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A NEW EURYPTERID FROM THE UPPER SILURIAN
OF SOUTHERN MICHIGAN

BY

ERWIN C. STUMM and ERIK N. KJELLESVIG-WAERING



MUSEUM OF PALEONTOLOGY
THE UNIVERSITY OF MICHIGAN
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ERWIN C. STUMM¹ and ERIK N. KJELLESVIG-WAERING²

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INTRODUCTION

PREVIOUSLY, the only known eurypterid from Michigan was a fragment of a tergite described by Landes, Ehlers, and Stanley (1945) from the Upper Silurian Pointe aux Chenes formation of Mackinac County. Against this meager record, we now present a very interesting occurrence of Upper Silurian eurypterids which were recovered in a core at a depth of 750 feet in a borehole drilled in Wayne County, Michigan. Three eurypterids were found, one of which was, surprisingly, nearly complete. All belong to the same subspecies, which differs significantly from related forms in New York and Ohio. It is interesting to note that the eurypterids occur with the articulate brachiopods *Whitfieldella nitida* (Hall) and *Howellella vanuxemi* (Hall) in the same ecological association as the closely related *Erieopterus microphthalmus microphthalmus* (Hall) of New York and *Erieopterus microphthalmus eriensis* (Whitfield) of Ohio. To ascribe any other habitat than marine for this group of eurypterids would be difficult.

ACKNOWLEDGMENTS

We wish to thank Dr. L. B. Kellum, Dr. C. A. Arnold, and Dr. R. V. Kesling for critically reviewing the manuscript. All type material except

¹ Museum of Paleontology, The University of Michigan.

² Pan American Trinidad Oil Company, Port of Spain, Trinidad, W. I.

the original of Figure 6 (Pl. I) is located in the Museum of Paleontology of The University of Michigan.

SYSTEMATIC DESCRIPTIONS

Class MEROSTOMATA Dana

Subclass EURYPTERIDA Burmeister

Superfamily Eurypteracea Burmeister

Family Eurypteridae Burmeister, 1845

Genus *Erieopterus* Kjellesvig-Waering, 1958

Type species.—By original designation, *Eurypterus microphthalmus microphthalmus* Hall.

***Erieopterus microphthalmus turgidus* Stumm and Kjellesvig-**

Waering, subsp. nov.

(Fig. 1; Pl. I, Figs. 1-5)

The subspecies is based on a small individual preserved as a dorsal impression and retaining most of the carapace, mesosoma, and metasoma. This specimen is the holotype and is registered as No. 44082 (Pl. I, Figs. 1, 2, 5). Except for poorly preserved fragments of the walking legs, the prosomal appendages are unknown. Besides this specimen, a paratype, No. 44083 (Pl. I, Figs. 3, 4) comprises parts of the carapace and mesosoma. Another paratype, No. 44084 (Fig. 1), consists of a fragment of the carapace but retains a particularly well-preserved lateral eye.

The over-all aspect of the eurypterid is that of a heavily constructed, rather swollen individual.

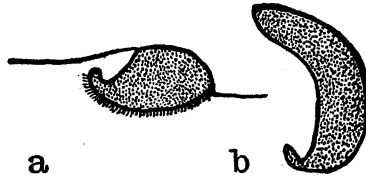


Figure 1

The carapace is rounded in the usual manner for the species and with characteristically small, protruding eyes. A very narrow marginal rim surrounds the carapace forward from the genal angles. The genal angles are obtuse, not unlike those that characterize the other subspecies. The ocelli are present in specimen No. 44084 and are located slightly behind the mid-section of the eyes. These are very inconspicuous, and are located on very small mounds. The round rim which commonly surrounds each ocellus is barely developed.

The lateral eyes are obliquely placed on the carapace, and are partly

covered by a narrow palpebral lobe (Fig. 1). The protruding, kidney-shaped eyes, that appear swollen, are particularly well preserved in specimen No. 44083, and retain barely perceptible, minute facets.

