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BULLETIN 134

**Ludlovian and Gedinian
Conodont Stratigraphy of
the Yass Basin, New South Wales**

by

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ERRATA SLIP FOR BULLETIN NO. 134

ERRATA

- P. v, List of Tables, delete existing description of Table 2 and substitute 'A list of Walliser's (1964) Cellon zones with index and guide species.'
- P. 15, delete the word 'YASS' from Table 2 heading.

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SUMMARY

Conodonts of Ludlovian-Gedinnian age from the Yass Basin of New South Wales are described. The fauna consists of 61 species referable to 24 genera of which one, *Coryssognathus*, is new. Four conodont assemblage zones are recognized and correlated with classic Ludlovian-Gedinnian zones of Europe; two faunas, one of probable *latialatus* Zone age and the other of probable *woschmidtii* Zone age, have also been recovered. Reworked Ludlovian conodonts from Devonian conglomerates at the top of the Yass succession are also described.

INTRODUCTION

The Yass Basin is situated in southeastern New South Wales (*see* Map, in back pocket), about 55 km northwest of Canberra. Upper Silurian to Lower Devonian rocks crop out in a syncline approximately 35 km long and 20 km wide. This structural basin lies in the Lachlan geosyncline which, in the Yass area, is characterized by the development of acid volcanics, shallow-water limestones, crossbedded sandstones, and shales, followed by deeper-water shales and turbiditic siltstones and a return to volcanics that record the termination of the geosyncline in this area (Fig. 1).

This conodont investigation is part of a larger detailed study of the stratigraphy, sedimentation, and palaeoecology of the Yass Basin by Link. The conodont study was undertaken to clarify the age of the strata as well as to establish a local conodont zonation. Conodont locations are shown in Figure 2. The Yass conodont faunas are compared with well-documented European conodont faunas from classical sections. Good correlation is shown to exist between the Australian and European faunas; many species, in fact, are common to both continents.

ACKNOWLEDGEMENTS

Although the bulk of a doctoral thesis by Link was prepared at the Australian National University, much of the study of the conodonts from the Yass Basin was facilitated by the use of the acid laboratory and Druce's comprehensive collection of conodont literature at the Bureau of Mineral Resources, Canberra.

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PREVIOUS RESEARCH ON LUDLOVIAN-GEDINNIAN CONODONTS

The earliest report of Silurian conodonts in Britain is that of Harley (1861), who described forms from the Downtonian Ludlow Bone Bed of Shropshire. Other early records are those by Moore (1864), Young (1879), and Smith & Jones (1881). Little interest was taken in conodonts of late Silurian to early Devonian age until Rhodes (1953) produced a monograph on the fauna from the Upper Bringewoodian Aymestry Limestone of Shropshire. In 1958 and 1962 Ireland reported conodonts from the limestones of the Welsh Borderland, and a late Ludlovian fauna from the Woolhope Inlier of Herefordshire was noted by Squirrell & Tucker (1960). Further descriptions of occurrences in Shropshire and south Staffordshire were published by Rhodes & Newall in 1963. Collinson & Druce (1966) referred conodonts from the Whitecliffe Flags of Diddlebury to the *eostein-hornensis* Zone of Walliser (1964).

European conodont faunas have been described from the Carnic Alps of Austria (Walliser, 1957; 1964), the Remschieder Sattels of Germany (Ziegler, 1960), and the Rügen Beds of Germany (Reichstein, 1962). Kockel (1958) recorded several species from the Malaga Beds in Spain, and forms from East Serbia were described by Spasov & Veselinović (1963). Spasov & Filipovic (1966) and Jentzsch (1962) recorded several species from the Tentaculite Limestone of Thuringia. Serpagli & Greco (1964) noted occurrences in the Monte Termula Beds

of Italy; Serpagli (1967) also described species from Sardinian limestones. Manzoni (1965) listed numerous forms from the Carnic Alps of Italy. Gedinnian conodonts occurring in the 'e-y' Kalk of southern Austria were systematically described and zoned by Schultze (1968).

Ethington & Furnish (1962) described faunas from the Spanish Sahara in North Africa. Occurrences in Asia include those described by Barnett, Kohut,

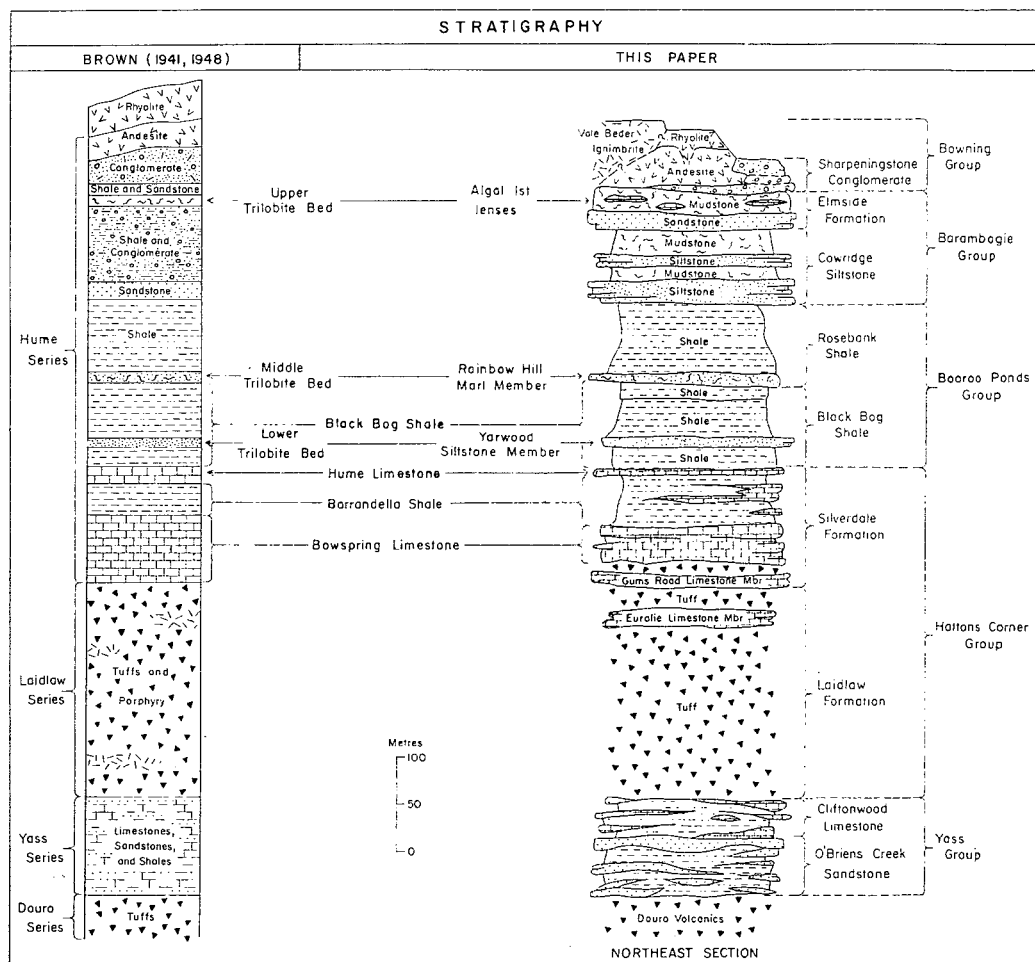


Figure 1. Stratigraphic Units of the Yass Basin

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Rust, & Sweet (1966) from the Nowshera Reef Limestone, West Pakistan; and by Igo & Koike (1967; 1968) from the Setul Limestone, Langkawi Islands, Malaya.

No information on Silurian faunas from eastern Australia has previously been published, but Druce & Wilson (1967) recovered Gedinnian conodonts from the Mount Holly Beds in the Yarrol Basin of Queensland, and Philip & Pedder (1967) noted several Gedinnian species from the Nemingha Limestone in northern New South Wales. Philip (1969) also described a small fauna of late Silurian age from the Dirk Hartog Formation of Western Australia.

STRATIGRAPHY

PREVIOUS INVESTIGATIONS

Geological observations in the Yass district began with those of the fossil occurrences by P. E. de Strezlecki in 1845. Clarke (1848), de Koninck (1876), Ratte (1886), Etheridge Jr (1878), Foerste (1888), and many others (*see* Brown, 1941, pp. 337-41, for a list of researches prior to 1940) have recorded fossils representing many groups.

In 1878, Jenkins published the first account of the stratigraphy, and in 1882 David produced a map of the area between the Yass township and Hattons Corner. Between 1886 and 1924 Mitchell, often in collaboration with Etheridge, described numerous fossils, in particular trilobites and brachiopods; he also gave accounts of the general geology of the Bowning area about 14 km northwest of the Yass township (1886; 1888). A map and section accompanied a report on the 'Geology of the Yass District' by Shearsby (1912), who also greatly contributed to the knowledge of the faunas. Rugose corals were described by Hill (1937; 1940) and tabulate corals by Jones (1937).

Brown (1941) added the results of previous investigations to original work and produced a sketch map and a stratigraphic section (*see* Fig. 1, this paper) that shows the overall synclinal structure, giving a basin-like appearance to the outcrop map of strata in the Yass district. Brown concluded (p. 334) that strata of the Yass Basin unconformably overlies older sediments containing Upper Ordovician graptolites.

Since 1941 there have been several relatively smaller studies, based mainly on the fauna of the sediments. Gill (1948) redescribed the trilobite *Dalmanites meridianus* Etheridge & Mitchell; and Brown (1948) redescribed the brachiopod *Plectodonta davidi* (Mitchell). From the upper beds of the Hume Series, Pickett (1966; 1969) listed corals, algae, a stromatoporoid, and a gastropod. A detailed study of the graptolites was completed by Jaeger in 1967.

PRESENT INVESTIGATIONS

Link is currently completing a detailed geological study of the Yass Basin involving aspects of stratigraphy, sedimentation, palaeoecology, conodonts, corals, algae, and stromatoporoids. As the results of this work will be published elsewhere, the revised stratigraphic terminology (*see* Fig. 1) is used here. Five stratigraphic groups are recognized in the basin; they are, in stratigraphic order: the Yass, Hattons Corner, Booroo Ponds, Barambogie, and Bowning Groups. Correlations of these strata with other Australian sequences are presented in Link (1970), and the redescription of the brachiopod *Aliconchidium yassi* St Joseph is given in Boucot, Johnson, & Link (1969).

Yass Group

The Yass Group overlies the coarse tuffs of the Douro Volcanics. It varies considerably in thickness; near the township of Yass it is approximately 190 m. It consists of two formations, the O'Briens Creek Sandstone and the Cliftonwood Limestone.

The O'Briens Creek Sandstone comprises shallow-water crossbedded fine to coarse sandstone with mudstone interbeds. Just north of Yass it is nearly 125 m thick. The Cliftonwood Limestone consists predominantly of fossiliferous blue-black argillaceous limestones interbedded with silty mudstones; it conformably overlies

the O'Briens Creek Sandstone and is 64.4 m thick near the Yass River and Bango Creek confluence. The fauna listed in Brown (1941, pp. 329-32) includes sponges; corals (*Rhizophyllum interpunctatum* de Koninck, *Phaulactis shearsbyi* (Süssmilch), *Heliolites* sp., *Alveolites* spp.); stromatoporoids; polyzoans (*Fenestella* sp., *Monticulipora* sp.); brachiopods (*Orthotetes shearsbyi* Dun, *Rhynchotreta* sp.); molluscs (*Pterinea laminosa* de Koninck, *Paracyclas* sp., *Orthoceras* sp.); trilobites (*Cryptonymus angustus* Mitchell, *Encrinurus etheridgei* Mitchell); and an ostracod (*Leperditia shearsbyi* Chapman). Several new species of algae were recovered from these limestones near the confluence of Bango Creek and Yass River: genera include *Rhabdoporella*, *Sphaerocodium*, and a new genus of Solenoporaceae. Sixteen species of conodonts are described from this formation (Table 1).

Hattons Corner Group

The Hattons Corner Group is conformable on the Yass Group and comprises two formations, the predominantly pyroclastic rocks of the Laidlaw Formation and the shelf carbonates and calcareous shales of the Silverdale Formation.

The Laidlaw Formation is about 300 m thick (Brown, 1941, p. 316) and consists of a limestone member interbedded between two thick tuff members. The Euralie Limestone Member is 14.8 m thick near Hattons Corner; it is an interbedded tuffaceous shale and coralline limestone. The corals *Phaulactis shearsbyi* (Süssmilch) and *Tryplasma lonsdalei* Etheridge are abundant. The stromatoporoids *Anostylostroma* spp., *Intexodictyon* sp., *Clathrodiction* spp., *Hermatostroma* spp., and *Stromatopora typica* Rosen are common. Twenty-five species of conodonts occur in this member (Table 1). Species of the alga *Rhabdoporella* are also present. The tuff members consist mainly of fine to coarse quartzose tuffs; where reworked they are crossbedded, poorly sorted, fine to coarse tuffaceous sandstones.

The Silverdale Formation consists of the Gums Road, Bowspring, and Hume Limestone Members, the 'Barrandella' Shale Member, and the Tullerah Sandstone Member. The Gums Road Limestone Member is conglomeratic near Gums Road and Booroo Ponds Creek, but semi-nodular with shale partings and sparsely fossiliferous near Silverdale. It is 10.3 m thick at Hattons Corner. South of Hattons Creek abraded *Alveolites* spp., *Favosites* spp., and *Heliolites daintreei* Nicholson & Etheridge are abundant. Sixteen species of conodonts are described from this limestone (Table 1).

The Bowspring Limestone Member is about 30 m thick and overlies the Tullerah Sandstone Member of about 2 m thickness. Among the large coral fauna are *Cystiphyllum* spp., *Disphyllum praecox* Hill, *Mucophyllum liliforme* (Etheridge), *Phaulactis shearsbyi* (Süssmilch), *Spongophyllum* sp., *Favosites gothlandicus* Lamarck, and *Propora conferta* Etheridge & Haime. Other fossils include the brachiopods *Atrypa* spp., *Aliconchidium yassi* St Joseph, and *Pentamerus* spp., and the molluscs *Euomphalus clarkei* de Koninck and *Orthoceras* sp. Also listed by Brown (1941, p. 332) is the trilobite *Encrinurus mitchelli* Foerste. Ostracods and stromatoporoids are abundant. Thirty-two species of conodonts are recorded (Table 1), the most common genus being *Panderodus*.

Conformably overlying the Bowspring Limestone Member is the 'Barrandella' Shale Member. It is approximately 82 m thick at Humewood, where it is predominantly a shale, and 26.9 m at Silverdale, where it consists of mainly thin beds of crinoidal limestone and calcareous shales. Fossils are abundant. Among the corals are *Rhizophyllum interpunctatum* de Koninck, *Tryplasma* spp., *Favosites*

allani Jones, and *Heliolites daintreei* Nicholson & Etheridge. Polyzoans, echinoids, annelids, and stromatoporoids are present. Brachiopods in Brown's (1941) list include *Stropheodonta silverdalensis* Mitchell, *Orthotetes* spp., *Chonetes* spp., *Atrypa poidea australis* Mitchell & Dun, and spiriferids. Molluscs include *Palaeoneilo victoriae* Chapman, *Chelodes calceoloides* Etheridge, *Pleurotomaria* sp., *Bellerophon* sp., *Cyclonema* sp., and *Ophidioceras giblini* Chapman. The trilobites *Calymene australis* Etheridge & Mitchell, *Cheirurus* spp., *Encrinurus bowningensis* Foerste, and *Sphaerexochus miris* Beyrich have also been recorded. This member contains 34 species of conodonts (Table 1).

The youngest member of the group, the Hume Limestone Member, is about 6 m thick; it is conformable with the 'Barrandella' Shale Member and is a crinoidal limestone near Derrington Creek, Silverdale. The corals *Phaulactis shearsbyi* (Süssmilch), *Mucophyllum* spp., *Heliolites daintreei* Nicholson & Etheridge, and *Favosites* spp. are abundant in this unit. Spiriferid, atrypid, and stropheodontid brachiopods, molluscs, *Pleurotomaria* sp., *Loxenema* sp., and the trilobites *Encrinurus* spp., *Odontopleura bowningensis* Etheridge & Mitchell, and *Phacops* sp., occur sparingly. Conodonts are most abundant here; 45 species have been described (Table 1).

Booroo Ponds Group

The Booroo Ponds Group consists mainly of shale and siltstone, subdivided into two formations, the Black Bog Shale and the Rosebank Shale.

The Black Bog Shale comprises a shale and the interbedded abundantly fossiliferous Yarwood Siltstone Member. The fauna of the siltstone member (previously called the Lower Trilobite Bed by Mitchell in 1886) includes the coelenterates *Entelophyllum* sp. and *Pleurodictyum* spp.; and the brachiopods *Lingula* sp., *Atrypa* spp., *Dicoelosia* spp., *Isorthis* sp., *Plectodonta davidi* (Mitchell), *Leptaena* spp., *Brachyprion bendeninensis* (Mitchell), *Fardenis shearsbyi* (Dun), and *Strophochonetes* spp. Trilobites include *Calymene australis* Etheridge & Mitchell, *Ceratocephala* spp., *Encrinurus* spp., and *Proetus* spp. Conodonts, although not as abundant as in the Hume Limestone Member, are represented by 24 species (Table 1).

The uppermost beds of the Black Bog Shale consist of carbonaceous shale containing *Monograptus bohemicus* (Barrande) and *Linograptus posthumus posthumus* (Richter).

Conformably overlying the graptolitic shale is the Rosebank Shale, composed of a lower fossiliferous marl member 1 to 3 m thick and a sparsely fossiliferous upper shale member. The lower Rainbow Hill Marl Member has yielded trilobites including *Dalmanites meridianus* Etheridge & Mitchell, *Proetus* spp., *Leonaspis rattei* (Etheridge & Mitchell), and *Ceratocephala impedita* Etheridge & Mitchell (Brown, 1941). Associated with them is the diminutive coral *Streptelasma australe* (Foerste). Brachiopod species include *Plectodonta davidi* (Mitchell), *Chonetes bipartita* Chapman, *Meristella* sp., *Atrypa* spp., and spiriferids.

Monograptus formosus Bouček and an occasional valve of *Plectodonta davidi* (Mitchell) have been recorded from the lower part of the shale that conformably overlies the marl.

Barambogie Group

The Barambogie Group consists of two formations, the Cowridge Siltstone and the Elmside Formation. The Cowridge Siltstone conformably overlies the Rosebank Shale, and consists of four alternating siltstone-mudstone members totalling more than 50 m in thickness. The graptolites *Monograptus transgrediens* Perner and *Monograptus bouceki* Pribyl occur in the lower siltstone member (Jaeger, 1967, p. 281).

The Elmside Formation consists of a poorly sorted fine to medium-grained sandstone member and a mudstone which has several algal limestone lenses. Pickett (1966; 1969) noted among the corals in these lenses *Thamnopora alterivalis* Chapman, *Thamnopora boloniensis* Gosselet, and *Lyriellasma* sp. The Upper Trilobite Bed of Mitchell (1886) is believed to be at the same stratigraphic level as these algal limestones. Recorded from this bed are the trilobites *Leonaspis jenkinsi* (Etheridge & Mitchell), *Leonaspis rattei* (Etheridge & Mitchell), *Otarion* (*Otarion*) *bowningensis* (Mitchell), and *Dicranurus longispinosus* (Etheridge & Mitchell) and the brachiopods *Plectodonta davidi* (Mitchell) and spiriferids (Brown, 1941). In addition 20 species of conodonts (Table 1) from the limestone lenses are described here.

Bowning Group

Rhyolite, andesite, ignimbrite, and the Sharpeningstone Conglomerate constitute this group. Within the conglomerate beds are rounded pebbles of limestone which have yielded the corals *Tryplasma lonsdalei* Etheridge and *Phaulactis shearsbyi* (Süssmilch) and 11 species of conodonts (Table 1).

CONODONT FAUNAS

Method of Study

More than 600 spot and channel samples, each weighing between 1 and 2 kg, were collected from measured sections and from isolated outcrops where the stratigraphy was obvious. Each sample was broken into chips of about 2 to 3 cm and digested in dilute monochloroacetic acid. The residue was then sieved under water through a 200-mesh screen, and dried. A split of the heavy minerals (which included the conodonts) was obtained by the use of bromoform (S.G. 2.95). The specimens were coated with ammonium chloride and photographed on Ilford KB14 film using a Leitz Orthomat microscope camera.

Nature of the Fauna

Approximately 3800 identifiable specimens were recovered from the marls and limestones; no conodonts were obtained from shale samples. Conodont localities are shown in Figure 2. Of the 61 species belonging to 24 genera, 53 are identified to species level. One new genus, *Coryssognathus*, and four new species, *Coryssognathus dentatus*, *Drepanodus acutaconus*, *Hindeodella brevimembra*, and *Scolopodus duplicatus*, are described.

Specimens of the genus *Panderodus* constitute approximately half the conodont fauna; *Panderodus gracilis* (Branson & Mehl) dominates with almost 680 specimens, and *Panderodus unicostatus seratus* Rexroad is represented by only three speci-

mens. Other abundant genera include *Belodella*, *Distomodus*, *Hindeodella*, *Ligonodina*, *Lonchodina*, *Neoprioniodus*, *Ozarkodina*, *Plectospathodus*, and *Trichonodella*. Over 500 spathognathodids and more than 300 hindeodellids have been recovered. (The panderodids in the thin sections of limestones shown in Pl. 12 may be natural assemblages of these cones.)

Geographic Distribution

Conodonts are most prolific in the northeast of the basin (Fig. 2). The Cliftonwood Limestone, the Hume Limestone Member, and the limestone lenses of the Elmside Formation show little variation in conodont abundance throughout the basin, but there is strong geographic control of abundances in the Euralie Limestone Member, Gums Road Limestone Member, Bowspring Limestone Member, and 'Barrandella' Shale Member. Yields from the northeastern outcrops are approximately eight times as high as those from the southern outcrops. This could be related to the lithological variation; crinoidal-coral-stromatoporoid limestones predominate in the north whereas the limestones in the south are more argillaceous.

Stratigraphic Distribution

The numbers of specimens and species obtained from each lithological unit are shown in Table 1. The ranges of the conodont species recovered from the Derringgullen/Limestone Creek outcrops in the northeastern part of the Yass Basin and those for species from south of the Yass River are shown in Figures 3 and 4 respectively.

The vertical distribution of specimens in these late Silurian and early Devonian rocks is not uniform. Conodonts were recovered from only the calcareous rocks; none were obtained from the noncalcareous shales although more than sixty shale samples were processed for specimens.

The lower part of the sequence from the Cliftonwood Limestone to the Hume Limestone Member has yielded sufficient specimens for the recognition of four conodont assemblage zones. Above the Hume Limestone Member, the two thin horizons of the Yarwood Siltstone Member and the limestone lenses in the Elmside Formation have also yielded conodonts. These horizons are separated from the Hume Limestone Member and from each other by strata yielding no conodonts. A conodont fauna was also recovered from the reworked limestone pebbles in the Sharpeningstone Conglomerate.

