

CONODONTS FROM THE MIDDLE ORDOVICIAN
PLATTEVILLE FORMATION IN WISCONSIN

BY

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ABSTRACT

Nearly 4,300 identifiable conodonts were recovered from 244 samples at fifteen localities of the Middle Ordovician Platteville Formation in southwestern and east-central Wisconsin. The samples yielded 51 form-species which were grouped into 39 single or multielement species of 24 genera. The genera represented include Acontiodus, Amorphognathus?, Belodina, Cardiodella, Chirognathus, Curtognathus, Cyrtoniodus, Distacodus, Drepanodus, Erismodus, Oistodus, Oulodus, Ozarkodina, Panderodus, Phragmodus, Plectodina, Polycaulodus, Polyplacognathus, Pravognathus, Prioniodina, Scandodus, Scyphiodus, Trucherognathus, and Zygognathus(?).

The abundance of the form-species Phragmodus undatus in the Decorah was useful in differentiating that formation from the Platteville. An unidentified sequence of dolomite and shale at one locality suspected to belong with the Platteville Formation contained a P. undatus abundance and is assigned to the Decorah.

Four species (i.e., Scyphiodus primus, Oistodus venustus, Belodina dispansa, and Cyrtoniodus flexuosus) were either absent in eastern Wisconsin, or found to occur higher in the section to the east indicating that the Platteville is younger in the western part of the state.

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INTRODUCTION

A micropaleontology laboratory exercise conducted at the University of Wisconsin during the spring of 1965 confirmed the presence of conodonts in rocks of the Platteville Formation in Wisconsin, however, the exact nature and distribution of the fauna has not been known. This study of the Platteville Formation conodont fauna was undertaken in an attempt to set up a biostratigraphic zonation of the Platteville using conodont occurrences and to relate this fauna with those of the underlying and overlying formations. Two hundred forty-four samples were collected from fifteen localities in the southwestern and east-central portions of Wisconsin, including a well core from an oil test drilled in Sheboygan County. Conodonts from samples of the underlying Glenwood and the overlying Decorah Formations were collected for comparison purposes only. References will be made to these samples throughout the report.

ACKNOWLEDGMENTS

I would like to thank Dr. David L. Clark of the University of Wisconsin for stimulating my interest in micropaleontology and for editing the manuscript. Dr. Meredith E. Ostrom, assistant geologist for the state of Wisconsin, aided by locating exposures and by procuring the Oostburg drill core. Mr. Perry Olcott, also with the Wisconsin Geological Survey, gave additional information concerning outcrops in eastern central Wisconsin. Dr. Raymond Ethington, University of

Missouri, gave invaluable assistance by verifying the identifications and providing type specimens for comparison. Finally, I want to thank my wife, Judy, for the typing. Figured specimens are in the Paleontology Repository, University of Wisconsin (UW).

PROCEDURE

Limestone and dolomite samples were broken apart in the field with a rock hammer. Two hundred to three hundred grams of each sample were disaggregated in 15 percent glacial acetic acid. Shale samples were treated in various ways. Some of the shales completely disaggregated with only one soaking in either kerosene or Stoddard Solvent. For others this procedure had to be repeated several times, along with boiling in sodium bicarbonate. Others responded to hydrogen peroxide treatment and one particularly stubborn shale was finally partially disaggregated by several repetitions of freezing and thawing.

The residues were washed and sieved on a 14 mesh (0.141 mm) and a 120 mesh (0.125 mm) screen. The fine fraction was collected and dried then processed in tetrabromoethane (acetylene tetrabromide) which was slightly diluted with kerosene to ensure more complete separation of the conodonts. The conodont bearing heavy fraction was drained away and washed with acetone, dried, then spread on a microfossil picking tray. The conodonts were picked with a wet 000 sable hair brush.

PLATTEVILLE CONODONT LOCALITIES

Fifteen localities were sampled during the summer and fall of 1965. Sampling was restricted to Wisconsin localities. Locality 14 is a drill core which is stored in the geology building of the University of Wisconsin-Milwaukee. Locality 1, which is described in detail in the report by Agnew, Heyl, Behre, and Lyons (1956), was used as a reference section. Locality 15, a sequence of shale and dolomite of unknown affinities, was sampled to determine if it was Platteville age. Conodonts suggest that it must be younger than Platteville.

Locality 1.-- NE $\frac{1}{4}$, sec. 12, T. 2 N., R. 2 W., Grant County, Wisconsin. A roadcut along U. S. Highway 151, 6.2 miles southwest of the intersection of Highways 151 and 81, south of Platteville, Wisconsin, exposes a nearly complete section of Platteville. The section ranges from the St. Peter - Glenwood - Pecatonica contacts at the base to the Quimbys Mill, the uppermost member of the Platteville. Although Agnew and Heyl reported finding the Quimbys Mill-Decorah contact at this roadcut, it was not located by this author.

Locality 2.-- NW $\frac{1}{4}$ NW $\frac{1}{4}$, sec. 34, T. 7 N., R. 7 E, Dane County, Wisconsin. This is a very small roadcut on County Highway J, $\frac{1}{2}$ mile west of the inter-

section with County Highway P, $\frac{1}{2}$ mile south of the town of Pine Bluff. It exposes the St. Peter - Glenwood - Pecatonica contacts. Only two feet of Pecatonica Dolomite is present at this location.

Locality 3.-- NE $\frac{1}{4}$, sec. 34, T. 9 N., R. 11 E., Dane County, Wisconsin. This quarry is found 2 miles northeast of Sun Prairie, Wisconsin, just off U. S. Highway 151. It exposes $4\frac{1}{2}$ feet of Pecatonica and approximately $25\frac{1}{2}$ feet of McGregor.

Locality 4.-- NE $\frac{1}{4}$, sec. 34, T. 9 N., R. 11 E., Dane County, Wisconsin. This quarry is directly adjacent to location 3. Location 4 has almost the same upper limit, but extends lower into the section, exposing the Glenwood Shale and the top of the Prairie du Chien Dolomite. The entire section of St. Peter Sandstone is missing at this locality.

Locality 5.-- W $\frac{1}{2}$, sec. 18, T. 5 N., R. 2 W., Grant County, Wisconsin. This roadcut exposes the St. Peter - Glenwood - Pecatonica contacts, and extends to nearly the top of the McGregor Member. It is located 5.2 miles south of Fennimore, Wisconsin, on U. S. Highway 61.

Locality 6.-- NW $\frac{1}{2}$ SE $\frac{1}{4}$, sec. 36, T. 5 N., R. 7 E., Dane County, Wisconsin. This excellent roadcut exposes a nearly complete section of rock from the St. Peter

Sandstone to the Galena Dolomite. Approximately 11 feet of Pecatonica Dolomite is covered. The St. Peter - Glenwood - Pecatonica contacts are exposed only on the south side of the road, but the rest of the section (above the covered interval) is fairly well exposed on both sides of the highway. This section is 3.5 miles north of the town of New Glarus, on Wisconsin Highway 69.

Locality 7.-- NW $\frac{1}{2}$ NW $\frac{1}{4}$, sec. 16, T. 12 N., R. 4 W., Vernon County, Wisconsin. This small roadcut, 15 miles south of Viroqua, on Wisconsin Highway 27-82, exposes the St. Peter - Glenwood - Pecatonica contacts. Only the basal four feet of the Pecatonica Member is present.

Locality 8.-- SW $\frac{1}{2}$ NW $\frac{1}{4}$, sec. 15, T. 4 N., R. 2 E., Iowa County, Wisconsin. The St. Peter - Glenwood - Pecatonica contacts are exposed in this roadcut 3.6 miles southwest of Mineral Point, on U. S. Highway 151. The section ranges upward into the very basal portion of the McGregor Member.

Locality 9.-- NE $\frac{1}{4}$, sec. 15, T. 4 N., R. 2 E., Iowa County, Wisconsin. This roadcut is located across the valley from location 8. It is 2.9 miles southwest of Mineral Point on U. S. Highway 151. The top part of the Pecatonica is exposed at the base of this section, which extends up into the Decorah.

Locality 10.-- $S\frac{1}{2}$, sec. 11, T. 20 N., R. 17 E., Winnebago County, Wisconsin. This huge quarry consists of upper Platteville and Decorah rocks. It is located on Wisconsin Highway 47 at the northern city limits of the town of Menasha, on property owned by Badger Highways Company, Inc. All measurements were made from the base of the Decorah downward to nearly 29 feet into the Platteville. Since the lithologies are considerably different in this area, the identity of the members is uncertain.

Locality 11.-- $NW\frac{1}{4}$, sec. 29, T. 20 N., R. 17 E., Winnebago County, Wisconsin. This locality, the Courtney - Plummer Quarry, is west of the town of Neenah. The quarry is located on Tullar Road, .2 mile north of Wisconsin Highway 114. Tullar Road crosses Highway 114 .4 mile west of the U. S. Highway 41 underpass. The upper portion of the Pecatonica and much if not all of the McGregor is exposed in this quarry.

Locality 12.-- $NE\frac{1}{4}$, sec. 5, T. 20 N., R. 17 E., Winnebago County, Wisconsin. Approximately nine feet of the bottom portion of the Pecatonica is exposed in this small quarry. It is located .2 mile south of County Highway BB, 1.3 miles west of the Highway 41 underpass. The quarry is not visible from the road.

Locality 13.-- NW $\frac{1}{4}$, sec. 21, T. 22 N., R. 18 E., Outagamie County, Wisconsin. Entrance to this quarry is made from County Highway C, .8 mile north of the end of County Highway O, about $\frac{3}{8}$ miles east of Wisconsin Highway 47. The quarry is .2 mile east of Highway C. The Prairie du Chien - Glenwood - Pecatonica contacts are exposed here, with slightly over eight feet of Pecatonica present. The entire section of St. Peter Sandstone is missing.

Locality 14.-- SE $\frac{1}{4}$ SE $\frac{1}{4}$, sec. 12, T. 13 N., R. 22 E., Sheboygan County, Wisconsin. This is the drill core from the Oostburg area. The entire section of Platteville rock is contained in the core.

Locality 15.-- NE $\frac{1}{4}$ SW $\frac{1}{4}$, sec. 9, T. 6 N., R. 7 E., Dane County, Wisconsin. This is a small roadcut .2 mile north of U. S. Highways 18-151, on County Highway P. The exact age of this sequence of shales and dolomites has not been determined. As stated before, it is assumed not to be Platteville age on the basis of conodonts. A discussion of this section follows.

Locality 16.-- NW $\frac{1}{4}$, sec. 22, T. 6 N., R. 3 W., Grant County, Wisconsin. This roadcut exposes the section from the Glenwood to the Decorah. However, samples were taken only from the upper part of the McGregor to the base of the Decorah. This was to compensate for the missing portion

of section which could not be collected at locality 5. Locality 16 is 3.1 miles west of Fennimore on U. S. Highway 18.

STRATIGRAPHY

The Platteville Formation was originally called the "Platteville limestone" by Bain (1905) after the town of Platteville, Wisconsin, near which the "formation is typically exposed." In his report Bain included everything between the top of the St. Peter Sandstone and the base of the Galena Dolomite as belonging to the "Platteville limestone." In his generalized section of the Platteville, Bain listed four main units (page 19):

- | | |
|--|---------|
| 4. Thin beds of limestone and shale | 10'-20' |
| 3. Thin-bedded brittle limestone, breaking with a conchoidal fracture | 25'-30' |
| 2. Buff to blue magnesian limestone, heavy bedded, frequently a dolomite | 20'-25' |
| 1. Shale, blue | 1'-5' |

Calvin (1906), working in the state of Iowa, renamed two of Bain's units. Bain's number 4 unit was renamed the Decorah Shale. The number 1 unit was called the Glenwood Shale, which if fifteen feet thick at the type locality. Calvin (1906, p. 76) stated that the Glenwood "should probably be divided into two parts, the upper to be classified as Platteville, the lower as Saint Peter." Since that time it has been considered to be the basal unit of the Platteville. Most

recent workers, however, separate it from the Platteville, and include it with the St. Peter, mainly on the basis of lithology (Swann and Willman, 1961; Dr. Meredith Ostrom, personal communication, 1965).

In Wisconsin, the Platteville is currently divided into three members. They are, in ascending order, the Pecatonica Dolomite Member, the McGregor Limestone Member, and the Quimbys Mill Member. The Pecatonica was named in 1897 by Hershey from exposures in the Pecatonica River Valley in southwestern Green County, Wisconsin; the McGregor, named by Kay in 1935 from exposures near the town of McGregor, Iowa; and the Quimbys Mill, named by Agnew and Heyl in 1946 from exposures in a quarry near Quimbys Mill, 5 miles west of Shullsburg, Wisconsin. A good review of these members and their history in literature is given in Agnew, Heyl, Behre, and Lyons (1956, p. 269).

The section described by Agnew and others (1956) was used as a reference section. It appears as my locality 1. The described section follows (Agnew and others, 1956, p. 274-275):

QUIMBYS MILL MEMBER ("glass rock"):	Thickness (feet)
Limestone, dark-purple, fine-grained, dense conchoidal fracture; very wavy upper surface; thin, dark-brown to black, fossiliferous platy shale parting at base.3 - .5

Total

MCGREGOR LIMESTONE MEMBER (Magnolia of Bays and Raasch, 1935):	Thickness (feet)
Limestone, light-gray, very fine grained, very dense, conchoidal fracture like "glass rock" above, fairly massive, very fossilif- erous; wavy upper surface.	0.9
Limestone as next above but less dense, medium bedded above to thin bedded below, fossiliferous; wavy upper surface.7
Dolomite, light-olive-drab, fine-grained, "sugary," argillaceous, very thin bedded; nodular.	1.6
Dolomite as next above but thick-bedded; calcite near middle.	3.0
Limestone, thin-bedded yet stands massively as one unit; light-greenish-gray-brown, weathering brown, with a few argillaceous streaks; sparingly fossiliferous, but with fossils and fucoids on top surface. . . .	2.6
Limestone, thin-bedded as next above but the beds are distinct; nodular beds and shaly partings; argillaceous in upper 0.3 ft, which is very fossiliferous.	3.4
Limestone, light-buffish-gray, in medium to thick beds; in places gradational into unit next below.	<u>3.6</u>
Total, upper McGregor.	<u>15.8</u>

MCGREGOR LIMESTONE MEMBER (Mifflin of Thickness (feet)

Bays, 1938):

Limestone, light-greenish-to-bluish-gray, in massive beds but composed of thick beds which are not separated; ample shaly mater- ial in wavy bands; fairly fossiliferous, argillaceous; a peculiar mottled light-gray and darker gray 0.1-ft zone, 1 ft below top.	3.9
Limestone, light-gray, very fine-grained, very dense, sublithographic, in extremely thin and nodular beds with thin calcareous shaly partings which become thinner below; the shale beds are light grayish blue, mottled, very fossiliferous; weathers slightly recessed.	4.0
Limestone as next above, but beds are not quite so thin; fossiliferous; poor gastropod zone 1.7 ft above base; shaly zone at base.	3.6
Limestone, dolomitic, light-gray, fine-grained, very slightly argillaceous, very fossiliferous, medium-bedded; indistinct argillaceous partings, not wavy; calcite and limonite, especially in basal 0.6 ft.	<u>3.6</u>
Total, Mifflin.	<u><u>15.1</u></u>

PECATONICA DOLOMITE MEMBER:	Thickness (feet)
Dolomite, light-grayish-brown, very coarse grained and vuggy, upper 2 ft are a mixture of this lithology and a somewhat argillaceous fine-grained "sugary" laminated dolomite; a 1-ft bed of very vuggy dolomite from 1.8 to 2.8 ft above base, shaly in lower part; stylolitic partings 1 ft above base.	4.8
Dolomite, medium-gray, laminated, somewhat argillaceous, fine-grained "sugary", fossiliferous, especially in lower 0.9 ft; medium-to thick-bedded; shaly at top; weathers brownish in lower 2.5 ft.	6.9
Dolomite, medium-gray, laminated, argillaceous; very fossiliferous partings	3.6
Dolomite, light-grayish-brown, very coarse grained and vuggy; thin brownish gritty dolomitic and platy shale parting at top.	1.4
Dolomite, medium-gray, laminated, somewhat argillaceous, fine-grained.	2.8
Dolomite, medium-gray, laminated, argillaceous, silty and sandy with fine to coarse quartz grains similar to those of the St. Peter Sandstone, phosphate nodules abundant (especially in two zones, one at base, the other 1 ft above base).	<u>2.0</u>
Total, Pecatonica	<u><u>21.5</u></u>

GLENWOOD SHALE MEMBER:	Thickness (feet)
Shale, sandy with rounded quartz grains, khaki to drab, soft; phosphate nodules.	0.4
Shale, sandy, olive to grayish brown; mottled yellowish brown, friable.2
Shale, sandy, medium-to dark-gray, olive, blocky, very hard.6
Shale, medium-gray, blocky, hard, sandy; streak of carbonaceous material at top.	<u>.3</u>
Total, Glenwood.	<u>1.5</u>
Total, Platteville	54.3

The Quimbys Mill, as it appears in this described section, differs in color from the other sections of Quimbys Mill which were collected. At all other locations it is a light-gray limestone. The rest of the described section is fairly representative of the Platteville as it is found in southwestern Wisconsin. The lithology in the Winnebago County area and the lithology of the Oostburg core are similar, but they differ somewhat from the lithology in southwestern Wisconsin. A description of the Oostburg Core is given here for comparison. The descriptions were made by the Texas-Wisconsin Exploration Corporation in an unpublished report.

