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EARTH SCIENCES

SOME PENNSYLVANIAN CHONDRICHTHYAN SPINES FROM NEBRASKA

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Fragmentary, dermal spines of Pennsylvanian chondrichthyans from Cass and Sarpy counties, Nebraska, are described. Forms that have been identified include the genera *Acondylacanthus, Amelacanthus, Bythiacanthus,* and *"Physonemus"* and an indeterminate hybodont. A diverse chondrichthyan fauna is therefore represented by these spines. The record of *Amelacanthus* is the first outside Great Britain and Northern Ireland.

† † †

INTRODUCTION

Fragments of dermal spines from Pennsylvanian chondrichthyans were collected by W. D. White from the Pennsylvanian Kiewitz Shale, Stoner Limestone of Cass and Sarpy counties, Nebraska. This report describes those specimens which were donated to the University of Nebraska State Museum (UNSM), and all specimen numbers refer to that institution.

Genus *Acondylacanthus* St. John and Worthen, 1875
Acondylacanthus aequicostatus St. John and Worthen, 1875

Fig. 1A and B

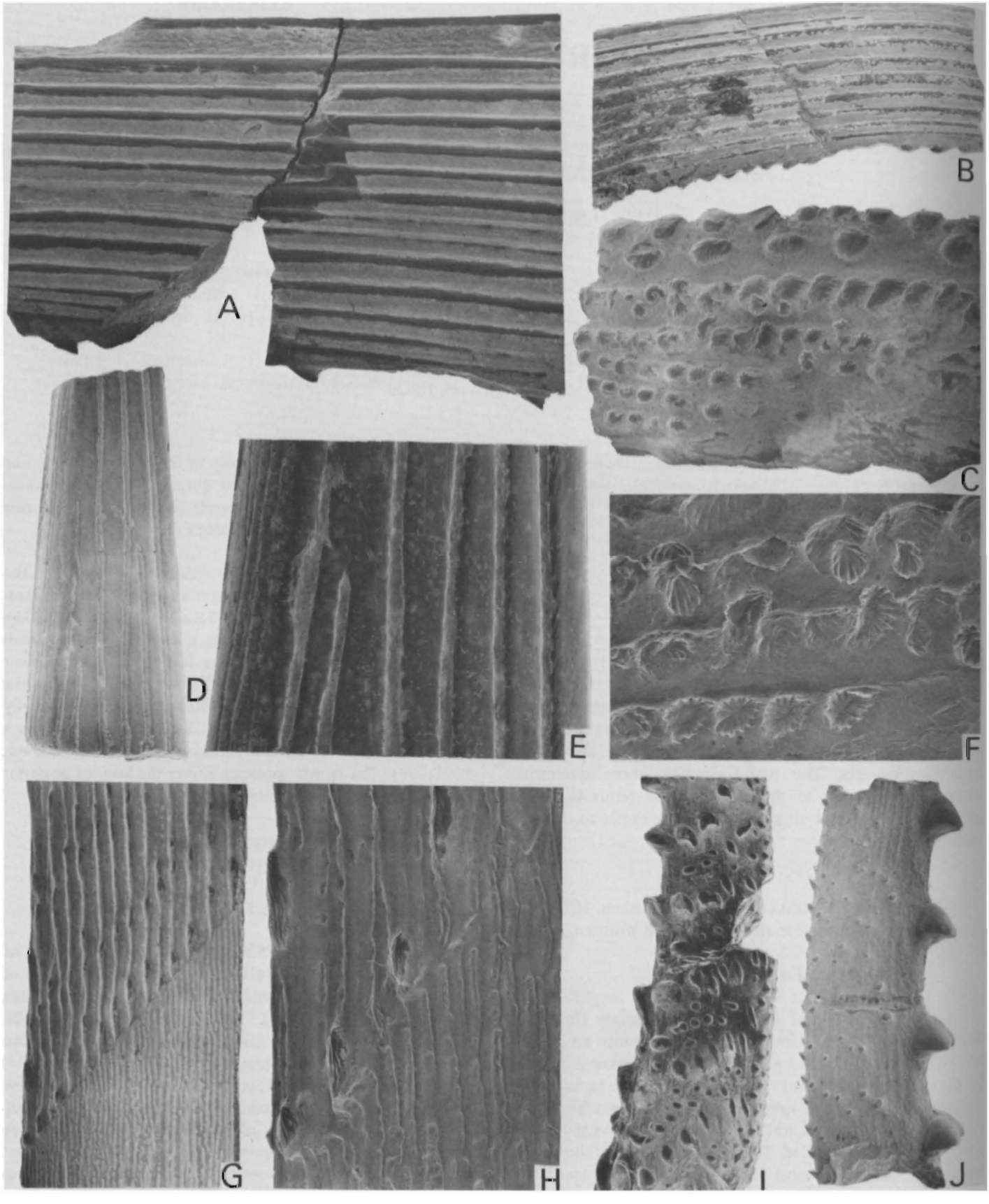
Fragments of several *Acondylacanthus* spines from the Kiewitz Shale, Stoner Limestone of Cass County are represented (UNSM 79186 and 82412). The largest piece is 36 mm long, but another fragment, 10 mm long, seems to be from the same spine. The overall spine length was originally about 90 mm. A piece from the apical region of another spine is 17 mm long, but its tip is abraded. This piece is interesting, however, because it shows that most of the costae on the lateral faces of the spine were established early in ontogeny, and only one or two new costae were added during subsequent growth. Most new costae are simply intercalated between the anterior and first lateral rib, and thus become a new first lateral rib.

