CONTRIBUTIONS FROM THE MUSEUM OF PALEONTOLOGY

UNIVERSITY OF MICHIGAN

VOL. XIII, No. 4, pp. 95–102 (1 pl.) JUNE 30, 1956

UPPER CAMBRIAN TRILOBITES FROM MICHIGAN

BY

ERWIN C. STUMM

From the
Ermine Cowles Case Memorial Volume

MUSEUM OF PALEONTOLOGY
UNIVERSITY OF MICHIGAN
ANN ARBOR

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CONTENTS

INTRODUCTION

RED, buff, and brown sandstone of Upper Cambrian age is exposed at intervals within a narrow belt of land in the Upper Peninsula of Michigan. The belt extends in Dickinson County from Foster City in the north to the region of Waucedah in the south. It is covered by drift where it continues southward from the Waucedah region, across Menominee County, to the Michigan-Wisconsin border. Outliers of sandstone are present farther west in Dickinson County, especially in the vicinity of Quinnesec. In the Foster City–Waucedah part the sandstone is discontinuous along the strike owing to its occurrence in depressions in the underlying Pre-Cambrian rocks. The age relationship of these sandstone pockets to the main body of the Upper Cambrian Lake Superior sandstone, which is exposed at Munising and in the area of the Pictured Rocks to the northeast, is under study.

An important feature of the sandstone in the pockets in Dickinson County is that it is fossiliferous. No fossils have been reported from the typical Lake Superior sandstone lying to the north and northeast. Although the presence of trilobites in Upper Cambrian sandstone pockets in Dickinson County has been reported in several publications, no species have been described or illustrated. A few fragments, collected either from the Wisconsin or Michigan bank of the Menominee River, were illustrated by Hall

1851, who referred them to the genus *Dikelocephalus* (pp. 205–6, Pl. 23, Figs. 3*a-e*).

In 1873 Rominger (p. 81) mentioned Hall's specimens and commented that he had collected from the same locality and that the fossils occur in an arenaceous limestone of "Calciferous" age. In the same reference he stated (p. 80) that "There is no record of any instance in which recognizable fossils were found in the Lake Superior sandstones." The first undisputed report of Cambrian fossils in Michigan was that made by Rominger in 1895 (p. 90). He wrote:

> The equivalency of the eastern sandstone with the Potsdam sandstone group of New York is proved by fossils in the upper layers east of Keweenaw and south of it, in the Menominee region, where at the Breen Mines and on the west side of the Quinnesec mines, certain seams of the horizontal sandrocks overlying discordantly the iron-bearing series, are full of *Lingula* shells and fragments of *Dikelocephalus* and other primordial trilobite forms.

Lane (1909, p. 39) in his discussion of the Lake Superior sandstone said, "*Dikelocephalus misa* (?), *Dikelocephalus* (Hall, Pl. XXIII, 3*a–e*, 4) and *Lingulepis primiformis* occur at Iron Mountain in the *Ptychaspis* zone." Since the nearest Cambrian rocks to Iron Mountain are those at the abandoned Quinnesec mine, about 3 miles to the east, the specimens mentioned by Lane probably came from that locality.

Ulrich and Resser (1933, p. 217) in their monographic work on the trilobites of the subfamily Saukiinae of the Upper Cambrian of Minnesota and Wisconsin, refer to the occurrence of Saukiid trilobites in Dickinson County, Michigan. A search through the Cambrian collections in the United States National Museum failed to reveal the specimens which they reported from this locality.

The Rominger specimens supplemented by others I obtained during the summers of 1953 and 1954, provided sufficient material to identify one trilobite to species and four to genera. The one abundant species is *Prosaukia curvicostata* Ulrich and Resser. The presence of this species is evidence that the Dickinson County sandstone is of Franconia age and, more specifically, that it may be correlated with the *Prosaukia curvicostata* faunal unit of the *Prosaukia* subzone of the *Prosaukia-Ptychaspis* zone of the Cambrian standard section (see Howell, and others, 1944, Chart I, and Raasch, 1951, p. 149). Occurrence of *Prosaukia curvicostata* in the fossiliferous sandstone of Dickinson County indicates that this sandstone may be correlated with the upper part of the Middle Franconia formation of the type area of the Upper Cambrian St. Croixan series.

I wish to thank Dr. Christina Lochman Balk for checking the identifications of the species illustrated in this paper.

All type material is in the Museum of Paleontology of the University of Michigan.

SYSTEMATIC DESCRIPTIONS

Phylum ARTHROPODA
Class TRILOBITA
Order OPISTHOPARIA
Family Saukiidae
Genus *Prosaukia* Ulrich and Resser

Prosaukia, Ulrich and Resser, 1933, pp. 137–41.

Type species.—By original designation, *Dikelocephalus misa* Hall, 1863, *partim*, p. 144, Pl. 8, Fig. 15; Pl. 10, Figs. 4–5. Franconia sandstone, Trempealeau and Miniska, Wisconsin.