DECORAH:	Thickness (feet)
Dolomite, with shale, green fossiliferous, shale occurs in stringers up to 0.2 feet thick.	8.8

PLATTEVILLE

Thickness (feet)

Dolomite, very light buff, micro to cryptocrystalline, some large vugs and vertical fractures.	21.1
Dolomite, as above, the presence of argil- laceous material creates a mottling effect on the core.	9.0
Dolomite as above, no argillaceous material. . .	3.0
Dolomite as above, with some argillaceous material and a few fossil outlines.	4.2
Dolomite as above, no argillaceous material . .	1.9
Dolomite, very light buff, micro to cryptocrys- talline, tight, scattered to numerous dark gray shale streaks up to $\frac{1}{2}$ " thick.	14.5
Dolomite, brown to dark brown, finely crystalline, tight, argillaceous material occurs as thin contorted bands.	3.5
Dolomite, brown to dark brown, crypto to microcrystalline, tight, highly contorted bedding, with mud lumps.	1.8
Dolomite as above, appears massive in core . .	2.1
Dolomite as above, highly contorted bedding with numerous small nodules, some trip- litic chert filled vugs.	1.1
Dolomite as above, with numerous large (up to 0.5 MM) well rounded and frosted sand grains. Dolomite appears massive in core. . .	0.9

PLATTEVILLE - Continued

Thickness (feet)

Dolomite, as above, with increasing sand content finally grading into a sandstone at base. No bedding is apparent; there is, however, numerous nodules and lump structures, also two pyrite filled vugs and two pyrite healed vertical fractures. The contact with underlying sandstone is entirely gradational. 1.1

Total, Platteville 64.2

ST. PETER:

Sandstone, light buff to white, fine to medium grained, subangular, frosted, poorly sorted grains, friable. 2.0

MULTIELEMENT SPECIES

The first "natural assemblage" of conodonts was described by Schmidt in 1934. Since that time other authors (Scott, 1942; DuBois, 1943; Rhodes, 1952) have described additional assemblages. These natural assemblages occur intact on pieces of shale, and are composed of 14 to 22 paired conodonts representing three to five form-species. Most contemporary students of conodonts agree that each assemblage represents a single biologic species, and that the ultimate goal of conodont identification should and will be based on a multielement taxonomy. However, since natural assemblages preserved together are extremely rare, another method of grouping individual form-species into natural, biologic species had to be devised.

Müller (1956) suggested that a statistical study of a large population composed of a small number of form-species could separate natural assemblages from the various form-species. Four authors (Bergström & Sweet, Webers, and Schopf) worked on this method simultaneously, and their results were published in three reports in 1966.

In identifying conodont specimens for this report, I have adopted the multielement taxonomy utilized by Bergström & Sweet (1966) and Webers (1966). This method consists of recognizing natural or biologic species composed of two or more well known form-species. In order to properly recognize multielement (biologic) conodont species, large, systematically made faunal collections must be statistically analyzed. This has been done and based on extremely large faunas by others (e.g. Bergström & Sweet, 1966). Since I have a relatively small number of specimens ranging over a narrow interval of geologic time, no statistical analysis was attempted. Therefore, form-species were grouped into the multielement species recognized in the more detailed previous work.

Bergström & Sweet (1966, p. 281) have justified this approach as follows:

"Our decision to treat several groups of form-species as representatives of a single biologic species is based on several considerations. First, close study of the

constituents of each group reveals similarities, or identities, in size, color, and secondary structural features such as denticulation, attachment-surface morphology, and ornamentation. Second, compilation of information with respect to stratigraphic distribution indicates that components of these groups have similar, or identical, ranges. Third, both section-by-section and composite frequency statistics indicate that components of these form-species groups occur together throughout their range in constant proportions that are expressible in small whole numbers and make good biologic 'sense.' Finally, a survey of the literature and our extensive reference collections indicates that most faunas from other localities that contain one of the members of a form-species group also contain the others."

It should be noted that Bergström & Sweet (1966), Webers (1966), and Schopf (1966) also recognized several biologic species which they considered to be composed of only one morphologic type. These are forms whose stratigraphic ranges are different from all other form-species. These forms, then, are not "multielement" species, but still are considered to be naturally occurring species and are grouped with the multielement species.

The naming of natural assemblages has been the cause of considerable debate in the past (see Webers, 1966, p. 6 & 7 for a concise review). Previous assemblages have been given a formal generic and specific name, as were each of the included form-species. This created a system of dual nomenclature in conodont taxonomy, which, according to Rhodes (1962), is illegal and unstable. To avoid the problem of having a dual nomenclature, Moore (1962) suggested informally identifying the constituent form-species by relating them to previously described species. The multielement species would then take on the name of the oldest described component. This is essentially what Webers (1966) and Bergström & Sweet (1966) have done, and also followed in this study.

Thirty-nine species, including seven multielement species, were identified and placed in 24 genera. Fifty-one individual form-species were recognized. In the faunal list that follows, the natural species and their form-species have been listed separately:

Natural Species

Form-species Name	Assemblage Name
1. <u>Acontiodus alveolaris</u>	<u>Acontiodus alveolaris</u>
2. <u>Amorphognathus?</u> sp.	<u>Amorphognathus?</u> sp.
3. <u>Belodina compressa</u>	<u>Belodina compressa</u>
<u>Eobelodina fornicala</u>	
4. <u>Belodina dispansa</u>	<u>Belodina dispansa</u>
5. <u>Cyrtoniodus flexuosus</u>	<u>Cyrtoniodus flexuosus</u>

Form-species Name	Assemblage Name
6. <u>Distacodus falcatus</u>	<u>Distacodus falcatus</u>
7. <u>Distacodus variabilis</u>	<u>Distacodus variabilis</u>
8. <u>Drepanodus suberectus</u>	<u>Drepanodus suberectus</u>
<u>D. homocurvatus</u>	
<u>Oistodus inclinatus</u>	
9. <u>Oistodus venustus</u>	<u>Oistodus venustus</u>
10. <u>Oulodus primus</u>	<u>Oulodus serratus</u>
<u>Cordylodus serratus</u>	
11. <u>Ozarkodina concinna</u>	<u>Ozarkodina concinna</u>
12. <u>Panderodus arcuatus</u>	<u>Panderodus arcuatus</u>
13. <u>Panderodus gracilis</u>	<u>Panderodus gracilis</u>
<u>P. striatus</u>	
<u>P. compressus</u>	
14. <u>Panderodus panderi</u>	<u>Panderodus panderi</u>
15. <u>Phragmodus undatus</u>	<u>Phragmodus undatus</u>
<u>Oistodus abundans</u>	
<u>Dichognathus typica</u>	
<u>Dichognathus brevis</u>	
16. <u>Cordylodus aculeatus</u>	<u>Plectodina aculeata</u>
<u>Trichonodella recurva</u>	
<u>Zygognathus illustris</u>	
17. <u>Polyplacognathus ramosa</u>	<u>Polyplacognathus ramosa</u>
<u>P. bilobata</u>	
18. <u>Pravognathus idonea</u>	<u>Pravognathus idonea</u>
19. <u>Scyphiodus primus</u>	<u>Scyphiodus primus</u>

Additional Form-speciesBelodina sp. cf. B. inornataCardiodella tumidusChirognathus delicatula?C. sp. cf. C. multidentisCurtognathus limitarisC. typaDistacodus? aff. D.? trigoniusErismodus asymmetricusE.? expansusE. gracilisE. symmetricusOistodus parallelusOzarkodina sp. cf. O. typicaPolycaulodus bidentatusP. inclinatusPrioniodina polita?Prioniodina? sp.Scandodus sp. cf. S. sinuosusTrucherognathus distortaZygnathus? sp. cf. Z.? abnormis

BIOSTRATIGRAPHY

Nearly 4,300 identifiable conodonts were recovered from 244 Platteville samples. Of these 244 samples, only seventeen contained no conodonts. A total of 59.25 kilograms of rock was completely dissolved by acid which results in a yield of

one conodont per 13.9 grams of rock. When the weight of the barren samples is subtracted, a yield of one conodont per 12.9 grams results.

It became apparent after examining the contact between the Platteville and the Decorah that the form-species Phragmodus undatus showed a marked increase in percentage of specimens found in the Decorah samples. This phenomena was observed at every locality where the contact between the two formations was exposed (i.e., localities 6, 9, 10, 14, and 16). These relationships are shown in the table below:

Locality	Total number of specimens recovered		Total number of the form-species, <u>Phragmodus undatus</u>	
	Upper Platteville	Basal Decorah	Upper Platteville	Basal Decorah
6	100±	60±	4	16
9	12	37	1	9
10	8	50±	1	7
14	0	35	0	2
16	600±	57	9	12

At locality 9, the contact between the Platteville and the Decorah is gradational in the form of a fine to medium grained gray dolomite. It is my opinion that the relative occurrences of the form-species Phragmodus undatus may be used to establish the placement of the contact. It is interesting to note that the five samples of basal Decorah yielded 46 specimens of the form-species P. undatus, whereas all 244 Platteville samples yielded only 54 specimens of that species.

The occurrence of the form-species Phragmodus undatus was used to help solve another stratigraphic problem. Locality 15 is a small roadcut exposing a sequence of dolomite and shales of unknown affinities. It is known to be Middle or Upper Ordovician on the basis of macrofossils, however, the problem lies in placing it in correct sequence in the Ordovician formations. This exposure occurs about $\frac{1}{4}$ mile south and approximately on the same level as a small outcrop of Pecatonica which is resting on top of a large roadcut of St. Peter Sandstone. The sixteen samples collected at this locality yielded approximately 1,500 excellently preserved conodonts of which the form-species Phragmodus undatus was clearly the most abundant individual form. The conodont fauna plus the nature of the outcrop itself are convincing evidence that this sequence is not Platteville and most likely is Decorah.

Another inconsistency in fossil distribution was observed when the results of this study were compared to those of Webers' Minnesota study (1966). He showed the species Oistodus venustus terminating at the top of the McGregor (before reappearing much later in the Galena Formation). In Wisconsin, this form ranges to the top of the Platteville. This could be an indication that the Platteville becomes younger in a westward direction.

Within the state of Wisconsin, this theory is supported by the distribution of Belodina dispansa. This form was not

found at any locality in the northeast (i.e., localities 10, 11, 12, 13, and 14), but was abundantly represented at nearly all the southwest localities. Used in conjunction with the distribution of Oistodus venustus, this may indicate that most, if not all, of the Platteville section had been deposited in the northeast before Belodina dispana made its appearance. Because Webers (1966) lumps B. dispana with B. compressa, no information is available concerning the range of B. dispana in Minnesota. Two other forms, Cyrtionodus flexuosus and Scyphiodus primus were also missing from every northeast locality, but were sparingly represented (23 specimens and 13 specimens, respectively) in the southwest. Ecological differences could provide an explanation for these differences. However, other writers (Clark & Stearn, 1960, p. 68) have suggested that deposition during Platteville time was from the north--the Canadian Shield--and from the east--the Appalachian geosyncline which, if true, confirms the younger-to-the-west theory.

SYSTEMATIC PALEONTOLOGY

The species are listed in alphabetical order. For the sake of convenience the localities have been lumped according to geographical location. Localities 1-9, and 16 were called "southwest;" localities 10, 11, 12, and 13 are called the "Lake Winnebago area;" and locality 14 is the Oostburg core. Detailed occurrences are given in the appendix. All the figured specimens are repositied in the micropaleontology

collections at the University of Wisconsin, Madison.

Genus ACONTIODUS Pander, 1856

Type species: Acontiodus latus Pander, 1856

Acontiodus alveolaris Stauffer

Pl. 1, fig. 1

Acontiodus alveolaris Stauffer, 1935b, p. 601, 602, pl. 74,
fig. 44; Bergström & Sweet, 1966, p. 306, pl. 35, figs.
16-19 (includes synonymy to 1966).

This bilaterally symmetrical form has a stout, nearly circular cusp which is recurved, coming to a point at its apex. The anterior face is smoothly rounded; the posterior face displays a median groove which is quite pronounced at the base but dies out before reaching the apex. Laterally, on the anterior margin of the cusp, keels occur in the same plane as the rounded anterior face which results in the keels being curved in a posterior direction. The keels die out upward but are extended to the tip of the cusp as faint costae. The keels increase in width toward the lower part to a point just above the base where they are sharply notched before extending onto the base. The base is extended laterally in the form of small knobs on which the keels terminate. The basal cavity is conical in shape, coming to a sharp apex right at the point of greatest curvature of the cusp and is flared somewhat so as to be extended beneath the knobs on the base.

Remarks.-- Acontiodus alveolaris is a very distinctive

form and even small fragments can be identified. The Platteville forms exhibit little variation, the most noticeable being that the median groove of several individuals is extremely weak, almost to the point of being non-existent.

Occurrence.-- This species was recovered from all three members in the southwest. The Oostburg core yielded one specimen from the McGregor Member. No specimens were found in the Lake Winnebago area. 25 specimens.

Repository.-- UW 801.

Genus AMORPHOGNATHUS Branson & Mehl, 1933

Type species: Amorphognathus orlovicica Branson & Mehl, 1933

Amorphognathus? sp.

Pl. 4, fig. 10

Remarks.-- A single, broken, incomplete fragment consists of two lobes, one nearly twice as long as the other (the tip of which is broken off). A median, nodose carina exists on both lobes. The edge of the platform is slightly deflected on the upper side forming a small ridge which surrounds most of the unit. The lower surface is broadly excavated and most of it is apparently filled with attachment material.

This form is readily separated from Polyplacognathus in that the latter species is characterized by a keeled lower surface. Therefore, it is questionably assigned to Amorphognathus because it is a single, fragmentary specimen.

Occurrence.-- A single specimen was recovered from the Pecatonica Member at locality 8.

