

A *PHYSONEMUS* SPINE FROM THE LOWER MERCER
LIMESTONE (PENNSYLVANIAN) OF PORTAGE
COUNTY, OHIO^{1, 2}

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ABSTRACT

A small, relatively complete ichthyodorulite from the Lower Mercer Limestone of the Pennsylvanian Pottsville Group (Kanawha-Lampasas Series and Westphalian B) has been found in eastern Portage County, Ohio. The spine is comparable to *Physonemus acinaciformis* (St. John and Worthen), *P. striatus* (Moore), and *P. anceps* (Newberry and Worthen), the first two of which may be synonyms.

In Baird's (1957) review of extant *Physonemus* material from Mississippian and Pennsylvanian strata of North America, he notes that Pennsylvanian specimens can be divided into two major groups on the basis of relative size. He reports only a single specimen from the lower Pennsylvanian, an imperfect spine from near San Saba, Texas, probably from the Marble Falls Limestone (Lee-Morrow Series and Westphalian A).

The present specimen was found by the author in 1968 in a dark shaly limestone of the Lower Mercer Limestone Member, exposed along the west shore of Berlin Reservoir, 7/10 of a mile southwest of the reservoir dam, Deerfield Township, Portage County, Ohio. Associated with the shark spine were crinoid stems, solitary corals, productid brachiopods, and a trilobite pygidium, indicative of the marine environment in which the fossil remains of this organ genus of sharks are usually found.

Description.—The specimen, OSU no. 28746, is incomplete at both ends (fig. 1). Maximum length along the anterior margin is 57.8 mm. Maximum width is 14.4 mm, and the thickness is 4.0 mm. There is no trace of a vascular canal.

Much of the posterior portion of the exposed lateral face is exfoliated so that the number of longitudinal rows of denticles cannot be determined. Fifteen rows are preserved, and it is estimated that originally there may have been as many as twenty. The rows of denticles are separated by fine longitudinal sulci which continue proximally onto the non-denticulate portion of the spine. Nearly all of the denticles have been abraded, but several of the larger denticles along the anterior margin of the spine display a distinctly stellate pattern. All are sub-circular in outline; none are elongated. On the mid-portion of the lateral face, there are about ten denticles per centimeter, measured longitudinally. The anterior edge is largely covered with tightly adhering matrix, but it has been possible to remove enough matrix to show that there are two marginal rows of enlarged denticles, with a third row between.

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Comparison and Discussion.—Four of the described species of *Physonemus* have been based upon relatively small specimens found in Pennsylvanian strata. *Physonemus acinaciformis* (St. John and Worthen) from the roof shales of coal No. 5 at Carlinville, Illinois (Allegheny-DesMoines Series and Westphalian D), is a slightly narrower form with non-stellate denticles. The stellate or non-stellate nature of the denticles is of doubtful significance in distinguishing members of this genus, however, for the stellate pattern is often indistinct and easily overlooked.

Physonemus anceps (Newberry and Worthen), based on a fragmentary spine from the horizon of coal No. 8 near Springfield, Illinois (Conemaugh-Missouri Series and basal Stephanian), agrees closely in form with the Lower Mercer specimen, but has denticles that are irregularly placed and presumably smooth. Baird (1957) regards *Physonemus anceps* as indeterminate.



FIGURE 1. Lateral view, $\times 1.5$, of *Physonemus* cf. *P. striatus* (Moore) from the Lower Mercer Limestone Member of Portage County, Ohio. The Ohio State University, Orton Museum, no. 28746.

Physonemus asper Eastman has laterally elongated denticles along the anterior margin and a more pronounced forward curvature. It, too, is regarded as indeterminate by Baird. The species is based upon a fragmentary spine from Leavenworth, Kansas (Virgil Series and mid-Stephanian).

Physonemus striatus (Moore), from the upper Pennsylvanian of eastern Kansas, is regarded by Baird as a junior synonym of *P. acinaciformis*. It closely resembles the Lower Mercer specimen in size, width, and number of rows of denticles, and also in the development of fine sulci between the rows of denticles. The chief distinction seems to be the non-stellate nature of the denticles in *P. striatus*, but as Baird observes, this may not be a significant distinction. It seems best to refer the Lower Mercer specimen to *P. striatus*, bearing in mind the fact that *P. striatus* may be a junior synonym of *P. acinaciformis*. The type specimens of

P. striatus and *P. acinaciformis* resemble one another much more closely than they do the specimen described by Baird from the Ames Limestone Member (Conemaugh-Missouri Series and mid-Stephanian) of West Virginia. That specimen, compared to *P. acinaciformis*, has elongated anterior and lateral denticles; longitudinal sulci are not pronounced.

No other fish remains were found in association with the Lower Mercer spine reported here. Isolated teeth of *Petalodus* and *Polyrhizodus* have been found in the Lower Mercer Limestone at other localities.

One other unrecorded *Physonemus* spine is known from Ohio. This is a well-preserved fragment of *Physonemus* cf. *P. acinaciformis* from the Cambridge Limestone Member of the Conemaugh Group, from a strip mine in section 35, Symmes Township, Lawrence County. In size the specimen more closely resembles the Ames Limestone spine described by Baird than the Pottsville specimen described herein. Donald Baird, Princeton University, has kindly called my attention to the Cambridge Limestone specimen, which is in the collection of the Department of Geology, Ohio University. Although no edestid teeth are known from the Pottsville Group of Ohio, such negative evidence does not mitigate against Baird's suggestion that *Physonemus* spines represent edestid sharks. The occurrence of a small *Physonemus* spine of Baird's "*acinaciformis* species group" (Baird, 1957, p. 1010) in the Pottsville does emphasize the resemblance of lower Pennsylvanian forms to those found in the upper Mississippian, and supports Baird's suggested phylogenetic relationship between *P. gemmatus* and *P. acinaciformis*.

REFERENCES CITED

- Baird, D. 1957. A *Physonemus* spine from the Pennsylvanian of West Virginia. J. Paleont. 31: 1010-1018.
- Eastman, C. R. 1903. Carboniferous fishes from the central western states. Mus. Comp. Zool. Bull. 39: 163-226. Pl. 1-5.
- Moore, R. C. 1929. A large fish spine from the Pennsylvanian of north central Texas. Denison Univ. Sci. Lab. Bull. 24: 237-244. Pl. 40.
- Newberry, J. S., and A. H. Worthen. 1866. Descriptions of new species of vertebrates, mainly from the Subcarboniferous limestone and Coal Measures of Illinois. Ill. Geol. Surv. 2: 9-134. Pl. 1-13.
- St. John, O. H., and A. H. Worthen. 1875. Descriptions of fossil fishes. Ill. Geol. Surv. 6: 245-488. Pls. 1-22.
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