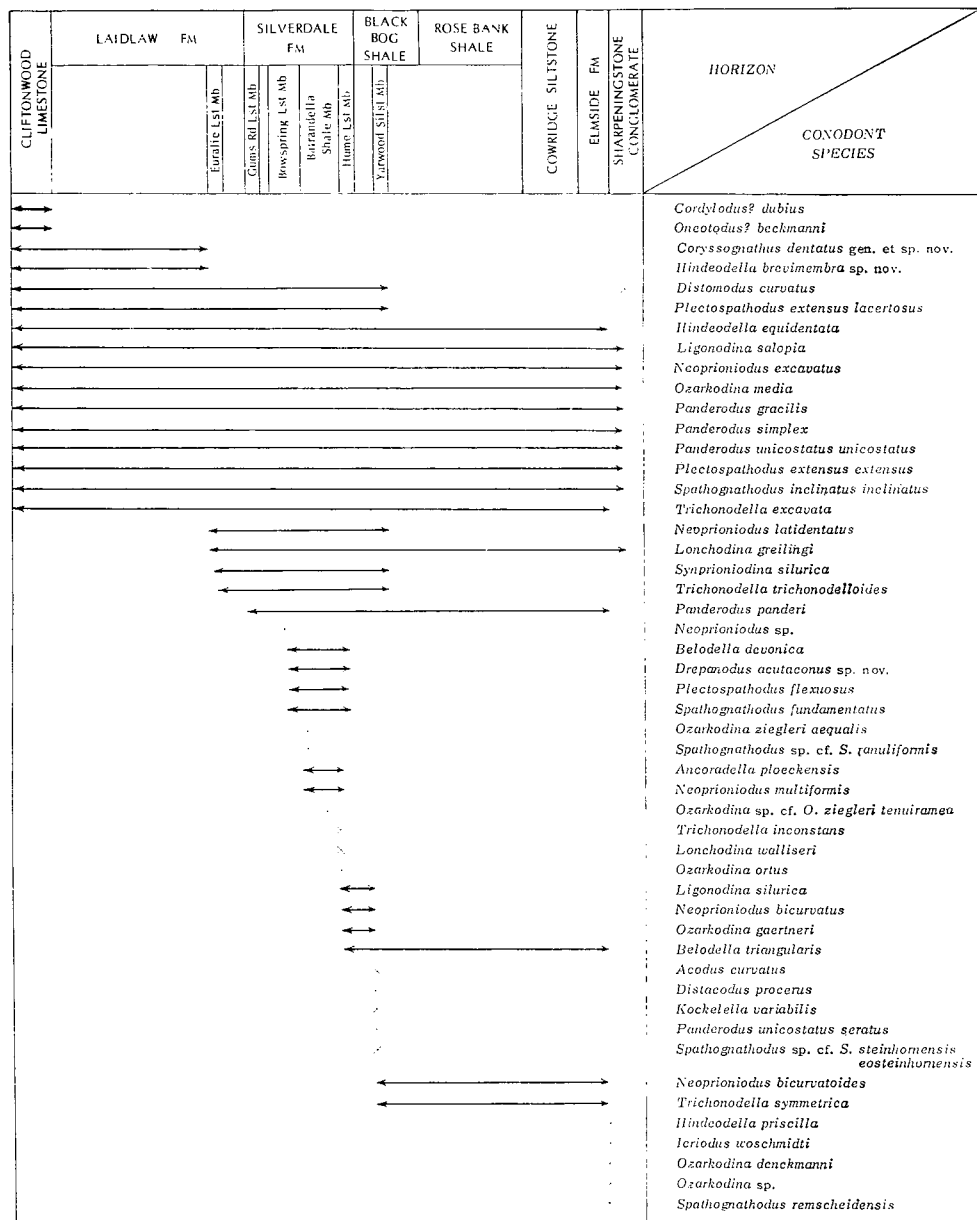
Conodont Biostratigraphic Zones

The greater part of the conodont fauna consists of simple cones, bars, and blades that are long-ranging and have, on the whole, little correlative value except within the basin itself. Of the few platform types recovered, *Ancoradella ploeckensis* Walliser, *Icriodus woschmidtii* Ziegler, and *Polygnathoides siluricus* Branson & Mehl proved to be the most useful not only for local zonation but also for intercontinental correlation.

Four conodont assemblage zones embracing the lithological units from the Cliftonwood Limestone to the Hume Limestone Member are recognized on the stratigraphic distribution of conodonts in the Derringgullen/Limestone Creek area (Fig. 3). These zones were readily established in the northeastern part of the

basin, but because fewer specimens were collected from south of the Yass River, southern assemblage zones were difficult to recognize. Zonation of the Cliftonwood Limestone is based on specimens obtained from outcrops near Cliftonwood homestead just north of Yass township.

The two younger faunas from the Yarwood Siltstone Member and the limestone lenses of the Elmside Formation as well as the fauna from reworked limestone



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Figure 4. Ranges of the conodonts in the southern part of the Yass Basin

pebbles of the Sharpeningstone Conglomerate are also discussed in this section. Although no zones have been recognized to include these horizons, the conodont faunas from these levels can be correlated with European faunas. The zones and faunas in stratigraphic order are: (1) *Neoprioniodus excavatus* Assemblage Zone, (2) *Spathognathodus* sp. cf. *S. ranuliformis* Assemblage Zone, (3) *Kockelella variabilis*-*Ancoradella ploeckensis* Assemblage Zone, (4) *Belodella triangularis*-*Polygnathoides siluricus* Assemblage Zone, (5) Fauna A from the Yarwood Siltstone Member, (6) Fauna B from the limestone lenses of the Elmside Formation, and (7) Sharpeningstone Conglomerate Fauna.

Neoprioniodus excavatus Assemblage Zone

The lower limit of this zone is not identified because the Cliftonwood Limestone overlies unfossiliferous tuffs of the Douro Volcanics, but its upper limit is clearly marked by the first occurrence of *Spathognathodus* sp. cf. *S. ranuliformis* Walliser. Included within the limits of this zone are the Cliftonwood Limestone, the barren lower tuff member of the Laidlaw Formation, and the basal 3 m of the Euralie Limestone Member.

Conodonts in this assemblage zone include *Neoprioniodus excavatus* (Branson & Mehl), *Plectospathodus extensus extensus* Rhodes, and *Ozarkodina media* Walliser. The most abundant forms are the simple cones *Panderodus unicostatus unicostatus* (Branson & Mehl) and *Panderodus simplex* (Branson & Mehl). *Oneotodus? beckmanni* Bischoff & Sannemann is confined to the Cliftonwood Limestone.

Spathognathodus sp. cf. *S. ranuliformis* Assemblage Zone.

The base of this assemblage zone is marked by the first occurrence of *Spathognathodus* sp. cf. *S. ranuliformis* Walliser; the first appearance of *Ancoradella ploeckensis* Walliser defines the base of the overlying assemblage zone. This zone occupies the lithologic interval from 3 m above the base of the Euralie Limestone Member to 8 m above the base of the Bowspring Limestone Member. Encompassed within this interval are the upper 6 m of the Euralie Limestone Member, the two uppermost tuff members of the Laidlaw Formation, the Gums Road Limestone Member, and the basal 8 m of the Bowspring Limestone Member.

Species in this zone include *Hindeodella equidentata* Rhodes, *Ligonodina salopia* Rhodes, *Spathognathodus inclinatus inclinatus* (Rhodes), *Lonchodina greilingi* Walliser, and *Trichonodella excavata* (Branson & Mehl). *Spathognathodus primus* (Branson & Mehl) and *Scolopodus duplicatus* sp. nov. are distinctive forms in the fauna.

Kockelella variabilis-*Ancoradella ploeckensis* Assemblage Zone

The base of this zone is marked by the first occurrence of *Ancoradella ploeckensis* Walliser; the top is just below the first occurrence of *Polygnathoides siluricus* Branson & Mehl. The middle and upper beds of the Bowspring Limestone Member, the 'Barrandella' Shale Member, and 0.6 m of the basal beds in the Hume Limestone Member are included in the zone.

Kockelella variabilis Walliser, *Synprioniodina silurica* Walliser, and *Ozarkodina gaertneri* Walliser are diagnostic forms; and long-ranging species such as *Lonchodina walliseri* Ziegler, *Neoprioniodus multififormis* Walliser, and *Hindeodella equidentata* Rhodes are common. Important first occurrences are *Belodella triangularis* (Stauffer), *Plectospathodus flexuosus* Branson & Mehl, *Spathognathodus fundamentatus* Walliser, and *Polygnathoides emarginatus* (Branson & Mehl).

Belodella triangularis-*Polygnathoides siluricus* Assemblage Zone

The initial occurrence of *Polygnathoides siluricus* Branson & Mehl defines the base; the top of the zone is not identified. The beds in the Hume Limestone Member above 0.6 m are included in this zone; the upper limit, however, is not recognized because the shale member conformably overlying the Hume Limestone Member yielded no conodonts and the character of the next stratigraphically higher conodont fauna is different. The largest number of specimens and species were recovered from the crinoid-coral-stromatoporoid limestones, and the least from the muddy limestones.

Among the species described are *Polygnathoides emarginatus* (Branson & Mehl), *Spathognathodus fundamentatus* Walliser, *Ozarkodina typica* Branson & Mehl, and *Kockelella variabilis* Walliser. Some of the most common species, in addition to the simple panderodid cones, are *Spathognathodus inclinatus inclinatus* (Rhodes), *Ozarkodina media* Walliser, *Belodella triangularis* (Stauffer), *Plectospathodus extensus extensus* Rhodes, and *Hindeodella equidentata* Rhodes.

Yarwood Siltstone Member Fauna (Fauna A)

This fauna, which is less than half the size of that in the underlying *Belodella triangularis*-*Polygnathoides siluricus* Assemblage Zone, is dominated by long-ranging panderodids. *Hindeodella equidentata* Rhodes, *Ligonodina salopia* Rhodes, *Ozarkodina media* Walliser, and *Spathognathodus inclinatus inclinatus* (Rhodes) are the most common blades.

Noticeably absent are the index form and most of the important species of the lower *Belodella triangularis*-*Polygnathoides siluricus* Assemblage Zone; that is, *Polygnathoides siluricus* Branson & Mehl, *Spathognathodus* sp. cf. *S. ranuliformis* Walliser, *Ancoradella ploeckensis* Walliser, *Kockelella variabilis* Walliser, *Spathognathodus fundamentatus* Walliser, and *Polygnathoides emarginatus* (Branson & Mehl). Although relatively common in the lower zone, they are absent from the conodont fauna of the Yarwood Siltstone Member despite the fact that it is only 15 to 28 m above the abundantly conodont-bearing Hume Limestone Member of the *Belodella triangularis*-*Polygnathoides siluricus* Assemblage Zone.

Elmside Formation Fauna (Fauna B)

Twenty species were recovered from the algal limestone lenses in the upper mudstone member of the Elmside Formation. Species in this fauna, which are also present in older strata of the Basin, include *Belodella triangularis* (Stauffer), *Hindeodella equidentata* Rhodes, *Ligonodina salopia* Rhodes, *Lonchodina greilingi* Walliser, *Ozarkodina media* Walliser, *Plectospathodus extensus extensus* Rhodes, *Spathognathodus inclinatus inclinatus* (Rhodes), and *Trichonodella excavata* (Branson & Mehl). The diagnostic species not recorded from older strata are *Icriodus woschmidtii* Ziegler, *Ozarkodina denckmanni* Ziegler, and *Spathognathodus remscheidensis* Ziegler.

Sharpeningstone Conglomerate Fauna

Conodonts from reworked limestone pebbles of the Sharpeningstone Conglomerate include *Distomodus curvatus* Rhodes, *Ligonodina salopia* Rhodes, *Lonchodina greilingi* Walliser, *Neoprioniodus excavatus* (Branson & Mehl), *Ozarkodina media* Walliser, *Panderodus gracilis* (Branson & Mehl), *Panderodus simplex* (Branson & Mehl), *Panderodus unicostatus unicostatus* (Branson & Mehl), *Plecto-*

spathodus extensus extensus Rhodes, *Spathognathodus inclinatus inclinatus* (Rhodes), and *Trichonodella inconstans* Walliser.

CORRELATIONS

Conodont faunas and assemblage zones noted in the measured sections and supplementary outcrops of the Silverdale and Derringullen Creek area are compared with the local faunas and zones erected in a similar manner for occurrences in the southern part of the Yass Basin (south of the Yass River). The Yass Basin reference sequence at Silverdale is compared with the classic sequence of Walliser (1964) in Southern Austria and with other intercontinental conodont occurrences.

LOCAL CORRELATIONS

As less than 20 percent of the total conodont recovery was from the southern part of the Yass Basin, comparison with the conodont zones and faunas of the northeastern part of the basin is difficult and must await further collection of specimens. A plot (Fig. 4) of the local ranges reveals, however, that some or parts of some of the northern zones are recognizable in the south but that the zones may cross some of the lithostratigraphic boundaries. For instance, the conodont fauna south of the Yass River in the Cliftonwood Limestone to just above the base of the 'Barrandella' Shale Member is similar to that in the *Neoprioniodus excavatus* Assemblage Zone defined in the northeastern part of the basin. Among the species that are included in the northern fauna but absent in this southern fauna are *Lonchodina detorta* Walliser, *Spathognathodus primus* (Branson & Mehl), and *Neoprioniodus multiformis* Walliser. In addition, the conodont fauna from just above the 'Barrandella' Shale Member to the Hume Limestone Member strongly resembles that in the *Spathognathodus* sp. cf. *S. ranuliformis* Assemblage Zone recognized in the northern outcrops.

Thus many of the species that are considered to be diagnostic forms of the northern assemblage zones are stratigraphically higher in the southern sequence (Figs 3 and 4). This apparent diachronism may only be the result of poor conodont recovery from south of the Yass River; and furthermore, geographic isolation of certain conodont organisms may also give rise to an apparent lack of resemblance in conodont faunas in spite of a general lithological similarity of strata. Further collecting from southern outcrops may elucidate this apparent diachronism within the Yass Basin.

INTERNATIONAL CORRELATIONS

Cellon Section, Austria

Silurian conodont stratigraphy advanced considerably with the publication of Walliser's (1964) conodont zonation for the Carnic Alps section in Austria. Walliser's Silurian conodont zones have been recognized not only in North America (e.g. Rexroad & Richard, 1965), but also in Southeast Asia (e.g. Igo & Koike, 1968) and now in Australia. After a very extensive collection of conodonts from measured section at Cellon in Austria, Walliser erected a conodont zonation and correlated the zones with classic European graptolite sequences. These European conodont zones and some of their important guide species are shown in Table 2. The fauna of each of the four Yass Basin conodont assemblage zones and the three conodont horizons are compared with the European standard section at

Cellon (Fig. 5) and with faunas described or listed from North America, Asia, Australia, North Africa, and Europe (Fig. 6).

The lowest Yass zones, that is, the *Neoprioniodus excavatus* and *Spathognathodus* sp. cf. *S. ranuliformis* Assemblage Zones, are tentatively correlated with

TABLE 2

CELLON ZONES	----- INDEX AND GUIDE SPECIES
<i>woschmidti</i>	<i>Icriodus woschmidti</i> Ziegler 1960 <i>Spathognathodus steinhornensis remscheidensis</i> Ziegler 1960
<i>eosteinhornensis</i>	<i>Spathognathodus steinhornensis eosteinhornensis</i> Walliser 1964
<i>crispus</i>	<i>Spathognathodus crispus</i> Walliser 1964
<i>latialatus</i>	<i>Icriodus latialatus</i> Walliser 1964
<i>siluricus</i>	<i>Polygnathoides siluricus</i> Branson & Mehl 1933
<i>ploeckensis</i>	<i>Ancoradella ploeckensis</i> Walliser 1964
<i>crassa</i>	<i>Ozarkodina crassa</i> Walliser 1964
<i>sagitta</i>	<i>Spathognathodus sagitta sagitta</i> Walliser 1964 <i>Ozarkodina edithae</i> Walliser 1964
<i>patula</i>	<i>Kockelella patula</i> Walliser 1964 <i>Ozarkodina ziegler aequalis</i> Walliser 1964 <i>Synprioniodina silurica</i> Walliser 1964
<i>amorphognathoides</i>	<i>Pterospathodus amorphognathoides</i> Walliser 1964 <i>Ozarkodina gaertneri</i> Walliser 1964
<i>celloni</i>	<i>Spathognathodus celloni</i> Walliser 1964 <i>Ozarkodina adiutricis</i> Walliser 1964
Bereich 1	<i>Ambalodus triangularis</i> Branson & Mehl 1933 <i>Amorphognathus</i> sp. nov. Walliser 1964

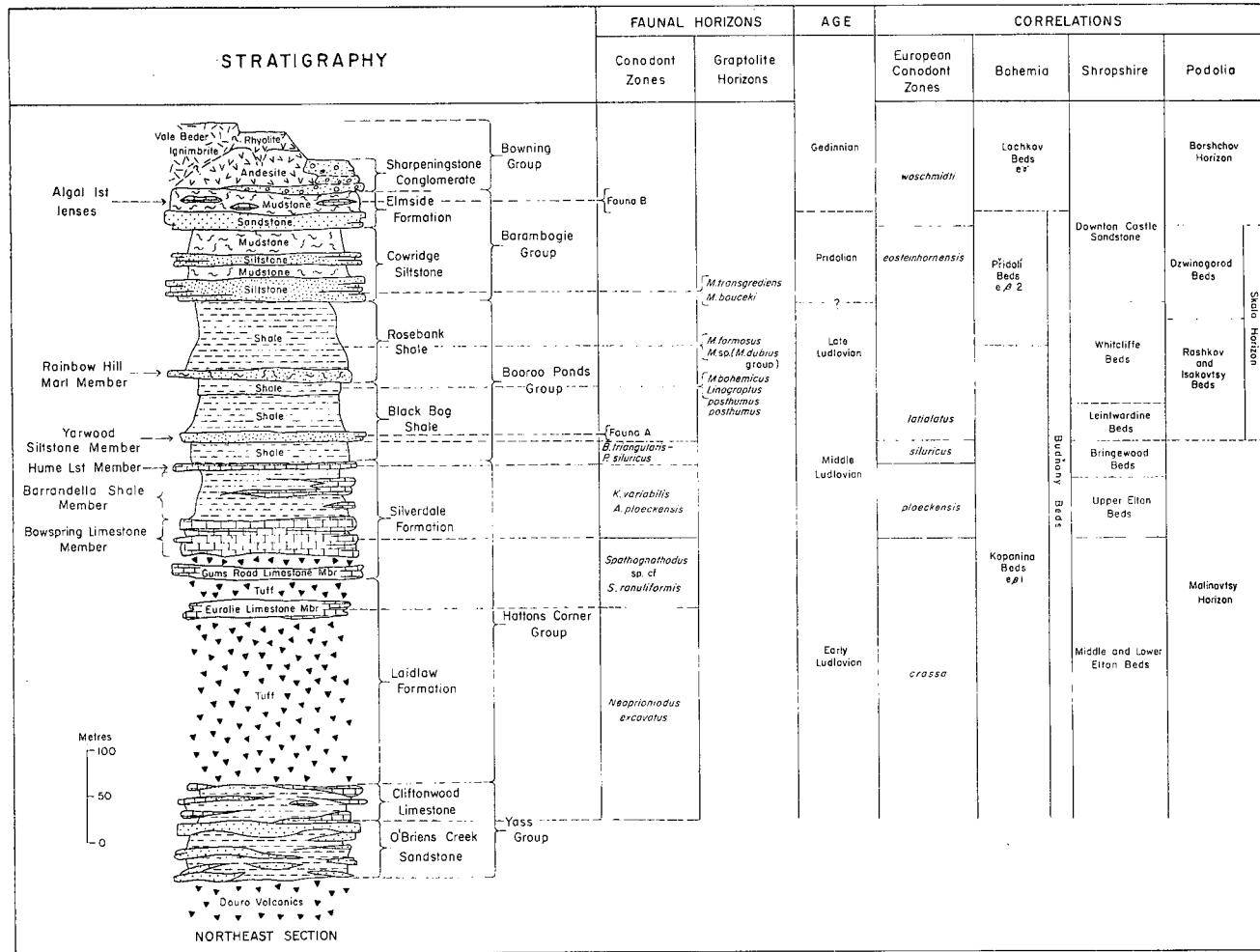


Figure 5. Conodont-graptolite horizons, age, and correlations

Walliser's (1964) *crassa* Zone in the Cellon section, Austria. The upper limits of both the *Spathognathodus* sp. cf. *S. ranuliformis* Assemblage Zone of Yass and the *crassa* Zone of Cellon are marked by the first occurrence of *Ancoradella ploeckensis* Walliser. Although the fauna of the lower *Neoprioniodus excavatus* Assemblage Zone consists of long-ranging species and does not contain *Ozarkodina crassa* Walliser, this zone is tentatively correlated with the lower part of the *crassa* Zone.

The presence of *Neoprioniodus excavatus* (Branson & Mehl), which ranges from not lower than the base of the *crassa* Zone, indicates that the *Neoprioniodus excavatus* Assemblage Zone is no lower than the European *crassa* Zone. Furthermore, the absence of *Spathognathodus sagitta sagitta* Walliser and *Ozarkodina edithae* Walliser from this assemblage zone suggests that the lowest Yass assemblage zone is higher than the European *sagitta* Zone. (*Spathognathodus sagitta sagitta* Walliser is recorded from the lowest basal beds within the Austrian *crassa* Zone.)

Although the *Spathognathodus* sp. cf. *S. ranuliformis* Assemblage Zone is composed mainly of long-ranging species and does not have the index species *Ozarkodina crassa* Walliser it is correlated with the upper part of Walliser's *crassa* Zone because: (1) most of the species of the Cellon *crassa* Zone are present in the Yass assemblage zone, (2) both the Australian and European zones are conformably overlain by strata bearing forms assigned to the correlatable *Kockelella variabilis*-*Ancoradella ploeckensis* and the *ploeckensis* Zones.

As the European *crassa* Zone is equivalent to Elles & Woods' graptolite zones 33 to 35 (Walliser, 1964, p. 94), the *Neoprioniodus excavatus* and *Spathognathodus* sp. cf. *S. ranuliformis* Assemblage Zones are equivalent to the lower part of the Kopanian stage of Bohemia.

The *Kockelella variabilis*-*Ancoradella ploeckensis* Assemblage Zone is correlated with the Austrian *ploeckensis* Zone because the lower limits of both these zones are recognized at the first appearance of *Ancoradella ploeckensis* Walliser and the upper limits at the first occurrence of *Polygnathoides siluricus* Branson & Mehl. Apart from *Ozarkodina ziegleri ziegleri* Walliser all the species in the European *ploeckensis* Zone are common to the Australian zone. The Yass fauna contains *Belodella triangularis* (Stauffer), *Ozarkodina gaertneri* Walliser, and *Spathognathodus* sp. cf. *S. ranuliformis* Walliser which are absent from the Austrian fauna. The Cellon *ploeckensis* Zone is equated by Walliser (1964, p. 94) with graptolite zones 34 to 36 of Elles & Woods and is shown to be equivalent to the middle of the Kopanian stage of Bohemia. Therefore, the *Kockelella variabilis*-*Ancoradella ploeckensis* Assemblage Zone is also equivalent to the same portion of the Kopanian stage.

The *Belodella triangularis*-*Polygnathoides siluricus* Assemblage Zone is correlated with Walliser's *siluricus* Zone. At Cellon this zone coincides with the range zone of *Polygnathoides siluricus* Branson & Mehl. The lower limit of the Australian zone is also established at the appearance of *Polygnathoides siluricus* Branson & Mehl. Because the upper limit of the Yass Basin zone cannot be determined, no correlation with the upper part of Walliser's Zone is attempted. Furthermore, as the top of the European *siluricus* Zone is at the first occurrence of *Icriodus latialatus* Walliser and as this species has not been found at Yass, the equivalence of Walliser's *siluricus*-*latialatus* Zone boundary cannot be established in the basin with certainty. Nevertheless, the entire fauna of 19 species in the Cellon *siluricus* Zone occurs in the Yass *Belodella triangularis*-*Polygnathoides siluricus* Assemblage Zone. Among the additional species in the Australian fauna, which contains almost twice as

many species as that at Cellon, are *Belodella triangularis* (Stauffer), *Ozarkodina crassa* Walliser, *Ozarkodina gaertneri* Walliser, and *Spathognathodus* sp. cf. *S. ranuliformis* Walliser. Because the Austrian *siluricus* Zone is equivalent to the upper part of the Kopaninian stage of Bohemia, the *Belodella triangularis*-*Polygnathoides siluricus* Assemblage Zone is therefore also equivalent to the same part of this Bohemian stage.