Repository.-- UW 802.

Genus BELODINA Ethington, 1959

Type species: Belodina compressa (Branson & Mehl, 1933)

Belodina compressa (Branson & Mehl)

Pl. 3, figs. 13, 15, 16

Belodus compressus Branson & Mehl, 1933, no. 2, p. 114, pl. 9,
figs. 15, 16.

Belodina compressa (Branson & Mehl) Bergström & Sweet, 1966,
p. 312-315, pl. 31, figs. 12-19 (includes synonymy to
1966).

Belodina grandis (Stauffer), Winder, 1966, v. 40, pl. 10,
fig. 1 (plate only).

Eobelodina fornicata (Stauffer), Winder, 1966, v. 40, pl. 10,
fig. 3 (plate only).

Remarks.-- This multielement species is composed of
several previously well known and well described conodonts,
namely Belodina compressa, B. grandis, B. wykoffensis, and
Eobelodina fornicata. B. compressa, B. grandis and B. wykoff-
ensis probably represent a single, variant form. However,
complete specimens can be readily separated into the two
form groups of B. grandis and B. wykoffensis. The degree of
curvature of the lower surface appears to be quite consistent
with B. grandis being more elongate (having less curvature)
than B. wykoffensis.

Both Bergström & Sweet (1966) and Webers (1966) consider
Belodina dispersa to be a juvenile form of B. compressa and
therefore include it with their multielement B. compressa.

Webers (1966, p. 24) states "B. dispansa Glenister is considered to be a juvenile form of this [B. compressa] variable form-species. Very well preserved mature specimens of the more elongate variety of 'B. compressa' show that the earliest growth stages bore small denticles inclined exactly like those of B. dispansa." While this is true in some cases, not all of the mature, elongate forms exhibit this phenomenon. The Platteville material has several very young juveniles of both the B. grandis and B. wykoffensis forms which are considerably smaller than most of my B. dispansa forms and the denticles of the juveniles are not inclined at all. Therefore, B. dispansa is considered to be a distinct form which can be readily distinguished from the B. compressa forms.

Stratigraphic distribution supports this observation. B. dispansa occurs with B. compressa at all of the southwest localities but is not found in any sample from either the Lake Winnebago area or the Oostburg core, where B. compressa was found in every member of the Platteville.

It is quite likely that the form that contained Belo-
dina dispansa was closely related to B. compressa, and even possible that B. dispansa was a later evolutionary development of B. compressa, but until more is known about the relationships of these two forms, they should be listed independently.

Occurrence.-- This abundant species, which comprises nearly 27% of my collection, is found in virtually every member at every location, with the exception of locality

4, where no forms were found. Nine hundred fifty-four belodininid forms and 188 eobelodininid forms were recovered.

Repository.-- UW 803, 804, 805.

Belodina dispansa (Glenister)

Pl. 2, fig. 5; Pl. 3, fig. 7

Belodus dispansus Glenister, 1957, p. 729, 730, pl. 88,
figs. 14, 15.

Belodina dispansa (Glenister) Schopf, 1966, p. 43, pl. 1,
fig. 7 (includes synonymy to 1966); Winder, 1966, pl.
10, fig. 4 (plate only).

Remarks.-- Specimens agree closely with Glenister's (1957) description and illustrations. It should be noted, however, that the specimens show two distinct types of curvature, not unlike that found in Belodina compressa. One type is identical to that of B. wykoffensis; that is, rapid, even curvature from a point just anterior to the posterior end of the unit. The other type shows very slight, gradual curvature to a point just anterior to the farthest extension of the basal cavity where there is a sudden and definite increase in the amount of curvature. As with B. compressa, there is probably no taxonomic significance attached to this variation.

Occurrence.-- Belodina dispansa is found in nearly every Platteville Member at all the southwest localities, with the exception of locality 4 where no forms were found. No specimens occur in samples from either the Lake Winnebago area or the Oostburg core. 45 specimens.

Repository.-- UW 806, 807.

Belodina sp. cf. *B. inornata* (Branson & Mehl)

Pl. 3, fig. 14

Belodus inornatus Branson & Mehl, 1933, no. 2, p. 115, pl. 9,
fig. 18.

Belodina sp. cf. *B. inornata* (Branson & Mehl), Bergström &
Sweet, 1966, p. 315-317, pl. 32, figs. 6-8; Winder, 1966,
pl. 10, fig. 5 (plate only).

Mature specimens are robust with a broad, gently curved, convex, lower surface and a denticulate, concave, upper surface. Three to four laterally compressed to peg-like denticles are present, but in each specimen, suppressed denticles are observed anterior to the first denticle. One side of the unit is smooth, showing no ornamentation. The other side has a distinct groove which extends from the posterior edge to the tip of the main cusp. This groove is nearer the upper edge of the cusp but nearer the lower edge of the expanded posterior end. There is a slight depression below the groove which forms a broad, rounded carina near the lower edge. This carina does not quite extend all the way to the posterior end as the groove does, and also gradually dies out anteriorly. The basal cavity is triangular in outline and extends to nearly the full height of the expanded posterior end. The cavity comes to a point just anterior to the mid-point below the denticulate surface, the upper side being long and steep due to the expanded nature of the posterior end.

Remarks.-- Four robust, mature forms and 14 immature forms are assigned to this species. The immature forms differ by having more denticles (up to seven) which, according to

Bergström & Sweet (1966) are overgrown by, and incorporated within, the posterior margin during ontogenetic development. Most of the juveniles possess the groove on one side, but lack a well developed carina such as found on the mature forms.

Occurrence.-- Belodina sp. cf. B. ornata was recovered from the Pecatonica and McGregor Members in the Lake Winnebago area, the McGregor Member of the Oostburg core, and from all three members in the southwest. 18 specimens.

Repository.-- UW 808.

Genus CARDIODELLA (Branson & Mehl), 1933

Type species: Cardiodus tumidus Branson & Mehl, 1933

Cardiodella tumidus (Branson & Mehl)

Pl. 2, fig. 3

Cardiodus tumidus Branson & Mehl, 1933, no. 2, p. 81, pl. 6, fig. 19, pl. 7, fig. 2.

Cardiodella tumidus (Branson & Mehl) Andrews, 1967, p. 886, 887, pl. 112, fig. 12, pl. 114, figs. 1, 2, 6 (includes synonymy to 1966).

Symmetrical, neurodontiform units having a slightly reclined, subcircular cusp. Viewed from the upper surface, the unit is crescentic in shape, caused by two diverging posterolateral processes which bear discrete, subcircular denticles which decrease in size posteriorly. The processes are directed downward causing the lower surface to be arched, with the cusp at its apex. Growth axes are visible in all the denticles.

Occurrence.--- Cardiodella tumidus was recovered from the Pecatonica Member at localities 1, 5, 6, 8, and 12, and from the Quimbys Mill Member at locality 9. No specimens were found in the Oostburg core. 9 specimens.

Repository.--- UW 809.

Genus CHIROGNATHUS Branson & Mehl, 1933

Type species: Chirognathus duodactyla Branson & Mehl, 1933

Chirognathus delicatula? Stauffer

Pl. 2, figs. 11, 14, 15

Chirognathus delicatulus Stauffer, 1935a, p. 136, 158, pl. 9, figs. 1, 3, 5, 8-10, 12, 17, 19, 21 (non-figs. 2, 7, 11, 13, 18);

Chirognathus delicatula Stauffer, Webers, 1966, p. 54, 55 pl. 5, figs. 1, 4 (includes synonymy to 1966); Oberg, 1966, p. 136, 137, pl. 15, fig. 6.

Remarks.---All of the forms I am questionably assigning to this species are discolored a dark gray and are abraded which makes specific recognition nearly impossible. Chirognathus delicatula is a highly variable form regarding size and number of denticles. Some of the abraded forms resemble those illustrated by Stauffer (1935a) and Webers (1966), and are listed here mainly to report their occurrence in Platteville rocks.

Occurrence.--- All of the specimens are from the basal two inches of the Pecatonica Member at locality 8, and are almost surely reworked Glenwood Shale conodonts. 9 specimens.

Repository.--- UW 810, 811, 812.

Chirognathus sp. cf. *C. multidentis* Branson & Mehl

Pl. 2, fig. 7

Chirognathus multidentis Branson & Mehl, 1933, no. 1, p. 34,
pl. 2, fig. 43; Webers, 1966, p. 56, pl. 5, fig. 2
(includes synonymy to 1966).

Remarks.-- This form is discolored and abraded. It appears to be a symmetrical form despite the fact that much of it is broken away. The form is resting on what appears to be attachment material and probably had a central, reclined cusp with lateral processes on each side. The process has four reclined denticles on the upper surface, the two nearest the cusp smaller than the others. It appears that the lower surface may be slightly arched. This form closely resembles *Chirognathus multidentis* illustrated by Stauffer (1935a) and Webers (1966), but because a single, fragmentary specimen was recovered, it is not definitely assigned to that species.

Occurrence.-- A single specimen was recovered from the basal two inches of the Pecatonica Member at locality 8.

Repository.-- UW 813.

Genus *CURTOGNATHUS* Branson & Mehl, 1933

Type species: *Curtognathus typa* Branson & Mehl, 1933

Curtognathus limitaris Branson & Mehl

Pl. 2, fig. 4

Curtognathus limitaris Branson & Mehl, 1933, no. 2, p. 88,
pl. 5, figs. 17, 23, 25; Webers, 1966, p. 63, pl. 4,
fig. 3; Andrews, 1967, p. 888, pl. 114, fig. 5 (includes

synonymy to 1966).

These are asymmetrical, neurodontiform units with divergent, pointed denticles mounted on an arched, bar-like base. The base is expanded beneath the apical denticle, which is found at the crest of the arch, causing this to be the widest part of the unit. The crest of the arch is off-center forming two limbs of unequal length. The denticles, which are confined to the plane of the bar, are circular at the arch, becoming smaller and more compressed laterally.

Occurrence.-- Only two specimens were recovered, one from the basal Pecatonica at locality 1, the other from the McGregor Member at locality 11.

Repository.-- UW 814.

Curtognathus *typa* Branson & Mehl

Pl. 2, fig. 8

Curtognathus typha Branson & Mehl, 1933, no. 2, p. 87, pl. 5, fig. 28; Andrews, 1967, p. 887, 888, pl. 113, figs. 4, 21, pl. 114, fig. 22 (includes synonymy to 1966).

Curtognathus chatfieldensis (Stauffer), Webers, 1966, p. 63, pl. 4, fig. 4.

These are symmetrical, neurodontiform units possessing divergent, pointed denticles mounted on the upper surface of an arched bar which terminates in thin to spatulate ends. The crest of the arch may support an apical denticle which bisects the unit. The denticles, which are confined to the plane of the bar, are circular at the arch, becoming smaller

and slightly compressed laterally.

Remarks.-- This specimen has two rejuvenated denticles and appears to have a small portion of one end broken off. This species closely resembles Polycaulodus inclinatus but differs from the latter in having an arched base.

Occurrence.-- One specimen was recovered from the Pecos Member at locality 12.

Repository.-- UW 815.

Genus CYRTONIODUS Stauffer, 1935

Type species: Cyrtoniodus complicatus Stauffer, 1935

Cyrtoniodus flexuosus (Branson & Mehl)

Pl. 1, fig. 11

Prioniodus(?) flexuosus Branson & Mehl, 1933, no. 2, p. 130, pl. 10, fig. 16.

Cyrtoniodus flexuosus (Branson & Mehl), Bergström & Sweet, 1966, p. 324, pl. 32, figs. 9-11 (includes synonymy to 1966); Andrews, 1967, p. 888, pl. 113, fig. 14.

Cyrtoniodus complicatus Stauffer, Oberg, 1966, no. 1, p. 137, pl. 15, figs. 4, 10.

The cusp is erect and laterally compressed, and is extended to form a short antiscusp. A slightly arched, posterior process bears up to ten or more (in mature specimens) laterally compressed denticles which decrease in size posteriorly. In most specimens the denticles are fused throughout most of their height and are inclined in a posterior direction. The basal cavity is rounded beneath the main cusp and is extended the entire length of the posterior process. The unit is decidedly asymmetrical caused by a pronounced flaring on the inside

of the basal sheath.

Remarks.-- There is little variation among my specimens, and that is caused by the denticles on the posterior process to be more strongly inclined on some specimens than on others. None of the specimens display the denticles on the anticusp mentioned by Bergström & Sweet (1966).

Occurrence.-- Cyrtoniodus is found in all three Platteville Members in the southwest. Neither the Lake Winnebago samples nor the Oostburg core yielded any specimens. 23 specimens.

Repository.-- UW 816.

Genus DISTACODUS Hinde, 1879

Type species: Machairodus incurvus Pander, 1856

Distacodus falcatus Stauffer

Pl. 3, fig. 4

Distacodus falcatus Stauffer, 1935a, p. 142, pl. 12, fig. 16;

Bergström & Sweet, 1966, p. 329, pl. 35, figs. 10-13

(includes synonymy to 1966); Winder, 1966, pl. 9,

fig. 9 (plate only).

Simple, subsymmetrical cones having a slightly expanded base and tapering to a point at its apex. The cusp is recurved and possesses three costae--one on each side, and one posterior. The costa on the inside begins just anterior to and slightly above the mid-point of the base. It is directed slightly posteriorly so that at the apex it occupies a position nearer the posterior face. The other lateral costa

originates from the same position on the outside of the base, but is directed anteriorly so that by the time it reaches the tip of the cusp, it is almost completely on the anterior face. The posterior costa originates nearly in the center of the posterior face and is flexed toward the outside so as to be completely lateral in position at the cusp's apex. The basal cavity is conical in shape and comes to a sharp point at the area of maximum curvature of the cusp.

Remarks.--- The curvature of this species varies considerably, from an angle of less than 45° with respect to the suberect base, to a right angle curve. Also, the length of the suberect portion of the base varies, being entirely absent on some, and extending fully half the length of the cusp on others.

Occurrence.--- Distacodus falcatus was recovered from the McGregor Member of localities 11 and 14, and from all three members in the southwest. 93 specimens.

Repository.--- UW 817.

Distacodus? aff. *D.?* *trigonus* Schopf

Pl. 4, figs. 2, 3

Distacodus? trigonus Schopf, 1966, p. 52, 53, pl. 5, figs.

2-4 (includes synonymy).

Simple, subsymmetrical cones having a recurved cusp. A wide, anterior face is flanked by sharp corners which extend as faint costae on the cusp. Broad, flat to slightly

concave, lateral faces converge to form a posterior keel which is flexed toward the outside, and is extended as a faint, lateral costa on the cusp. A fourth costa originates near the posterior keel and is extended onto the inside of the cusp. The basal cavity is triangular in outline, and roughly has the shape of a 3 sided pyramid, reaching an apex at the point of maximum cusp curvature.

Remarks.--- Only two specimens were recovered. They differ from Distacodus? trigonius only by the possession of a fourth costa on the inside of the cusp, which could well be within the range of variation of the species.

Occurrence.--- One specimen was recovered from the McGregor Member at locality 5, the other from the Pecatonica Member at locality 8.

Repository.--- UW 818.

Distacodus variabilis Webers

Pl. 3, figs. 1, 2, 6

Distacodus variabilis Webers, 1966, p. 28, pl. 2, figs. 15, 16, 17.

Simple, symmetric to subsymmetric forms having a recurved cusp. The cusp may be gently curved throughout its length or may be suberect for fully half its length. There is complete gradation between these extremes. The laterally compressed cusp has sharp anterior and posterior keels which extend the length of the unit. Lateral costae are present

posteriorly on each side, and are parallel to the keel to the apex. These costae extend downward to a point just above the lower surface where they occupy a median position on the base. The lower surface is flat, but posteriorly it curves upward where it intersects the extension of the posterior keel. A small knob is commonly formed at this intersection. The basal cavity, which is extended posteriorly under the knob, is roughly triangular in outline and usually reaches to the point of maximum cusp curvature. The base may or may not be flared at the point of termination of the lateral costae, or one side may be relatively flat and the other side considerably flared.

