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EUPROOPS FROM THE "UFFINGTON SHALE" OF COLUMBIANA COUNTY, OHIO

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A nearly complete specimen of *Euproops laevicula* Raymond and the prosoma of a specimen of *E. danae* (Meek and Worthen) have been found in two large ironstone concretions in the dark fissile roof shales overlying the upper Freeport (No. 7) coal exposed in a strip mine, SE¼, SE¼ Section 19, Center Township, Columbiana County, Ohio. These are the first xiphosuran remains reported from the Pennsylvanian system of Ohio, although several specimens have been described from the Conemaugh and Allegheny groups of Pennsylvania, and their occurrence is of considerable stratigraphic interest.

Class ARACHNIDA
Subclass MEROSTOMATA Woodward
Order XIPHOSURA Gronovius
Family EUPROOPIDAE Eller
Genus *Euproops* Meek
Euproops danae (Meek and Worthen)
Plate 1, figure 1

Bellinurus danae Meek and Worthen, 1865, Proc. Acad. Nat. Sci. Philadelphia, 2: 44. Meek and Worthen, 1866, Illinois Geol. Surv., 2: 395, pl. 32, figs. 2, 2a.

Prestwichia danae Meek, 1867, Amer. Jour. Sci., 43: 257. Packard, 1886, Mem. Natl. Acad. Sci., 3(16): 146, pl. 5, figs. 3, 3a; pl. 6, figs. 1, 2a.

Euproops danae Meek, 1867, Amer. Jour. Sci., 43: 395. Woodward, 1868, Geol. Mag., 5: 2. White, 1885, Geol. Natl. Hist. Surv. Indiana, 13th.

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Ann. Rept. (1883): 170, pl. 39, fig. 1. Raymond, 1943, Illinois State Mus. Sci. Papers., 3(3): 4-6, pl. 1, figs. 1-2; pl. 2, figs. 1-2. Raymond, 1944, Bull. Mus. Comp. Zool., 94(10): 484-486.

REPOSITORY: Carnegie Museum (CM 33060)

MEASUREMENTS: Maximum length of prosoma, 11.5 mm. Maximum width of prosoma at the base of the genal spines, 23.0 mm.

DISCUSSION: This species is so well known that no formal diagnosis is necessary (Raymond, 1944: 485). Although incomplete, consisting only of the prosoma, the specimen can be readily identified, for it possesses the rapidly tapering cardiac lobe characteristic of *E. danae*. *E. packardi* Willard and Jones has a similar cardiac lobe, but the prosoma is relatively wider. *E. packardi* is also described as having a rather strong posterior notch at the base of the cardiac lobe (Willard and Jones, 1935: 1277). This feature could not be discerned on a cast of the holotype from the Carnegie Museum collections (CM 23459).

The width/length ratio of the upper Freeport specimen is less than that of typical specimens of *E. danae*. The very short genal spines and the relatively small size of this specimen also suggest that it represents a young individual. The prosoma is unusually well preserved, only slightly wrinkled, with the ocelli prominent. The transverse bar at the midpoint of the cardiac lobe is also preserved.

Euproops laevicula Raymond
Plate 1, figure 2

Euproops laevicula Raymond, 1944, Bull. Mus. Comp. Zool., 94(10): 490, fig. 3.

REPOSITORY: Carnegie Museum (CM 33061)

DESCRIPTION: Cardiac lobe gradually tapering, prosoma narrow with a width/length ratio of 2.0. Thoracetron with nearly smooth lateral lobes, axial lobe with faint transverse furrows and nodes on the last several rings. Spines on thoracetron not preserved; genal spines short.

The prosoma of this specimen is partly obscured by the impression of a second specimen, though most of the features of the prosoma can be discerned. Diagnostic features of the second specimen cannot be determined.

MEASUREMENTS: Maximum length of prosoma, 11 mm. Maximum length of specimen (without telson), 20 mm.