The fauna of the Yarwood Siltstone Member is tentatively correlated with that of Walliser's *latialatus* Zone. Among the forms common to both the *siluricus* and *latialatus* Zones are *Ligonodina salopia* Rhodes, *Ligonodina silurica* Branson & Mehl, *Spathognathodus inclinatus inclinatus* (Rhodes), and *Trichonodella excavata* (Branson & Mehl). *Icriodus latialatus* Walliser, the index fossil in the Austrian *latialatus* Zone, is absent, however, from these siltstones. Important species of the *siluricus* Zones of both sections such as *Spathognathodus fundamentatus* Walliser, *Polygnathoides emarginatus* (Branson & Mehl), and *Polygnathoides siluricus* Branson & Mehl are absent not only from the Austrian *latialatus* Zone but also from the Yarwood Siltstone Member fauna.

The fauna of the algal limestone lenses of the Elmside Formation is correlated with that of the European *woschmidtii* Zone. *Hindeodella priscilla* Stauffer, *Icriodus woschmidtii* Ziegler, *Ozarkodina denckmanni* Ziegler, *Spathognathodus remscheidensis* Ziegler, and *Trichonodella symmetrica* (Branson & Mehl) are common to both the Yass and Cellon faunas. *Belodella triangularis* (Stauffer) and *Ozarkodina media* Walliser are abundant at Yass but absent at Cellon. Walliser shows the Cellon *woschmidtii* Zone to be equivalent to the Lochkovian stage of Bohemia.

The fauna of the reworked limestone pebbles in the Sharpeningstone Conglomerate consists of long-ranging forms that can be broadly correlated with those of Walliser's *crassa*, *ploeckensis*, and *siluricus* Zones. The presence of *Neoprioniodus excavatus* (Branson & Mehl) in the pebbles establishes the oldest limit as that of the lowest part of the European *crassa* Zone: *Distomodus curvatus* Rhodes fixes the youngest limit as that of the *siluricus* Zone. Therefore, the conodont fauna in the pebbles of the Sharpeningstone Conglomerate can be correlated with the same Cellon zones as the faunas of the *Neoprioniodus excavatus*, *Spathognathodus* sp. cf. *S. ranuliformis*, *Kockelella variabilis*-*Ancoradella ploeckensis*, and *Belodella triangularis*-*Polygnathoides siluricus* Assemblage Zones lower in the Yass succession.

Other Conodont Occurrences

Igo & Koike (1968) described 10 conodont species, including *Kockelella variabilis* Walliser, *Ligonodina elegans* Walliser, and *Plectospathodus extensus extensus* Rhodes, from the Upper Setul Limestone of the Langkawi Islands of Malaya. They correlated this conodont fauna with that in Walliser's *crassa* Zone and stated that the conodont horizon 'represents a higher part of the Wenlock or the lowermost Ludlow' (1968, p. 5). As this fauna could also be correlated with Walliser's *ploeckensis* and *siluricus* Zones, only a tentative correlation (Fig. 6) is here proposed with the lower Yass Zones from *Neoprioniodus excavatus* to *Belodella triangularis*-*Polygnathoides siluricus* Assemblage Zones.

No faunal list accompanies Rexroad & Richard's (1965) zonation of the Goat Island Member, Niagara Gorge. Nevertheless, on the presence of *Plectospathodus extensus extensus* Rhodes and the absence of *Spathognathodus sagitta sagitta* Walliser in this member, they correlate the upper part of the Goat Island

Member with the Cella *crassa* Zone, and place a latest Wenlockian age on the member. As Walliser had correlated his *crassa* Zone with earliest Ludlovian graptolite zones, the age Rexroad & Richard place on the Goat Island Member seems to be slightly older than the conodonts of this member indicate.

Reichstein (1962) described an early Ludlovian fauna containing *Kockelella variabilis* Walliser in association with *Monograptus chimaera* Barrande and *Monograptus pazdroi* Urbanek of the 34/35 Elles & Woods graptolite zones from Rügen, Germany. The Rügen Beds are therefore equivalent to the strata in the upper part of the *Spathognathodus* sp. cf. *S. ranuliformis* Assemblage Zone and the lower part of the overlying *Kockelella variabilis*-*Ancoradella ploeckensis* Assemblage Zone.

One African and several other European conodont faunas can be broadly correlated with those of the Yass Basin. These faunas were obtained from the Carnic Alps of Italy (Serpagli & Greco, 1964); Sardinia (Serpagli, 1967); East Serbia (Spasov & Veselinović, 1963); Malaga Beds of Spain (Kockel, 1958); and Spanish Sahara (Ethington & Furnish, 1962). Although Spasov & Veselinović (1963, p. 242) suggested an upper Ludlovian age for limestones in East Serbia, they concluded that the fauna contained Silurian and Devonian elements. Their conclusions were based on the joint occurrence of the Devonian *Spathognathodus wurmi* Bischoff & Sannemann and the middle to early late Ludlovian *Spathognathodus fundamentatus* Walliser. These species in the one fauna certainly suggest a possible mixing of conodont faunas of different ages. The presence of *Kockelella variabilis* Walliser and *Spathognathodus fundamentatus* Walliser in the conodont fauna from limestones of the Spanish Sahara (Ethington & Furnish, 1962) indicates an equivalence in age of these limestones with the Yass *Kockelella variabilis*-*Ancoradella ploeckensis* and *Belodella triangularis*-*Polygnathoides siluricus* Assemblage Zones.

The *Kockelella variabilis*-*Ancoradella ploeckensis* Assemblage Zone contains several species that are also present in the fauna from Col di Mezzo, Camp. CT426 and Cima del Monte Cocco, Camp. CT289 of the Carnic Alps, Italy. Manzoni (1965) correlated the CT426 fauna with Walliser's *ploeckensis*-*siluricus* Zones and the CT289 fauna with the *ploeckensis* Zone. He fixed the lower limit of the CT426 fauna on the presence of *Neoprioniodus latidentatus* Walliser, which had been recorded in strata no older than the *ploeckensis* Zone. With the occurrence of this species at the top of the Yass *Neoprioniodus excavatus* Assemblage Zone the CT426 fauna is also correlatable with the middle of Walliser's *crassa* Zone as well as the *ploeckensis* and *siluricus* Zones. That is, the CT426 fauna is equivalent to those of the upper part of the Yass *Neoprioniodus excavatus*, *Spathognathodus* sp. cf. *S. ranuliformis*, *Kockelella variabilis*-*Ancoradella ploeckensis*, and the *Belodella triangularis*-*Polygnathoides siluricus* Assemblage Zones. Fahraeus (1967; 1969) recorded a conodont fauna including the index species *Ancoradella ploeckensis* Walliser from the Middle Hemse Beds of Gotland. Therefore, the Hemse Beds are equivalent to those in the *Kockelella variabilis*-*Ancoradella ploeckensis* Assemblage Zone.

The conodont fauna of the *Belodella triangularis*-*Polygnathoides siluricus* Assemblage Zone is similar to that of the upper Bringewoodian Aymestry Limestone of Shropshire described by Rhodes (1953), and Rhodes & Newall (1963); and to the Upper Hemse Beds and Lower Eke Beds of Gotland described by Fahraeus (1967; pers. comm. 1969). Common to the Aymestry Limestone and the Yass faunas are *Kockelella variabilis* Walliser and *Ozarkodina typica* Branson & Mehl;

the ranges of these species overlap only in the *siluricus* Zone. The Yass zone fossil *Polygnathoides siluricus* Branson & Mehl is also present in the mid-Upper Hemse Beds, which have been correlated by Fahraeus with Walliser's *siluricus* Zone. He regards the age of these beds to be early late Ludlovian.

The fauna of the Yarwood Siltstone Member is similar to that in the Upper Eke Beds of Gotland. These faunas lack the zone species *Icriodus latialatus* Walliser; nevertheless, the faunas of the Upper Eke Beds and the Yarwood Siltstone are correlated with that of Walliser's *latialatus* Zone because both (a) contain many common forms; (b) lack forms such as *Spathognathodus fundamentatus* Walliser, *Kockelella variabilis* Walliser, *Polygnathoides emarginatus* (Branson & Mehl), and *Polygnathoides siluricus* Branson & Mehl which are not recorded above Walliser's *siluricus* Zone; and (c) immediately overlie rocks containing *siluricus* Zone faunas. Fahraeus (pers. comm., 1969) regards the Eke Beds as middle late Ludlovian in age.

Philip (1969) has described a conodont fauna from the Dirk Hartog Formation, Western Australia. Because none of Walliser's index forms are present he assigned a broad Ludlovian age to this formation. With the occurrence of *Spathognathodus fundamentatus* Walliser, *Neoprioniodus latidentatus* Walliser, *Neoprioniodus bicurvatus* (Branson & Mehl), *Spathognathodus primus* (Branson & Mehl), and *Trichonodella symmetrica* (Branson & Mehl), the Dirk Hartog Formation has faunal elements similar to those occurring in the Yass *Belodella triangularis*-*Polygnathoides siluricus* Assemblage Zone in the Hume Limestone Member and Fauna A of the Yarwood Siltstone Member. Therefore, the Dirk Hartog Formation is tentatively considered to be correlatable with the stratigraphic interval represented by the Hume Limestone and Yarwood Siltstone Members.

The conodont fauna of the algal limestone lenses in the Elmside Formation is correlated with similar faunas described from:

(i) Remscheid Sattels of Germany. Ziegler (1960) reported *Icriodus woschmidtii* Ziegler, *Spathognathodus remscheidensis* Ziegler, and *Ozarkodina denckmanni* Ziegler and assigned the strata a Gedinian age.

(ii) 'ey' Kalk of Southern Austria. Schulze (1968) described a lower Gedinian fauna which has, in addition to the species in the Yass fauna, *Spathognathodus steinhornensis* Ziegler, *Spathognathodus primus* (Branson & Mehl), *Lonchodina serbica* Schulze, and *Lonchodina detorta* Walliser.

(iii) Tentaculite Limestone of Thuringia. Jentzsch (1962) reported *Ozarkodina denckmanni* Ziegler in the fauna.

(iv) Tajna, Mitkov, and Bogdanovka Beds, Borshkov Horizon of Podolia. The fauna at the lower boundary of the Tajna beds includes the graptolite *Monograptus uniformis angustidens* Pribyl, the conodonts *Icriodus woschmidtii* Ziegler and *Spathognathodus remscheidensis* Ziegler, and the trilobite *Warburgella rugulosa* Alth. Nikiforova & Predtechenskij (1968, p. 28) considered the Mitkov Beds containing *Icriodus woschmidtii* Ziegler, *Spathognathodus remscheidensis* Ziegler, and *Ozarkodina denckmanni* Ziegler, as faunally similar to the lower Gedinian of Belgium, the Hüinghauser beds of West Germany, and the lower Lochkov of Czechoslovakia. These conodonts also occur in the Bogdanovka Beds.

(v) Ohesaare Beds of Gotland-Estonia. Fahraeus (pers. comm., 1969) noted *Spathognathodus remscheidensis* Ziegler. Underlying these beds is the Beyrichienkalk, which has yielded the last of *Spathognathodus steinhornensis eosteinhornensis*

Walliser in the Gotland sequence and is thus the highest unit of this sequence referable to Walliser's *eosteinhornensis* zone.

(vi) Cima del Monte Cocco, Camp. CA211. Manzoni (1965) recovered *Hindeodella priscilla* Stauffer and *Icriodus woschmidtii* Ziegler.

(vii) Nowshera Reef Limestone, West Pakistan. Barnett et al. (1966) assigned this limestone, which contains *Spathognathodus remscheidensis* Ziegler, a late Silurian to early Devonian age. No guide forms distinctive of stages younger than Gedinnian are included in this conodont fauna.

(viii) Sutherland River Formation, Devon Island, Canada. The conodont fauna includes *Spathognathodus canadensis* Walliser (a name which 'should be considered as a junior synonym for *Spathognathodus remscheidensis*', Clark & Ethington, 1966, p. 668), and according to Walliser (*in* Boucot et al., 1960, p. 21), 'appears to be of high upper Ludlovian age'. Because the conodont fauna of the Sutherland River Formation is similar to that in the Tentaculite Limestone of Thuringia, the Ohesaare Beds of Gotland, and the Mitkov and Bogdanovka Beds of Podolia, the Sutherland River Formation is more likely to be equivalent to these early Gedinnian European strata.

(ix) *Gypidula* cf. *pelagica* unit at Royal Creek, Yukon Territory. *Icriodus woschmidtii* Ziegler and *Spathognathodus remscheidensis* Ziegler occur in this unit (Klapper, 1969).

(x) Upper Roberts Mountain Formation, Nevada. The 902-foot level is correlated with the *Gypidula* cf. *pelagica* unit by Klapper (1969) on the icriodid pieces that 'are probably fragments of *Icriodus woschmidtii*' (*in* Johnson, Boucot, & Murphy, 1967, p. 684). *Icriodus woschmidtii* Ziegler and *Spathognathodus remscheidensis* Ziegler occur at the 1284-foot level. Clark & Ethington (1966, p. 668) attributed a 'probable' late Gedinnian age to the unnamed interval overlying the Roberts Mountain Formation from which they recorded *Spathognathodus remscheidensis* Ziegler, *Spathognathodus wurmi* Bischoff & Sannemann, and *Ozarkodina denckmanni* Ziegler.

(xi) Mount Holly Beds, Yarrol Basin, Queensland. *Icriodus woschmidtii* Ziegler and *Spathognathodus remscheidensis* Ziegler occur in the lower limestone horizon (Druce & Wilson, 1967, p. 190).

(xii) Nemingha Limestone, northern New South Wales. Philip & Pedder (1967, p. 1036) placed an early Gedinnian age on these limestones on the mega-fossil fauna and the presence of *Icriodus woschmidtii* Ziegler.

AGE OF THE YASS BASIN STRATA

Between 1940 and the present conodont study, ages assigned to the rocks of the Yass Basin have been based on coral, brachiopod, and graptolite evidence. From a study of the rugose corals, Hill (1940, p. 338) correlated the limestones of the lower part of the Hume Series with those of the top of the Wenlockian and the base of the Ludlovian of England. Brown (1941, p. 335) assigned a late Silurian age to the Hume Series and in 1948 (p. 200), after redescribing the brachiopod *Plectodonta davidi* (Mitchell), concluded that the presence of this brachiopod 'confirms the evidence of the associated fauna of the Upper Silurian (possibly Ludlow) age of the Upper Trilobite Bed at Bowning, N.S.W.'

The most recent graptolite study (Jaeger, 1967) revealed several species occurring in the middle part of Brown's (1941) Hume Series, that is, in the Black

Bog Shale, Rosebank Shale, and Cowridge Siltstone (Fig. 1). On the presence of *Monograptus bohemicus* (Barrande) and *Linograptus posthumus posthumus* (Richter), he placed a late Ludlovian age on the uppermost shale beds of the Black Bog Shale. A late Ludlovian age was given to the green shale containing *Monograptus formosus* Bouček about 30 metres above the Middle Trilobite Bed and on the occurrence of *Monograptus bouceki* Pribyl and *Monograptus transgrediens* Perner a late late Ludlovian-Downtonian age was placed on the lowest siltstones of the Hume Series.

Mainly on the evidence of the coral *Lyriolasma* sp. in limestone lenses at the top of the Hume Series, Pickett (1966) concluded that the coral 'clearly indicates a Lower Devonian age'. In 1969 (p. 2) he suggested 'a Lochkovian age (Siegenian-Gedinnian)' for these limestones.

The present conodont study broadly substantiates the findings of workers since 1940. Because of the generally exceptionally good correlation between the Australian conodont faunas and those of the European classical sections, an early early Ludlovian (earliest $e\beta 1$) age is assigned to the *Neoprioniodus excavatus* Assemblage Zone fauna and a mid-late early Ludlovian (early $e\beta 1$) age is placed on the *Spathognathodus* sp. cf. *S. ranuliformis* Assemblage Zone fauna. Therefore, the stratigraphic interval from the base of the Cliftonwood Limestone to 7.8 m above the base of the Bowspring Limestone Member in the northeastern part of the Yass Basin is early Ludlovian in age. The excellent correlation between the Australian *Kockella variabilis-Ancoradella ploeckensis* Assemblage Zone and the Austrian *ploeckensis* Zone permits a late early Ludlovian to middle Ludlovian age (mid $e\beta 1$) to be assigned to the fauna of this Yass zone and hence this age to the strata from the middle and upper beds of the Bowspring Limestone Member, the 'Barrandella' Shale Member, and the basal beds of the Hume Limestone Member. The upper beds of the Hume Limestone Member are late middle Ludlovian (early late $e\beta 1$) in age on the evidence of the excellent correlation between the Yass *Belodella triangularis-Polygnathoides siluricus* Assemblage Zone and the Cellon *siluricus* Zone. The conodont-bearing Yarwood Siltstone Member is considered to be early late Ludlovian (late $e\beta 1$), while the limestone lenses of the Elmside Formation are concluded to be early Gedinnian ($e\gamma$) in age on the occurrence of the distinctive *Icriodus woschmidti* Ziegler and *Spathognathodus remscheidensis* Ziegler, diagnostic forms of Walliser's *woschmidti* Zone. Although the reworked limestone pebbles in the Sharpeningstone Conglomerate contain conodonts assignable to the four Yass assemblage zones and were thus derived from limestone outcrops of early to middle Ludlovian age, the stratigraphic position of this conglomerate 1 to 3 m above the lenses clearly demonstrates a post-algal-limestone-lens age for these overlying rudaceous deposits. Andesite and rhyolite boulders of the same petrographic composition as the andesites and rhyolite of the Mount Bowning-Mount Stumpy igneous rock outcrops also occur in the Sharpeningstone Conglomerate. Therefore, the age of the Bowning Group, which appears in the northern outcrops to be in part conformable with the Elmside Formation, is also considered to be early Gedinnian in age.

The Silurian-Devonian Boundary in the Yass Basin

Since 1839, when Murchison first systematically studied the strata in the Welsh Borderland, there has been much vigorous and sometimes heated debate on the placement of the boundary between the Silurian and Devonian Systems. Murchison had observed the lithofacies change near the top of the Silurian sequence

and in 1854 regarded the top of the Downton Castle Sandstone as the upper limit of the Silurian System. But since 1920, due initially to the work of Stamp, the boundary has been considered by many geologists as being at the base of the Ludlow Bone Bed. Because of the gradual change from marine to nonmarine rock near this horizon, the Silurian-Devonian boundary has been difficult to recognize outside the British type area.

At a symposium in Prague in 1958 it was suggested that the boundary coincide with the final occurrence of *Monograptus hercynicus* in Bohemia. But subsequent brachiopod (Boucot & Pankowskyj, 1962), trilobite (Alberti, 1963), and conodont (Walliser, 1960) studies have revealed that some of the Bohemian strata contain Gedinnian forms of these groups. After correlating the conodont zones of Cellon in southern Austria with the well-recognized European graptolite zones, Walliser (1964) was able to demonstrate that the *woschmidtii* conodont zone is earliest Gedinnian in age. The base of this zone and the first occurrence of *Monograptus uniformis* is regarded by Holland (1965), Bouček, Horny, & Chlupac (1966), and Jackson (1966) as the Silurian-Devonian boundary.

Accepting this definition of the boundary for the present and observing that the Pridolian graptolites *Monograptus bouceki* and *Monograptus transgrediens* occur in the basal units of the Cowridge Siltstone (Fig. 5) and that the conodont *Icriodus woschmidtii* occurs in the limestone lenses of the Elmside Formation, the boundary between the Silurian and Devonian Systems in the Yass Basin is within the Barambogie Group. It is probably close to the contact between the Cowridge Siltstone and the Elmside Formation.

SUMMARY AND CONCLUSIONS

To date, no zonation of Silurian conodonts in eastern Australia has been presented and only a few studies of Gedinnian forms have been published. The present investigation presents a description and zonation of the Ludlovian to Gedinnian conodonts of the Yass Basin, together with intercontinental correlations of the zones.

The stratigraphic ranges of all conodont species in this area are shown on Figures 3 and 4. The previously known ranges of *Cordylodus ? dubius* Rhodes, *Distomodus curvatus* Rhodes, *Oneotodus ? beckmanni* Bischoff & Sannemann, *Lonchodina detorta* Walliser, and *Neoprioniodus latidentatus* Walliser have been extended lower to Walliser's *crassa* Zone. The longest extension is that of *Belodella devonica* (Stauffer), which was previously recorded only from Devonian strata; it is present in the middle beds of the Bowspring Limestone Member, which have been correlated with the Cellon strata in Walliser's *ploeckensis* Zone. *Belodella triangularis* (Stauffer) has also been extended to the *ploeckensis* Zone.

Four conodont assemblage zones plus three faunal units are recognized in the Yass Basin. Diachronism of lithological units is suspected in the basin: seventeen species occur stratigraphically higher in the sequence south of the Yass River than they do in the northeastern part of the Yass Basin; whereas only nine species occur stratigraphically lower in the south than they do in the northeast.

Good conodont correlations have been established with occurrences in other continents, particularly with the classical sections at Cellon in Austria. The two lowest assemblage zones at Yass, the *Neoprioniodus excavatus* and the *Spathognathodus* sp. cf. *S. ranuliformis* Assemblage Zones, are together probably equivalent to the *crassa* Zone of Walliser (1964). Conodonts occurring in several Euro-

pean, Asian, North American, and North African sequences are also correlated with the fauna of these Yass assemblage zones. An excellent correlation exists between the Australian *Kockelella variabilis*-*Ancoradella ploeckensis* and *Belodella triangularis*-*Polygnathoides siluricus* Assemblage Zones, and the Austrian *ploeckensis* and *siluricus* Zones respectively. Faunas from the Yarwood Siltstone Member and the Elmside Formation are correlated with those in Walliser's *latialatus* and *woschmidtii* Zones respectively.

The conodont fauna, supported by coral and graptolite evidence, shows that the age of the Yass Basin strata for the interval from the base of the Cliftonwood Limestone to the Bowring Group is early early Ludlovian to early Gedinian. Furthermore, the Silurian-Devonian boundary probably occurs within the sparsely fossiliferous shales near the contact between the Cowridge Siltstone and the Elmside Formation.

SYSTEMATIC PALAEOONTOLOGY

A text figure accompanies each description and is designed to show what are considered here to be the most important morphological characters of the species. The outlines and ornaments of the illustrated specimens in this study provided most of the data for the sketches. In the few cases where the recovered material is poorly preserved, fragmented, or does not show the salient specific features to an advantage, composite sketches based on the available data and that obtained from specimens illustrated by Walliser (1964) are presented.

For fuller details than those appearing in the descriptions of species below about sample numbers, locations and the number of specimens and species from each location, see the later section headed—'sample, locality, and fauna details'.

Genus ACODUS Pander, 1856

Type species: *Acodus erectus* Pander, 1856

ACODUS CURVATUS Branson & Branson, 1947

(Pl. 1, fig. 1; text-fig. 7)

1947 *Acodus curvatus* Branson & Branson, p. 554, pl. 81, fig. 20.

1967 *Acodus curvatus* Branson & Branson; Rexroad, p. 25, pl. 4, figs 9-12.

1968 *Acodus curvatus* Branson & Branson; Nicholl & Rexroad, p. 23, pl. 7, figs 19, 20.

Material: 2 specimens; CPC 11181 figured.

