete specimen available for study, the widths of the interspaces between the ridges (generally 0.3 mm) are consistently less than the widths of the ridges (generally 0.8 to 1.0 mm).

The ornamentation becomes simpler and somewhat finer towards the only preserved margin, where a single row of tubercles covers the apices of the ridges. However, in the central portion of the incomplete plate (where two different sets of radiating ridges meet), larger numbers of tubercles cover the ridge apices. In the central part of the plate, the ridges are wider than elsewhere and two to three tubercles (smaller than most) may occur in a line across the ridge (fig. 1D). In this central region the ridges are anastomosing, while in other parts of the plate they are largely parallel and continuous. The ridges cover the entire surface of the preserved plate except near the margin. The entire surface of the plate is also covered with numerous very small pits (fig. 1B-D).

Internally the plate is smooth or radially pitted, with small pits (generally about 3 mm in diameter) occurring at an angle to the surface (fig. 1A). Also

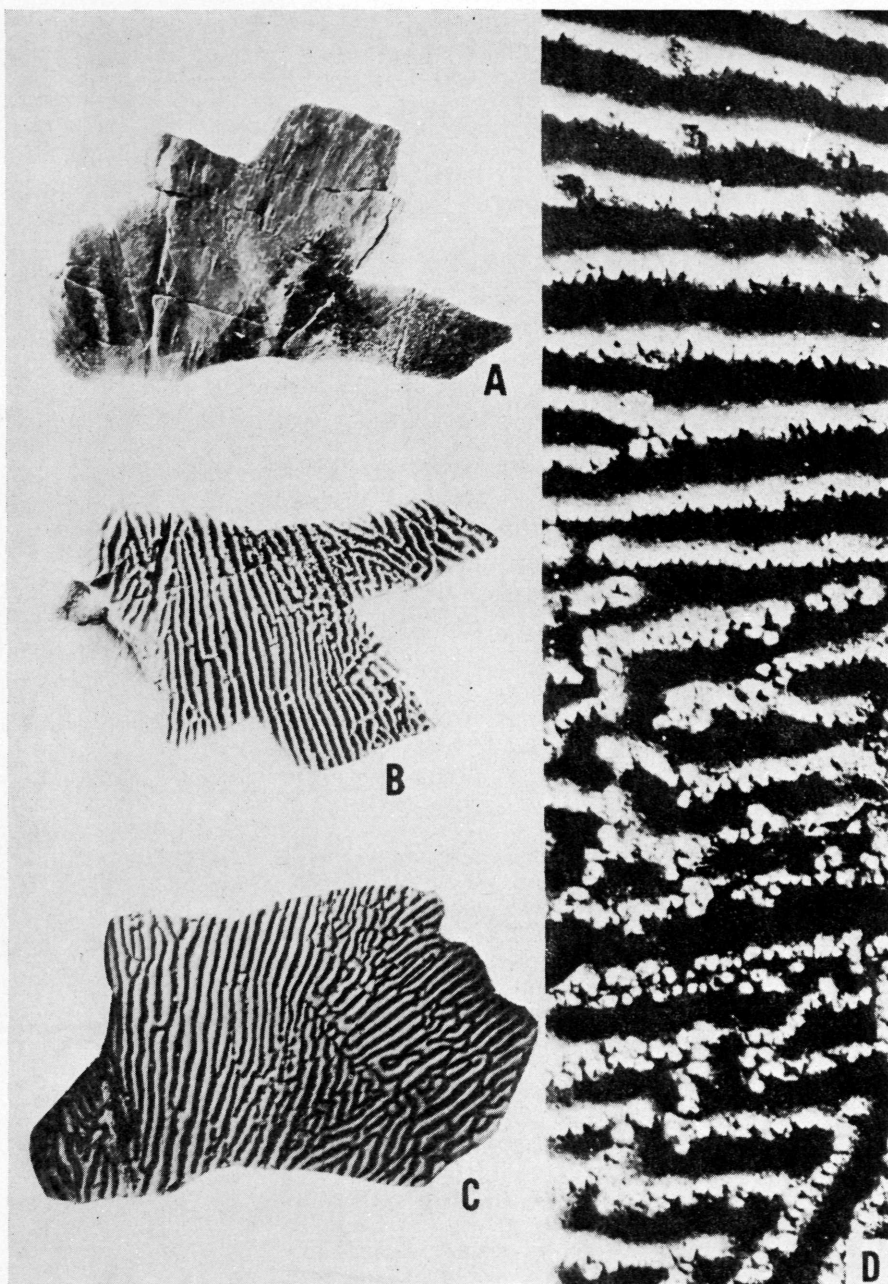


FIGURE 1. Right paranuchal plate of cranial shield of *Holonema* sp., figured specimen, UMMP No. 57591. A, interior side of plate, X1; B, exterior side of plate, X1; C, impression of exterior side of plate, X1; D, enlarged diagonal section across upper part of plate exterior, X10. Specimen from unit 7A (Mitchell, 1967, p. 189) of the Silica Formation, north quarry of Medusa Portland Cement Company, 2½ miles southwest of Sylvania, Lucas County, Ohio.

present is the attachment scar of an inarticulate brachiopod, probably *Petrocrania hamiltoniae* (Hall). This suggests that the plate lay exposed on the sea bottom before burial by sediments.

Discussion.—Although the plate is incomplete, the features which are present strongly suggest that it is a right paranuchal plate of the cranial shield of *Holonema*. The presence of only radial and longitudinal (and not concentric) ornamentation and of a sensory groove nearly parallel to the preserved margin support this conclusion. Case (1931, p. 173, pl. IV, fig. 1) describes and figures a nuchal plate and parts of two adjacent paranuchal plates from the Middle Devonian Rockport Quarry Limestone (Traverse Group) exposed