The walking legs are poorly preserved and only reveal that the joints are reinforced with longitudinal keels (Pl. I, Fig. 5).

The opisthosoma is characterized by a very wide mesosoma which tapers into the metasoma, without any great contraction, at the eighth tergite. Nevertheless, contraction does occur there, and it is from the seventh tergite to the last where small, posteriorly directed epimeral spurs are developed. The first tergite is very narrow and short (Pl. I, Figs. 3, 4). The most striking feature of the eurypterid occurs at the posterior of the tergites of the dorsal side of the opisthosoma which are crenulated with a row of conspicuous plicae, or evenly spaced, short ridges. These crenulations are better developed on the metasoma than the mesosoma. The telson is unknown.

No specimen reveals the underside. All specimens are preserved in dolomite and retain some relief, but for the most part are crushed but not greatly distorted.

Measurement of specimens:

Holotype No. 44082

- Prosoma, width at base: 19.5 mm (est.)
- Prosoma, width behind eyes: 15.0 mm (est.)
- Prosoma, length: 13.0 mm (est.)
- Eyes from anterior margin: 5.3 mm
- Eyes from posterior margin: 11.8 mm
- Eyes from lateral margin: 3.6 mm (est.)
- Eyes, apart at front: 4.8 mm
- Eyes, apart at back: 6.4 mm
- Eyes, length: 2.7 mm
- Eyes, width: 1.5 mm

<i>Tergite length</i>	<i>Tergite width at posterior</i>
No. 1 1.3 mm	17.0 mm (est.)
No. 2 2.7 mm	19.0 mm (est.)
No. 3 2.7 mm	20.5 mm (est.)
No. 4 2.7 mm	21.0 mm (est.)
No. 5 3.0 mm	19.0 mm (est.)
No. 6 3.2 mm	17.5 mm
No. 7 3.2 mm	14.0 mm
No. 8 3.2 mm	11.0 mm
No. 9 3.2 mm	9.5 mm
No. 10 3.6 mm	7.1 mm
No. 11 4.7 mm	6.2 mm
No. 12 5.3 mm	5.2 mm

Paratype No. 44083

- Eyes from posterior margin: 10.0 mm

Eyes from lateral margin: 7.7 mm

Eyes, length: 3.5 mm

Eyes, width: 2.4 mm

Tergite length

No. 1 2.0 mm

No. 2 4.5 mm

No. 3 4.6 mm

No. 4 5.3 mm

No. 5 5.3 mm

No. 6 5.3 mm

No. 7 5.3 mm

The ornamentation consists of small, but very noticeable pustules, coarser than those noted for *E. m. microphthalmus* (Hall) and *E. m. eriensis* (Whitfield).

As in the other subspecies, the anterior of each tergite is bounded by a longitudinal ridge, a structure that likely has generic importance.

Horizon and locality.—The eurypterids were recovered from a core taken at a depth of 750 feet in the International Salt Company Borehole No. 5, Detroit Metropolitan Airport, 1,125 feet south of the Wabash Railway tracks and 80 feet east of the extended centerline of Merriman Road; W $\frac{1}{2}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 14, T. 3 S.; R. 9 E., Wayne County, Michigan. They occur in a buff-colored, finely crystalline dolomite associated with *Whitfieldella nitida* (Hall) and *Howellella vanuxemi* (Hall). The section penetrated by the borehole is as follows:

	Drift:	85 feet
Middle Devonian	{ Dundee limestone	79.3 feet
	{ Lucas dolomite	189.2 feet
	{ Amherstburg dolomite	56.6 feet
	{ Sylvania sandstone	141.3 feet
	{ Bois Blanc formation	33.7 feet
Upper Silurian	{ Bass Islands dolomite	188.0 feet
	{ Salina formation	79.6 feet plus

The eurypterids were found 162 feet below the top of the Bass Islands dolomite, nearly at the base of the formation. In Ohio the dolomite is divided into the Raisin River dolomite above and the Put-in-Bay dolomite below. In subsurface it is generally not possible to distinguish between the two members. Nevertheless, the closeness to the base of the dolomite where the eurypterids were found indicates that the enclosing rock is equivalent to the Put-in-Bay dolomite of Ohio. This correlation is strengthened by the presence of the above-mentioned brachiopods, which were collected from the depths of 736 feet and 814 feet. These brachiopods are common elements of the Put-in-Bay dolomite of Ohio.