Description: A strongly curved, laterally compressed cone with a prominent costa on one lateral face. Anterior and posterior margins knife-edged. Basal cavity subconical, compressed, and terminating in a point at mid-cone height. Recurvature greater in lower half of the unit.

Remarks: *Acodus curvatus* resembles *Distacodus obliquicostatus* Branson & Mehl but is distinguished from it by the presence of only one lateral costa.

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Branson &	Brassfield Fm.,	Early Silurian
	Branson (1947)	Kentucky	
	Rexroad (1967)	Brassfield Fm.,	Early to mid-
		Indiana, Ohio,	Llandoveryan
		Kentucky	
	Nicholl &	Brassfield Fm.,	Upper Bereich I to
	Rexroad (1968)	Indiana	<i>amorphognathoides</i>

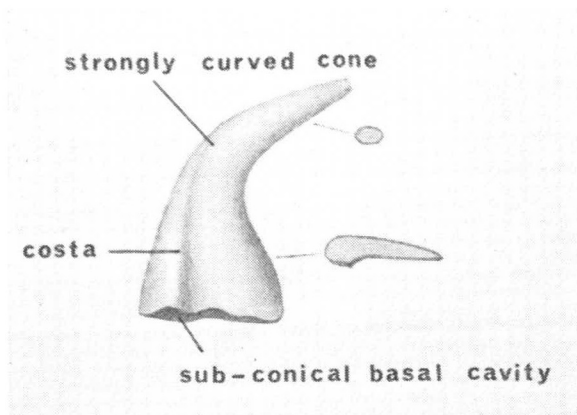


Figure 7. *Acodus curvatus* Branson & Branson, 1947 (x80). Lateral view of reconstructed CPC 11181 (Pl. 1, fig. 1)

Yass Basin—The two specimens were recovered from the Yarwood Siltstone Member near Good Hope Road and Taemas Road junction.

Range: The previously known range of early to middle Llandoveryian is extended from early Llandoveryian (Upper Bereich I Zone) to late Ludlovian (*latialatus* Zone).

Genus *ANCORADELLA* Walliser, 1964

Type species: *Ancoradella ploeckensis* Walliser, 1964

ANCORADELLA PLOECKENSIS Walliser, 1964

(Pl. 1, figs 2-9; text-fig. 8a, 8b)

1964 *Ancoradella ploeckensis* Walliser, p. 28, pl. 7, fig. 10; pl. 16, figs 16-21.

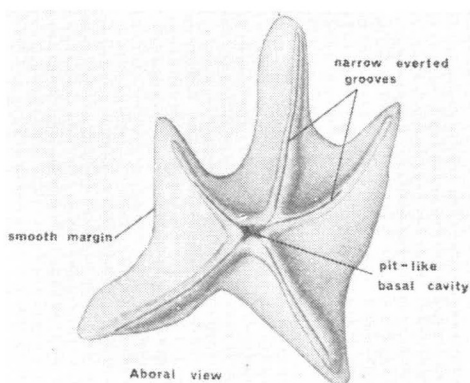


Figure 8a. *Ancoradella ploeckensis* Walliser, 1964 (x25). Aboral view of CPC 11184 (Pl. 1, figs 5, 6)

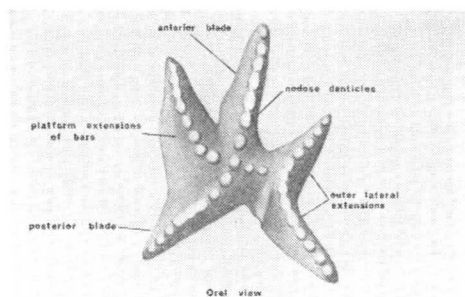


Figure 8b. *Ancoradella ploeckensis* Walliser, 1964 (x20). Oral view of CPC 11184 (Pl. 1, figs 5, 6)

Material: 28 specimens; CPC 11182, 11183, 11184, 11185 figured.

Description: Unit consisting of anterior free bar and posterior bar that widens into broad platform with maple-leaf outline. Seven tall, nodose, laterally compressed, discrete to crowded denticles on anterior extremity. Denticles on posterior bar and

platform short, discrete to fused, and nodose. In adult forms, 2 rows of low denticles on the platform diverge from a point separated from the outer side of the main row of denticles by a slightly elongated denticle. On the inner side of the bar and directly opposite this elongated denticle is an anteriorly directed row of 4 to 5 low denticles. No secondary ornament is present on the platform, but some specimens have an upwardly enrolled platform edge.

The basal cavity is central to the platform; it is wide in juvenile forms but reduced to a shallow pit with narrow groove-like extensions along the bars and the digitate extremities of the platform in adult forms.

Remarks: The presence of five aboral grooves and the general morphology of *Ancoradella ploeckensis* suggest that this species developed from *Kockelella patula* Walliser. *A. ploeckensis* is a possible intermediate between *Kockelella patula* and *Ancyrodella curvata* Branson & Mehl; the wide basal cavity of the former is in the latter reduced to long, narrow grooves and a shallow pit. Also, the essentially smooth oral surfaces of *K. patula* and *A. ploeckensis* become ornamented in *Ancyrodella curvata*.

Young forms of *A. ploeckensis* differ from juveniles of *Kockelella variabilis* Walliser by having a denticle between the posterior bar and the two rows of denticles on the outer platform. Furthermore, the denticles of *A. ploeckensis* are nodose whereas those of *K. variabilis* are larger and similar to spathognathodid denticles.

Occurrence:

	<i>Reference</i>	<i>Formation/Location</i>	<i>Age/Zone</i>
Europe	Walliser (1964)	Carnic Alps, Germany	<i>ploeckensis</i> to lowest <i>siluricus</i>

Yass Basin—*Ancoradella ploeckensis* Walliser first occurs 7.8 m above the base of the Bowspring Limestone in the Derringullen Creek outcrops at Silverdale; its last occurrence is in the topmost beds of the Hume Limestone Member in the quarry near Limestone Creek, Silverdale. The first occurrence south of the Yass River is 13.8 m above the base of the 'Barrandella' Shale Member, near Hattons Corner; its final appearance is in the middle beds of the Hume Limestone Member.

Range: Late early Ludlovian (*ploeckensis* Zone) to middle Ludlovian (lowest *siluricus* Zone).

Genus BELODELLA Ethington, 1959

Type species: *Belodus devonicus* Stauffer, 1940

Remarks: According to Clark & Ethington (1966, p. 677), 'The enormous size of the basal cavity serves to distinguish this genus from *Belodus* in which the basal excavation is quite restricted in development . . .'

Basal cavities vary continuously from those which extend almost to the apex of the apical denticle to those which extend only one-third of the distance to the apex. This variation in size of basal cavity appears to be related to the amount of twisting, for the shallowest cavities occur in the more strongly twisted units. As there is a continuous range from strongly twisted forms with a relatively shallow basal cavity to straight forms with a deep basal cavity, forms with a small or large cavity are regarded as intraspecific variants.

BELODELLA DEVONICA (Stauffer, 1940)
(Pl. 2, figs 1-4; text-fig. 9)

- 1940 *Belodus devonicus* Stauffer, p. 420, pl. 59, figs 47, 48.
 1957 *Belodus* cf. *B. devonicus*, Stauffer; Rhodes & Dineley, p. 359, pl. 37, fig. 3.
 1964 *Belodella* sp. Serpagli & Greco, p. 199, pl. 37, figs 3, 4.
 1966 *Belodella devonica* (Stauffer); Barnett et al., p. 436, pl. 58, fig. 1.
 1966 *Belodella devonicus* (Stauffer); Clark & Ethington, p. 677, pl. 82, figs 8, 9.
 1966 *Belodus asiaticus* Moskalenko, p. 198, pl. 1, fig. 4.
 1966 *Belodus multidentatus* Moskalenko, p. 199, pl. 1, figs 6, 7.
 1969 *Belodella devonica* (Stauffer); Druce, p. 49, pl. 8, fig. 3.
 1970 *Belodella devonica* (Stauffer); Druce, p. 32, pl. 4, fig. 3.

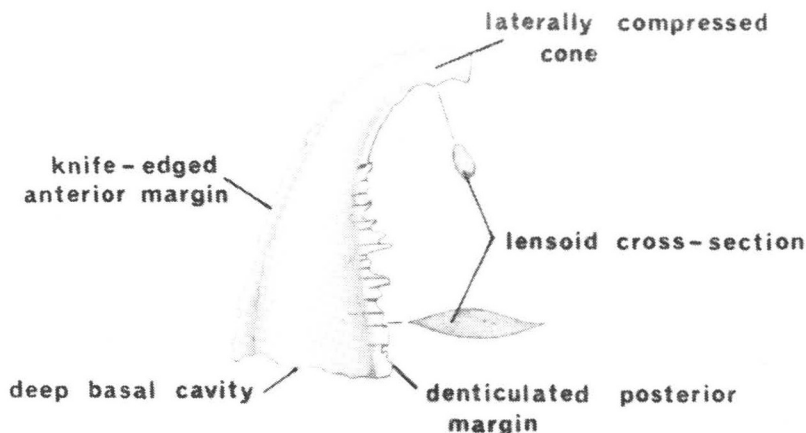


Figure 9. *Belodella devonica* (Stauffer, 1940) (x105). Lateral view of CPC 11186
(Pl. 2, figs 1, 4)

Material: 4 specimens; CPC 11186 figured.

Description: Laterally compressed belodellid with lensoid cross-section and anterior and posterior keel. Basal cavity, extending for more than half length of unit. Denticles minute, parallel, fused, lining posterior ridge.

Remarks: All specimens are slightly twisted. The lensoid cross-section distinguishes this species from *Belodus triangularis* (Stauffer), which has a triangular cross-section.

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Stauffer (1940)	Clays overlying Cedar Valley Fm., Minnesota	Mid Devonian (Collison & Scott, 1958)
	Clark & Ethington (1966)	Roberts Mts Fm., Nevada Fm., Rabbit Hill Fm., Nevada and Utah	Late Silurian ('Skala') to Emsian
Europe	Rhodes & Dineley (1957)	Bishopsteignton Bore, South Devon	Mid Devonian
	Moskalenko (1966)	Zeravshan Range, USSR	Mid Siegenian

	Reference	Formation/Location	Age/Zone
Asia	Barnett et al. (1966)	Nowshera Reef Limestone, West Pakistan	Late Silurian (<i>eosteinhornensis</i> to <i>woschmidtii</i>)
Australia	Druce & Wilson (1967)	Yarrol Basin, Queensland	Emsian
	Druce (1969)	N. Yarrol Basin, Queensland	Early Devonian
	Druce (1970)	Garra Fm., NSW	Mid Siegenian

Yass Basin—*Belodella devonica* (Stauffer) first occurs at 19.5 m in the Bowspring Limestone Member in the railway cutting opposite Black Range Road; its last occurrence is at about 4 m in Hume Limestone Member at Bowning Creek.

Range: This is the first occurrence of *Belodella devonica* (Stauffer) from strata of early Ludlovian age. Its emended range is from late early Ludlovian (*plœckensis* Zone) to middle Devonian.

BELODELLA TRIANGULARIS (Stauffer, 1940)

(Pl. 2, figs 5-10; text-fig. 10)

- 1940 *Belodus triangularis* Stauffer, p. 420, pl. 59, fig. 49.
- 1957 *Belodus triangularis* Stauffer; Rhodes & Dineley, p. 358, pl. 37, figs 1, 2.
- 1958 *Belodus triangularis* Stauffer; Bischoff & Sannemann, p. 94, pl. 15, figs 8, 9.
- 1961 *Belodus triangularis* Stauffer; Budurov, p. 261, pl. 3, fig. 7.
- 1962 *Belodus triangularis* Stauffer; Jentzsch, p. 964, pl. 1, figs 2, 3.
- 1965 *Belodella triangularis* (Stauffer); Merrill, p. 369, pl. 3, figs 11, 13.
- 1965 *Belodus cf. triangularis* Stauffer; Philip, p. 99, pl. 8, figs 22, 26-28.
- 1966 *Belodus subtriangularis* Moskalenko, p. 199, pl. 1, fig. 5.
- 1966 *Belodella triangularis* (Stauffer); Clark & Ethington, p. 677, pl. 82, figs 1, 7.
- 1966 *Belodella triangularis* (Stauffer); Philip, p. 444, pl. 1, figs 20, 21.
- 1966 *Belodella triangularis* (Stauffer); Barnett et al., p. 436, pl. 58, fig. 4.
- 1968 *Belodus triangularis* Stauffer; Mound, p. 475, pl. 65, fig. 32.
- 1968 *Belodus triangularis* Stauffer; Schulze, p. 185, pl. 16, fig. 14.
- 1970 *Belodella triangularis* (Stauffer); Druce, p. 32, pl. 4, figs 1, 2.

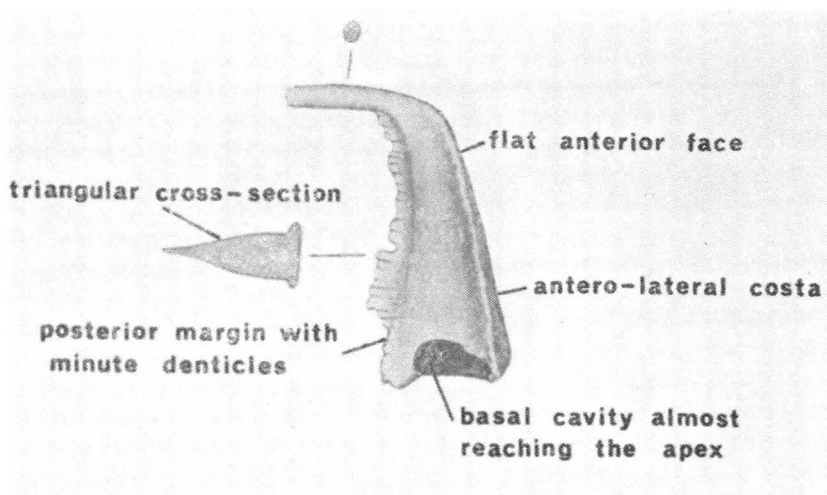


Figure 10. *Belodella triangularis* (Stauffer, 1940) (x100). Lateral view of CPC 11189 (Pl. 2, figs 7, 8).

Material: 37 specimens; CPC 11188, 11189, 11190 figured.

Description: Belodellid with triangular cross-section, 2 anterolateral costae, and flat anterior. Unit thin-walled and strongly curved near apex. Basal cavity reaching almost to apex in untwisted forms but only penetrating one-third of strongly twisted units. Cross-section generally isosceles triangle but right-angle triangles also occur.

Ornament of fused minute denticles along posterior or concave margin and 2 sharp costae at junctions of lateral and anterior faces; one of these costae may be indistinct.

Remarks: The flat anterior face of *Belodella triangularis* distinguishes this species from the sharply keeled anterior edge of *B. devonica* (Stauffer). Although the cross-sections of *B. triangularis* from the Burnam Limestone are equilateral triangles (Merrill, 1965, p. 370), these forms are included in synonymy.

Occurrence:

	<i>Reference</i>	<i>Formation/Location</i>	<i>Age/Zone</i>
North America	Stauffer (1940)	Clays overlying Cedar Valley Fm., Minnesota	Mid Devonian
	Merrill (1965)	Burnam Limestone, Central Texas	Gedinnian to Emsian
	Clark & Ethington (1966)	Roberts Mts Fm., Nevada Fm., Rabbit Hill Fm., Nevada and Utah	Late Silurian ('Skala') to Emsian
	Mound (1968)	Duvernay Fm., South Alberta	Mid Frasnian
Europe	Rhodes & Dineley (1957)	Bishopsteignton Bore, South Devon	Mid Devonian
	Bischoff & Sannemann (1958)	Tentakulitenkalk, Germany	Early Devonian
	Burdurov (1961)	Bulgaria	Givetian
	Jentzsch (1962)	Tentaculite Lst., Thuringia	Early Devonian
	Moskalenko (1966)	Zeravshan Range, USSR	Mid Siegenian
	Schultze (1968)	Karawanken Alps, South Austria	Silurian to late Devonian
Australia	Barnett et al. (1966)	Nowshera Reef Limestone, West Pakistan	Late Silurian (<i>eosteinhornensis</i> —early <i>woschmidtii</i>)
	Philip (1965)	Coopers Creek Fm., Gippsland, Victoria	Upper Gedinnian to Siegenian
	Philip (1966)	Murrindal Limestone, Buchan Caves Lst., E. Victoria	Lower Emsian
	Druce (1970)	Garra Fm., N.S.W.	Mid Siegenian to late Emsian

Yass Basin—*Belodella triangularis* (Stauffer) first appears 3 m above the base of the 'Barrandella' Shale Member at Silverdale; it also occurs in the Hume Limestone Member and the limestone lenses of the Elmside Formation. In the southern part of the basin the species occurs 2 m above the base of the Hume Limestone Member at Hattons Corner, and in the Yarwood Siltstone Member at Humewood.

Range: The occurrence of *B. triangularis* in the 'Barrandella' Shale Member extends the previously known range to that of early middle Ludlovian (*ploeckensis* Zone) to middle Devonian.

BELODELLA sp.
(Pl. 2, figs 2, 3; text-fig. 11)

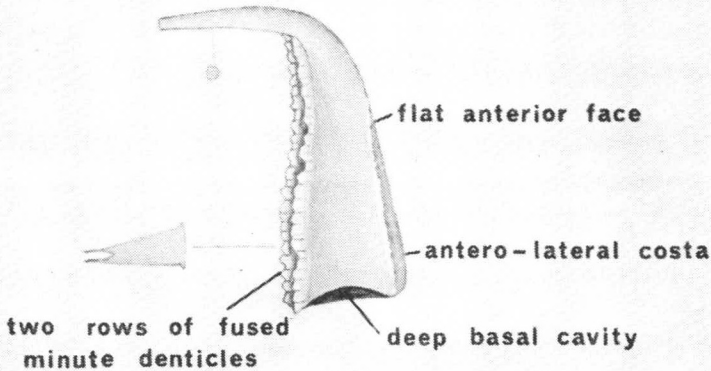


Figure 11. *Belodella* sp. (x85). Lateral view of CPC 11187 (Pl. 2, figs 2, 3)

Material: 1 specimen; CPC 11187 figured.

Description: This specimen has 2 rows of small, crowded denticles. Each row extends from the posterior margin of the base to one side of the apex. A narrow, shallow trough exists between them. Other morphological features are identical with those of *Belodella triangularis* (Stauffer).

Occurrence:

Yass Basin—The specimen was obtained from the Hume Limestone Member in Bowring Creek near Woodlea Park.

Range: Late middle Ludlovian (*siluricus* Zone).

Genus *CORDYLODUS* Pander, 1856

Type species: *Cordylodus angulatus* Pander, 1856

CORDYLODUS? *DUBIUS* Rhodes, 1953

(Pl. 2, figs 11, 12; text-fig. 12)

1953 *Cordylodus? dubius* Rhodes, p. 299, pl. 23, figs 221-224.

Material: 3 specimens; CPC 11191 figured.

Description: Long, pointed unit strongly recurved just below mid-bar; tapering rapidly from flared base to mid-bar, then gradually to apex. One to two isolated, erect, stump-like denticles on basal posterior margin. Cross section biconvex, both anterior and posterior margins sharp. Basal cavity about one-third unit height.

Remarks: The absence of a posterior bar in these units leaves some doubt as to their generic classification. The present specimens have a belodellid key-hole cross-section and the distinct belodellid oral heel; they lack the posterior bar which is a generic characteristic of *Cordylodus*.

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Rhodes (1953)	Aymestry Limestone, Shropshire and Staffordshire	Upper Silurian (Bringingwoodian)

Yass Basin—*Cordylodus? dubius* Rhodes was recovered from the Cliftonwood Limestone, the topmost bed of the Euralie Limestone Member near Silverdale, and the Hume Limestone Member, Bowning Creek.

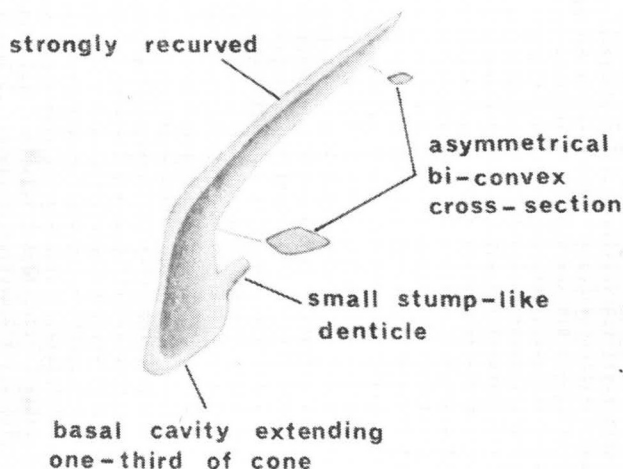


Figure 12. *Cordylodus? dubius* Rhodes, 1953 (x60). Lateral view of CPC 11191 (Pl. 2, figs 11, 12)

Range: The Yass Basin occurrences extend the previously known range, that is, middle Ludlovian, to early Ludlovian (*crassa* Zone) to late Silurian.

Genus CORYSSOGNATHUS nov.

Type species: *Coryssognathus dentatus* gen. et sp. nov.

Derivation of name: From Greek *korysso*, meaning helmet.

Generic diagnosis: A triangular unit with two short denticulated bars and, in mature specimens, a denticulated lateral process. The basal cavity occupies the entire suboral region.

Remarks: This genus differs from *Pelekyognathus* Thomas by being distinctly shorter, triangular in basal outline, and entirely excavated.

CORYSSOGNATHUS DENTATUS sp. nov. (Pl. 2, figs 13-19; text-fig. 13)

Material: 9 specimens. Holotype CPC 11193; paratypes CPC 11192, 11194 figured.

Derivation of name: From Latin *dentatus*, meaning dentate.

Description: Unit short, consisting of denticulated posterior bar, apical denticle not prominently larger than denticles of posterior bar, short anterior bar, and lateral bar. Bar denticles blunt, erect, oval in cross-section, and decreasing in size from apical denticle; 2 to 3 denticles on posterior bar, 1 on anterior and 1 on lateral bar. Basal cavity deep, occupying aboral region.

Remarks: *Coryssognathus dentatus* is distinguished from *Ambalodus triangularis* Branson & Mehl by its lack of a prominent denticle and lateral carinae, and by its triangular rather than crescentic outline. Furthermore, the denticles of *C. dentatus* are not nodose.

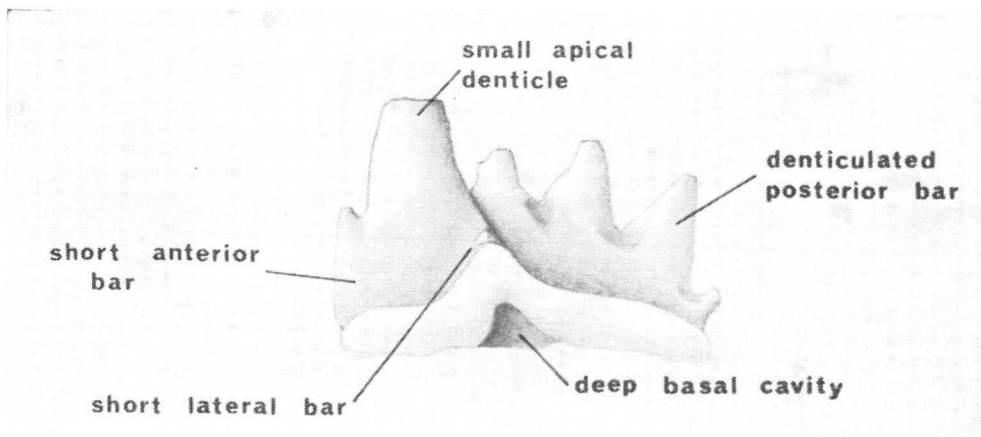


Figure 13. *Coryssognathus dentatus* gen. et sp. nov. (x65). Lateral view of CPC 11192 (Pl. 2, figs 13, 14)

Occurrence:

Yass Basin—*Coryssognathus dentatus* occurs in the Cliftonwood Limestone, Fairy Holes Creek, and in the basal limy shale beds of the Euralie Limestone Member at Euralie.