Remarks.-- My specimens are identical to those pictured and described by Weber (1966).

Occurrence.-- One specimen was recovered from the Pecatonice Member at locality 12. The rest were found in all three members in the southwest. 69 specimens.

Repository.-- UW 819, 820, 821.

Genus DREPANODUS Pander, 1856

Type species: Drepanodus arcuatus Pander, 1856

Drepanodus suberectus (Branson & Mehl)

Pl. 1, figs. 7, 9, 10, 13, 14

Oistodus suberectus Branson & Mehl, 1933, no. 2, p. 111,

pl. 9, fig. 7.

Drepanodus suberectus (Branson & Mehl), Bergström & Sweet,

1966, p. 330, pl. 35, figs. 22-27 (includes synonymy to 1966), Oberg, 1966, p. 137-138, pl. 16, fig. 1; Winder, 1966, pl. 9, fig. 6 (plate only).

Drepanodus homocurvatus Lindström, Oberg, 1966, p. 137, pl. 16, fig. 13; Winder, 1966, pl. 9, fig. 11 (plate only); Andrews, 1967, p. 889, pl. 113, fig. 16, pl. 114, figs. 8, 15.

Oistodus inclinatus Branson & Mehl, Oberg, 1966, p. 139, pl. 15, fig. 3; Andrews, 1967, p. 895, pl. 114, fig. 19.

Oistodus excelsus Stauffer, Oberg, 1966, p. 139, pl. 15, fig. 2; Winder, 1966, pl. 9, fig. 13 (plate only).

Remarks.--- This multielement species is composed of three well known and well described form-species, namely Drepanodus homocurvatus, D. suberectus, and Oistodus inclinatus. D. homocurvatus and D. suberectus are quite variable with respect to degree of curvature of the cusp and of basal configuration. Bergström & Sweet (1966, p. 332) stated: "We have been unable to divide either form-species into subordinate groups that maintain stability in any combination of these characters." Bergström & Sweet (1966) also compared the type specimens of both Oistodus inclinatus Branson & Mehl and Oistodus excelsus Stauffer and found them to be conspecific.

The form-species Drepanodus homocurvatus is nearly three times as abundant as the combined totals of the form-species

D. suberectus and *Oistodus inclinatus*. Webers' (1966) tabulations suggested a similar relationship. However, the totals of Bergström & Sweet's (1966) fauna indicate a 4 to 1 relationship. This is probably due to the greater number of specimens in their collection. (Bergström & Sweet recovered nearly 250,000 conodonts, Webers nearly 50,000.)

Occurrence.-- This abundant species, which comprises slightly over 28% of my collection, is found in every Platteville Member at every locality. I recovered 875 of the form-species *Drepanodus homocurvatus*, 247 oistodid forms, and 88 of the form-species *Drepanodus suberectus*.

Repository.-- UW 822, 823, 824, 825, 826.

Genus *ERISMODUS* Branson & Mehl, 1933

Type species: *Erismodus typus* Branson & Mehl, 1933

Erismodus asymmetricus (Branson & Mehl)

Pl. 4, fig. 12

Microcoelodus asymmetricus Branson & Mehl, 1933, no. 2,

p. 91, pl. 7, figs. 5, 10, 11, 14, 15.

Erismodus asymmetricus (Branson & Mehl), Andrews, p. 893, 894

pl. 112, figs. 1, 3, 6, 7, 14, 17, pl. 113, fig. 1,

pl. 114, figs. 7, 9, 13 (includes synonymy to 1967).

Compound, asymmetrical, neurodontiform units having a large, recurved postero-laterally directed cusp, with diverging lateral processes bearing discrete, erect, sharply pointed denticles. Lateral costae extend from the apex of the cusp to the processes. The expanded, deeply cupped basal cavity is generally restricted to the region beneath the apical

denticle, but on occasion may extend part way beneath a process. The pointed cavity is directed anterolaterally. A clearly visible growth axis extends in a relatively straight line from the tip of the basal cavity to the tip of the cusp.

Remarks.-- There is some variation with respect to curvature of the cusp in my specimens. The majority of the specimens have cusps which are recurved at approximately 30° - 45° , but a couple of the specimens have cusps recurved nearly 90° .

Occurrence.-- Erismodus asymmetricus was recovered from the Pecatonica Member at localities 1, 12, and 13, and from the McGregor Member at localities 3, 9, 11, and 14. 14 specimens.

Repository.-- UW 827.

Erismodus? expansus (Branson & Mehl)

Pl. 4, fig. 14

Microcoelodus expansus Branson & Mehl, 1933, no. 2, p. 93,

pl. 6, fig. 7, pl. 7, fig. 16.

Erismodus? expansus (Branson & Mehl), Andrews, 1967, p. 895,

pl. 114, figs. 16, 23 (includes synonymy to 1967).

Compound, subsymmetrical, neurodontiform units having a large, erect cusp which is slightly recurved posterolaterally, with diverging lateral processes which bear discrete, erect, sharply pointed denticles. The cusp is sharply keeled laterally, the keels extending onto the processes which are slightly arched in a vertical plane. The basal cavity is

expanded under the apical denticle and may extend part way beneath the processes. The cusp contains an evident growth axis from the tip of the upright basal cavity, to the apex of the cusp.

Remarks.-- Andrews (1967) questionably assigned this species to Erismodus because it closely resembles some members of Curtognathus which possess a large apical denticle. This form differs, however, by having a distinct basal cavity.

Occurrence.-- Only five specimens were recovered: one each from the Pecatonica Member at localities 5, 6, and 14, and one each from the McGregor Member at localities 3 and 6.

Repository.-- UW 828.

Erismodus gracilis (Branson & Mehl)

Pl. 4, fig. 7

Pteroonus gracilis Branson & Mehl, 1933, no. 2, p. 111, pl.

8, figs. 30, 32 [non figs. 28, 35 (=E. asymmetricus)].

Erismodus gracilis (Branson & Mehl), Andrews, 1967, p. 894,

pl. 112, fig. 19 (includes synonymy to 1967).

Compound, asymmetrical, neurodontiform units having a large, recurved, posterolaterally directed cusp. The cusp possesses lateral costae which are extended onto the expanded base where they form a few short sharp denticles. The anterolateral costa is commonly extended below the lower surface as a rounded, spatulate projection. A growth axis is clearly visible in the cusp, extending from the tip of the anterolaterally deflected basal cavity to the apex of the cusp.

Remarks.-- Erismodus gracilis is readily distinguished from E. asymmetricus as the former lacks lateral processes.

Occurrence.-- Specimens were recovered from the Pecatonica Member at localities 1, 6, 12, and 14; from the McGregor Member at localities 6 and 11; from the Quimbys Mill Member at localities 9 and 10. 10 specimens.

Repository.-- UW 829.

Erismodus symmetricus Branson & Mehl

Pl. 2, fig. 12

Erismodus symmetricus Branson & Mehl, 1933, no. 2, p. 104, pl. 10, fig. 10; Andrews, 1967, p. 892, 893, pl. 112, figs. 4, 5, 13, 16, 21, pl. 113, fig. 7, pl. 114, figs. 4, 18, 24 (includes synonymy to 1967).

Compound, symmetrical, neurodontiform units having a large, recurved cusp which is laterally keeled. The keels extend from the apex of the cusp onto the lateral processes which are directed posteriorly and downward. Discrete, erect, sharply pointed denticles occur on the upper surface of the processes. The basal cavity tends to be somewhat compressed laterally and confined to the region beneath the apical denticle. A growth axis can be seen extending from the tip of the upright basal cavity to the tip of the cusp.

Remarks.-- Erismodus symmetricus differs from E.? expansus by having posteriorly directed lateral processes and a recurved cusp, and from E. gracilis and E. asymmetricus

by being symmetrical.

Occurrence.--- Erismodus symmetricus was recovered from the Pecatonica Member at localities 1 and 4, and from the McGregor Member at localities 3, 6, 11, and 14. 7 specimens.

Repository.--- UW 830.

Genus OISTODUS Pander 1856

Type species: Oistodus lanceolatus Pander, 1856

Oistodus parallelus Pander

Pl. 3, fig. 3

Oistodus parallelus Pander, 1856, p. 27; pl. 2, fig. 30;

Winder, 1966, p. 58, pl. 9, fig. 17 (includes synonymy to 1966).

The cusp is laterally compressed, sharply keeled and flexed rather strongly toward the inside. Broad, rounded carinas exist on each side, the one on the inside being much more prominent. The cusp is reclined so strongly that the anterior, upper edge is nearly parallel with the lower surface of the base. The antero-upper and antero-lower corners form nearly right angles giving the anterior portion of the unit a distinct rectangular shape. The base is comparatively small, expanded somewhat laterally, and excavated the entire length by the basal cavity.

Remarks.--- Some of the specimens of the form-species Oistodus inclinatus approach the shape of O. parallelus, and a detailed study may show them to be extremes of a highly variable species.

Occurrence.-- Oistodus parallelus was recovered from the Pecatonica Member at localities 1, 5, 6, 7, & 8; from the McGregor Member at localities 5 and 14; from the Quimbys Mill Member at locality 9. 17 specimens.

Repository.-- UW 831.

Oistodus venustus Stauffer

Pl. 3, fig. 10

Oistodus venustus Stauffer, 1935a, p. 146, 159, pl. 12, fig. 12; Bergström & Sweet, 1966, p. 341, pl. 35, figs. 20, 21 (includes synonymy to 1966); Winder, 1966, pl. 9, fig. 12 (plate only).

The cusp is strongly reclined, laterally compressed, sharply keeled, and flexed slightly inward. A broad, rounded carina extends the length of the cusp on the inside. The base length is generally almost half that of the cusp. The upper edge of the base is slightly concave, but the presence of a thin keel makes it convex. The lower surface of the base is rounded and flared somewhat in the center. The basal cavity generally extends to the posterior end of the base, but is terminated before reaching the sharply rounded antero-basal end. The cavity comes to a sharp point which is directed anteriorly to a point just anterior to the posterior junction of the cusp and the base.

Remarks.-- Oistodus venustus displays variation in the curvature of the cusp (some are reclined more strongly than others) and the shape of the base (on some, the lower surface of the base is nearly flat forming a relatively

"slender" base--on others, the lower surface is broadly rounded forming a relatively "fat" base).

Occurrence.-- Specimens were recovered from all three members in the southwest and from the McGregor Member at locality 11. 100 specimens.

Repository.-- UW 832.

Genus OULODUS Branson & Mehl, 1933

Emend. Bergström & Sweet, 1966

Type species: Oulodus mediocris Branson & Mehl, 1933

Oulodus serratus (Stauffer)

Pl. 4, figs. 13, 15

Cordylodus serratus Stauffer, 1930, p. 124, pl. 10, fig. 7;

Webers, 1966, p. 27, pl. 9, figs. 1-3, 5 (includes synonymy to 1966).

This is a multielement species which includes the two form-species Cordylodus serratus Stauffer and Oulodus primus (Stauffer). Cordylodid elements have a robust cusp that is somewhat laterally compressed in early growth stages but tends to become heart-shaped in cross section in some mature specimens. A straight to slightly arched posterior process bears posteriorly inclined, laterally compressed to peg-like denticles that tend to be discrete in all growth stages. A distinct depression occurs at the junction of the posterior process and the cusp. This depression is normally empty, although occasionally small denticles may be present in this interval. The basal cavity is relatively shallow and broad beneath the posterior process and extends

beneath the cusp where it is enclosed by a slightly flared sheath which reaches from the process to the lower extension of the cusp.

Oulodid elements have a stout, recurved cusp which is nearly circular in mature forms but tends to be compressed in juveniles. The upper surface of the lateral processes bears discrete, compressed or peg-like denticles which may be erect or recurved. One process is arched downward and in an anterior direction, whereas the other is only slightly bowed downward and curves in a posterior direction. The basal cavity extends beneath the entire unit and the basal sheath is flared slightly under the cusp.

Remarks.-- None of the specimens of either form have complete cusps or complete processes. However, both forms are quite distinctive and are readily recognizable. Webers (1966) lists this species as Cordylodus serratus, whereas Bergström & Sweet (1966) call it Oulodus serratus, the name I have used.

Occurrence.-- This species was recovered from the Quimbys Mill Member at localities 6 and 16, from the McGregor Member at locality 9, and from the Pecatonica Member at locality 8. I found 13 cordylodids and 11 oulodids.

Repository.-- UW 833, 834.

Genus OZARKODINA Branson & Mehl, 1933

Type species: Ozarkodina typica Branson & Mehl, 1933

Ozarkodina concinna Stauffer

Ozarkodina concinna Stauffer, 1935a, p. 148, pl. 10, figs.

41, 45, 46; Oberg, 1966, p. 140, pl. 15, fig. 15
(includes synonymy to 1966); Winder, 1966, pl. 10,
fig. 22 (plate only); Webers, 1966, p. 35, 36, pl. 9,
figs. 9-12.

These are compound, laterally compressed units consisting of a relatively long, straight, anterior blade and a shorter, downward directed posterior blade, which may be flexed slightly inward. The basal sheath is dramatically flared beneath the posteriorly inclined main cusp, which unequally divides the unit. The entire upper surface of the unit is set with laterally compressed denticles which are fused proximally but become discrete distally. The basal excavation is largest beneath the main cusp, then tapers gradually to the tips of the blades.

Occurrence.-- Ozarkodina concinna was recovered from the Pecatonica Member at localities 1, 8, 12 & 13; from the McGregor Member at locality 11; and from the upper Platteville at locality 10. 18 specimens.

Repository.-- UW 835.

Ozarkodina sp. cf. O. typica Branson & Mehl

Pl. 1, fig. 12

Ozarkodina typica Branson & Mehl, 1933, no. 1, p. 51, 52,

pl. 3, figs. 43-45.

Laterally compressed, blade-like form bearing denticles along the upper surface. The lower surface is flared minutely

under the main denticle, and narrowly excavated beneath both blades. The excavation terminates prior to reaching the end of the one complete blade. The main denticle is twice as wide as the largest minor denticle, the minor denticles being unequal in size. The denticles are fused throughout their entire length and all the tips have been broken off on my single specimen.

Remarks.--- This specimen closely resembles the illustrations and description of Branson & Mehl (1933). Because I have only one incomplete specimen and Ozarkodina typica comes from the middle Silurian, I have not equated it with that form.

Occurrence.--- One specimen was recovered from the basal two inches of the Pecatonica Member at locality 8.

Repository.--- UW 836.

Genus PANDERODUS Ethington, 1959

Type species: Paltodus unicosatus Branson & Mehl, 1933

Panderodus arcuatus (Stauffer)

Pl. 3, fig. 11

Paltodus arcuatus Stauffer, 1935b, p. 612, pl. 74, figs. 6, 8, 9.

Panderodus arcuatus (Stauffer), Winder, 1966, p. 58, 59, pl. 9, fig. 23; text fig. 3-23 (includes synonymy to 1966).

Simple, asymmetric, recurved forms that have a relatively wide base and taper upward to a sharp point. The concave, posterior edge is sharply keeled; the convex anterior face is

broadly rounded. The inner side of the base is smooth except for a distinct, anterior costa which begins just above the lower surface and tends to die out distally. On the outer side, about one-third of the way in from the posterior keel, a groove extends from the lower surface to the apex of the cusp. This causes the anterior two-thirds of the outside to be broadly rounded. The basal cavity is a tall, thin triangular shape in outline, extending to a sharp apex right at the point of maximum cusp curvature. The lower surface generally slopes in a posterior direction.