Repository.—The holotype is registered as No. 44082 and paratypes are Nos. 44083 and 44084 in the collection of the Museum of Paleontology of The University of Michigan.

Remarks.—*Erieopterus microphthalmus turgidus* belongs in a group with *Erieopterus microphthalmus microphthalmus* (Hall) and *Erieopterus microphthalmus eriensis* (Whitfield). All are upper Silurian in age; each occurs in a separate basin. *E. m. turgidus* occurs in the Michigan Basin, *E. m. eriensis* in the Ohio Basin and *E. m. microphthalmus* in the Appalachian Basin (Alling and Briggs, 1961, p. 544). The writers do not necessarily suggest that the morphological differences are due to isolation or other geographical causes as these differences may be more the result of temporal factors. The Put-in-Bay dolomite has furnished the first two subspecies; nevertheless, this formation is a thick unit and the two forms could occur in separate horizons.

The differences between the Michigan form and the other two are readily apparent. *E. m. turgidus* differs from *E. m. microphthalmus* and *E. m. eriensis* in the much heavier and wider construction of the opisthosoma. This is more apparent in comparison with *E. m. microphthalmus* than with the latter (see for comparison Pl. I, Figs. 1 and 6). The greatest difference is the presence of distinct crenulations on the posterior of the tergites of *E. m. turgidus*. This structure alone will separate it from the others. The ornamentation is relatively coarser in *E. m. turgidus* than in the other two. It should be noted that the pretelson and the eleventh tergites of *E. m. turgidus* are relatively longer in comparison to the preceding tergites than in *E. m. eriensis* (compare Kjellesvig-Waering, 1958, text-fig. 10 which shows the corresponding tergites in *E. m. eriensis*). Comparison with other species of *Erieopterus* is unnecessary as the differences are readily apparent.

Erieopterus microphthalmus eriensis (Whitfield)

(Pl. I, Figs. 7, 8)

Eurypterus eriensis Whitfield: Whitfield, 1882, p. 196 (figures not given until 1893); Claypole, 1884, p. 239; Hall, 1884, p. 29; Miller, 1889, p. 548; Whitfield, 1893, pp. 416–17, Pl. 1, Figs. 31, 32; Lane *et al.*, 1909, p. 554; Sherzer and Grabau, 1909, p. 546; Grabau and Shimer, 1910, p. 407, Fig. 1707; Grabau and Sherzer, 1910, pp. 208–9, Pl. 30, Figs. 31, 32; Leutze, 1958, p. 939.

Eurypterus microphthalmus Hall (*partim*): Clarke and Ruedemann, 1912, p. 193–94, Pl. 20, Figs. 6, 7; O'Connell, 1916, p. 50.

Eurypterus microphthalmus eriensis (Whitfield): Kjellesvig-Waering, 1958, pp. 1115–18, Pl. 147, Fig. 4, Pl. 148, Figs. 2–5, text-figs. 5–10; Alling and Briggs, 1961, p. 529.

An unusually well-preserved carapace is recorded here for comparison (Pl. I, Figs. 7, 8). The carapace is preserved in light buff, finegrained dolomite, and is slightly flattened, but not horizontally distorted. It measures 33.0 mm in length, 46.0 mm in width at the base and 42.0 mm behind the eyes. The compound eyes are located on the carapace, 12.0 mm from the anterior margin, 21.0 mm from the posterior margin, and 12.0 mm from the lateral margin. They are 4 mm in length, and 3 mm wide and are 11.0 mm apart at the front and approximately 12.0 mm apart at the posterior.