Range: This new species is early early Ludlovian (*crassa* Zone) in age.

Genus DISTACODUS Hinde, 1879

Type species: *Machairodus incurvus* Pander, 1856

DISTACODUS PROCERUS Ethington, 1959
(Pl. 2, figs 26-29; text-fig. 14)

1959 *Distacodus procerus* Ethington, pl. 39, fig. 8.

1966 *Distacodus procerus* Ethington; Clark & Ethington, p. 678, pl. 82, fig. 4.

Material: 7 specimens; CPC 11198, 11199 figured.

Description: Strongly laterally compressed distacodid with 1 prominent postero-lateral costa on each side of cone. Slightly arching basal outline, spur-like posterior keel at base, and compressed subconical basal cavity that terminates in point about one-third of unit height. Cone curvature greatest just below mid-height; anterior and posterior margins sharp.

Remarks: In some specimens that are slightly twisted, the cavity lip is asymmetrically flared and the inner costa is weakly defined. Specimens of *Distacodus obliquicostatus* Branson & Mehl from the Bainbridge Formation of Missouri have parallel striae (Branson & Mehl, 1933, p. 41); but only faint striae are present on three of the specimens here. *Distacodus variabilis* Weber has poorly developed costae compared with those of *D. procerus*.

Occurrence:

	<i>Reference</i>	<i>Formation/Location</i>	<i>Age/Zone</i>
North America	Ethington (1959)	Galena Fm., Minnesota	Late Ordovician
	Clark & Ethington (1966)	Roberts Mountains Fm., Nevada	Late Silurian
Africa	Ethington & Furnish (1962)	Tindouf Basin, Spanish Sahara	Silurian

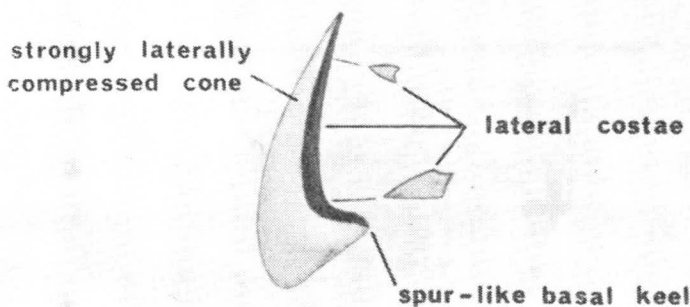


Figure 14. *Distacodus procerus* Ethington, 1959 (x60). Lateral view of CPC 11199 (Pl. 2, figs 28, 29)

Yass Basin—*Distacodus procerus* Ethington occurs in the Yarwood Siltstone Member on the Rosebank property near Reedy Creek.

Range: Late Ordovician to late Silurian.

Genus *DISTOMODUS* Branson & Branson, 1947

Type species: *Distomodus kentuckyensis* Branson & Branson, 1947

DISTOMODUS CURVATUS Rhodes, 1953
(Pl. 2, figs 20-22, 25; text-fig. 15)

1953 *Distomodus curvatus* Rhodes, p. 290, pl. 23, figs 209, 226-228.

1953 *Distomodus curvatus* var. *D. dentatus* Rhodes, p. 291, pl. 23, figs 217, 218, 229, 230.

Material: 68 specimens; CPC 11195, 11196 figured.

Description: Units recurved just above flared base. Cavity lip subtriangular to sub-circular in outline, sometimes having very small denticle on margin. Basal cavity shallow and subconical. Posterior face more convex than anterior face; 2 lateral costae on one face extending from apex to basal margin.

Remarks: *Distomodus curvatus* differs from *D. suberectus* Rhodes; the latter is a straighter unit. *D. kentuckyensis* Branson & Branson resembles *D. curvatus*, but is distinguished from the latter by possessing an antecusp.

Occurrence:

	<i>Reference</i>	<i>Formation/Location</i>	<i>Age/Zone</i>
Europe	Rhodes (1953)	Aymestry Limestone, Shropshire and Staffordshire	Late Silurian

Yass Basin—*Distomodus curvatus* Rhodes occurs in the Cliftonwood Limestone near Bango Creek. In the northern part of the basin it is found as high as the topmost beds of the Hume Limestone Member, whereas, south of the Yass River it occurs up to 3.3 m above the base of the Hume Limestone Member. One specimen was recovered from a limestone pebble of the Sharpeningstone Conglomerate.

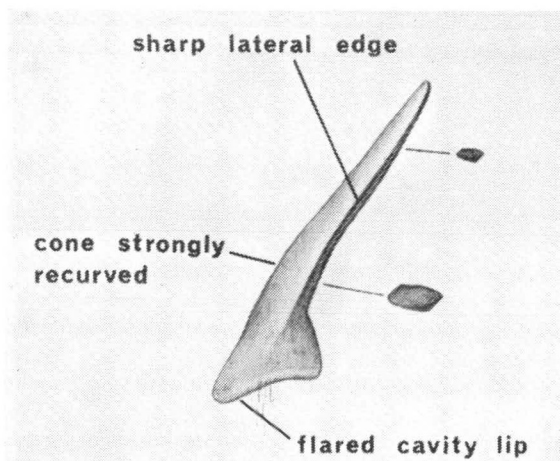


Figure 15. *Distomodus curvatus* Rhodes, 1953 (x35).
Lateral view of CPC 11196 (Pl. 2, figs 22, 25)

Range: Early early Ludlovian (*crassa* Zone) to late middle Ludlovian (*siluricus* Zone).

Genus *DREPANODUS* Pander, 1856

Type species: *Drepanodus arcuatus* Pander, 1856

DREPANODUS ACUTACONUS sp. nov.
(Pl. 2, figs 23, 24, 30, 31; text-fig. 16)

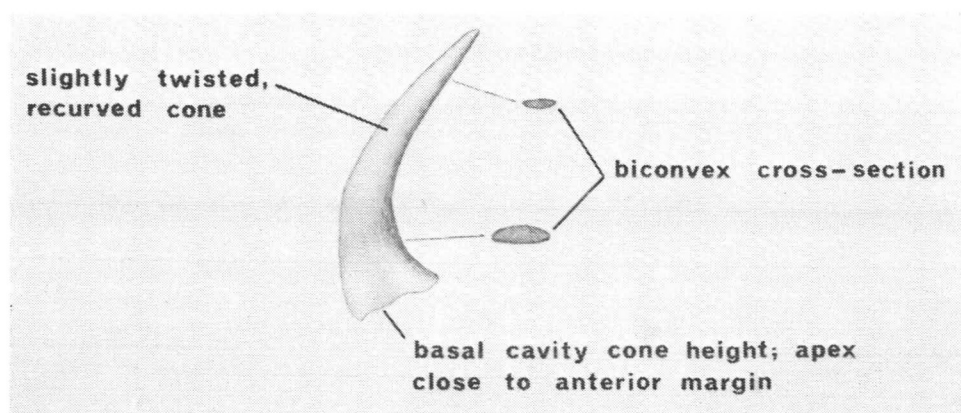


Figure 16. *Drepanodus acutaconus* sp. nov. (x60). Lateral view of holotype CPC 11200 (Pl. 2, figs 30, 31)

Derivation of name: From the Latin *acutus*, meaning pointed; *conus*, meaning cone.

Material: 24 specimens; holotype CPC 11200, paratype CPC 11197.

Description: Slightly twisted, recurved cones with knife-edged anterior and posterior margins; recurvature greatest in lower half. Aboral outline of basal cavity sub-oval, and flatter on one side. Anterior margin uniformly curved, posterior margin more strongly curved nearer base. In lateral view, basal cavity nearly a straight cone with its apex almost reaching anterior margin, gently laterally compressed for one-quarter to one-third of cone height.

Remarks: This species most closely resembles *Drepanodus toomeyi* Ethington & Clark, 1964, but differs from it in having the oral tip of the basal cavity closer to the anterior margin and a deeper cavity.

Occurrence:

Yass Basin—*Drepanodus acutaconus* extends from 3 m above the base of the 'Barrandella' Shale Member to 5.4 m in Hume Limestone Member near Silverdale. South of the Yass River this species extends from 21 m above the base of the Bowspring Limestone Member near Hattons Creek to 3.3 m in the Hume Limestone Member, near Euralie homestead.

Range: Early Ludlovian to middle Ludlovian.

Genus HINDEODELLA Bassler, 1925

Type species: *Hindeodella subtilis* Bassler, 1925

HINDEODELLA BREVIMEMBRA sp. nov.
(Pl. 3, figs 8, 9; text-fig. 17)

1964 *Hindeodella* sp. Walliser, p. 36, pl. 32, fig. 29.

1966 *Hindeodella* sp. Barnett et al., p. 436, pl. 58, fig. 6.

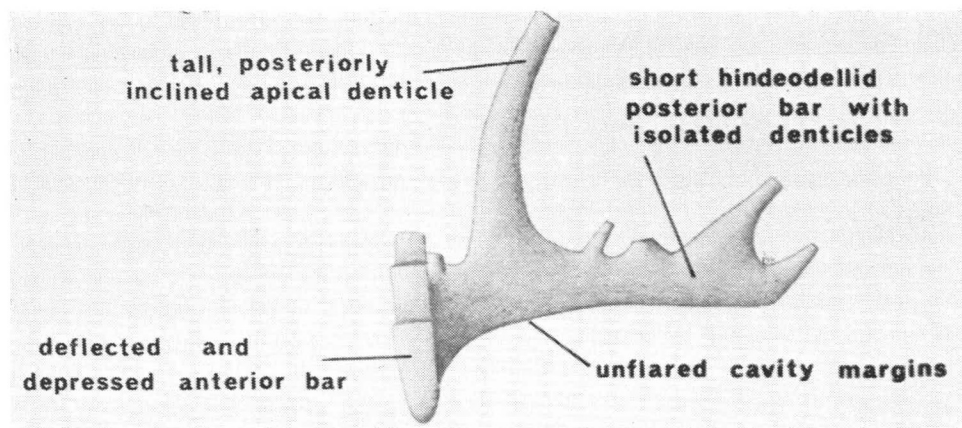


Figure 17. *Hindeodella brevimbria* sp. nov. (x70). Inner lateral view of holotype CPC 11205 (Pl. 3, figs 8, 9)

Derivation of name: From the Latin *brevis*, meaning short, and *membra*, meaning limb; referring to the short posterior bar of this hindeodellid.

Material: 3 specimens; holotype CPC 11205 figured.

Specific diagnosis: A hindeodellid with a short posterior bar, an almost equal number of isolated denticles on the anterior and posterior bars, and a tall posteriorly inclined slender apical denticle.

Description: Posterior bar a little more than twice as long as anterior bar; 5 posteriorly inclined isolated, pointed, knife-edged denticles. Anterior bar deflected and depressed, bearing 6 laterally compressed, discrete denticles. Apical denticle up to 3 times as tall as tallest of bar denticles, uniformly curved posteriorly. Narrow grooves extending from unflared sub-apical basal cavity to extremities.

Remarks: The short posterior bar, the slender isolated bar denticles, the uniformly curved apical denticle, and the almost equal number of denticles on each bar characterize this species.

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Walliser (1964)	Carnic Alps, Germany	<i>celloni</i>
Asia	Barnett et al. (1966)	Nowshera Reef Limestone, West Pakistan	<i>eosteinhornensis</i> to <i>woschmidt</i>

Yass Basin—Near the Silverdale quarry *Hindeodella brevimembra* occurs in the topmost beds of the Euralie Limestone Member, but at Euralie it occurs only in the lowest limey beds of this member.

Range: The occurrences in the Carnic Alps and the Nowshera Reef Limestones, West Pakistan, establish the range limits as middle Llandoveryan (*celloni* Zone) to lower Gedinian (*woschmidt* Zone).

HINDEODELLA EQUIDENTATA Rhodes, 1953
(Pl. 3, figs 1-4; text-fig. 18)

- 1953 *Hindeodella equidentata* Rhodes; p. 303, pl. 23, figs 248, 252-254.
- 1957 *Hindeodella equidentata* Rhodes; Walliser, p. 34, pl. 2, fig. 3.
- 1960 *Hindeodella equidentata* Rhodes; Ziegler, p. 182, pl. 15, fig. 10.
- 1960 *Hindeodella* cf. *H. equidentata* Rhodes; Walliser, p. 30, pl. 8, fig. 15.
- 1960 *Hindeodella equidentata* Rhodes; Spasov, p. 68, pl. 1, fig. 11.
- 1962 *Hindeodella equidentata* Rhodes; Ethington & Furnish, p. 1267, pl. 173, fig. 2.
- 1962 *Hindeodella equidentata* Rhodes; Jentzsch, p. 965, pl. 2, figs 10, 11.
- 1962 *Hindeodella equidentata* Rhodes; Walliser, p. 282, fig. 1, no. 8.
- 1963 *Hindeodella equidentata* Rhodes; Spasov & Veselinović, p. 244, pl. 2, figs 10, 11.
- 1964 *Hindeodella equidentata* Rhodes; Serpagli & Greco, p. 10, pl. 37, fig. 7.
- 1964 *Hindeodella equidentata* Rhodes; Walliser, p. 36, pl. 8, fig. 3; pl. 32, fig. 11.
- 1965 *Hindeodella equidentata* Rhodes; Philip, p. 102, pl. 8, fig. 11.
- 1966 *Hindeodella equidentata* Rhodes; Philip, p. 445, pl. 3, fig. 1.
- 1966 *Hindeodella equidentata* Rhodes; Spasov & Filipovic, p. 41, pl. 2, fig. 12.
- 1968 *Hindeodella equidentata* Rhodes; Schulze, p. 187, pl. 18, fig. 2.

Material: 272 specimens; CPC 11201, 11202 figured.

Description: Posterior bar long, essentially straight, and up to 4 times as long as anterior bar; uniform in depth and thickness. Anterior bar deflected through 50° to 90° and somewhat depressed. Bar denticles discrete, laterally compressed, pointed, knife-edged, and posteriorly inclined. Bar denticle inclination increases posteriorly from slightly inclined at apical denticle to 30° at posterior termination.

Apical denticle up to 4 times as broad as bar denticles, posteriorly inclined and anteriorly and posteriorly knife-edged; curvature greatest in its lowest third.

Basal cavity shallow, narrow, under postero-aboral edge of apical denticle; continuing as narrow groove beneath bars. Apical lips unflared.

Remarks: *Hindeodella equidentata* shows no geographic variation. Specimens from Europe, North America, and Australia have the same morphology.

The fused bar denticles of *H. confluens* Branson & Mehl contrast with the discrete denticles of *H. equidentata*. The lack of cyclic dentition in the present species distinguishes it from *H. priscilla* Stauffer.

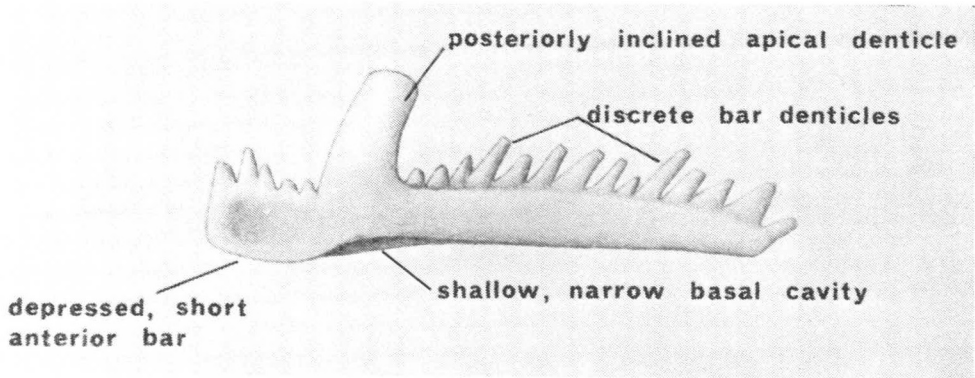


Figure 18. *Hindeodella equidentata* Rhodes, 1953 (x60). Inner lateral view of CPC 11202 (Pl. 3, figs 2, 4)

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Walliser (1960)	Sutherland River Fm., Canada	Gedinnian (Johnson et al., 1967)
Africa	Ethington & Furnish	Tindouf Basin, Spanish Sahara	Silurian
Europe	Rhodes (1953)	Aymestry Limestone, Shropshire and Staffordshire	Late Silurian
	Walliser (1957)	Carnic Alps, Germany	Late Wenlockian to Ludlovian
	Kockel (1958)	Ardales, Spain	Late Wenlockian to Late Ludlovian
	Ziegler (1960)	Rheinisches Schiefergebirge, Germany	Gedinnian
	Spasov (1960)	Southwest Bulgaria and Austria	Late Silurian
	Walliser (1962)		Gedinnian
	Jentzsch (1962)	Tentaculite Lst., Thuringia	Early Devonian
	Spasov & Veselinović (1963)	Suva Planina, Yugoslavia	Late Ludlovian
	Serpagli & Greco (1964)	Carnic Alps, Italy	Silurian
	Walliser (1964)	Carnic Alps, Germany	sagitta to Gedinnian
	Manzoni (1965)	Carnic Alps, Italy	Silurian
	Spasov & Filipovic (1966)	Southeast Bosnia	Silurian

	Reference	Formation/Location	Age/Zone
	Serpagli (1967)	Sardinia	Ludlovian
	Schulze (1968)	Karawanken Alps, Southern Austria	Gedinnian to Emsian
Australia	Philip (1965)	Coopers Creek Fm., Gippsland, Victoria	Late Gedinnian to Siegenian
	Philip (1966)	Buchan Caves Lst., Murrindal Lst., Victoria	Early Emsian

Yass Basin—*Hindeodella equidentata* Rhodes occurs throughout the sequence studied, from the Cliftonwood Limestone to the Elmside Formation.

Range: Late Wenlockian (*sagitta* Zone) to Emsian.

HINDEODELLA PRISCILLA Stauffer, 1938

(Pl. 3, figs 5-7; text-fig. 19)

- 1938 *Hindeodella priscilla* Stauffer, p. 429, pl. 50, fig. 6.
- 1938 *Hindeodella lambtonensis* Stauffer, p. 428, pl. 50, figs 2, 5, 8, 13, 14, 17, 20, 25, 28, 31.
- 1938 *Hindeodella milleri* Stauffer, p. 428, pl. 50, figs 3, 4, 9-11.
- 1940 *Hindeodella moweri* Stauffer, p. 424, pl. 58, figs 2, 10, 11.
- 1958 *Hindeodella priscilla* Stauffer; Bischoff & Sannemann, p. 94, pl. 15, fig. 1.
- 1960 *Hindeodella priscilla* Stauffer; Spasov, p. 69, pl. 1, fig. 13.
- 1960 *Hindeodella* n. sp. Walliser, p. 30, pl. 8, fig. 6.
- 1960 *Hindeodella* n. sp. Walliser; Ziegler, p. 183, pl. 15, figs 3, 4.
- 1964 *Hindeodella priscilla* Stauffer; Walliser, p. 36, pl. 9, fig. 12; pl. 32, figs 12, 13.
- 1965 *Hindeodella priscilla* Stauffer; Philip, p. 102, pl. 8, figs 13, 14, 24, 25.
- 1965 *Plectospathodus alternatus* Walliser; Philip, p. 110, pl. 8, figs 31, 32.
- 1966 *Hindeodella priscilla* Stauffer; Philip, p. 445, pl. 3, figs 2, 6-9, 11, 18.
- 1966 *Plectospathodus alternatus* Walliser; Philip, p. 448, pl. 3, figs 10, 17, 21, 25.
- 1966 *Hindeodella kshtutensis* Moskalenko, p. 200, pl. 1, figs 8-10; p. 86, pl. 11, figs 8-10.
- 1968 *Hindeodella* sp. Nikiforova & Predtechenskij, pl. 28, fig. 8.
- 1970 *Hindeodella priscilla* Stauffer; Druce, p. 35, pl. 5, fig. 3.

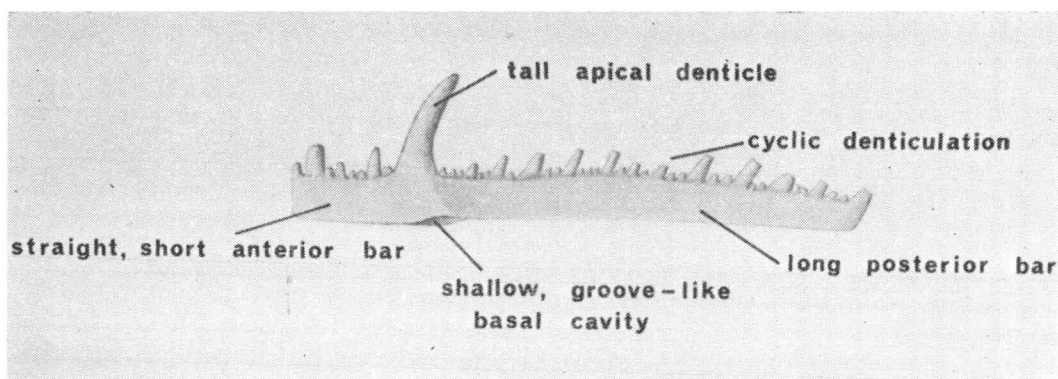


Figure 19. *Hindeodella priscilla* Stauffer, 1938 (x60). Inner lateral view of CPC 11203 (Pl. 3, fig. 5)

Material: 51 specimens; CPC 11203, 11204 figured.

Description: Posterior bar long, straight to gently arched, and of constant depth and thickness. Anterior bar slightly twisted; straight, deflected through 35°. Bar denticles very fine, needle-like, alternating in size, and elliptical in cross-section, increasing in posterior inclination and size from apical denticle.

Apical denticle posteriorly and sometimes inwardly inclined, elliptical in cross-section, tall, and slender. Subapical basal cavity small, extending along both bars in very narrow groove.

Remarks: The cyclic dentition of both *Hindeodella alternata* Ulrich & Bassler and *H. subtilis* Bassler resembles that of *H. priscilla*; however, *H. priscilla* differs from them in having an undepressed anterior bar.

Occurrence:

	Reference	Formation/Location	Age/Zone
America	Stauffer (1938)	Olentangy Shale, Ohio and Ontario	Devonian
	Stauffer (1940)	Cedar Valley Limestone, Minnesota	Devonian
	Walliser (1960)	Sutherland River Fm., Devon Island	Gedinnian (Johnson et al., 1967)
Europe	Bischoff & Sannemann (1958)	Tentakulitenkalk, Germany	Early Devonian
	Spasov (1960)	Southwest Bulgaria and Austria	Devonian
	Ziegler (1960)	Rheinisches Schiefergebirge, Germany	Gedinnian
	Walliser (1964)	Carnic Alps, Germany	Mid <i>crispus</i> to early Devonian
	Manzoni (1965)	Carnic Alps, Italy	<i>crispus</i> to early Devonian
	Moskalenko (1966)	Zeravshan Range, USSR	Mid Siegenian
Australia	Nikiforova & Predtechenskij (1968)	Tajna Beds, Podolia, USSR	Early Gedinnian
	Philip (1965)	Coopers Creek Fm., Gippsland, Victoria	Late Gedinnian to Siegenian
	Philip (1966)	Buchan Caves Lst., Murrindal Lst., Buchan, Victoria	Early Emsian
	Druce (1970)	Garra Fm., NSW	Mid Siegenian
	Yass Basin— <i>Hindeodella priscilla</i> Stauffer is restricted to the limestone lenses in the Elmside Formation.		