Remarks.--- Specimens display variation in the width of the unit (some being considerably wider than others), and in the height of the basal excavation (i.e., the suberect portion of the base). They agree completely with Stauffer's (1935b) description and illustrations.

Occurrence.--- Panderodus arcuatus was found in the Pecatonica Member at localities 12 and 14, and in the McGregor Member at locality 11. It was found in every member at every locality in the southwest except localities 4 and 7. 170 specimens.

Repository.--- UW 837.

Panderodus gracilis (Branson & Mehl)

Pl. 4, figs. 4, 5, 9

Paltodus gracilis Branson & Mehl, 1933, no. 2, p. 108, pl. 8, figs. 20, 21.

Panderodus gracilis (Branson & Mehl), Bergström & Sweet, 1966, p. 355, pl. 35, figs. 1-6 (includes synonymy to 1966);

Oberg, 1966, p. 140, pl. 16, fig. 3; Winder, 1966, pl. 9, fig. 25 (plate only); Andrews, 1967, p. 896, pl. 113, fig. 9.

Panderodus compressus (Branson & Mehl), Oberg, 1966, p. 140 pl. 15, fig. 8; Winder, 1966, pl. 9, fig. 26 (plate only); Andrews, 1967, p. 895, pl. 113, fig. 3.

Panderodus striatus (Stauffer), Winder, 1966, pl. 9, fig. 24 (plate only).

This multielement species is composed of several form-species which have been lumped traditionally into two distinct forms, namely Panderodus gracilis (Branson & Mehl) and Panderodus compressus (Branson & Mehl). (See Bergström & Sweet, 1966, p. 355-357 for complete synonymy.) The forms included in P. gracilis are relatively slender, gently recurved units with broadly rounded anterior faces. They all have a distinct costa near the anterior margin on the inside, and a conspicuous groove near the posterior margin on the outside. They all have a deeply excavated basal cavity, extending half the length of the cusp.

The forms included in Panderodus compressus are laterally compressed, recurved units having more or less keeled anterior and posterior margins. One side is completely free of ornamentation. Near the posterior margin of the other side a faint groove extends the length of the cusp. Like the other Panderodus forms, they have the deeply excavated basal cavity.

Remarks.--- The Panderodus gracilis forms are quite variable with respect to degree of curvature of the cusp, placement and degree of lateral ornamentation, and depth of basal excavation. The Panderodus compressus forms do not exhibit such wide variation, and are readily identified by their compressed nature.

Recovery of 223 Panderodus compressus forms and 169 P. gracilis forms gives a ratio of 1.0:0.77, whereas Bergström & Sweet (1966) tallied a ratio of about 1:2. This difference can probably be attributed to the unequal size of the two collections. Webers (1966) did not recognize this multielement species in Minnesota.

Occurrence.--- Panderodus gracilis (including P. compressus) was found in all three members in the Lake Winnebago area, in the Pecatonica and McGregor Members of the Oostburg core, and in virtually every member at every locality in the southwest, except locality 4. Two hundred twenty-three P. compressus forms, 136 P. striatus forms, and 33 P. gracilis forms were recovered.

Repository.--- UW 838, 839, 840.

Panderodus panderi (Stauffer)

Pl. 4, fig. 8

Paltodus panderi Stauffer, 1940, p. 427, pl. 60, figs. 8, 9.

Panderodus panderi (Stauffer) Bergström & Sweet, 1966,

p. 359-361, pl. 35, figs. 14, 15; text - fig. 11

(includes synonymy to 1966); Oberg, 1966, p. 140, 141,

pl. 15, fig. 1; Winder, 1966, pl. 9, fig. 28 (plate only).

Strongly recurved forms with a broad, rounded carina on one side. This same side displays a groove, which extends the length of the entire unit, near the posterior margin. The other side may also have a broad carina, but this is restricted to the base of the cusp. There may or may not be an antero-lateral costa present. The posterior margin is keeled; the anterior margin is rounded at the base but develops a keel distally. The deep basal outline extends to half the cusp's length.

Remarks.-- These specimens lack an antero-lateral costa.

Occurrence.-- Panderodus panderi was found in the Pecatonica and McGregor Members at locality 11, and in all the members in the southwest. 146 specimens.

Repository.-- UW 841.

Genus PHRAGMODUS Branson & Mehl, 1933

Emend., Bergström & Sweet, 1966

Type species: Phragmodus primus Branson & Mehl, 1933

Phragmodus undatus Branson & Mehl

Pl. 2, fig. 6; Pl. 3, fig. 8; Pl. 4, fig. 6

Phragmodus undatus Branson & Mehl, 1933, no. 2, p. 115, 116

pl. 8, figs. 22-26; Bergström & Sweet, 1966, p. 369,

pl. 28, figs. 13-20 (includes synonymy to 1966); Winder,

1966, pl. 10, fig. 11 (plate only); Andrews, 1967,

p. 896, pl. 114, fig. 10.

Oistodus abundans Branson & Mehl, Winder, 1966, pl. 9, fig.

16 (plate only); Andrews, 1967, p. 895, pl. 114, fig. 14.

?Dichognathus typica Branson & Mehl, Andrews, 1967, p. 889,
pl. 114, fig. 12.

Dichognathus brevis Branson & Mehl, Oberg, 1966, p. 137,
pl. 15, fig. 16; Winder, 1966, p. 55, pl. 10, fig. 23.

This multielement species is composed of four well known form-species. They are: Phragmodus undatus, Dichognathus typica, D. brevis, and Oistodus abundans, all described by Branson & Mehl. The phragmodid forms are laterally compressed, arched, bar-like units having a posterior process which bears denticles on its upper surface. The main cusp is slightly recurved. Posterior to the main cusp, at the point of greatest flexure of the bar, a second, large cusp is present, generally larger than the anterior one. The space between the large denticles is usually occupied by several smaller denticles. The lower surface of the bar is excavated and enclosed in a sheath beneath the anterior denticle.

Dichognathid forms are arched, blade-like units having a laterally compressed, sharply keeled, reclined cusp. Lateral processes bear laterally compressed denticles which may be fused or discrete. The apical denticle is conspicuously off-set laterally on the anterior face. The basal cavity is deep beneath the apical denticle, then tapers to the tips of the processes. In the form-species Dichognathus brevis, the lateral processes are more strongly arched and directed more posteriorly than in the form-species D. typica.

The oistodid forms have a laterally compressed, sharply

keeled, strongly reclined cusp with an elongate, excavated base which is sharply pointed at both ends. The basal cavity comes to a small point which is directed anteriorly beneath the cusp. The base is markedly flared on one side, the other side being just slightly convex.

Remarks.--- Most specimens of Dichognathus are quite fragmentary, and very few could be separated into the form-species D. brevis and D. typica.

It should be noted that some of the specimens of the form-species Oistodus abundans closely resemble Oistodus linguatus var. extenuatus Lindström (1955) in that the anterior end of the specimen is extenuate. Indeed, O. abundans closely resembles the forms described and illustrated by Lindström (1955) as O. linguatus and it may be that they are closely related, if not identical, forms.

The oistodid, dichognathid, and phragmodid forms occur in Wisconsin in a ratio of 1:1.2:0.68 respectively. Webers' (1966) specimens were found together in a 1:1.14:1.83 ratio, and Bergström & Sweet's (1966) tabulations showed a 1:1.5:3.1 relationship. The disparity of the ratios is probably the result of the significant differences in the size of the three collections.

Occurrence.--- Phragmodus undatus (including form-taxa Dichognathus typica, D. brevis, and Oistodus abundans) was recovered from all members at all localities in the southwest and the Lake Winnebago area (except locality 13), and from the Pecatonica and McGregor Members of the Oostburg core.

Ninety-seven dichognathids, 80 oistodids, and 54 phragmodids were found.

Repository.-- UW 842, 843, 844.

Genus PLECTODINA Stauffer, 1935

Type species: Plectodina aculeata (Stauffer, 1930)

Plectodina aculeata (Stauffer)

Pl. 1, figs. 4, 5, 6, 8

Prioniodus aculeatus Stauffer, 1930, p. 126, pl. 10, fig. 12.

Plectodina aculeata (Stauffer), Bergström & Sweet, 1966, p. 373-377, pl. 32, figs. 15, 16; pl. 33, figs. 22, 23; pl. 34, figs. 5, 6; text-figs. 9 A-F (includes synonymy to 1966).

Subcordylodus plattinensis (Branson & Mehl), Oberg, 1966 p. 142, pl. 16, fig. 12.

Trichonodella recurva (Branson & Mehl), Oberg, 1966, p. 143, pl. 15; figs. 5, 26.

This is a multielement species composed of the three form-species Cordylodus aculeatus, Trichonodella recurva, and Zyggognathus illustris. The cordylodid elements are bowed, laterally compressed, asymmetric units consisting of an erect to distally recurved, sharply keeled cusp and a long posterior process which bears a row of low, reclined denticles on its upper surface. The denticles tend to be fused throughout most of their height. The cusp is twisted laterally so that the plane containing its keeled edges nearly forms a right angle to the plane of the posterior process. The anterior edge of the cusp is extended downward in a posterior

direction forming a distinct anticusp which may bear one or two short, sharp denticles on the distal portion. The basal cavity, which extends as a shallow excavation along the lower surface of the process, is enclosed within a sheath beneath the main cusp.

The trichonodellid elements are symmetric to subsymmetric units consisting of a stout, recurved cusp, the postero-basal portion of which is extended posteriorly as a short process, which may on the upper surface bear one or two or more short denticles which tend to be discrete but may become fused if several denticles are present. Two straight lateral processes are directed sharply downward and bear from two to six erect, antero-posteriorly compressed denticles in early growth stages, the denticles becoming circular and peg-like in late growth stages. The basal cavity exists as a relatively deep, subconical cavity beneath the main cusp, and as shallow excavations which extend to the tips of all three processes.

The zygognathid elements are highly asymmetric units possessing a stout, recurved cusp which is slightly laterally deflected, and two lateral processes which are directed sharply downward. One process is extended posteriorly and slightly flexed in an inward direction, the other extends generally straight down with a slightly convex lower surface. The upper surface of the processes are set with antero-posteriorly compressed denticles, the ones on the posteriorly extended bar being directed laterally due to the flexure of

the bar, the ones on the other bar being erect. These denticles tend to become peg-like in later growth stages. The basal cavity is a subconical excavation beneath the main cusp, which extends as a shallow groove to the tips of the processes.

Remarks.-- In Wisconsin the zygognathid-trichonodellid-cordylodid ratio of this multielement species is 1:2.8:4.6. Bergström & Sweet (1966) tallied a ratio of 1:3.1:3.4. Webers (1966) did not recognize this multielement species in Minnesota.

Occurrence.-- Plectodina aculeata was recovered from all the Platteville Members from nearly every locality. One hundred fifty-eight cordylodids, 96 trichonodellids, and 34 zygognathids were found.

Repository.-- UW 845, 846, 847, 848.

Genus POLYCAULODUS Branson & Mehl, 1933

Type species: Polycaulodus inclinatus Branson & Mehl, 1933

Polycaulodus bidentatus Branson & Mehl

Pl. 1, figs. 2, 3

Polycaulodus bidentatus Branson & Mehl, 1933, no. 2, p. 106, pl. 8, figs. 1-3; Webers, 1966, p. 68, pl. 6, fig. 10; Andrews, 1967, p. 897, 898, pl. 112, figs. 2, 8, 15 (includes synonymy to 1966).

Polycaulodus sp. Schopf, 1966, pl. 6, fig. 5 (plate only).

These are asymmetrical, bar-like, neurodontiform units having a large, slightly postero-laterally reclined cusp on one end with one or more discrete, erect denticles which

become progressively smaller laterally away from the main cusp. The lower surface may be flat, slightly concave, or slightly convex. Growth axes are visible in most of the denticles.

Remarks.-- These are highly variable forms which may have from two to five denticles of various sizes on a base of varying width. The base may be flat or may be gently flexed downward from the main cusp.

Occurrence.-- Polycaulodus bidentatus was recovered from the Pecatonica Member at localities 1, 3, 6, 8, and 14; from the McGregor Member at localities 3 and 11; and from the Quimbys Mill Member at localities 6 and 10. 27 specimens.

Repository.-- UW 849, 850.

Polycaulodus inclinatus Branson & Mehl

Pl. 4, fig. 11

Polycaulodus inclinatus Branson & Mehl, 1933, no. 2, p. 86, pl. 6, fig. 22; Andrews, 1967, p. 898, pl. 113, fig. 24, pl. 114, fig. 11 (includes synonymy to 1966).

These are asymmetrical to subsymmetrical, neurodontiform, bar-like units bearing discrete, erect, slightly diverging, elliptical to subcircular denticles on the upper surface of a relatively short, straight bar. The denticles decrease in size laterally from a main denticle which may or may not occupy a central position on the bar. The lower surface is generally flat.

Remarks.-- This species exhibits wide variation in the size, shape, number, and orientation of its denticles. It

differs from Polycaulodus bidentatus only by having smaller denticles on both sides of the main denticle.

Occurrence.-- Specimens were recovered from locality 10, the Pecatonica Member at localities 1 and 12, and the McGregor Member at localities 1 and 3. 6 specimens.

Repository.-- UW 851.

Genus POLYPLACOGNATHUS Stauffer, 1935

Emend., Bergström & Sweet, 1966

Type species: Polyplacognathus ramosa Stauffer, 1935

Polyplacognathus ramosa Stauffer

Pl. 3, figs. 5, 9

Polyplacognathus ramosa Stauffer, 1935b, p. 615, pl. 75, figs. 23, 28-31, 37; Bergström & Sweet, 1966, p. 386, pl. 28, figs. 9-12 (includes synonymy to 1966).

This is a multielement species composed of Polyplacognathus ramosa Stauffer, and a new form recently described by Schopf (1966), P. bilobata. The P. ramosa form is a long, straight platform which is rounded on the posterior end and comes to a sharp point anteriorly. Four lateral lobes are developed near the posterior end and are arched downward. The three larger lobes are spatulate, the fourth and smallest is somewhat broader. On the upper surface, the lobes bear nodular carinas which meet at a central node on the platform. The upper surface of the broad posterior portion of the platform has a median, nodular carina which is surrounded on both sides by small nodes which may

develop into lateral carinas. The anterior extension also has a median, nodular carina which may have smaller lateral carinas paralleling it part of the way. The lower surface is keeled, sharply beneath the lateral lobes and anterior extension, and indistinctly beneath the broad, posterior end.

The P. bilobata form is an elongate platform having a long anterior process and a bifid posterior process. The anterior process bears discrete, median, ridge-like denticles. The posterior lobes have low, median, nodular carinas. A large, postero-laterally deflected ridge-like cusp occurs at the junction of the posterior and anterior processes. The lower surface is keeled and a small pit may be formed at the junction of the keels beneath the main denticle.

Remarks.-- The nodular carinas of both forms may occur as discrete, low nodes on some of the processes during early growth stages. With the exception of the figured form, all specimens of the Polyplacognathus bilobata form are broken.

Recovery of 28 bilobatid forms and 151 ramosid forms gives a ratio of 1:5.4. Bergström & Sweet's (1966) ratio for this species was 1:9.4 whereas Webers (1966) reported a ratio of 1:1.1. The variation in the ratios may be the result of a combination of the collection size differences and the fragile nature of the specimens. Both forms of

this multielement species are easily broken into many fragments making accurate counts difficult.