Horizon and locality.—Silurian, Put-in-Bay dolomite at Peach Point, South Bass Island, Ohio, collected by Carl Rominger.

Repository.—No. 23609 *a* and *b*, in the collections of the Museum of Paleontology of The University of Michigan.

Erieopterus microphthalmus microphthalmus (Hall)

(Pl. I, Fig. 6)

Eurypterus microphthalmus Hall: Hall, 1859, p. 407, Fig. 7; Miller, 1877, p. 217; Hall, 1884, p. 29; Miller, 1889, p. 548; Whitfield, 1893, p. 417; Clarke, 1909, p. 37; Clarke and Ruedemann, 1912, p. 192, Pl. 20, Figs. 2-5, 8-10; Woodward, 1913, p. 297; O'Connell, 1916, p. 40; Diener, 1924, p. 18; Dehee, 1928, p. 324; Størmer, 1934, p. 19; 1936, p. 33; Shimer and Shrock, 1944, p. 707, Pl. 299, Figs. 12, 13; Kjellesvig-Waering, 1948, p. 466.

Eurypterus microphthalmus Clarke and Ruedemann: Van Oyen, 1956, p. 54.

Erieopterus microphthalmus microphthalmus (Hall): Kjellesvig-Waering, 1958, p. 1118-20, Pl. 147, Figs. 1-3, text-fig. 11; Alling and Briggs, 1961, p. 529.

Non Erieopterus microphthalmus microphthalmus (Hall) *partim*: Clarke and Ruedemann, 1912, p. 193-94, Pl. 20, Figs. 6-7 (= *Erieopterus microphthalmus eriensis* (Whitfield); O'Connell, 1916, p. 50.

This species is still considered rare as less than ten, mostly fragmentary, specimens are known. An excellently preserved and nearly whole specimen is figured here for the first time, although a drawing and measurements had previously been given (Kjellesvig-Waering, 1958, p. 1120, text Fig. 11). The underside of the species remains unknown.

Two more carapaces add to our knowledge of this species. The first comprises an uncrushed carapace (No. 2247) which clearly reveals a part of the prosomal doublure or ventral shield, through a broken part of the carapace. This shows a limbate suture, with the edges turned inward, along the anterior part of the doublure. It was through the opening marked by this suture that ecdysis occurred. In *Eurypterus* (see Kjellesvig-Waering, 1958, text-fig. 18) emergence from the old mould occurred through a suture located between the ventral marginal rim and the rest of the ventral

shield. There does not seem to be a marginal rim in the doublure of *Eriopterus*.

Specimen No. 2247 comprises an uncrushed and undistorted carapace preserved in dark gray, finely crystalline dolomite ("waterlime") and has the following dimensions:

- Width at base: 21.6 mm
- Width behind eyes: 21.0 mm
- Length: 17.1 mm
- Eyes located from anterior margin: 6.4 mm
- Eyes located from posterior margin: 8.0 mm
- Eyes located from lateral margin: 6.2 mm
- Eyes apart at front: 5.3 mm
- Eyes apart at back: 6.2 mm
- Eyes, length: 2.6 mm
- Eyes, width: 1.9 mm
- Ocellar mound located on carapace:
 - From anterior margin: 7.4 mm
 - From posterior margin: 8.3 mm
 - From lateral margin: 9.3 mm
- Ocellar mound diameter: 1.2 mm

Specimen No. 17 comprises a crushed but undistorted carapace preserved in dark gray, finely crystalline dolomite ("waterlime") and has the following dimensions:

- Width at base: 41.2 mm
- Width behind eyes: 37.0 mm
- Length: 27.2 mm
- Eyes located from anterior margin: 9.7 mm
- Eyes located from posterior margin: 12.5 mm
- Eyes located from lateral margin: 10.8 mm
- Eyes apart at front: 9.8 mm
- Eyes apart at back: 11.9 mm
- Eyes, length: 4.5 mm
- Eyes, width: 2.5 mm

Horizon and locality.—Specimen No. 2247 is from the Manlius dolomite of New York.