Range: Late Ludlovian (mid *crispus* Zone) to early Emsian.

Genus *ICRIODUS* Branson & Mehl, 1938

Type species: *Icriodus expansus* Branson & Mehl, 1938

ICRIODUS WOSCHMIDTI Ziegler, 1960
(Pl. 3, figs 10, 13, 14; text-fig. 20)

- 1960 *Icriodus woschmidti* Ziegler; p. 185, pl. 15, figs 16-18, 20-22.
- 1962 *Icriodus woschmidti* Ziegler; Jentzsch, p. 967, pl. 1, figs 17-23.
- 1962 *Icriodus woschmidti* Ziegler; Walliser, p. 284, fig. 1, no. 34.
- 1964 *Icriodus woschmidti* Ziegler; Walliser, p. 38, pl. 9, fig. 22; pl. 11, figs 14-22.
- 1968 *Icriodus woschmidti* Ziegler; Schulze, p. 191, pl. 16, fig. 9.
- 1968 *Icriodus woschmidti* Ziegler; Nikiforova & Predtechenskij, pp. 26-29, pl. 28, figs 4-6; pl. 32, fig. 26; pl. 33, figs 19-22.
- 1969 *Icriodus woschmidti* Ziegler; Druce, p. 51, pl. 11, figs 1-3.
- 1969 *Icriodus woschmidti* Ziegler; Klapper, p. 10, pl. 2, figs 1-5.

Material: 1 specimen; CPC 11206 figured.

Description: Specimen having main platform and row of nodes on oral surface over deep basal cavity. Platform long, narrow, straight; anterior termination pointed. Marginal and medial nodes circular in cross-section, 6 on each side and down centre of platform, separated by deep transverse depressions, transversely linked by sharp ridges. Faint medial nodes present at posterior end of platform. Low median ridge in each transverse depression links transverse ridges. Row of small nodes traversing oral surface of basal cavity from posteriormost platform node forms angle of about 130° with platform. Basal cavity wide, deep, occupying entire aboral surface, deepest under posteriormost transverse ridge; aboral outline an irregular pentagon narrowing anteriorly.

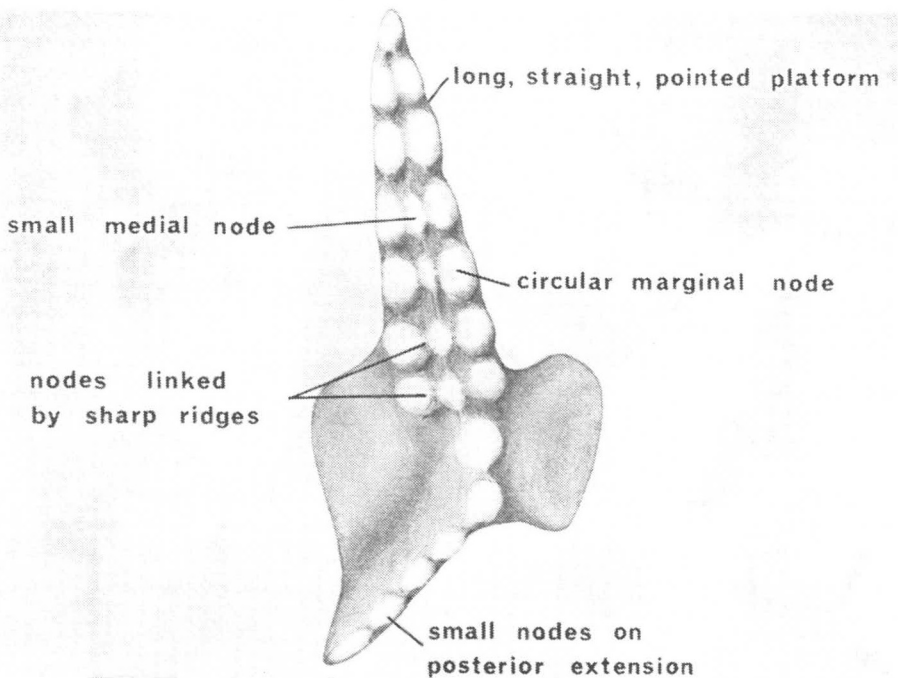


Figure 20. *Icriodus woschmidtii* Ziegler, 1960 (x65). Oral view of CPC 11206 (Pl. 3, figs 10, 13, 14)

Remarks: This specimen differs from those figured by Ziegler by having faint low medial nodes at the posterior end of the platform. It also lacks the prominent cusp that characterizes the type material from the Huinghauser beds (lower Gedinian, Rhenish Schiefergebirge, Germany).

The faint medial nodes are thought to reflect an early development towards *Icriodus latericrescens hudlei* Klapper & Ziegler. Further study may require this form and possibly those figured by Klapper (1969, pl. 2, figs 1-5) to be described as a new subspecies of *I. woschmidtii*, as both the medial nodes and the lack of a prominent cusp are not in accord with the features of the type material described by Ziegler.

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Ziegler (1960)	Rheinisches Schiefergebirge, Germany	Early Gedinnian
	Walliser (1964)	Carnic Alps, Germany	<i>woschmidt</i> Zone
	Manzoni (1965)	Carnic Alps, Italy	<i>woschmidt</i> Zone
	Schulze (1968)	Karawanken Alps, Southern Austria	Gedinnian to Siegenian
	Nikiforova & Predtechenskij (1968)	Tajna, Mitkov, and Bogdanovka Beds, Podolia	Early Gedinnian
North America	Klapper (1969)	Yukon and Devon Islands, Canada	Early to mid Gedinnian
Australia	Druce & Wilson (1967)	Mount Holly Beds, Queensland	Early Gedinnian
	Druce (1969)	N. Yarrol Basin, Queensland	Early Gedinnian

Yass Basin—The one perfectly preserved specimen of *Icriodus woschmidt* Ziegler was recovered from a limestone lens of the Elmside Formation.

Range: Early to middle Gedinnian (*woschmidt* Zone).

Genus KOCKELELLA Walliser, 1957

Type species: *Kockelella variabilis* Walliser, 1957

KOCKELELLA VARIABILIS Walliser, 1957

(Pl. 3, figs 11, 12, 15, 16; pl. 4, figs 1, 4, 5; text-fig. 21)

1957 *Kockelella variabilis* Walliser, p. 35, pl. 1, figs 3-10.

1962 *Kockelella variabilis* Walliser; Walliser, p. 282, fig. 1, no. 24.

1963 *Kockelella variabilis* Walliser; Rhodes & Newall, p. 166, figs 1-6.

1964 *Kockelella variabilis* Walliser; Walliser, p. 40, pl. 8, fig. 12, pl. 16, figs 1-15.

1968 *Kockelella variabilis* Walliser; Igo & Koike, p. 10, pl. 3, figs 6-9.

Material: 13 specimens; CPC 11207, 11208 figured.

Description: Deep units with wide basal cavity and lateral processes in posterior third. Anterior bar almost twice as long as posterior bar. Bars straight to slightly

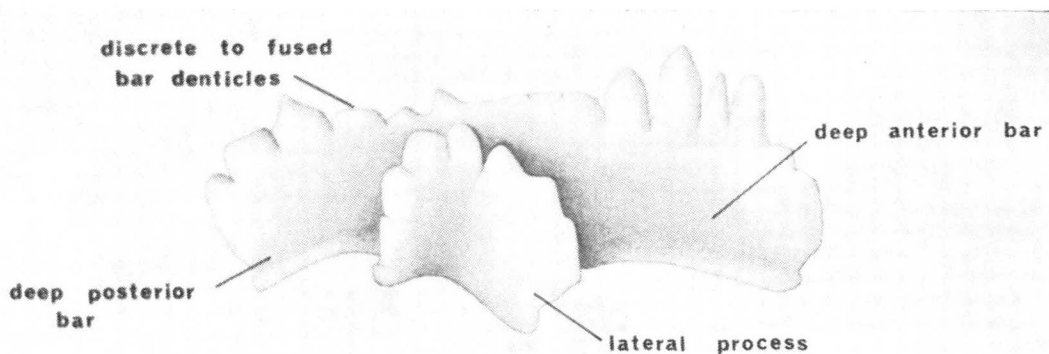


Figure 21. *Kockelella variabilis* Walliser, 1957 (x55). Outer lateral view of CPC 11207 (Pl. 3, figs 11, 12, 15, 16)

deflected and medially thickened. The 2 to 4 anteriormost bar denticles larger than remainder. Denticles vertical to slightly posteriorly inclined, discrete to fused, 5 to 8 on anterior bar and 3 to 5 on posterior bar. Apical denticle barely larger than adjacent denticles.

Up to 4 denticulated lateral processes radiate from apical denticle. Basal cavity subapical, extending deep along bars to their terminations.

Remarks: *Kockelella variabilis* differs from *Ancoradella ploeckensis* Walliser in not possessing a platform and from *K. patula* Walliser in having the lateral processes closer to mid-bar.

Occurrence:

	Reference	Formation/Location	Age/Zone
Africa	Ethington & Furnish (1962)	Tindouf Basin, Spanish Sahara	Silurian
Europe	Walliser (1957)	Carnic Alps, Germany	Late Wenlockian to early Ludlovian
	Rhodes & Newall (1963)	Aymestry Lst., Shropshire	Late Silurian
	Walliser (1964)	Carnic Alps, Germany	<i>crassa</i> to <i>siluricus</i>
	Manzoni (1965)	Carnic Alps, Italy	<i>crassa</i> to <i>siluricus</i>
	Serpagli (1967)	Sardinia	Ludlovian
	Remack-Petitot (1960)	Regganne, Southern Algeria	Early Ludlovian
	Walliser (1962)		Early Ludlovian
Southeast Asia	Reichstein (1962)	Germany	Early Ludlovian
	Igo & Koike (1968)	Upper Setul Lst., Langkawi Is., Malaya	<i>crassa</i>

Yass Basin—*Kockelella variabilis* Walliser occurs at 7 m from the base of the Bowspring Limestone Member and extends to the topmost beds of the Hume Limestone in Derringullen Creek. South of the Yass River it has been recovered from as high as the Yarwood Siltstone Member.

Range: Early early Ludlovian (*crassa* Zone) to early late Ludlovian (*siluricus* Zone). The lower limit of the range is clearly shown by Walliser (1964, p. 94) to be early Ludlovian; this slightly modifies the range he suggested for this species in 1957.

Genus LIGONODINA Bassler, 1925

Type species: *Ligonodina pectinata* Bassler, 1925

LIGONODINA ELEGANS Walliser, 1964 (Pl. 4, figs 2, 3, 6, 7; text-fig. 22)

- 1962 *Hindeodella* sp. Ethington & Furnish, p. 1268, pl. 173, fig. 1.
- 1964 *Ligonodina elegans* Walliser, p. 41, pl. 9, fig. 19; pl. 32, figs 16-21.
- 1968 *Ligonodina elegans* Walliser; Nikiforova & Predtechenskij, pl. 21, fig. 37.
- 1968 *Ligonodina elegans* Walliser; Igo & Koike, p. 10, pl. 1, fig. 26.
- 1968 *Ligonodina elegans* Walliser; Legault, p. 10, pl. 1, figs 10-12.
- 1969 *Ligonodina silurica* Branson & Mehl; Philip, p. 291, pl. 18, fig. 25.

Material: 3 specimens; CPC 11209, 11210 figured.

Description: Unit a long denticulated posterior bar and an arcuate posteriorly directed, denticulated, anterolateral process. Posterior bar straight, long, sturdy,

suboval in cross-section. Posterior bar bears 9 to 10 discrete, posteriorly inclined denticles, progressively stouter and more inclined posteriorly, oval in cross-section and generally needle-like. Apical denticle situated at junction of posterior bar and lateral process; posteriorly inclined with greatest curvature just above base, often bears anterolateral ridge. Slightly more than twice as wide as bar denticles.

Arcuate lateral process forms angle of at least 90° with posterior bar; twisted and aborally depressed, bearing 5 posteriorly inclined discrete pointed denticles, oval in cross-section.

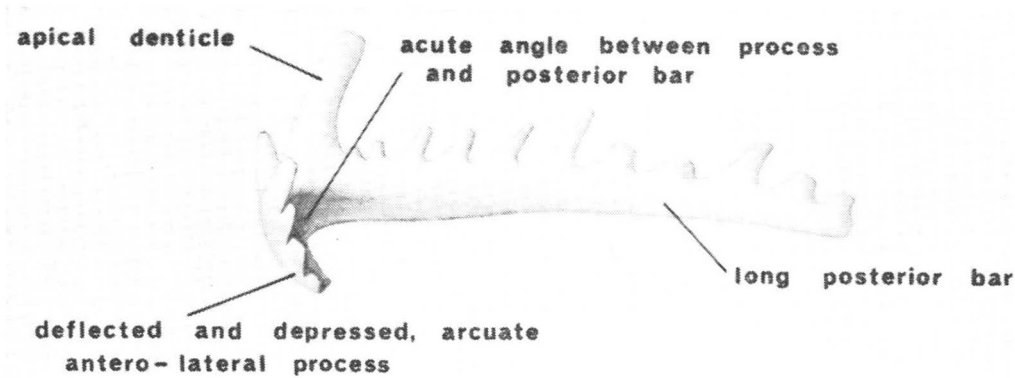


Figure 22. *Ligonodina elegans* Walliser, 1964 (x70). Inner lateral view of CPC 11209 (Pl. 4, figs 2, 3)

Basal cavity situated beneath apical denticle; extends along both bars as narrowing groove towards extremities. Apical lips unflared.

Remarks: The denticles on the lateral process are stouter and taller than those of the posterior bar. The twisting of the deflected and depressed anterolateral process distinguishes *Ligonodina elegans* from *L. silurica* Branson & Mehl. Furthermore, the angle between the lateral process and the posterior bar is up to 90 degrees in *L. elegans* and greater than this angle in *L. silurica*.

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Walliser (1964)	Carnic Alps, Germany	Mid <i>crispus</i> to <i>eosteinhornensis</i>
	Manzoni (1965)	Carnic Alps, Italy	Mid <i>crispus</i> to <i>eosteinhornensis</i>
	Nikiforova & Predtechenskij (1968)	Rashkov Beds, Podolia	Late Ludlovian
North America	Legault (1968)	Stonehouse Fm., Nova Scotia	<i>eosteinhornensis</i>
Southeast Asia	Igo & Koike (1968)	Upper Setul Lst., Langkawi Is., Malaya	<i>crassa</i>
Western Australia	Philip (1969)	Dirk Hartog Fm., Western Australia	Ludlovian

Yass Basin—*Ligonodina elegans* is found in the crinoidal limestone beds of the Hume Limestone Member on the Allview property and in the reefal limestones of the same member near Bowning Creek. None were recorded from rocks south of the Yass River.

Range: Early Ludlovian (*crassa* Zone) to Late Silurian (*eosteinhornensis* Zone).

LIGONODINA SALOPIA Rhodes, 1953

(Pl. 4, figs 8, 9; text-fig. 23)

- 1953 *Ligonodina salopia* Rhodes, p. 307, pl. 33, figs 245, 257, 260.
1957 *Ligonodina diversa* Walliser, p. 36, pl. 2, figs 11-14.
1958 *Ligonodina diversa* Walliser; Bischoff & Sannemann, p. 97, pl. 14, figs 24, 25.
1960 *Ligonodina diversa* Walliser; Ziegler, p. 186, pl. 14, figs 8, 12.
1960 *Ligonodina* n. sp. Walliser; Ziegler, p. 187, pl. 14, figs 9, 10.
1960 *Ligonodina* n. sp. a. Ziegler, p. 187, pl. 14, fig. 13.
1962 *Ligonodina diversa* Walliser; Walliser, p. 283, fig. 1, no. 16.
1962 *Ligonodina diversa* Walliser; Jentzsch, p. 967, pl. 3, figs 8, 14.
1964 *Ligonodina salopia* Rhodes; Walliser, p. 41, pl. 8, fig. 9; pl. 32, figs 5, 10.
1968 *Ligonodina salopia* Rhodes; Schulze, p. 195, pl. 19, figs 7, 8.
1969 *Ligonodina silurica* Branson & Mehl; Philip, p. 291, pl. 18, fig. 23.
1970 *Ligonodina salopia* Rhodes; Druce, p. 38, pl. 5, fig. 4.

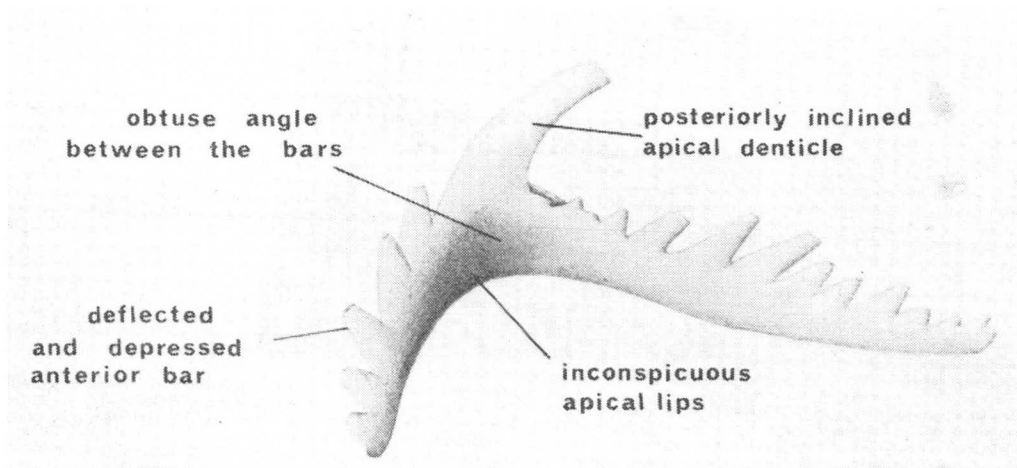


Figure 23. *Ligonodina salopia* Rhodes, 1953 (x65). Inner lateral view of CPC 11211 (Pl. 4, figs 8, 9)

Material: 40 specimens; CPC 11211 figured.

Description: Blade consisting of long posterior bar, large apical denticle, and deflected and depressed short rounded anterior bar. Posterior bar essentially straight. Bar denticles oval to circular, tall, posteriorly inclined, stout, and decreasing in size distally. Apical denticle subcircular in cross-section, more than twice as tall as bar denticles.

Basal cavity subapical, extending almost to bar extremities as narrowing grooves. Inner and outer apical lips inconspicuous.

Remarks: The arcuate contact between the bars of *Ligonodina salopia* differs from the angular contact in *L. silurica* Branson & Mehl. Study of topotype material may reveal that *L. kentuckyensis* Branson & Branson (1947) is a senior synonym, for its morphological features appear to come within the scope of those typical of *L. salopia*.

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Rhodes (1953)	Aymestry Lst., Shropshire and Staffordshire	Late Silurian
	Walliser (1957)	Carnic Alps, Germany	Late Wenlockian to Ludlovian
	Kockel (1958)	Ardales, Spain	Late Wenlockian to early Ludlovian
	Bischoff & Sannemann (1958)	Tentakulitenkalk, Germany	Early Devonian
	Ziegler (1960)	Rheinisches Schiefergebirge, Germany	Gedinnian
	Jentzsch (1962)	Tentaculite Lst., Thuringia	Early Devonian
	Walliser (1964)	Carnic Alps, Germany	<i>patula</i> to early Devonian
	Manzoni (1965) Schulze (1968)	Carnic Alps, Italy Karawanken Alps, Southern Austria	<i>patula</i> to <i>crispus</i> Gedinnian to late Emsian
North America	Walliser (1960)	Sutherland River Fm., Devon Island	Gedinnian (Johnson et al., 1967)
Australia	Philip (1969)	Dirk Hartog Fm., Western Australia	Ludlovian
	Druce (1970)	Garra Fm., NSW	Mid Siegenian

Yass Basin—*Ligonodina salopia* Rhodes occurs in the Cliftonwood Limestone near Fairy Holes Creek. At Silverdale it is present in all the calcareous units including the Elmside Formation. Two specimens were also recovered from reworked limestone pebbles of the Sharpeningstone Conglomerate.

Range: Wenlockian (*patula* Zone) to Emsian.

LIGONODINA SILURICA Branson & Mehl, 1933 (Pl. 4, figs 10, 11; text-fig. 24)

- 1933 *Ligonodina silurica* Branson & Mehl, p. 48, pl. 3, figs 18-20.
 1957 *Ligonodina ingens* Walliser, p. 37, pl. 2, fig. 20.
 1957 *Ligonodina silurica* Branson & Mehl; Walliser, p. 38, pl. 2, fig. 10.
 1958 *Ligonodina silurica* Branson & Mehl; Bischoff & Sannemann, p. 97, pl. 14, figs 24, 25.
 1963 *Ligonodina silurica* Branson & Mehl; Spasov & Veselinović, p. 244, pl. 1, fig. 5.
 1964 *Ligonodina silurica* Branson & Mehl; Walliser, p. 42, pl. 8; fig. 13; pl. 32, fig. 15.
 1968 *Ligonodina silurica* Branson & Mehl; Schulze, p. 195, pl. 18, figs 16, 18.
 1969 *Ligonodina silurica* Branson & Mehl; Philip, p. 291, pl. 18, fig. 18.
 1970 *Ligonodina silurica* Branson & Mehl; Druce, p. 38, pl. 5, figs 5a-6b.

Material: 45 specimens; CPC 11212 figured.

Description: Blade with short straight anterolateral bar which forms obtuse angle with long posterior bar. Bar denticles posteriorly inclined, moderately laterally compressed, anterior edges sharp, crowded to isolated; posterior denticles taller at mid-bar length. Apical denticle posteriorly inclined, 3 to 4 times as broad as bar denticles.

Anterolateral bar deflected and depressed but not markedly twisted, bearing up to 5 denticles, tallest at mid-bar length and with subcircular cross sections. Bar has pointed termination. Basal cavity subapical, narrowing to grooves under bars. Apical lips not prominently flared.

Remarks: *Ligonodina silurica* differs from *L. salopia* Rhodes in the obtuse angle formed at the confluence of the two bars. The anterolateral bar of *L. salopia* approaches the posterior bar in a smooth arc. *L. delicata* Branson & Mehl has a more slender apical denticle and *L. elegans* Walliser has an arcuate anterior bar.