Original diagnosis (Ulrich and Resser, 1933, pp. 137–38).—

Saukiinae with typical subrectangular glabella, narrow fixed cheeks, rather large eyes, long, nearly parallel-sided posterior limbs, and large, widely margined segmented pygidium. Dorsal furrows of cranidium converging more or less in forward direction. Frontal furrow rather wide, extending in transverse direction entirely across the front of the cranidium, its bottom usually distinctly, though often only very slightly, convex in longitudinal section. Glabellar furrows varying considerably in number, depth and direction but in all cases characteristically saukinid in expression. Nuchal spine absent in the typical section but present and often strongly developed in other groups of species.

Free cheeks as in *Saukia* and *Tellerina.*

Pleurae divided into more or less equal parts. On the pygidium both the dividing grooves and the pleural furrows are clearly defined and usually traceable to or beyond the middle of the wide and generally concave border.

Surface of test smooth or finely striated in the typical section, more or less coarsely tuberculated in other groups of species.

Prosaukia curvicostata Ulrich and Resser
(Pl. I; Figs. 1–12)

Prosaukia curvicostata Ulrich and Resser, 1933, pp. 145–47, Pl. 25, Figs. 1–7.
Prosaukia alternata Ulrich and Resser, 1933, pp. 149–50, Pl. 25, Figs. 8–12.
Prosaukia transversa Ulrich and Resser, 1933, p. 150, Pl. 25, Figs. 13–16.
Prosaukia demissa Ulrich and Resser, 1933, pp. 147–48, Pl. 25, Figs. 17–18.
Prosaukia subconica Ulrich and Resser, 1933, pp. 150–51, Pl. 25, Fig. 19.
Prosaukia subrecta Ulrich and Resser, 1933, pp. 148–49, Pl. 26, Figs. 2–8.
Prosaukia subaequalis Ulrich and Resser, 1933, pp. 151–52, Pl. 26, Figs. 9–12.
Prosaukia curvicostata Raasch, 1951, pp. 141–43, 149.

Description.—Cranidium with relatively wide, smooth, low convex brim. Glabella subrectangular with parallel sides and gently rounded front. Anterior and medial glabellar furrows absent or indicated by very faint

indentations along the lateral glabellar margins. Posterior glabellar furrow thin but distinct, continuous across glabella, gently convex posteriorly. Occipital furrow distinct, relatively straight. Occipital ring broad, relatively flat-topped, without medial node or spine. Fixed cheeks narrow, with distinct, flat-topped palpebral lobes. Free cheeks with wide, flat ocular platforms, and long, tapering genal spines. Eyes not preserved.

Thoracic segments with broad, flat-topped axial lobes and low convex pleural lobes having wide, deep medial grooves.

Pygidium subcircular with a prominent axis tapering rapidly posteriorly. Anterior 4 axial lobes transverse, flat-topped. Posterior axial lobe triangular with apex of triangle directed posteriorly and extending almost to margin. Pleural lobes typically 5 on each side of axis, each with a prominent, deep medial groove. No distinct pygidial brim present.

Occurrence.—Upper Cambrian; ledges along north side of U.S. Highway 2, one-tenth mile east of junction with Foster City road, one-half mile north of Waucedah; abandoned Breen Mine, sec. 22, T.39 N., R.28 W.; abandoned Quinnesec Mine, one-half mile north of Quinnesec, Dickinson County, Michigan.

Types.—Hypotypes Nos. 29952, 29953, 29956, 33337, 33338, 33339, 33340, 33341, 33342, 33343, 33344, and 33345.

Prosaukia sp. cf. *P. curvicostata* Ulrich and Resser
(Pl. I, Fig. 13)

Remarks.—One cranidium is similar to that of typical *P. curvicostata* except that it is much smaller and that the sides of the glabella converge slightly anteriorly and that the frontal lobe of the glabella is proportionally somewhat longer. The brim and palpebral lobes are well preserved.

Occurrence.—Upper Cambrian; ledges along north side of U.S. Highway 2, one-tenth mile east of junction with Foster City road, one-half mile north of Waucedah, Dickinson County, Michigan.

Figured specimen.—No. 33346.

Prosaukia, sp. A
(Pl. I, Figs. 14–15)

Remarks.—A small cranidium and associated free cheek are similar to those of *P. curvicostata* but differ in the following respects. The cephalon is about one-third the size of those of typical *P. curvicostata* and its posterior glabellar furrow is so indistinct as to be barely visible. The associated free cheek has a much shorter genal spine than those of *P. curvicostata*. There is no evidence except close association in the rock matrix that the cranidium and free cheek belong to the same specimen or even to the same species.

Occurrence.—Upper Cambrian; ledges along north side of U.S. Highway 2, one-tenth mile east of junction with Foster City road, one-half mile north of Waucedah, Dickinson County, Michigan.

Figured specimens.—Nos. 29957 and 33348.