Occurrence.-- Polyplacognathus ramosa (including P. bilobata) was recovered from the McGregor Member at locality 14, and from all the members in the southwest.

Repository.-- UW 852, 853.

Genus PRAVOGNATHUS Stauffer, 1936

Type species: Pravognathus idoneus (Stauffer), 1935

Pravognathus idonea (Stauffer)

Pl. 2, fig. 2

Heterognathus idoneus Stauffer, 1935b, p. 607, pl. 72,

figs. 9, 14, 15, 18?, 20, 26, 29, 32.

Pravognathus idonea (Stauffer) Webers, 1966, p. 45, pl. 10,

fig. 8, pl. 11, figs. 4, 9 (includes synonymy to 1966).

These are antero-posteriorly compressed, blade-like units possessing lateral processes which bear erect, subequal, sharply pointed denticles which tend to be fused proximally. The unit is conspicuously bowed in a posterior direction beneath a central to subcentral, reclined, main cusp. A shallow excavation of the lower surface is terminated prior to reaching the extremities.

Remarks.-- The main cusp is often rivaled in size by one or more of the immediately adjacent lateral denticles. I agree with Webers (1966) that this is indeed, a valid genus and not just broken posterior processes of the form-species Phragmodus undatus. Several nearly "whole" posterior processes of the form-species P. undatus in the

collections differ considerably from Pravognathus idonea in that the former are much more sinuous, the size and distribution of the denticles is much more erratic, and the unit is excavated throughout its entire length.

Occurrence.-- Pravognathus idonea was recovered from the Quimbys Mill Member at localities 9 and 16, and from the McGregor Member at localities 1, 8, and 9. 13 specimens.

Repository.-- UW 854.

Genus PRIONIODINA Bassler, 1925

Type species Prioniodina subcurvata Ulrich & Bassler, 1926

Prioniodina polita? (Stauffer)

Pl. 4, fig. 16

Tortoniodus politus Stauffer, 1935a, p. 155, pl. 10, figs. 38, 42.

Prioniodina polita (Stauffer), Webers, 1966, p. 53, pl. 7, figs. 8, 10, 17 (includes synonymy to 1966).

Laterally compressed forms having a large, erect to slightly postero-laterally reclined main cusp, with anterior and posterior processes which bear denticles. The anterior process is shortest, and directed slightly downward. The denticles are erect and fused, tending to be discrete only distally. The longer, posterior process is directed more sharply downward causing the denticles to be strongly inclined posteriorly. These denticles tend to be much more discrete than the anterior denticles. The denticles on each process tend to become larger away from the main cusp, then smaller near the extremities. The basal cavity is subconical

and somewhat flared beneath the main cusp, and extends as a shallow groove to near the tips of the processes.

Remarks.--- This form resembles the ozarkodinid element of Ozarkodina obliqua (Stauffer), a multielement species figured by Webers (1966) and Bergström & Sweet (1966). However, because neither the ptiloconid element nor the dichognathid element were recognized, and because my forms agree reasonably well with Webers' (1966) illustrations and description of Prioniodina polita, they were questionably assigned to that species.

Occurrence.--- Prioniodina polita? was recovered from the Pecatonica Member at localities 11, 12, and 13; from the McGregor and Quimbys Mill Members at locality 14; from the upper Platteville at locality 10; and from all three members in the southwest. 37 specimens.

Repository.--- UW 855.

Prioniodina? sp.

Pl. 2, fig. 13

Remarks.--- Three fragmentary, somewhat abraded, discolored specimens were recovered from basal Pecatonica rocks at two locations. All three forms apparently had a posterior process which has been broken-off, a stout, erect main cusp, and a downward directed anterior process possessing discrete, peg-like denticles. The basal cavity is flared beneath the main cusp and extended the length of the broken anterior process. These forms resemble the

prioniodinid element of Ozarkodina obliqua, but because of their abraded, fragmentary nature, plus lack of abundance, they were only questionably assigned on the generic level.

Occurrence.-- Two specimens from the basal two inches of the Pecatonica Member at locality 8, and one specimen from the basal inch of the Pecatonica Member at locality 1.

Repository.-- UW 856.

Genus SCANDODUS Lindström, 1955

Type species: Scandodus furnishi Lindström, 1955

Scandodus sp. cf. *S. sinuosus* Mound

Pl. 2, fig. 1

Scandodus sinuosus Mound, 1965, p. 33, 34, pl. 4, figs. 21, 22, 24; text-fig. 1J.

These are asymmetrical, gently to sharply recurved, sharply keeled, simple cones. The anterior keel is deflected toward the inside and occupies this antero-lateral position to the tip of the cusp, giving the unit the appearance of being twisted. A broad, rounded carina exists on the inside of the unit, but tends to disappear distally. The outside of the unit is broadly convex. The base is only slightly wider than the proximal portion of the cusp, is flared slightly on the inside, and houses an upright, sharply pointed, subconical excavation.

Remarks.-- Specimens agree with the description and illustrations of Scandodus sinuosus Mound in almost every respect. However, Wisconsin forms lack the distinct posterior extension of the base plus the anteriorly directed

basal cavity. It is not known whether these differences are of taxonomic significance or whether they fall within the range of variation of this species, hence the assignment.

Occurrence.-- Specimens were recovered from the Pecatonica Member at localities 1, 3, 5, 8, and 13; from the McGregor Member at localities 1, 3, 5, and 6; and from the Quimbys Mill Member at locality 16.

Repository.-- UW 857.

Genus SCYPHIODUS Stauffer, 1935

Type species: Scyphiodus primus Stauffer, 1935

Scyphiodus primus Stauffer

Pl. 4, fig. 1

Scyphiodus primus Stauffer, 1935b, p. 617, pl. 75, figs.

34, 40, 41, 45, 46, 50, 51, 57, 58; Webers, 1966

p. 45, pl. 8, figs. 15a, b (includes synonymy to 1966).

Ozarkodinid-type units having a laterally compressed posterior process and a platform-like anterior process. The posterior process is directed downward, flexed slightly inward, and bears denticles which are fused proximally. A large, laterally compressed denticle which is offset posteriorly from the center of the unit, may be erect or slightly reclined. Two small, compressed, fused denticles occur just anterior to the main cusp. The lower portion of the anterior process is compressed, but the upper surface bears three rows of short peg-like denticles which are basally confluent. The process terminates with a single

peg-like denticle and a spatulate anterior extension. In advanced growth stages, the rows of denticles tend to fuse laterally forming transverse ridges. The basal excavation is shallow and flared beneath the main cusp, is extended as a shallow groove under the posterior process, and a deep groove under the anterior process.

Occurrence.-- Scyphiodus primus was recovered from the Pecatonica Member at locality 8; from the McGregor Member at localities 5, 8, and 9; and from the Quimbys Mill Member at localities 9 and 16. 13 specimens.

Repository.-- UW 858.

Genus TRUCHEROGNATHUS Branson & Mehl, 1933

Type species: Trucherognathus distorta Branson & Mehl, 1933

Trucherognathus distorta Branson & Mehl

Pl. 2, fig. 10

Trucherognathus distorta Branson & Mehl, 1933, no. 2, p. 84, pl. 5, fig. 1; Andrews, 1967, p. 900, pl. 112, fig. 2, pl. 113, figs. 10, 25 (includes synonymy to 1966).

Compound, subsymmetrical, neurodontiform units consisting of a row of denticles on the upper surface of a relatively straight bar-like base. The denticles are elliptical to circular in section, and may be fused or discrete. The lower surface of the base is generally flat to slightly concave.

Remarks.-- These are highly variable forms exhibiting a wide range in the size, shape, number, and orientation

of the denticles. Andrews (1967) also stated that the base may be long and slender or short and stout. Because all Wisconsin forms were fragmentary, this variation was not observed.

Occurrence.-- Four specimens were recovered: one each from the Pecatonica Member at localities 1 and 12; one from the McGregor Member at locality 14; and one from the Quimbys Mill Member at locality 16.

Repository.-- UW 859.

Genus ZYGOGNATHUS Branson, Mehl, & Branson, 1951

Type species: Zygognathus pyramidalis Branson, Mehl, & Branson, 1951

Zygognathus? sp. cf. Z.? abnormis Branson, Mehl, & Branson

Pl. 3, fig. 12

cf. Zygognathus? abnormis Branson, Mehl, & Branson, 1951,

p. 14, pl. 3, fig. 20.

Zygognathus? sp. cf. Z.? abnormis Branson, Mehl, & Branson,

Oberg, 1966, p. 145, pl. 15, fig. 24; pl. 16, figs.

8, 15 (includes synonymy to 1966).

Remarks.-- Six fragmentary forms which resemble Zygognathus? abnormis (Branson, Mehl, and Branson, 1951) and Oberg (1966) were recovered. The specimens have a sharply keeled, laterally compressed cusp which is extended as a pronounced anticusp. At least two peg-like to laterally compressed, discrete denticles are found on the anticusp. A relatively deep basal cavity exists under the main cusp and extends down the antiosup as a shallow groove. Three of the specimens have one or two denticles on the upper

surface of the posterior margin of the cusp; the other three specimens appear to be broken at that point. Since a well defined posterior process (or even the beginning of one) is not present on any specimens, they are not definitely assigned to Z. ? abnormis. However, they appear to be similar in all other respects.

Occurrence.--- Specimens were recovered from the Pecos Member at localities 1 and 5; from the McGregor Member at locality 11; from the Quimbys Mill Member at locality 6; and from the upper Platteville at locality 10. 6 specimens.

Repository.--- UW 860.

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APPENDIX I

Appendix I consists of faunal lists of specimens recovered at each locality, recorded by member. The names of the members have been abbreviated as follows: Pecatonica = Pec; McGregor = McG; Quimbys Mill = QM. Multielement species are listed as being present, even though all the elements may not have been recovered. Numbers of specimens are given in descriptions.

Locality 1	Pec	McG	QM
<u>Acontiodus alveolaris</u>	X	X	
<u>Belodina compressa</u>	X	X	X
<u>B. dispansa</u>	X	X	X
<u>B. sp. cf. B. inornata</u>		X	
<u>Cardiodella tumidus</u>	X		
<u>Curtognathus limitaris</u>	X		
<u>Cyrtoniodus flexuosus</u>	X		
<u>Distacodus falcatus</u>	X	X	
<u>D. variabilis</u>	X	X	X
<u>Drepanodus suberectus</u>	X	X	X
<u>Erismodus asymmetricus</u>	X		
<u>E. gracilis</u>	X		
<u>E. symmetricus</u>	X		
<u>Oistodus parallelus</u>	X		
<u>O. venustus</u>	X	X	X
<u>Ozarkodina concinna</u>	X		
<u>Panderodus arcuatus</u>	X	X	X
<u>P. gracilis</u>	X	X	X
<u>P. panderi</u>	X	X	X

APPENDIX I (cont.)

Locality 1, continued	Pec	McG	QM
<u>Phragmodus undatus</u>	X	X	X
<u>Plectodina aculeata</u>	X	X	X
<u>Polycaulodus bidentatus</u>	X		
<u>P. inclinatus</u>	X	X	
<u>Polyplacognathus ramosa</u>	X	X	X
<u>Pravognathus idonea</u>		X	
<u>Prioniodina polita?</u>	X		
<u>Prioniodina? sp.</u>	X		
<u>Scandodus sp. cf. S. sinuosus</u>	X	X	
<u>Trucherognathus distorta</u>	X		
<u>Zygnognathus? sp. cf. Z.? abnormis</u>	X		

Locality 2 - Pecatonica Member only

<u>Belodina compressa</u>
<u>B. dispansa</u>
<u>Cyrtoniodus flexuosus</u>
<u>Distacodus falcatus</u>
<u>D. variabilis</u>
<u>Drepanodus suberectus</u>
<u>Oistodus venustus</u>
<u>Panderodus arcuatus</u>
<u>P. gracilis</u>
<u>P. panderi</u>
<u>Phragmodus undatus</u>
<u>Plectodina aculeata</u>

APPENDIX I (cont.)

Locality 3	Pec	McG
<u>Acontiodus alveolaris</u>		X
<u>Belodina compressa</u>	X	X
<u>B. dispansa</u>	X	X
<u>B. sp. cf. B. inornata</u>		X
<u>Distacodus falcatus</u>		X
<u>D. variabilis</u>	X	X
<u>Drepanodus suberectus</u>	X	X
<u>Erismodus asymmetricus</u>		X
<u>E.? expansus</u>		X
<u>E. symmetricus</u>		X
<u>Panderodus arcuatus</u>	X	X
<u>P. gracilis</u>		X
<u>P. panderi</u>		X
<u>Phragmodus undatus</u>	X	X
<u>Plectodina aculeata</u>		X
<u>Polycaulodus bidentatus</u>	X	X
<u>P. inclinatus</u>		X
<u>Polyplacognathus ramosa</u>		X
<u>Prioniodina polita?</u>	X	X
<u>Scandodus sp. cf. S. sinuosus</u>	X	X

Locality 4 - Pecatonica Member only

Drepanodus suberectus
Erismodus symmetricus
Phragmodus undatus

APPENDIX I (cont.)

Locality 5	Pec	McG
<u>Acontiodus alveolaris</u>	X	X
<u>Belodina compressa</u>	X	X
<u>B. dispansa</u>	X	X
<u>B. sp. cf. B. inornata</u>	X	X
<u>Cardiodella tumidus</u>	X	
<u>Cyrtoniodus flexuosus</u>	X	
<u>Distacodus falcatus</u>	X	X
<u>D.? aff. D.? trigonius</u>		X
<u>D. variabilis</u>	X	X
<u>Drepanodus suberectus</u>	X	X
<u>Erismodus? expansus</u>	X	
<u>Oistodus parallelus</u>	X	X
<u>O. venustus</u>	X	X
<u>Panderodus arcuatus</u>	X	X
<u>P. gracilis</u>	X	X
<u>P. panderi</u>	X	X
<u>Phragmodus undatus</u>	X	X
<u>Plectodina aculeata</u>	X	X
<u>Polyplacognathus ramosa</u>	X	X
<u>Prioniodina polita?</u>	X	X
<u>Scandodus sp. cf. S. sinuosus</u>	X	X
<u>Scyphiodus primus</u>		X
<u>Zygognathus? sp. cf. Z.? abnormis</u>	X	

APPENDIX I (cont.)

Locality 6	Pec	McG	QM
<u>Acontiodus alveolaris</u>		X	
<u>Belodina compressa</u>	X	X	X
<u>B. dispansa</u>		X	
<u>B. sp. cf. B. inornata</u>		X	
<u>Cardiodella tumidus</u>	X		
<u>Cyrtoniodus flexuosus</u>	X		
<u>Distacodus falcatus</u>	X	X	
<u>D. variabilis</u>	X	X	
<u>Drepanodus suberectus</u>	X	X	X
<u>Erismodus? expansus</u>	X	X	
<u>E. gracilis</u>	X	X	
<u>E. symmetricus</u>		X	
<u>Oistodus parallelus</u>	X		
<u>O. venustus</u>	X	X	
<u>Oulodus serratus</u>			X
<u>Panderodus arcuatus</u>	X	X	X
<u>P. gracilis</u>	X	X	X
<u>P. panderi</u>	X	X	
<u>Phragmodus undatus</u>	X	X	X
<u>Plectodina aculeata</u>	X	X	X
<u>Polycaulodus bidentatus</u>	X		X
<u>Polyplacognathus ramosa</u>		X	
<u>Prioniodina polita?</u>	X	X	
<u>Scandodus sp. cf. S. sinuosus</u>		X	
<u>Zygognathus? sp. cf. Z.? abnormis</u>			X

APPENDIX I (cont.)