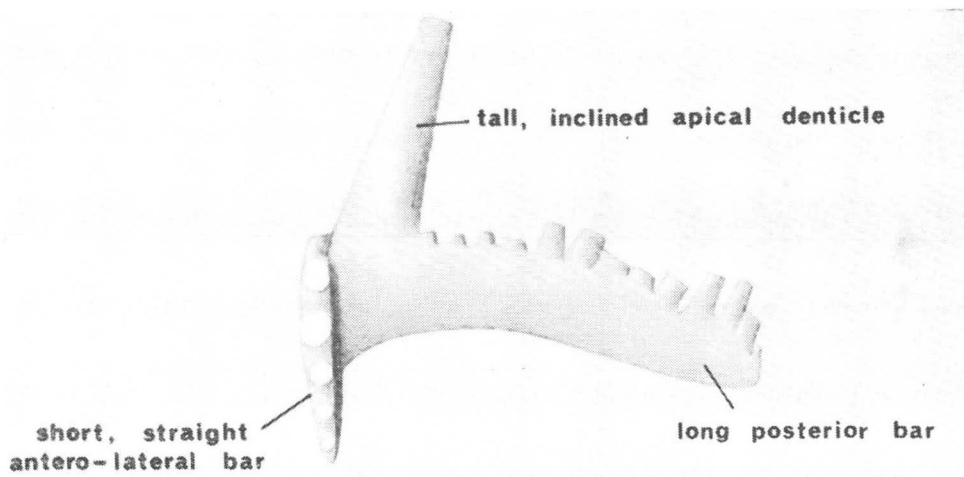


Figure 24. *Ligonodina silurica* Branson & Mehl, 1933 (x65). Inner lateral view of CPC 11212 (Pl. 4, figs 10, 11)

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Branson & Mehl (1933)	Bainbridge Fm., Missouri	Silurian
Africa	Ethington & Furnish (1962)	Tindouf Basin, Spanish Sahara	Silurian
Europe	Walliser (1957)	Carnic Alps, Germany	Late Wenlockian to Ludlovian
	Kockel (1958)	Ardales, Malaga, Spain	Late Wenlockian to late Ludlovian
	Bischoff & Sannemann (1958)	Tentakulitenkalk, Germany	Early Devonian
	Reichstein (1962)	Germany	Early Ludlovian
	Spasov & Veselinović (1963)	Suva Planina, Yugoslavia	Late Ludlovian
	Walliser (1964)	Carnic Alps, Germany	<i>sagitta</i> to early Devonian
	Serpagli (1967)	Sardinia	Ludlovian
	Schulze (1968)	Karawanken Alps, Southern Austria	Gedinnian to late Emsian
Australia	Philip (1969)	Dirk Hartog Fm., Western Australia	Ludlovian
	Druce (1970)	Garra Fm., NSW	Mid Siegenian

Yass Basin—*Ligonodina silurica* Branson & Mehl occurs from the basal beds of the Gums Road Limestone Member to the upper beds of the Hume Limestone Member at Limestone Creek. South of the Yass River it extends from just above the base of the Hume Limestone Member to the Yarwood Siltstone Member at Good Hope Road.

Range: Late Wenlockian (*sagitta* Zone) to late Emsian.

Genus LONCHODINA Bassler, 1925

Type species: *Lonchodina typicalis* Bassler, 1925

LONCHODINA DETORTA Walliser, 1964
(Pl. 4, figs 12-15; text-fig. 25)

- 1957 *Lonchodina* n. sp. (a) Walliser, p. 39, pl. 3, figs 29, 30.
1964 *Lonchodina detorta* Walliser, p. 43, pl. 9, fig. 20; pl. 30, figs 34-37.
1968 *Lonchodina detorta* Walliser; Schulze, p. 196, pl. 18, figs 17, a, b.
1968 *Lonchodina detorta* Walliser; Legault, p. 11, pl. 2, figs 1-4.
1969 *Neoprioniodus latidentatus* Walliser; Philip, p. 293, pl. 17, fig. 11.

Material: 2 specimens; CPC 11213, 11214 figured.

Description: Arched units with unequal twisted bars forming sharp reflex outer angle at apical denticle. Bars in oral view sigmoidally curved; denticles discrete, needle-like, stout, laterally compressed, flattened, with elliptical cross section. Apical denticle at junction of anterior and posterior bars, oval in cross section, more than twice diameter of bar denticles, continuous to aboral margin.

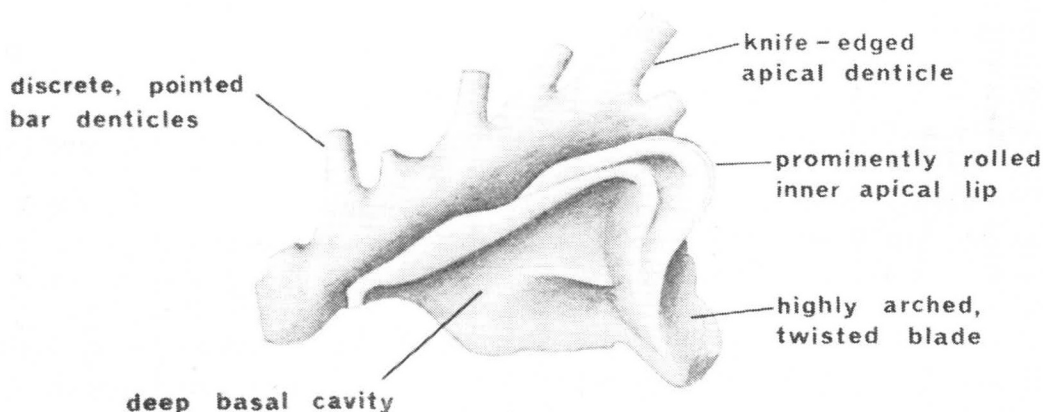


Figure 25. *Lonchodina detorta* Walliser, 1964 (x50). Composite sketch of CPC 11215 (Pl. 4, figs 16, 19) and fig. 37 in pl. 30 (Walliser, 1964)

Both anterior and posterior bars twisted outwards; apical and bar denticles curved inwards. Laterally compressed specimens have sharp anterior and posterior edges on bar denticles as well as on apical denticle. Basal cavity subapical, triangular in outline, deep, extending as grooves to anterior and posterior bar extremities. Outer apical lip inconspicuous; inner apical lip prominently flared, enrolled up to inner face of apical denticle, and irregular in outline.

Remarks: These specimens resemble some small forms of *Lonchodina walliseri* Ziegler; however, specimens of the latter have a partly everted basal cavity whereas *L. detorta* has a deep, more irregular shaped cavity.

Occurrence:

	Reference	Formation/Location	Age/Zone
Australia	Philip (1969)	Dirk Hartog Fm., Western Australia	Ludlovian

Yass Basin—*Lonchodina detorta* Walliser is restricted to the Euralie Limestone Member near Silverdale.

Range: Middle early Ludlovian (*crassa* Zone) to middle Siegenian.

LONCHODINA GREILINGI Walliser, 1957 **(Pl. 4, figs 16-19; pl. 5, figs 1, 2; text-fig. 26)**

- 1957 *Lonchodina greilingi* Walliser, p. 38, pl. 3, figs 20-26.
- 1960 *Lonchodina greilingi* Walliser; Walliser, p. 31, pl. 8, figs 17, 18.
- 1962 *Lonchodina greilingi* Walliser; Ethington & Furnish, p. 1274, pl. 173, fig. 10.
- 1962 *Lonchodina greilingi* Walliser; Jentzsch, p. 968, pl. 3, fig. 4.
- 1962 *Lonchodina greilingi* Walliser; Walliser, p. 283, fig. 1, no. 22.
- 1964 *Lonchodina greilingi* Walliser; Walliser, p. 44, pl. 8, fig. 7; pl. 30, figs 7-9.
- 1967 *Lonchodina greilingi* Walliser; Philip & Pedder, p. 797, text-fig. 4.
- 1968 *Lonchodina greilingi* Walliser; Schulze, p. 197, pl. 17, fig. 29; pl. 18, figs 1, 3.
- 1968 *Lonchodina greilingi* Walliser; Legault, p. 12, pl. 2, figs 10-12.
- 1969 *Lonchodina greilingi* Walliser; Philip, p. 292, pl. 17, figs 17-18, 21, text-fig. 1e.

Material: 39 specimens; CPC 11213, 11214, 11216, 11217 figured.

Description: Asymmetrical, highly arched blade with denticulated posterior and anterior bars. Bars wide, twisted relative to each other, each having 5 to 6 inwardly inclined thick denticles. Apical denticle at junction of bars; tapers distally and subcircular in cross-section, slender, twisted, strongly posteriorly oriented, and

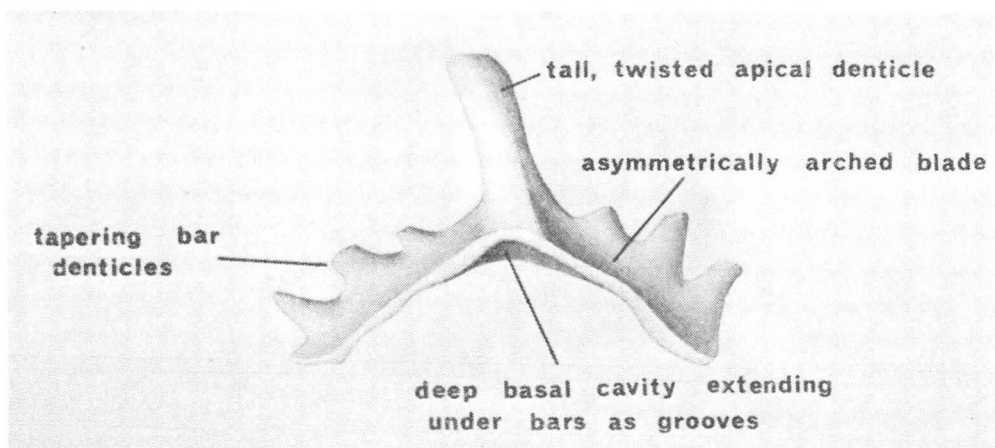


Figure 26. *Lonchodina greilingi* Walliser, 1964 (x95). Inner lateral view of CPC 11217 (Pl. 5, figs 1, 2)

more than twice as tall as bar denticles; may be inwardly offset from plane of bar denticles. Bar denticles discrete, tapering, pointed, posteriorly inclined, and oval to circular in cross-section.

In large specimens the basal cavity is beneath the cusp and elliptical; it extends up the cusp to mid-bar height and along the bar as a wide shallow extension. In small specimens the basal cavity is more subapically confined. Apical

lips are variable; slender forms have inconspicuous lips; massive forms have markedly flared lips that may extend along the inner sides of both bars and up the face of the apical denticle to the oral edge of the bars.

Remarks: Walliser (1957) defined the bars as lateral processes and in a subsequent paper (1964) as lateral and posterior processes. As most specimens from Yass have bars which are clearly anterior and posterior to the apical denticle Walliser's later definition of bar orientation is adopted here. Although a very wide range of morphological types were noted in the Yass fauna, often in the one sample, no stratigraphic importance could be attached to the variants. At one extreme, the bars are rounded and severely twisted; they have rounded denticles with marked posterior inclination. At the other extreme, the bars are narrow and only slightly twisted; they have sharp posterior and anterior edges to the moderately posteriorly inclined denticles.

Units that are similar to *Lonchodina greilingi* Walliser but symmetrical are referred to the genus *Trichonodella*. *L. greilingi* is characterized by its asymmetry, large apical denticle with a subcircular cross-section, massive bars bearing subcircular discrete denticles, and well-developed large basal cavity. Most variations are due to the degree of twisting. Apical and bar denticles of the more strongly twisted forms are more posteriorly inclined and twisted; also, the apical lip outline is more irregular.

Occurrence:

	Reference	Formation/Location	Age/Zone
Africa	Ethington & Furnish (1962)	Tindouf Basin, Spanish Sahara	Silurian
North America	Walliser (1960)	Sutherland River Fm., Devon Island	Gedinnian (Johnson et al., 1967)
	Legault (1968)	Stonehouse Fm., Nova Scotia	<i>eosteinhornensis</i>
Europe	Walliser (1957)	Carnic Alps, Germany	Late Wenlockian to Ludlovian
	Kockel (1958)	Ardales, Spain	Late Wenlockian to late Ludlovian
	Ziegler (1960)	Rheinisches Schiefergebirge, Germany	Gedinnian
	Jentzsch (1962)	Tentaculite Lst., Germany	Early Devonian
	Walliser (1964)	Carnic Alps, Germany	<i>amorphognathoides</i> to early Devonian
	Manzoni (1965)	Carnic Alps, Italy	<i>patula</i> to <i>crispus</i>
	Serpagli (1967)	Sardinia	Ludlovian
Australia	Schulze (1968)	Karawanken Alps, Southern Austria	Gedinnian to early Emsian
	Philip & Pedder (1967)	Lilydale Lst., Victoria	Early Siegenian
	Philip (1969)	Dirk Hartog Fm., Western Australia	Ludlovian

Yass Basin—*Lonchodina greilingi* Walliser occurs at the base of the Euralie Limestone Member near Derringullen Creek and is present in all the overlying calcareous beds, including the Elmside Formation and the reworked limestone pebbles of the Sharpeningstone Conglomerate. South of the Yass River, this species first appears at 2 m above the base of the Euralie Limestone Member and extends to the Hume Limestone Member at Humewood.

Range: Llandoveryan (*amorphognathoides* Zone) to early Emsian.

LONCHODINA WALLISERI Ziegler, 1960
(Pl. 5, figs 3-7; pl. 11, fig. 14; text-fig. 27)

- 1957 *Lonchodina* n. sp. (b) Walliser, p. 40, pl. 3, figs 27, 28.
 1960 *Lonchodina walliseri* Ziegler, p. 188; pl. 14, figs 1, 3, 7.
 1963 *Lonchodina walliseri* Ziegler; Spasov & Veselinović, p. 245, pl. 2, figs 13, 15.
 1964 *Lonchodina walliseri* Ziegler; Walliser, p. 44, pl. 8, fig. 17; pl. 30, figs 26-33.
 1965 *Lonchodina walliseri* Ziegler; Philip, p. 104, pl. 8, fig. 35.
 1967 *Lonchodina walliseri* Ziegler; Rexroad, p. 37, pl. 3, fig. 6.
 1968 *Lonchodina walliseri* Ziegler; Nikiforova & Predtechenskij, pl. 21, fig. 38.
 1968 *Lonchodina walliseri* Ziegler; Nicholl & Rexroad, p. 40, pl. 4, figs 8, 9.
 1969 *Lonchodina walliseri* Ziegler; Philip, p. 292, pl. 17, fig. 19.
 1969 *Lonchodina walliseri* Ziegler; Druce, p. 52, pl. 11, fig. 9.
 1970 *Lonchodina walliseri* Ziegler; Druce, p. 38, pl. 6, fig. 1.

Material: 28 specimens; CPC 11218, 11219, 11220 figured.

Description: Unit arched with anterior and posterior bar. Apical denticle taller than bar denticles, subcircular in cross section, posteriorly inclined and twisted; in some specimens lies outside plane of bars. Posterior bar slightly longer than

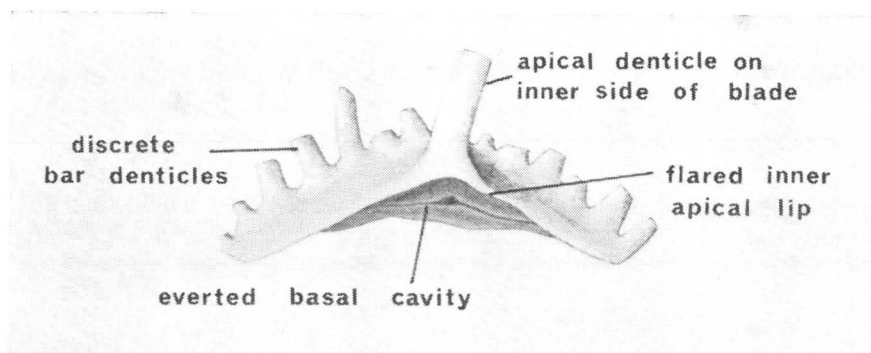


Figure 27. *Lonchodina walliseri* Ziegler, 1960 (x75). Inner lateral view of CPC 11219 (Pl. 5, figs 4, 7)

anterior bar; both bars bear 5 to 6 discrete, pointed, posteriorly inclined and inwardly curved denticles, circular in cross-section. Juvenile specimens tend to have equidimensional and thinner bar denticles.

Anterior bar outwardly deflected; posterior bar twisted so that part near apical denticle more outwardly inclined. Basal cavity wide, everted, with central pit beneath or just posterior to apical denticle; pit continues under posterior bar as gradually shallowing and narrowing, somewhat everted, extension. These extensions in juveniles are more groove-like. Beneath the apical denticle the apical lips are prominently flared; they gradually merge with the posterior bar but they abruptly meet the anterior bar in front of the apical denticle.

Remarks: The distinctive everted basal cavity extensions distinguish *Lonchodina walliseri* from *L. greilingi* Walliser, which has a deep basal cavity limited to beneath the apical denticle. Some forms may show a resemblance to *Ozarkodina media* Walliser (1957), but the latter has thickened bars, a more erect apical denticle, and a much smaller basal cavity.

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Rexroad & Richards (1965)	Niagara Gorge, Ontario	Lower <i>patula</i>
	Rexroad (1967)	Brassfield Fm., Indiana, Kentucky, Ohio	Early to mid-Llandoveryan
	Nicholl & Rexroad (1968)	Salamonie and Lee Ck. Member, Brassfield Fm., Indiana	Late Bereich I, to <i>amorphognathoides</i>
Europe	Walliser (1957)	Carnic Alps, Germany	Late Wenlockian
	Ziegler (1960)	Rheinisches Schiefergebirge, Germany	Gedinnian
	Spasov & Veselinović (1963)	Suva Planina Yugoslavia	Late Ludlovian
	Walliser (1964)	Carnic Alps, Germany	<i>sagitta</i> to early Devonian
	Manzoni (1965)	Carnic Alps, Italy	<i>sagitta</i> to Gedinnian
	Schulze (1968)	Karawanken Alps, Southern Austria	Gedinnian to mid Siegenian
	Nikiforova & Predtechenskij (1968)	Radkov Beds, Podolia	Late Ludlovian
Australia	Philip (1965)	Coopers Creek Fm., Gippsland, Victoria	Late Gedinnian to Siegenian
	Druce (1969)	N. Yarrol Basin, Queensland	Early Gedinnian
	Philip (1969)	Dirk Hartog Fm., Western Australia	Ludlovian
	Druce (1970)	Garra Fm., NSW	Mid Siegenian

Yass Basin—*Lonchodina walliseri* Ziegler occurs at the base of the Euralie Limestone Member and at the top of the Hume Limestone Member in the Derringullen/Limestone Creek area. In the southern part of the basin, the species first appears 3 m below the base of the Hume Limestone Member; its final appearance is at 5.1 m in the Hume Limestone Member.

Range: Early Llandoveryan (late Bereich I Zone) to middle Siegenian.

Genus NEOPRIONIODUS Rhodes & Müller, 1956

Type species: *Prioniodus conjunctus* Gunnell, 1933

NEOPRIONIODUS BICURVATOIDES Walliser, 1964

(Pl. 5, figs 8, 9, 26, 27; text-fig. 28)

1964 *Neoprioniodus bicurvatooides* Walliser, p. 46, pl. 7, fig. 8; pl. 29, figs 36, 37.

1969 *Neoprioniodus bicurvatus* (Branson & Mehl); Philip, p. 292, pl. 17, fig. 15.

Material: 9 specimens; CPC 11221, 11231 figured.

Description: Blade consisting of arched posterior bar and large apical denticle. Posterior bar thin, shallow, depressed, and bowed. Apical denticle erect, 3 to 4 times taller than bar denticles, inwardly inclined and triangular in cross-section. Bar denticles even in height and subparallel; those nearest the apical denticle are parallel to it but those towards the bar extremity tend to diverge from it.

Basal cavity narrow, deepest beneath posterior part of apical denticle; extends along most of bar as narrow, shallow groove. Inner apical lip slightly flared.

Remarks: The posterior bar near the apical denticle is not as broadly arched nor is the aboral projection of the anterior face of the apical denticle as prominent and pointed as in *Neoprioniodus bicurvatus* (Branson & Mehl).

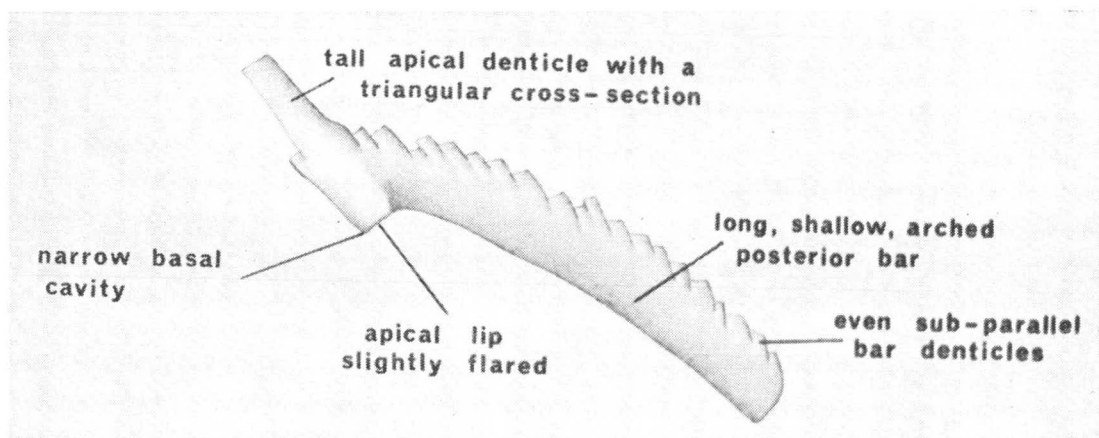


Figure 28. *Neoprioniodus bicurvatooides* Walliser, 1964 (x95). Inner lateral view of CPC 11231 (Pl. 5, figs 26, 27)

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Walliser (1964)	Carnic Alps, Germany	<i>sagitta</i>
	Manzoni (1965)	Carnic Alps, Italy	<i>sagitta</i>
Australia	Philip (1969)	Dirk Hartog Fm., Western Australia	Ludlovian

Yass Basin—*Neoprioniodus bicurvatooides* Walliser occurs in the Hume Limestone Member at the Silverdale quarry, and in the Elmside Formation. South of the Yass River this species occurs in the Yarwood Siltstone Member.

Range: Late Wenlockian (*sagitta* Zone) to early Gedinnian.

NEOPRIONIODUS BICURVATUS (Branson & Mehl, 1933)
(Pl. 5, figs 10, 11; text-fig. 29)

- 1933 *Prioniodus bicurvatus* Branson & Mehl, p. 44, pl. 3, figs 9-12.
- 1956 *Prioniodina tropa* (Stauffer); Ziegler, p. 104, pl. 6, fig. 29; pl. 7, fig. 29.
- 1958 *Prioniodina bicurvata* (Branson & Mehl); Bischoff & Sannemann, p. 102, pl. 15, figs 6, 12.
- 1960 *Prioniodina tropa* (Stauffer); Spasov, p. 70, pl. 1, fig. 19.
- 1960 *Prioniodina bicurvata pronoides* Walliser; Ziegler, p. 193, pl. 15, figs 8, 9.
- 1960 *Prioniodina* n. sp. Ziegler, p. 193, pl. 15, fig. 23.
- 1960 *Prioniodina bicurvata pronoides* Walliser, p. 33, pl. 8, figs 8-10.
- 1962 *Neoprioniodus* sp. Ethington & Furnish, p. 1275, pl. 173, fig. 3.
- 1962 *Prioniodina bicurvata pronoides* Walliser; Jentzsch, p. 971, pl. 2, fig. 13.
- Non1964 *Prioniodina bicurvatus* (Branson & Mehl); Serpagli & Greco, p. 207, pl. 37, fig. 11.
- 1964 *Neoprioniodus bicurvatus* (Branson & Mehl); Walliser, p. 46, pl. 9, fig. 13; pl. 29, figs 27-33; text-fig. 5d.
- 1965 *Neoprioniodus bicurvatus* (Branson & Mehl); Philip, p. 105, pl. 9, figs 13, 18, 20.
- 1966 *Neoprioniodus bicurvatus* (Branson & Mehl); Philip, p. 446, pl. 3, figs 12-16.
- 1966 *Synprioniodina bicurvata pronoides* (Walliser); Moskalenko, p. 202, pl. 1, figs 16-18.
- 1968 *Neoprioniodus bicurvatus* (Branson & Mehl); Schulze, p. 200, pl. 18, figs 9, 11.

1968 *Neoprioniodus bicurvatus* (Branson & Mehl); Nikiforova & Predtechenskij, pl. 28, figs 9, 10.

Non1969 *Neoprioniodus bicurvatus* (Branson & Mehl); Philip, p. 292, pl. 17, fig. 15.

1970 *Neoprioniodus bicurvatus* (Branson & Mehl); Druce, p. 39.

Material: 12 specimens; CPC 11222 figured.