in the abandoned quarry of Kelley's Island Lime and Transport Company at Rockport, Alpena County, Michigan. The ornamentation and position of the sensory groove (nearly parallel and close to the margin) on the right paranuchal plate agree very closely with that of this plate of *Holonema* from the Silica Formation. The ornamentation of the species of *Holonema* from the Rockport Quarry Limestone also consists of longitudinal and radial ridges with the apices covered with numerous small nonstellate tubercles, and the interspaces between the ridges are also less than the width of the ridges, like the ornamentation found on the fragment of *Holonema* from the Silica Formation. *Holonema radiatum* Obručev also has ornamentation similar to that of the Silica Formation *Holonema* plate—fused ridges of two to four tubercles in a line. Kulczycki (1957, p. 330) reports finding ridges which are produced by the fusion of one to two rows of tubercles in *H. radiatum*.

Another species of *Holonema* from a higher horizon in the Traverse Group of Michigan has been described and figured by Stevens (1964). *Holonema farrowi* Stevens from the Koehler Limestone is characterized by ornamentation consisting of nonstellate tubercles arranged in beadlike rows which never fuse to form a ridge, as in the species of *Holonema* occurring in the Silica Formation and in the Rockport Quarry Limestone. *Holonema farrowi* also differs in having interspaces wider or narrower than the tubercle rows.

As suggested by Wells (1942, p. 654; and 1943, p. 264–6), the specimens of *Holonema* from the Rockport Quarry Limestone are conspecific or very closely related to *H. rugosum* (Claypole). The species of *Holonema* occurring in the Silica Formation is likewise closely related or identical to *H. rugosum* (Claypole). However, the quantity of material of the *Holonema* species occurring both in the Rockport Quarry Limestone and in the Silica Formation is still insufficient to allow a detailed comparison with *H. rugosum* (Claypole). Until further specimens become available, the specific identification of the Silica Formation form must remain in question.

Type.—Figured specimen; housed in the Museum of Paleontology, University of Michigan, Ann Arbor, Michigan (UMMP No. 57591).

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