These fragments are referred to *A. aequicostatus* on the basis of similarities in the ornament and their shape in transverse section. According to St. John and Worthen (1875), the type species (*A. gracilis*) has a concave posterior wall with median ridge, but the ridge is not apparent in their figures (St. John and Worthen, 1875: 434, plate xvi, Figs. 12 and 13). Other spines referred to *Acondylacanthus* generally lack a median posterior ridge, and I regard its absence as a diagnostic feature of *Acondylacanthus* spines (cf Woodward, 1891:109). The largest specimen shows the level of posterior closure to be low down on the spine.

Genus *Amelacanthus* Maisey, 1982
Amelacanthus americanus n. sp.

Fig. 1E and F

A single fragment, 11.5 mm long, from near the apex of a small finspine (UNSM 82410) represents the only record of this distinctive genus outside Great Britain and Northern Ireland (Maisey, 1982:13). The specimen is tapered, with smooth, flat sides, and a gently concave posterior wall. An enamelled anterior keel is present, flanked by three (apically) to six (proximally) smooth, closely spaced costae. All the new costae were added by bifurcation of existing ones. The specimen resembles *A. laevis, A. plicatus,* and *A. suicatus* (the type species) in its ornament pattern and transverse section, but the extent to which its costae bifurcate on the lateral surfaces


A
B
C
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distinguishes it from previously described *Amelacanthus* spines. This, together with its younger (Pennsylvanian) age and geographical location, suggests that a new species is represented. The central cavity is located towards the back of the spine, and the spine wall is consequently much thinner posteriorly than anteriorly. In this respect, *A. americanus* resembles *A. laevis,* but the ribs of *A. laevis* spines are much finer. Ribbing of *A. americanus* is more like that of *A. sulcatus* spines.

Genus *Bythiacanthus* St. John and Worthen, 1875

Fig. 1C and D

A single fragment, 16 mm long, from the midregion of a small finspine (UNSM 82413) is referred to *Bythiacanthus.* The spine would have been rather slender, with only five or six rows of tubercles laterally. The small size, slender shape, and small number of tubercle rows suggest that this is a juvenile spine, and no attempt was made to refer it to any described species (*see* Maisey, 1982:2). The top of the inserted region is present, and the posterior wall is open throughout the length of the fragment.

Hybodontidae, gen. et sp. indet.

Fig. 1G and H

This fragmentary spine (UNSM 82414) resembles those of *Acrodus* and *Hybodus* from the Mesozoic, and it is also similar to the finspines of an as yet undescribed Late Carboniferous hybodont. The fragment from the Kiewitz Shale is 31 mm long, and represents part of the spine midregion. The anterior part only is preserved, both posterior margins being lost, although an associated fragment represents part of the inserted region. The principal fragment is ornamented by numerous fine costae that are swollen and enamelled at intervals to form nodes. These nodes collectively define varices across the spine, parallel to the level of insertion (*vide* Maisey, 1978). Two varices are clearly seen in Figure 1G. Measured down the spine long axis, these varices are 5.0 mm apart anteriorly and 4.3 mm apart farther laterally, and the level of insertion is approximately 4 mm below the lowest varix. The varices and insertion line slope at approximately 45° to the spine long axis. There is a small anterior saddle on the inserted region. A continuous anterior rib is absent; the leading edge of the ornamented region comprises several short costae which bifurcate irregularly.