Family Dikelocephalidae

Genus *Briscoia* Walcott

Briscoia Walcott 1924, p. 37; 1925, pp. 74–75.

Type species.—By original designation, *Briscoia sinclairensis* Walcott, 1924, p. 37.

Diagnosis (Walcott, 1925, p. 74).—

Briscoia differs from *Dikelocephalus* in its elongate glabella, frontal limb and course of the facial sutures in front of the glabella, and in the latter the suture is intramarginal to the center while in *Briscoia* the suture appears to be intramarginal for a less distance: the most strongly marked difference, however, is the presence of the characteristic postero-lateral spine on the pygidium of *Dikelocephalus*. The thoracic segments are essentially the same.

Briscoia sp. A

(Pl. I, Fig. 16)

Remarks.—An incomplete right pleural lobe of a pygidium is the only representative of a specimen of a species of this genus found so far in these deposits. The lobe is wider than long and shows 8 ribs, which are very distinct toward the axial lobe and fade out and become obsolete toward the periphery.

Occurrence.—Upper Cambrian; ledges at top of abandoned Breen Mine, sec. 22, T.39 N., R.28 W., Dickinson County, Michigan.

Figured specimen.—No. 29959.

Genus *Idahoia* Walcott

Idahoia Walcott, 1924, p. 58; 1925, pp. 95–96.

Type species.—By original designation, *Idahoia serapio* Walcott, 1924, p. 58, Pl. 14, Fig. 1; 1925, p. 96, Pl. 19, Figs. 1–12.

Idahoia sp. A

(Pl. I, Fig. 17)

Remarks.—A single incomplete glabella is referred to a species of this genus. The glabella tapers anteriorly, anterior margin rounded. Anterior and medial glabellar furrows absent. Posterior glabellar furrow complete but weakly defined. Occipital furrow thin and shallow. Occipital lobe relatively wide, low convex, bearing a distinct axial node.

Occurrence.—Upper Cambrian; ledges along north side of U.S. Highway 2, one-tenth mile east of junction with Foster City road, one-half mile north of Waucedah, Dickinson County, Michigan.

Figured Specimen.—No. 33347.

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PLATE

EXPLANATION OF PLATE I

PAGE

Prosaukia curvicostata Ulrich and Resser 97

FIG. 1. Latex cast of external mold of left free cheek with well-developed genal spine. Hypotype No. 33337. × 1. Ledges along north side of U.S. Highway 2, one-tenth mile east of junction with Foster City road, one-half mile north of Waucedah, Dickinson County.

FIG. 2. Latex cast of cranidium showing well-developed glabella. Hypotype No. 33338. × 1. Ledges at top of abandoned Breen Mine, sec. 22, T.39 N., R.28 W., Dickinson County.

FIG. 3. Pygidium with well-defined axial lobe and pleural ribs. Hypotype No. 33339. × 1. Locality as original of Figure 2.

FIG. 4. Incomplete right free cheek showing ocular platform. Hypotype No. 333340. × 1. Locality as original of Figure 1.

FIG. 5. Small cranidium with relatively long glabella. Hypotype No. 29953. × 1. Locality as original of Figure 1.

FIG. 6. Large cranidium with preserved brim and palpebral lobes. Hypotype No. 29956. × 1. Locality as original of Fig. 2.

FIG. 7. Right free cheek with long, slender genal spine. Hypotype No. 33341. × 1. Locality as original of Figure 2.

FIG. 8. Part of thoracic segment showing left pleural lobe and axial lobe. Hypotype No. 33342. × 1. Locality as original of Figure 1.

FIG. 9. Pygidium with posterior margin preserved. Hypotype No. 33343. × 1. Locality as original of Figure 1.

FIG. 10. Small cranidium with complete brim. Hypotype No. 29952. × 1. Locality as original of Figure 1.

FIG. 11. Left free cheek with complete ocular platform. Hypotype No. 33344. × 1. Locality as original of Figure 1.

FIG. 12. Well-preserved cranidium with free cheeks and palpebral lobes. Hypotype No. 33345. × 1. Locality as original of Figure 1.

Prosaukia sp. cf. *P. curvicostata* Ulrich and Resser 98

FIG. 13. Cranidium with glabella showing long, convergent frontal lobe. No. 33346. × 2. Locality as original of Figure 2.

Prosaukia sp. A 98

FIG. 14. Incomplete cranidium with obsolete posterior glabellar furrow. No. 33348. × 2. Locality as original of Figure 1.

FIG. 15. Right free cheek with short genal spine. No. 29957. × 2. Locality as original of Figure 1.

Briscoia sp. A 99

FIG. 16. Right pleural lobe of pygidium showing ribs and smooth peripheral area. No. 29959. × 1. Locality as original of Figure 2.

Idahoia sp. A. 99

FIG. 17. Part of cranidium showing anteriorly converging, rounded glabella with indistinct posterior glabellar furrow, and occipital ring with axial node. No. 33347. × 2. Locality as original of Figure 1.

PLATE I