Locality 7 - Pecatonica Member only

Belodina compressa
B. dispansa
Drepanodus suberectus
Oistodus parallelus
Panderodus gracilis
P. panderi
Phragmodus undatus
Plectodina aculeata
Polyplacognathus ramosa
Prioniodina polita?

Locality 8	Pec	McG
<u>Acontiodus alveolaris</u>	X	
<u>Amorphognathus? sp.</u>	X	
<u>Belodina compressa</u>	X	X
<u>Cardiodella tumidus</u>	X	
<u>Chirognathus delicatula?</u>	X	
<u>C. sp. cf. C. multidentis</u>	X	
<u>Cyrtoniodus flexuosus</u>	X	X
<u>Distacodus falcatus</u>	X	X
<u>D.? aff. D.? trigonius</u>	X	
<u>D. variabilis</u>	X	X
<u>Drepanodus suberectus</u>	X	X
<u>Oistodus parallelus</u>	X	

APPENDIX I (cont.)

Locality 8, continued	Pec	McG	
<u>O. venustus</u>	X	X	
<u>Oulodus serratus</u>	X		
<u>Ozarkodina concinna</u>	X		
<u>O. sp. cf. O. typica</u>	X		
<u>Panderodus arcuatus</u>	X	X	
<u>P. gracilis</u>	X	X	
<u>P. panderi</u>	X	X	
<u>Phragmodus undatus</u>	X		
<u>Plectodina aculeata</u>	X		
<u>Polycaulodus bidentatus</u>	X		
<u>Polyplacognathus ramosa</u>		X	
<u>Pravognathus idonea</u>		X	
<u>Prioniodina polita?</u>	X		
<u>Prioniodina? sp.</u>	X		
<u>Scandodus sp. cf. S. sinuosus</u>	X		
<u>Scyphiodus primus</u>	X	X	
Locality 9		McG	QM
<u>Acontiodus alveolaris</u>		X	
<u>Belodina compressa</u>		X	X
<u>B. dispansa</u>		X	
<u>B. sp. cf. B. inornata</u>		X	
<u>Cardiodella tumidus</u>			X
<u>Cyrtoniodus flexuosus</u>			X

APPENDIX I (cont.)

Locality 9, continued	McG	QM
<u>Distacodus falcatus</u>	X	
<u>D. variabilis</u>	X	
<u>Drepanodus suberectus</u>	X	X
<u>Erismodus asymmetricus</u>	X	
<u>E. gracilis</u>		X
<u>Oistodus parallelus</u>		X
<u>O. venustus</u>	X	
<u>Oulodus serratus</u>	X	
<u>Panderodus arcuatus</u>	X	X
<u>P. gracilis</u>	X	X
<u>P. panderi</u>	X	
<u>Phragmodus undatus</u>	X	X
<u>Plectodina aculeata</u>	X	X
<u>Polyplacognathus ramosa</u>	X	X
<u>Pravognathus idonea</u>	X	X
<u>Prioniodina polita?</u>	X	X
<u>Scyphiodus primus</u>	X	X

Locality 10

No sharp lithologic break was observed at this locality. However, because 28' 9" of Platteville rock was sampled, the Quimbys Mill - McGregor contact must be present. At a point 8' 2" down from the Decorah contact there seems to be a faunal increase. This could be indicative of a short hiatus or a slight change of conditions. This level has been chosen

APPENDIX I (cont.)

arbitrarily as the Quimbys Mill - McGregor contact for the purpose of this faunal distribution chart.

	McG	QM
<u>Belodina compressa</u>	X	X
<u>Drepanodus suberectus</u>	X	X
<u>Erismodus gracilis</u>		X
<u>Ozarkodina concinna</u>		X
<u>Panderodus gracilis</u>		X
<u>Phragmodus undatus</u>	X	X
<u>Plectodina aculeata</u>	X	X
<u>Polycaulodus bidentatus</u>	X	X
<u>P. inclinatus</u>	X	
<u>Prioniodina polita?</u>		X
<u>Zygognathus? sp. cf. Z.? abnormis</u>		X

Locality 11	Pec	McG
<u>Belodina compressa</u>	X	X
<u>B. sp. cf. B. inornata</u>		X
<u>Curtoznathus limitaris</u>		X
<u>Distacodus falcatus</u>		X
<u>Drepanodus suberectus</u>	X	X
<u>Erismodus asymmetricus</u>		X
<u>E. gracilis</u>		X
<u>E. symmetricus</u>		X
<u>Oistodus venustus</u>		X
<u>Ozarkodina concinna</u>		X
<u>Panderodus arcuatus</u>		X

APPENDIX I (cont.)

Locality 11, continued	Pec	McG
<u>P. gracilis</u>	X	X
<u>P. panderi</u>	X	X
<u>Phragmodus undatus</u>	X	X
<u>Plectodina aculeata</u>	X	X
<u>Polycaulodus bidentatus</u>		X
<u>Prioniodina polita?</u>	X	
<u>Zygognathus? sp. cf. Z.? abnormis</u>		X

Locality 12 - Pecatonica Member only

<u>Belodina compressa</u>
<u>B. sp. cf. B. inornata</u>
<u>Cardiodella tumidus</u>
<u>Curtognathus typa</u>
<u>Distacodus variabilis</u>
<u>Drepanodus suberectus</u>
<u>Erismodus asymmetricus</u>
<u>E. gracilis</u>
<u>Ozarkodina concinna</u>
<u>Panderodus arcuatus</u>
<u>P. gracilis</u>
<u>Phragmodus undatus</u>
<u>Plectodina aculeata</u>
<u>Polycaulodus inclinatus</u>
<u>Prioniodina polita?</u>
<u>Trucherognathus distorta</u>

APPENDIX I (cont.)

Locality 13 - Pecatonica Member only

Belodina compressaDrepanodus suberectusErismodus asymmetricusOzarkodina concinnaPlectodina aculeataPrioniodina polita?Scandodus sp. cf. S. sinuosus

Locality 14

Pec

McG

QM

Acontiodus alveolaris

X

Belodina compressa

X

X

B. sp. cf. B. inornata

X

Distacodus falcatus

X

Drepanodus suberectus

X

X

Erismodus asymmetricus

X

E.? expansus

X

E. gracilis

X

E. symmetricus

X

Oistodus parallelus

X

Panderodus arcuatus

X

P. gracilis

X

X

Phragmodus undatus

X

X

Plectodina aculeata

X

X

Polycaulodus bidentatus

X

Polyplacognathus ramosa

X

APPENDIX I (cont.)

Locality 14, continued	Pec	McG	QM
<u>Prioniodina polita?</u>		X	X
<u>Trucherognathus distorta</u>		X	
Locality 16		McG	QM
<u>Acontiodus alveolaris</u>		X	X
<u>Belodina compressa</u>		X	X
<u>B. dispansa</u>		X	X
<u>B. sp. cf. B. inornata</u>			X
<u>Cyrtoniodus flexuosus</u>			X
<u>Distacodus falcatus</u>		X	X
<u>D. variabilis</u>			X
<u>Drepanodus suberectus</u>		X	X
<u>Oistodus venustus</u>			X
<u>Oulodus serratus</u>			X
<u>Panderodus arcuatus</u>		X	X
<u>P. gracilis</u>		X	X
<u>P. panderi</u>			X
<u>Phragmodus undatus</u>		X	X
<u>Plectodina aculeata</u>		X	X
<u>Polyplacognathus ramosa</u>		X	X
<u>Pravognathus idonea</u>			X
<u>Scandodus sp. cf. S. sinuosus</u>			X
<u>Scyphiodus primus</u>			X
<u>Trucherognathus distorta</u>			X

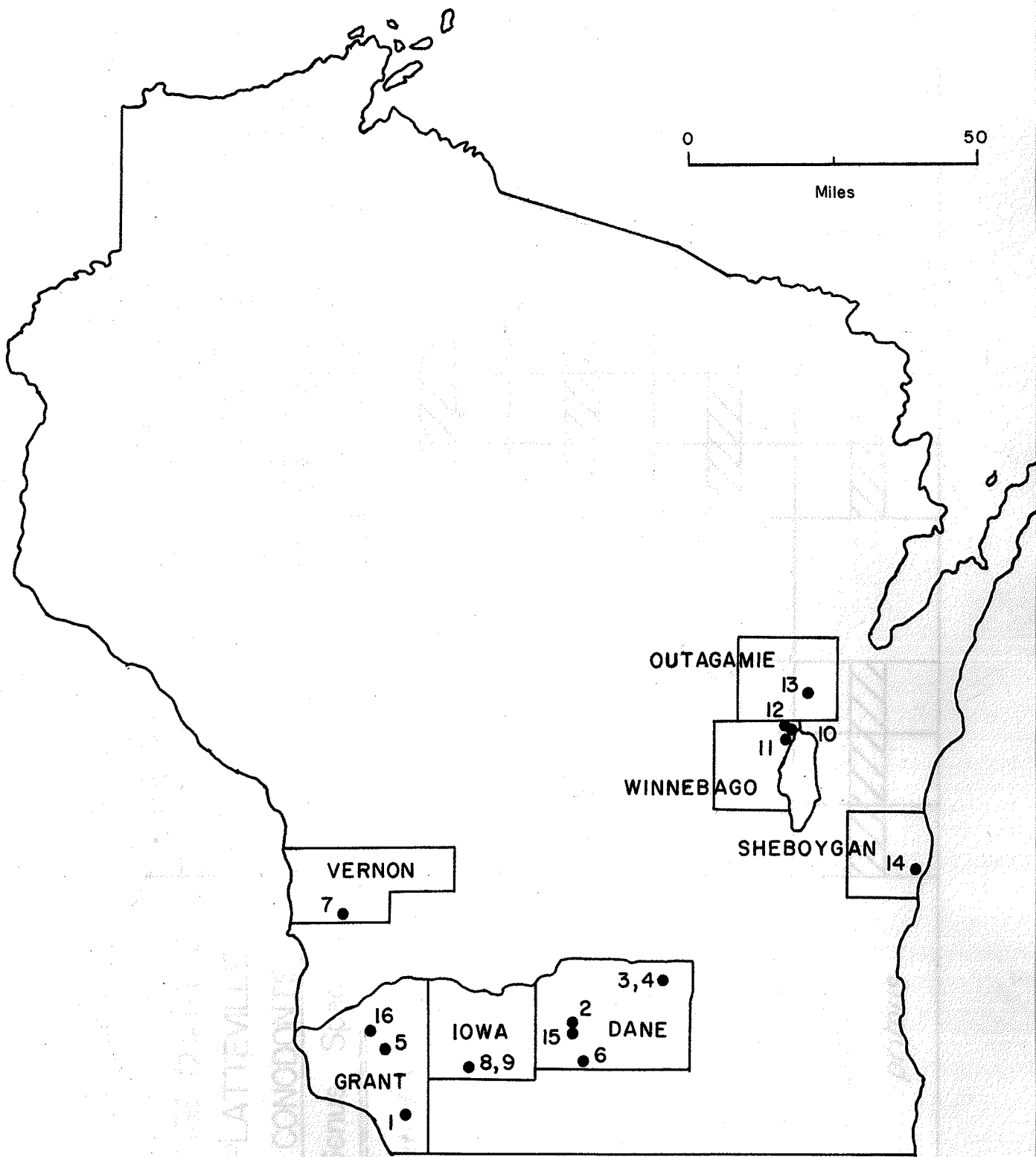


Fig. 1 Index map of Wisconsin showing locations of exposures and location of core utilized for this report.

Genus Species	IOWA SECTION			WISCONSIN SECTION								
	Pecatonia Member	Mc Gregor Member	Quimbys Mill Member	SOUTHWEST			NORTHEAST					
<i>Oistodus</i> <i>venustus</i>	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)		Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
<i>Belodina</i> <i>dispansa</i>	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)		Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
<i>Cyrtoniodus</i> <i>flexuosus</i>	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)		Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)
<i>Scyphiodus</i> <i>primus</i>	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)		Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)	Diagonal lines (top-left to bottom-right)

Fig. 2
RANGE CHART OF
PLATTEVILLE
CONODONTS

EXPLANATION OF PLATE 1

All figures approximately X56 unless otherwise noted.

Fig. 1--Acontiodus alveolaris Stauffer, posterior view, McGregor Member, loc. 14, UW 801.

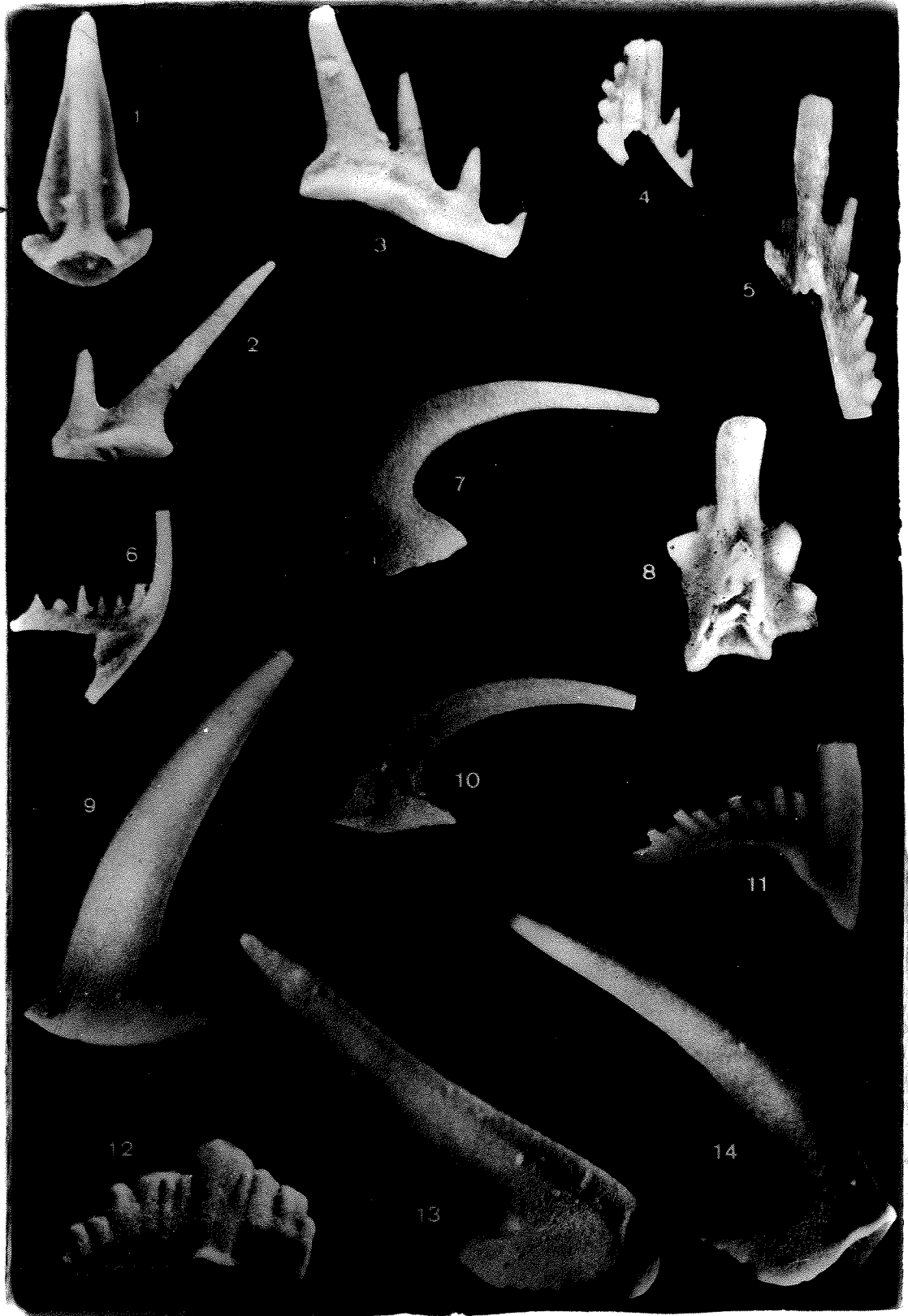
Figs. 2, 3--Polycaulodus bidentatus Branson & Mehl, lateral views. 2, Pecatonica Member, loc. 13, UW 849; 3, McGregor Member, loc. 6, UW 850.