DISCUSSION: The obscure transverse ridges on the axial and lateral lobes of the thoracetron are characteristic of this species. *Euproops laevicula* can be distinguished from the similar *E. parkardi* of the Allegheny group of Pennsylvania by the tapering cardiac lobe; that of *E. packardi* is like

the abruptly contracted lobe of *E. danae*. *Euproops packardi* also has a much wider prosoma and comparatively conspicuous transverse ridges

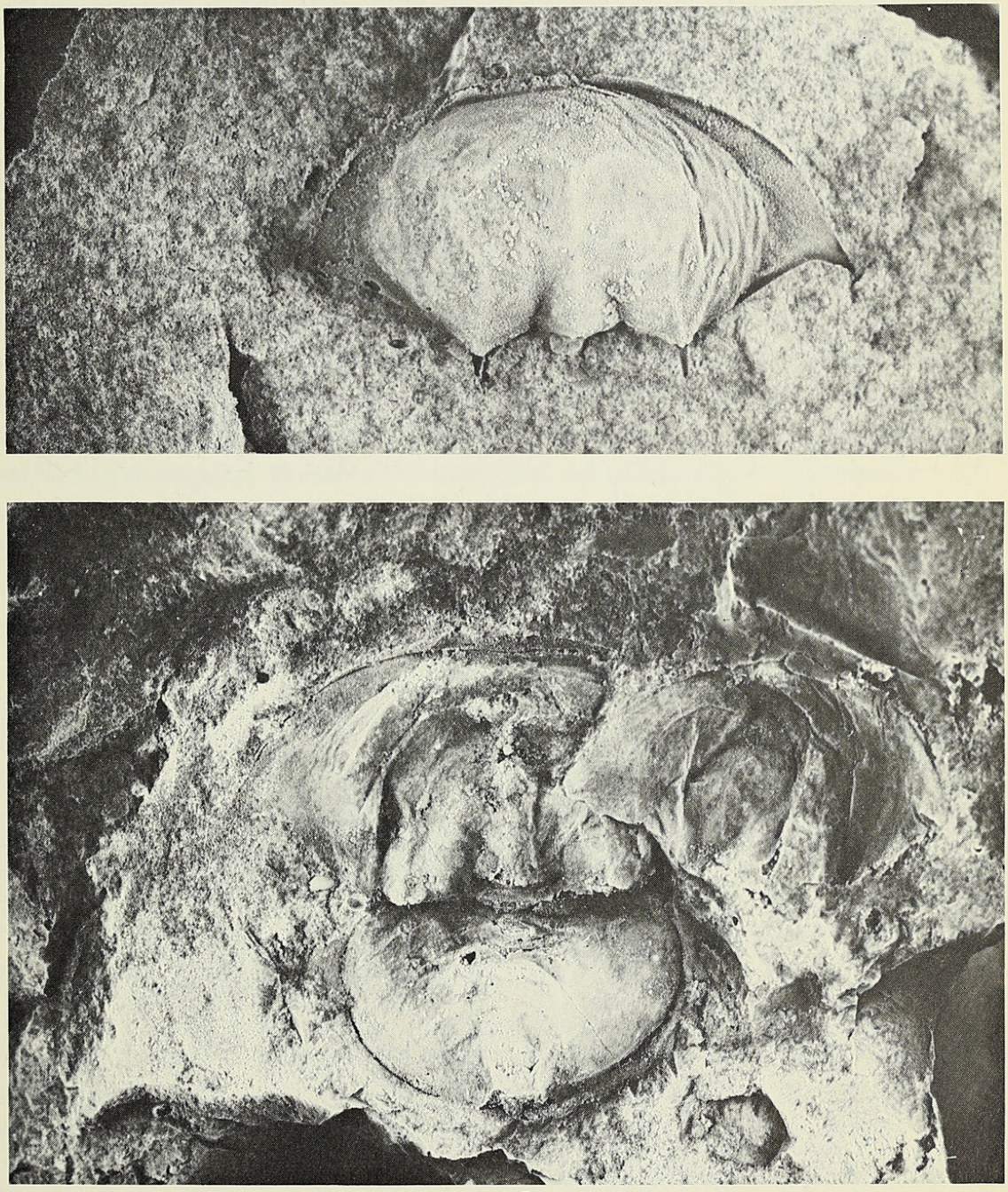

PLATE 1

Fig. 1. *Euproops danae* (Meek and Worthen); CM 33060. Prosoma from ironstone concretion. Upper Freeport coal roof shale, strip mine high wall, SE¼, SE¼ Section 19, Center Township, Columbiana County, Ohio.