Specimen No. 17 was collected by Willard P. Leutze in 1957 from the Manlius dolomite float in talus 20' below the top of Olney (?) member, northeast end of Split Rock Quarry, Syracuse, New York.

Repository.—No. 2247 is in the James Hall Collection at the American Museum of Natural History. No. 17 is at present in the collection of Kjellesvig-Waering.

It is interesting to note the discrepancies present in the length-width ratio of the carapace of this species, if preservation factors are not taken

into consideration. This is true also, in many other eurypterids but is particularly well shown in this form as it has a highly arched dorsal side, and therefore flattened specimens will appear as much wider than they actually were in life. The three carapaces cited by Kjellesvig-Waering (1958, p. 1119) and No. 17 described above, are crushed or flattened specimens. These give a length-width ratio of from 6.4 to 6.8:10 or an average of 6.6:10. The four carapaces measured by Clarke and Reudemann (1912, p. 193) but for which the state of preservation is not given by the authors, range from 6.3 to 7.2:10 or an average of 6.8:10. The carapace, No. 2247, above described retains original convexity and reveals a proportional ratio of 7.9:10, a proportion that represents the true dimensions of the species. It is obvious that the condition and preservation of the eurypterid should be always stated when measurements are given, as it is a basic factor. It is important to know whether the specimen is vertically compressed and/or horizontally distorted.

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EXPLANATION OF PLATE I

PAGE

- Erieopterus microphthalmus turgidus* Stumm and Kjellesvig-Waering, subsp. nov. 196
 FIG. 1. Holotype No. 44082. Core of International Salt Company's borehole, Detroit Metropolitan Airport, Wayne County, Michigan. $\times 2$.
 FIG. 2. View of posterior tergites of same specimen. $\times 4$.
 FIGS. 3-4. Counterparts of paratype No. 44083. $\times 1$.
 FIG. 5. Walking legs of holotype. $\times 4$.
- Erieopterus microphthalmus microphthalmus* (Hall) 200
 FIG. 6. A complete individual from the Manlius limestone of New York. Collection of E. Kjellesvig-Waering. $\times 1$.
- Erieopterus microphthalmus eriensis* (Whitfield) 199
 FIGS. 7-8. Counterparts of carapace. Hypotype No. 23609. Peach Point, Put-in-Bay Island, Lake Erie. $\times 1$.

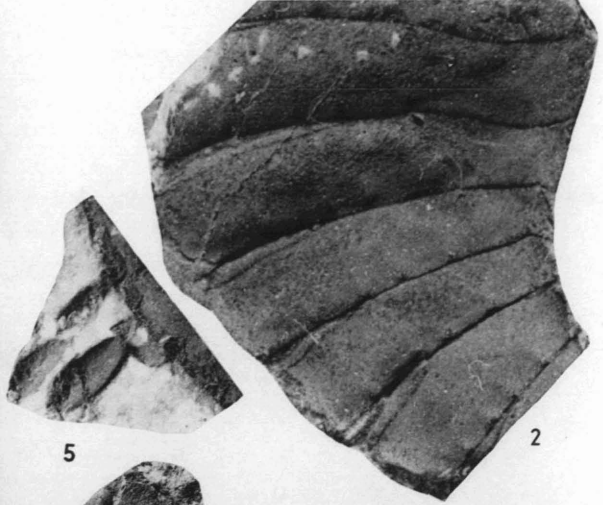
PLATE I



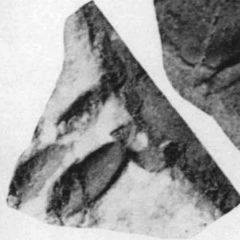
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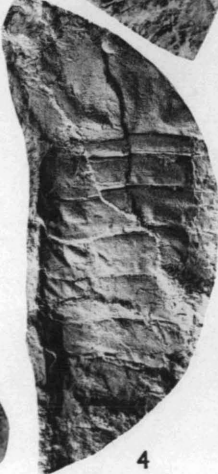
5



3



1



4



6