Genus *"Physonemus"*

"Physonemus" baculiformis (St. John and Worthen, 1875)

Fig. 1I and J

The distal parts of two spines (UNSM 08558 and 47048) are represented, 12 mm and 37 mm in length respectively. The spines are elongate and slender, oval in transverse section, and have typical "reverse" curvature. The leading edge is ornamented by enlarged, transverse tubercles gently arched upwards, and sometimes separated into paired nodes. These large tubercles resemble bracket fungi in the way they sit upon the spine. Lateral tubercles are much smaller, and towards the posterolateral margins consist only of numerous small bumps. The posterior wall is marked by a very shallow median groove apically.

The nomenclature of *"Physonemus"* spines is in some disarray. A number of genera have been erected, e.g., *Batacanthus, Drepanacanthus, Physonemus, Stethacanthus,* and *Xystracanthus.* All have spines with reverse curvature, and all but *Stethacanthus* have ornamented spines. Woodward (1891) placed *Drepanacanthus* and *Xystracanthus* into synonymy with *Physonemus* and suggested that *Batacanthus* is another synonym, a view tentatively accepted here. More recently Lund (personal communication) has discovered articulated remains to indicate that *Stethacanthus* and *"Physonemus"* are not closely related, and that *"Physonemus"* comprises a diverse array of forms. Therefore, pending reinvestigation of these forms, all are referred to as *"Physonemus."*

"Physonemus" stellatus (Newberry and Worthen, 1866)

A fragment of spine 17 mm long, UNSM 47048, is referred to this species. It is not very well preserved and it is therefore not figured here, but its ornament agrees with that of published figures (*see* Newberry and Worthen, 1866: plate xii, Fig. 7; St. John and Worthen, 1875: plate xxi, Figs. 1-3).

← FIGURE 1. Pennsylvanian chondrichthyan spines coated with "Polaron" conducting film aerosol and photographed at 2.5 kV using Cambridge "Stereoscan 250" in the American Museum of Natural History. A and B. *Acondylacanthus aequicostatus.* **A.** UNSM 79186, X8.25. **B.** UNSM 82412, X4.4. C and D. *Bythiacanthus* sp. **C.** UNSM 82413, X6.75. **D.** UNSM 82413, X17.5. E and F. *Amelacanthus americanus* n. sp. **E.** Holotype, UNSM 82410, X6.45. **F.** UNSM 82410, X13.5. G and H. Indeterminate hybodont. **G.** UNSM 82414, X4.1. **H.** UNSM 82414, X13.5. I and J. *"Physonemus" baculiformis.* **I.** UNSM 47048, X4.1. **J.** UNSM 08558, X6.45.

In particular the bases of two large anterior denticles are visible. These denticles seem to have alternated in position down the anterior midline.

REFERENCES

Maisey, J. G. 1978. Growth and form of finspines in hybodont sharks. *Palaeontology,* 21:657–666.

_____. 1982. Studies on the Paleozoic selachian genus *Ctenacanthus* Agassiz: No. 2. *Bythiacanthus* St. John and Worthen, *Amelacanthus,* New Genus, *Eunemacanthus* St. John and Worthen, *Sphenacanthus* Agassiz, and *Wodnika* Munster. *American Museum Novitates,* No. 2722:1–24.

Newberry, J. S., and A. H. Worthen. 1866. Description of vertebrates. *Geological Survey of Illinois,* 2 (Palaentology): 9–141.

St. John, O., and A. H. Worthen. 1875. Description of fossil fishes. *Geological Survey of Illinois,* 6 (Palaeontology): 245–488.

Woodward, A. S. 1891. *Catalogue of the fossil fishes in the British Museum (Natural History). Part II.* London, British Museum (Natural History): xliv and 567p.