Fig. 2. *Euproops laevicula* Raymond; CM 33061. A nearly complete specimen from the same horizon and locality.

on the lateral lobes of the thoracetron. The Ohio specimen may represent a slightly more mature individual than the holotype of *E. packardi* (CM 23459), for it has a longer thoracetron. *Euproops danae* can be distinguished by the presence of prominent transverse ridges on the thoracetron and by the abruptly tapering cardiac lobe.

Euproops darrahi Raymond of the Mason shale of Pennsylvania is probably a junior synonym of *E. packardi.*

This is only the second reported specimen of *E. laevicula.* It is of particular interest because of the close agreement with Raymond's original description. In a group like the Xiphosura, one should be extremely cautious in proposing new species. Considerable variation may be expected between individuals of the same species, fossil specimens are rare and usually distorted by crushing, and there is the further difficulty of molt stages and sexual dimorphism. Raymond might in fact be suspected of a needless proliferation of species based upon very slender evidence, arbitrary criteria, and often only single specimens. These two new specimens can readily be assigned to existing species within Raymond's scheme of classification. The conclusion to be drawn is that Raymond's classification, though artificial, is internally consistent, fairly conservative, and may suffice until a thorough, modern reappraisal of this group is undertaken.

THE UPPER FREEPORT ROOF SHALE FAUNA

Associated fossils at the xiphosuran locality include the estherid *Cyzicus* sp., which has been found in both the black fissile shale and the ironstone nodules. The black shale also yields abundant ganoid (*Haplolepis*) and crossopterygian fish scales. Ostracods (*Candona and Gutschickia*) are also common in the nodules. A single blattoid wing has been identified by C. J. Durden as *Stygetoblatta.* A conspecific specimen has been found in the Mason shale of Pennsylvania (C. J. Durden, personal comm., Sept. 5, 1967).

Examination of other outcrops of the upper Freeport roof shales in Madison, Center, Hanover, and West townships reveals that the black fissile shale bed is widespread, with abundant ganoid scales and occasional *Xenacanthus* teeth. One fragmentary insect wing, identified by C. J. Durden as either *Mylacris* or *Orthomylacris* sp., has been found by R. Max Gard, Lisbon, Ohio, in an exposure along U. S. Route 30, NE¼ 24, Hanover Township, Columbiana County, Ohio. At this locality fossiliferous ironstone concretions occur sparingly, containing a few fresh-water ostracods. Estheriids (*Leaia*) occur in a section measured

by Stout and Lamborn (1924: 258) at West Point, Madison Township, and in a strip mine in West Township, though in both instances the unit is a silty shale overlying the black fissile shale. Normal marine fossils have not been found overlying the coal. With the exception of a Perry County locality cited by Sturgeon (1958: 92), where the brackish-water forms *Lingula* and *Orbiculoidea* occur sparingly, no brachiopods or molluscs are known from the beds immediately overlying the upper Freeport coal.

STRATIGRAPHIC DISCUSSION: The stratigraphic problem has been confused by recognition of a marine Uffington shale member that does not exist (Sturgeon, 1958: 92). Sturgeon failed to note that the marine Uffington shale of the type area, Morgantown, West Virginia, was long ago found to have been based upon a misidentified outcrop of the Mahoning coal and Brush Creek shale member. Nor did he note Price's (1917) redescription of the Uffington as a non-marine, plant-bearing shale immediately overlying the upper Freeport coal. A definite marine member overlying the upper Freeport coal would certainly deserve formal stratigraphic recognition, but the presence of two brackish-water brachiopod species at the Perry County locality is a poor foundation on which to erect a new marine member. The Columbiana County localities cited by Sturgeon (Stout and Lamborn, 1924: 238, 258) were originally described only as "fossiliferous," and collecting at these localities has shown that Sturgeon's belief that these fossils are marine is ill-founded.

If a marine zone were discovered over the upper Freeport coal, it could not be called Uffington, for that name belongs to the non-marine, plant-bearing unit of Price. Price's Uffington shale, incidentally, though recognized in the USGS lexicon, is probably deserving of no more than bed rank. The same is true of the black, fissile shale which is usually found between the coal and the Uffington shale or between the coal and the Mahoning sandstone member when the Uffington is absent. This black shale unit is presumably equivalent to units 2 and 3 of Cross's typical Dunkard cyclothem (Beerbower, 1961: 1031). Typical Uffington shale, as described by Price, and the black fissile roof shale bed are both present in Athens County, Ohio, but neither can be considered important enough to be termed a member.

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