Figs. 4, 5, 6, 8--Plectodina aculeata (Stauffer). 4, posterior view of zygognathid element, Quimbys Mill Member, loc. 1, UW 845; 5, 8, posterior views of two trichonodellid elements, Pecatonica Member, locs. 6 and 1, UW 846, UW 848; 6, lateral view of cordylodid element, Pecatonica Member, loc. 8, UW 847.

Figs. 7, 9, 10, 13, 14--Drepanodus suberectus (Branson & Mehl). 7, 10, 14, lateral views of the form-species Drepanodus homocurvatus; 7, McGregor Member, loc. 9, UW 822; 10, Pecatonica Member, loc. 12, UW 824; 14, McGregor Member, loc. 9, UW 826. 9, lateral view of the form-species Drepanodus suberectus, McGregor Member, loc. 5, UW 823. 13, lateral view of the form-species Oistodus inclinatus, Pecatonica Member, loc. 2, UW 825.

Fig. 11--Cyrtoniodus flexuosus (Branson & Mehl), lateral view, Quimbys Mill Member, loc. 16, X65, UW 816.

Fig. 12--Ozarkodina sp. cf. O. typica Branson & Mehl, lateral view, Pecatonica Member, loc. 8, UW 836.



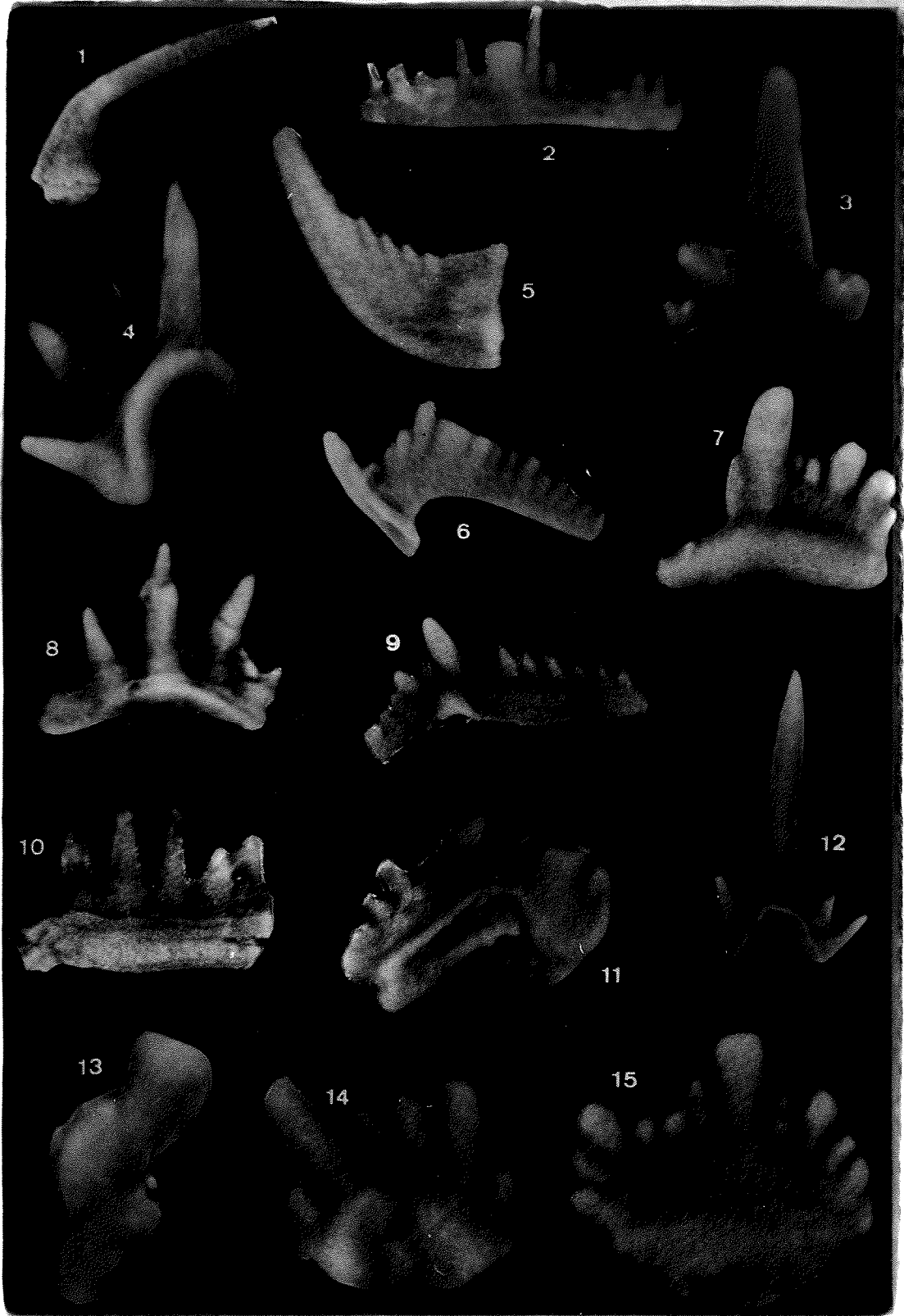
EXPLANATION OF PLATE 2

- Fig. 1--Scandodus sp. cf. S. sinuosus Mound, lateral view,
McGregor Member, loc. 5, X56, UW 857.
- Fig. 2--Pravognathus idonea (Stauffer), posterior view, Quimbys
Mill Member, loc. 9, X88, UW 854.
- Fig. 3--Cardiodella tumidus (Branson & Mehl), view of upper surface,
Pecatonica Member, loc. 1, X56, UW 809.
- Fig. 4--Curtognathus limitaris Branson & Mehl, posterior view,
Pecatonica Member, loc. 1, X56, UW 814.
- Fig. 5--Belodina dispansa (Glenister), lateral view, McGregor
Member, loc. 5, X88, UW 806.
- Fig. 6--Phragmodus undatus Branson & Mehl, lateral view of the
form-species Phragmodus undatus, Quimbys Mill Member, loc. 16,
X60, UW 842.
- Fig. 7--Chirognathus sp. cf. C. multidentis Branson & Mehl, posterior
view, Pecatonica Member, loc. 8, X78, UW 813.
- Fig. 8--Curtognathus typa Branson & Mehl, posterior view, Peca-
tonica Member, loc. 12, X80, UW 815.
- Fig. 9--Ozarkodina concinna Stauffer, lateral view, Pecatonica
Member, loc. 8, X 56, UW 835.
- Fig. 10--Trucherognathus distorta Branson & Mehl, lateral view,
Pecatonica Member, loc. 1, X71, UW 859.
- Figs. 11, 14, 15--Chirognathus delicatula? Stauffer, posterior
views, all from the Pecatonica Member, loc. 8. 11, X65,
UW 810; 14, X100, UW 811; 15, X71, UW 812.

EXPLANATION OF PLATE 2, continued

Fig. 12--Erismodus symmetricus Branson & Mehl, posterior view,
Pecatonica Member, loc. 6, X23, UW 830.

Fig. 13--Prioniodina? sp., lateral view, Pecatonica Member, loc. 1,
X 56, UW 856.



EXPLANATION OF PLATE 3

All figures approximately X56 unless otherwise noted.

Figs. 1, 2, 6--Distacodus variabilis Webers, lateral views.

1, 2, Quimbys Mill Member, loc. 16, UW 819, UW 820;

6, Quimbys Mill Member, loc. 1, UW 821.

Fig. 3--Oistodus parallelus Pander, lateral view, McGregor

Member, loc. 14, UW 831.

Fig. 4--Distacodus falcatus Stauffer, lateral view, Pecatonica

Member, loc. 14, UW 817.

Figs. 5, 9--Polyplacognathus ramosa Stauffer. 5, lateral view

of the form-species Polyplacognathus bilobata, Quimbys Mill

Member, loc. 16, UW 852; 9, view of lower surface of the

form-species Polyplacognathus ramosa, Pecatonica Member,

loc. 14, UW 853.

Fig. 7--Belodina dispansa (Glenister), lateral view, Quimbys

Mill Member, loc. 16, UW 807.

Fig. 8--Phragmodus undatus Branson & Mehl, lateral view of the

form-species Oistodus abundans, Pecatonica Member, loc. 12,

UW 843.

Fig. 10--Oistodus venustus Stauffer, lateral view, Quimbys Mill

Member, loc. 1, UW 832.

Fig. 11--Panderodus arcuatus (Stauffer), lateral view, Quimbys

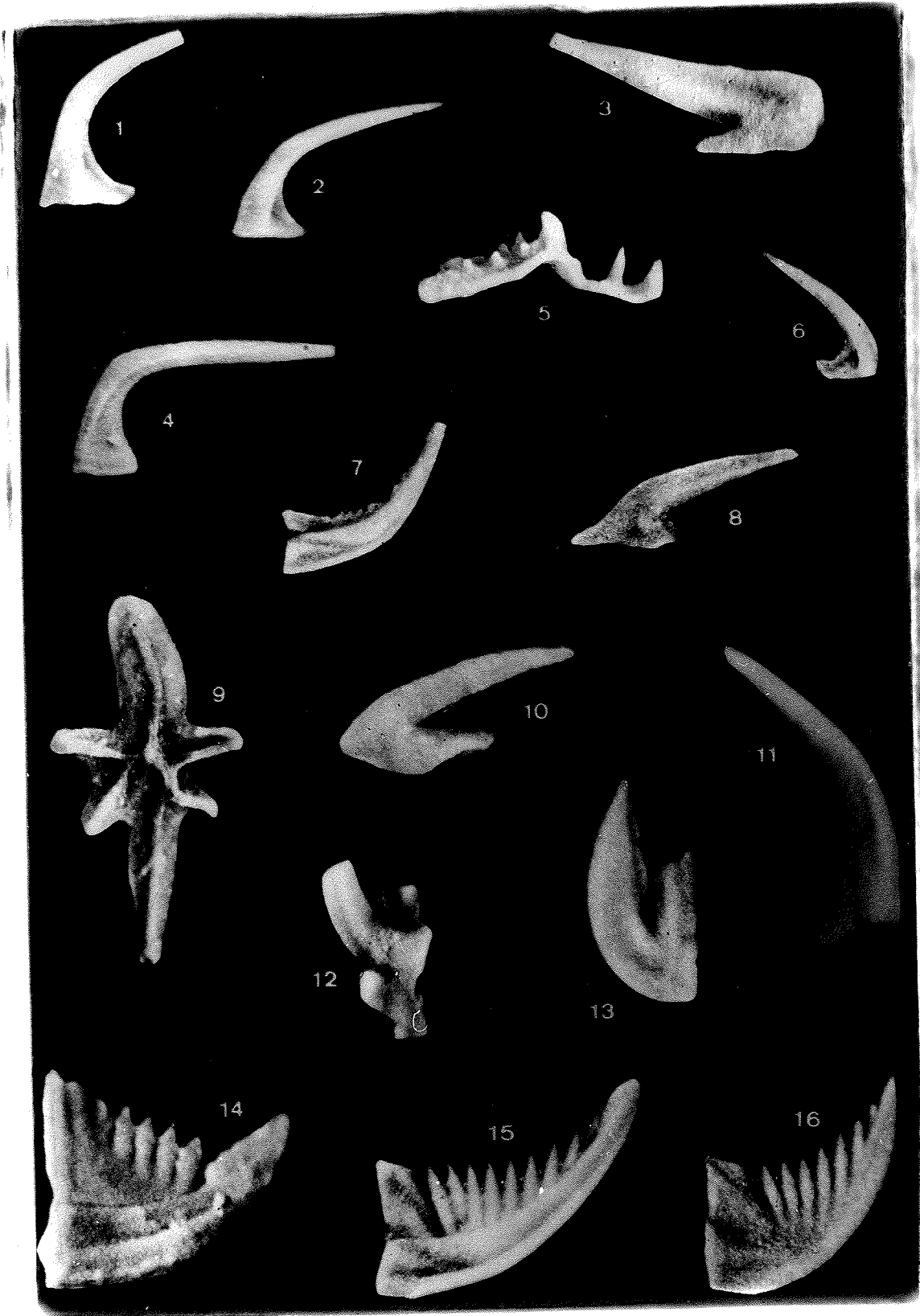
Mill Member, loc. 16, X75, UW 837.

Fig. 12--Zygognathus? sp. cf. Z.? abnormis Branson, Mehl, &

Branson, lateral view, Pecatonica Member, loc. 1, UW 860.

EXPLANATION OF PLATE 3, continued

- Figs. 13, 15, 16--Belodina compressa (Branson & Mehl). 13, lateral view of the form-species Eobelodina fornicata, Quimbys Mill Member, loc. 16, UW 803; 15, lateral view of the form-species Belodina grandis, McGregor Member, loc. 5, UW 804; 16, lateral view of the form-species Belodina wykoffensis, Pecatonica Member, loc. 14, UW 805.
- Fig. 14--Belodina sp. cf. B. inornata (Branson & Mehl), lateral view of a mature specimen, McGregor Member, loc. 6, UW 808.



EXPLANATION OF PLATE 4

All figures approximately X56 unless otherwise noted.

- Fig. 1--Scyphiodus primus Stauffer, lateral view, Quimbys Mill Member, loc. 16, UW 858.
- Figs. 2, 3--Distacodus? aff. D.? trigonius Schopf, posterior and lateral views, Pecatonica Member, loc. 8, UW 818.
- Figs. 4, 5, 9--Panderodus gracilis (Branson & Mehl). 4, lateral view of the form-species Panderodus gracilis, Quimbys Mill Member, loc. 6, UW 838; 5, lateral view of the form-species Panderodus compressus, Pecatonica Member, loc. 5, UW 839; 9, lateral view of the form-species Panderodus striatus, McGregor Member, loc. 9, UW 840.
- Fig. 6--Phragmodus undatus Branson & Mehl, anterior view of dichognathid element, Quimbys Mill Member, loc. 6, UW 844.
- Fig. 7--Erismodus gracilis (Branson & Mehl), postero-lateral view, McGregor Member, loc. 9, UW 829.
- Fig. 8--Panderodus panderi (Stauffer), lateral view, Quimbys Mill Member, loc. 16, UW 841.
- Fig. 10--Amorphognathus? sp., view of upper surface, Pecatonica Member, loc. 8, X83, UW 802.
- Fig. 11--Polycaulodus inclinatus Branson & Mehl, lateral view, McGregor Member, loc. 18, X97, UW 851.
- Fig. 12--Erismodus asymmetricus (Branson & Mehl), postero-lateral view, Pecatonica Member, loc. 1, UW 827.

EXPLANATION OF PLATE 4, continued

- Figs. 13, 15--Oulodus serratus (Stauffer). 13, posterior view of the form-species Oulodus primus, McGregor Member, loc. 9, X56, UW 833; 15, lateral view of the form-species Cordylodus serratus, Quimbys Mill Member, loc. 16, X 56, UW 834.
- Fig. 14--Erismodus? expansus (Branson & Mehl), posterior view, McGregor Member, loc. 6, X37, UW 828.
- Fig. 16--Prioniodina polita? (Stauffer), posterior view, McGregor Member, loc. 5, X65, UW 855.



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APPROVED

May 29, 1969

DATE