Description: Unit consisting of prominent apical denticle, posterior bar, and antecusp. Posterior bar long, broadly arched, slightly deflected, shallow, and of uniform depth. Bar denticles anteriorly inclined, essentially parallel, and cyclically developed, i.e. small and large denticles alternating.

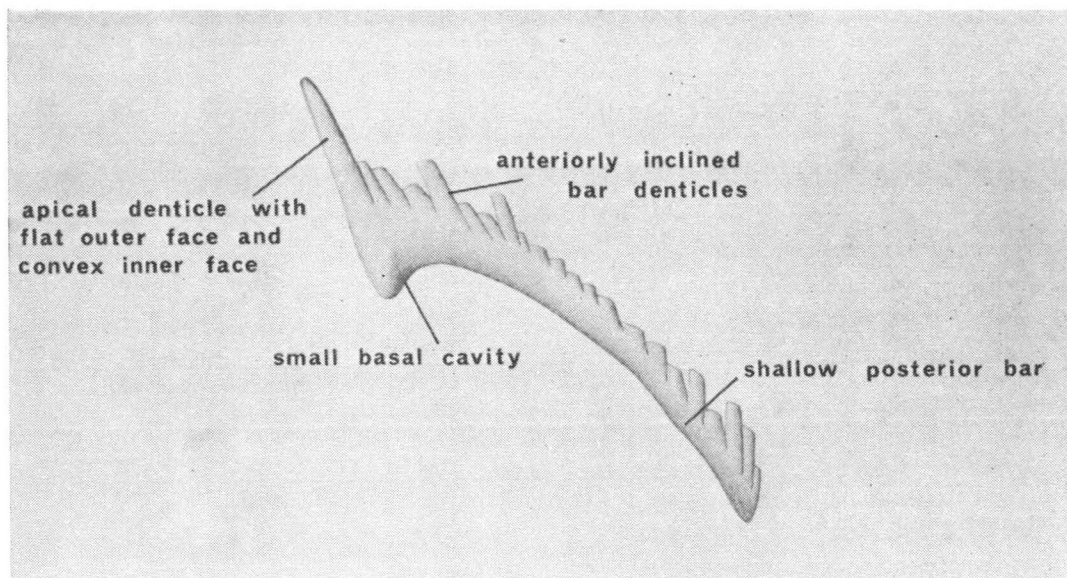


Figure 29. *Neoprioniodus bicurvatus* (Branson & Mehl, 1933) (x100). Outer lateral view of CPC 11222 (Pl. 5, figs 10, 11)

Apical denticle inwardly inclined, having flat outer face, convex inner face, and sharp anterior and posterior edges. Basal cavity beneath posterior part of apical denticle, extending as narrow shallow groove along posterior bar. Inner apical lip flared just posterior of apical denticle.

Remarks: The antecusp may bear several fused, parallel-sided, needle-like denticles on its exterior face. *Neoprioniodus bicurvatus* is distinguished from *N. multiformis* Walliser and *N. excavatus* (Branson & Mehl) by its smaller basal cavity. The anteriorly inclined bar denticles of the present species are also distinctive. Walliser (1964, p. 46) states that *N. bicurvatus* and *N. bicurvatooides* Walliser are homeomorphs and are difficult to separate. Nevertheless, it was observed here that the bar denticles in *N. bicurvatooides* may be slightly thicker and rounder and the aboral extension of the antecusp may be greater.

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Branson & Mehl (1933)	Bainbridge Lst., Missouri	Wenlockian

	Reference	Formation/Location	Age/Zone
Africa	Walliser (1960)	Sutherland River Fm., Devon Island	Gedinnian (Johnson et al., 1967)
	Ethington & Furnish (1962)	Tindouf Basin, Spanish Sahara	Silurian
Europe	Ziegler (1956)	Schonauer—Kalk, Oberems—Kalk, Germany	Early to late Emsian
	Bischoff & Sannemann (1958)	Tentakulitenkalk, Germany	Early Devonian
	Kockel (1958)	Ardales, Spain	Late Wenlockian to Emsian
	Spasov (1960)	Southwest Bulgaria	Late Silurian
	Ziegler (1960)	Rheinisches Schiefergebirge, Germany	Gedinnian
	Jentzsch (1962)	Tentakulite Lst., Germany	Early Devonian
	Walliser (1964)	Carnic Alps, Germany	Mid <i>crispus</i> to early Devonian
	Moskalenko (1966)	Zeravshan Range, USSR	Late Silurian
	Schulze (1968)	Karawanken Alps, Southern Austria	Gedinnian to late Emsian
	Nikiforova & Predtechenskij (1968)	Tajna Beds, Podolia	Early Gedinnian
Australia	Philip (1965)	Coopers Creek Fm., Gippsland, Victoria	Late Gedinnian to Siegenian
	Philip (1966)	Buchan Caves Lst., Murrindal Lst., Victoria	Early Emsian
	Druce (1970)	Garra Formation, NSW	Mid Siegenian

Yass Basin—*Neoprioniodus bicurvatus* (Branson & Mehl) is confined to the Yarwood Siltstone and the Hume Limestone Members.

Range: Early late Ludlovian to Emsian.

NEOPRIONIODUS EXCAVATUS (Branson & Mehl, 1933) (Pl. 5, figs 12-15; text-fig. 30)

- 1933 *Prioniodus excavatus* (Branson & Mehl), p. 45, pl. 3, figs 7-8.
1957 *Prioniodina bicurvata* (Branson & Mehl); Walliser, p. 46, pl. 2, figs 18, 19.
1958 *Prioniodina excavata* (Branson & Mehl); Bischoff & Sannemann, p. 103, pl. 15, figs 7, 10.
1962 *Prioniodina bicurvata* (Branson & Mehl); Ethington & Furnish, p. 1283, pl. 173, fig. 17.
1962 *Prioniodina excavata* (Branson & Mehl); Jentzsch, p. 972, pl. 2, fig. 9.
1962 *Prioniodina bicurvata* (Branson & Mehl); Walliser, p. 283, fig. 1, no. 17.
1964 *Neoprioniodus excavatus* (Branson & Mehl); Walliser, p. 49, pl. 8, fig. 4; pl. 29, fig. 26.
1965 *Neoprioniodus excavatus* (Branson & Mehl); Philip, p. 105, pl. 9, figs 16-17.
1965 *Neoprioniodus excavatus* (Branson & Mehl); Spasov, p. 28, pl. 1, fig. 10.
1968 *Neoprioniodus excavatus* (Branson & Mehl); Schulze, p. 200, pl. 18, figs 5, 6, 8.
1970 *Neoprioniodus excavatus* (Branson & Mehl); Druce, p. 39.

Material: 97 specimens; CPC 11223, 11224 figured.

Description: Blade with long posterior bar, stout apical denticle, and elongate basal cavity. Posterior bar stout, deep, depressed through 20° to 30°, deflected, and tapering gradually towards posterior end. Antecusp lined with up to 4 parallel

needle-like denticles. Bar denticles discrete, pointed, laterally compressed, and knife-edged, decreasing slightly in height posteriorly. Apical denticle 3 to 4 times as tall and broad as adjacent bar denticles, inwardly and slightly posteriorly inclined. Inner faces of bar and apical denticles strongly convex; outer faces gently convex. Parallelism of bar denticles with apical denticle decreasing gradually posteriorly.

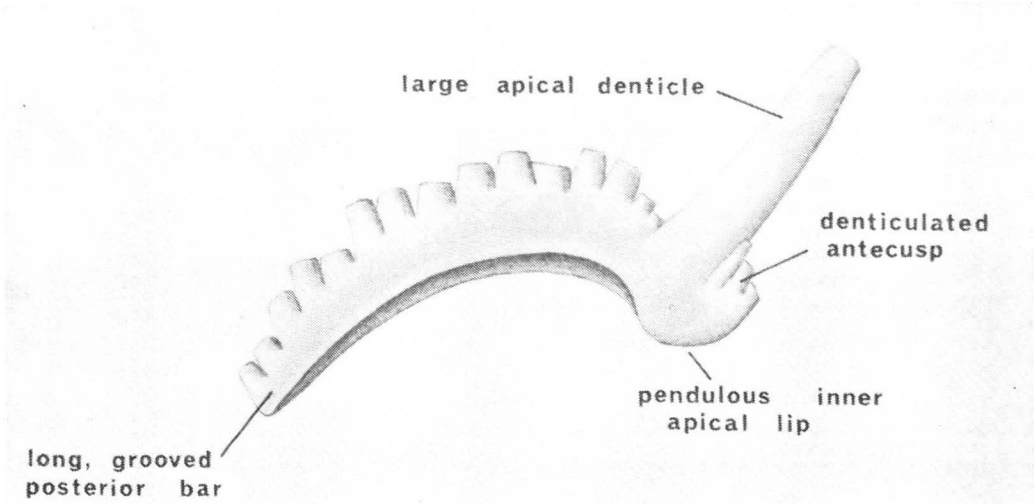


Figure 30. *Neoprioniodus excavatus* (Branson & Mehl, 1933) (x90). Inner lateral view of CPC 11223 (Pl. 5, figs 12, 13)

Basal cavity subapical, narrowing along posterior bar; deep pit beneath posterior part of apical denticle. Inner apical lip flared; projected pendulously near apical denticle, but upwardly towards mid-bar height along bar.

Remarks: *Neoprioniodus excavatus* is distinguished from other species of the genus by its diagnostic pendulous inner apical lip and its long, grooved posterior bar.

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Branson & Mehl (1933)	Bainbridge Lst., Missouri	Wenlockian
Africa	Ethington & Furnish (1962)	Tindouf Basin, Spanish Sahara	Silurian
Europe	Walliser (1957)	Carnic Alps, Germany	Wenlockian to Ludlovian
	Bischoff & Sannemann (1958)	Tentakulitenkalk, Germany	Early Devonian
	Kockel (1958)	Ardales, Spain	Mid to late Ludlovian
	Jentzsch (1962)	Tentaculite Lst., Germany	Early Devonian
	Walliser (1962)		Wenlockian
	Spasov & Veselinović (1963)	Suva Planina, Yugoslavia	Late Ludlovian
	Walliser (1964)	Carnic Alps, Germany	<i>patula</i> to early Devonian

	Reference	Formation/Location	Age/Zone
	Spasov (1965)	West Macedonia	Late Silurian
	Manzoni (1965)	Carnic Alps, Italy	<i>ploeckensis</i> to <i>siluricus</i>
	Schulze	Karawanken Alps, Southern Austria	Gedinnian to late Emsian
Australia	Philip (1965)	Coopers Creek Fm., Victoria	Late Gedinnian to Siegenian
	Druce (1970)	Garra Fm., NSW	Mid Siegenian

Yass Basin—*Neoprioniodus excavatus* (Branson & Mehl) is present in the calcareous beds both north and south of the Yass River. Specimens have also been recovered from reworked limestone pebbles of the Sharpeningstone Conglomerate.

Range: Early Wenlockian (*patula* Zone) to late Emsian.

NEOPRIONIODUS LATIDENTATUS Walliser, 1964
(Pl. 5, figs 16-18; text-fig. 31)

- 1957 *Prioniodina excavata* (Branson & Mehl); Walliser, p. 46, pl. 2, fig. 17.
 1960 *Prioniodina excavata* (Branson & Mehl); Ziegler, p. 192, pl. 15, fig. 5.
 1964 *Neoprioniodus latidentatus* Walliser, p. 50, pl. 8, fig. 15; pl. 29, figs 34, 35; text-fig. 5b.
 1969 *Neoprioniodus latidentatus* Walliser; Philip, p. 293, pl. 7, figs 7-10, 16.

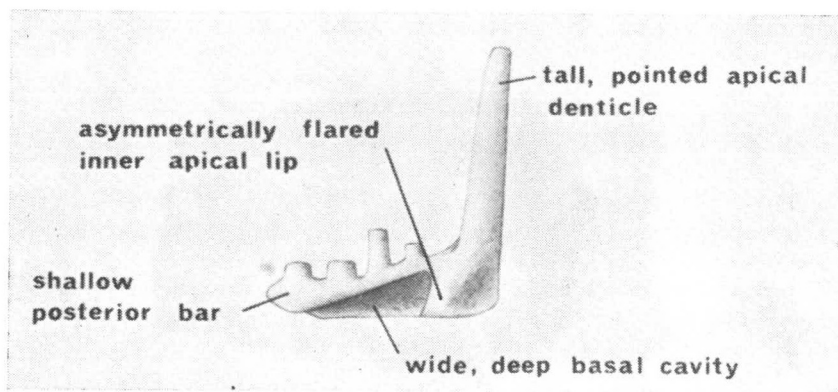


Figure 31. *Neoprioniodus latidentatus* Walliser, 1964 (x80). Inner lateral view of CPC 11225 (Pl. 5, figs 16, 17)

Material: 17 specimens; CPC 11225, 11226 figured.

Description: Shallow neoprioniodid consisting of tall, slender apical denticle, thin antero-aboral margin, and isolated denticles on posterior bar. Bar denticles pointed, slender, and circular in cross-section. Posterior bar tapering to a point distally, deflected through 15° to 20°. Apical denticle pointed, tall, oval in cross-section and curved posteriorly, angle of curvature greatest nearer base.

Basal cavity wide and deep, situated posterior to apical denticle, continuing as wide but shallow depression to end of posterior bar. Very short anterior extension also. Inner apical lip asymmetrically flared, almost as high as oral surface of posterior bar.

Remarks: *Neoprioniodus latidentatus* differs from *N. excavatus* (Branson & Mehl), which has a deeper bar and the anterior part of its inner apical lip projected below the base of the unit.

N. latidentatus appears to be an intermediate between two variants of *N. multiformis* Walliser. One variant possesses a short denticulated anterior bar and a slender apical denticle; the other variant has a broad apical denticle and no anterior bar. It is possible that larger collections of these variants may be split into stratigraphically useful groups.

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Walliser (1957)	Carnic Alps, Germany	Wenlockian to Ludlovian
	Ziegler (1960)	Rheinisches Schiefergebirge, Germany	Gedinnian
	Walliser (1964)	Carnic Alps, Germany	<i>ploeckensis</i> to early Devonian
	Manzoni (1965)	Carnic Alps, Italy	<i>crassa</i> to <i>latialatus</i>
	Serpagli (1967) Schulze (1968)	Sardinia Karawanken Alps, Southern Austria	Ludlovian Gedinnian to mid-Siegenian
Australia	Philip (1969)	Dirk Hartog Fm., Western Australia	Ludlovian

Yass Basin—*Neoprioniodus latidentatus* Walliser, in the Derringullen Creek/Silverdale area, occurs at the base of the Euralie Limestone Member and extends to 3 m above the base of the Hume Limestone Member. South of the Yass River its first occurrence is near the base of the Euralie Limestone Member; it is also present in the Yarwood Siltstone Member near Reedy Creek.

Range: Middle early Ludlovian (*crassa* Zone) to middle Siegenian.

NEOPRIONIODUS MULTIFORMIS Walliser, 1964
(Pl. 5, figs 19-21, 23-25; text-fig. 32)

1964 *Neoprioniodus multiformis* Walliser, p. 50, pl. 8, fig. 10; pl. 29, figs 14, 16-25; text-fig. 5a.

1968 *Neoprioniodus multiformis* Walliser; Schulze, p. 201, pl. 18, fig. 4.

Material: 32 specimens; CPC 11227, 11228, 11230 figured.

Description: The morphology of this species is extremely variable. Specimens are arched and have a prominent apical denticle and a long posterior bar. Posterior bars are moderately deflected and tapering posteriorly. Over half the specimens have short anterior bars bearing 1 to 5 denticles. Bar denticles are circular to lensoid in cross-section, discrete to fused, and uniform to irregular in size. The apical denticle of the forms without an anterior bar is massive and is up to 5 times as wide as the adjacent denticles. Massive apical denticles are erect and moderately laterally compressed, whereas the slender denticles of forms with an anterior bar are posteriorly inclined and subcircular in cross-section.

The inner apical lip is usually flared and asymmetrical. A wide, deep basal cavity, deepest just posterior to the apical denticle, extends as grooves to the bar extremities.

Remarks: Some specimens referred to *Neoprioniodus multiformis* in this study resemble *Synprioniodina silurica* Walliser. Nevertheless, the latter species is distinguished by its more strongly deflected bars, smaller basal cavity, and extensions under the bars. The extreme range in morphology indicates a need for further detailed study of a large collection of this species.

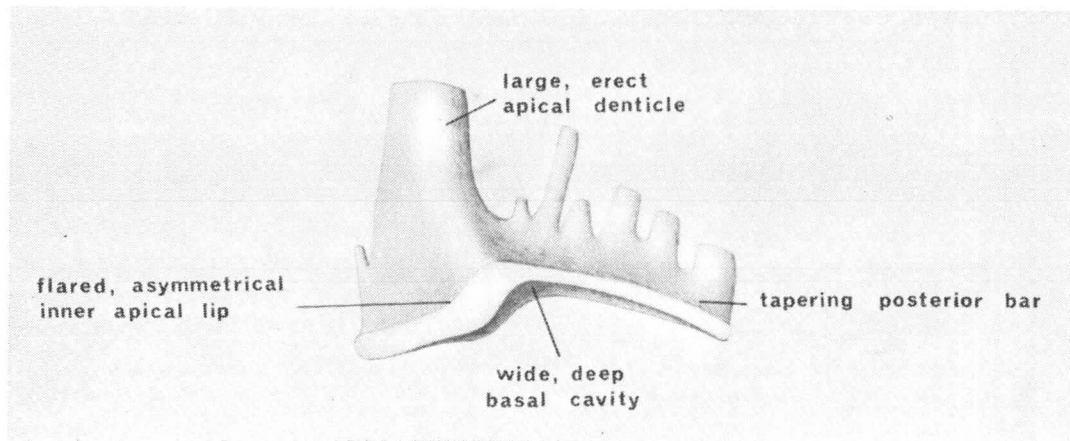


Figure 32. *Neoprioniodus multiformis* Walliser, 1964 (x80). Inner lateral view of CPC 11228 (Pl. 5, figs 20, 21)

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Walliser (1964)	Carnic Alps, Germany	<i>crassa</i> to <i>siluricus</i>
	Manzoni (1965)	Carnic Alps, Italy	<i>sagitta</i> to <i>ploeckensis</i>
	Serpagli (1967)	Sardinia	Ludlovian
	Schulze (1968)	Karawanken Alps, Southern Austria	Gedinnian to mid-Siegenian

Yass Basin—*Neoprioniodus multiformis* Walliser occurs in the lowest beds of the Euralie Limestone Member near Derringullen Creek, Silverdale; it extends to 3 m above the base of the Hume Limestone Member in the Silverdale quarry. At Hattons Corner it occurs in the lower beds of the ‘Barrandella’ Shale Member and extends to the middle beds of the Hume Limestone Member at Good Hope Road.

Range: Late Wenlockian (*sagitta* Zone) to middle Siegenian.

NEOPRIONIODUS sp.
(Pl. 5, fig. 22; text-fig. 33)

1964 *Prioniodina bicurvata* (Branson & Mehl); Serpagli & Greco, p. 207, pl. 37, fig. 11.

Material: 1 specimen; CPC 11229 figured.

Remarks: This specimen has a shallow posterior bar and laterally compressed bar denticles that are half as tall as the apical denticle, pointed and triangular in cross-section. In comparison with *Neoprioniodus latidentatus* Walliser the basal cavity is narrow and limited to beneath the apical denticle.

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Serpagli & Greco (1964)	Carnic Alps, Italy	Silurian

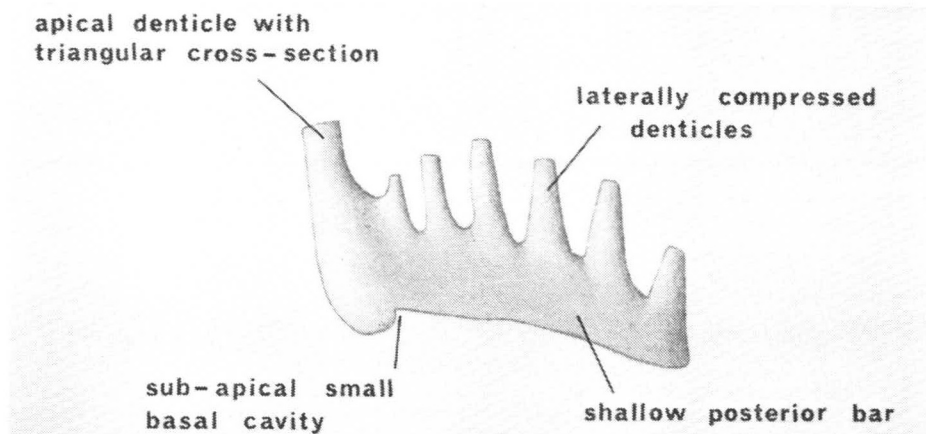


Figure 33. *Neoprioniodus* sp. (x125). Inner lateral view of CPC 11229 (Pl. 5, fig. 22)

Yass Basin—The specimen was recovered from the lower beds of the Bowspring Limestone Member near Good Hope Road.

Range: Early Ludlovian.

Genus ONEOTODUS Lindstrom, 1954

Type species: *Distacodus? simplex* Furnish, 1938

Remarks: Hass (1962, p. 43) regarded *Oneotodus* as a junior synonym of *Drepanodus*. But drepanodids are sharp-edged, laterally compressed units that have biconvex cross-sections: oneotodids are squat conical units.

ONEOTODUS? BECKMANNI Bischoff & Sannemann, 1958
(Pl. 6, fig. 1; text-fig. 34)

- 1958 *Oneotodus? beckmanni* Bischoff & Sannemann, p. 98, pl. 15, figs 22-25.
- 1960 *Oneotodus? beckmanni* Bischoff & Sannemann; Spasov, p. 70, pl. 1, fig. 3.
- 1963 *Oneotodus? beckmanni* Bischoff & Sannemann; Spasov & Veselinović, p. 246, pl. 2, fig. 3.
- 1965 Gen. et sp. indet. A. Philip, p. 113, pl. 8, figs 1-4.
- 1966 *Oneotodus? beckmanni* Bischoff & Sannemann; Clark & Ethington, p. 680, pl. 83, figs 1, 2.
- 1968 *Oneotodus? beckmanni* Bischoff & Sannemann; Schulze, p. 202, pl. 16, fig. 11.
- 1969 *Oneotodus? beckmanni* Bischoff & Sannemann; Druce, p. 53, pl. 11, figs 7a-8b.

Material: 1 specimen; CPC 11232 figured.

Description: A low erect cone, slightly recurved near the apex. Cross-sections near the base, middle, and apex are elliptical, circular, and oval respectively. Cone height and basal diameter are almost equal. The conical basal cavity occupies most of the cone and terminates just beneath the apex.

Remarks: Doubt has been expressed about these cones being conodonts (Clark & Ethington, 1966, p. 681).

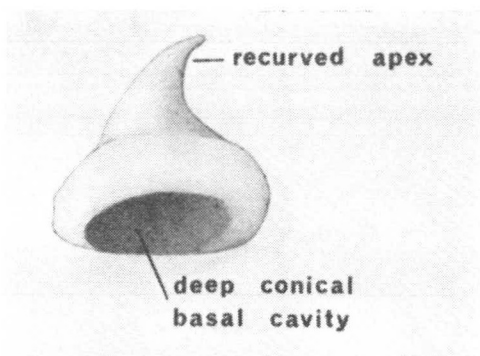


Figure 34. *Oneotodus (?) beckmanni* (x120).
Aboral/lateral view of CPC 11232
(Pl. 6, fig. 1)

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Bischoff &	Tentakulitenkalk,	Early Devonian
	Sannemann (1958)	Germany	
	Spasov (1960)	Southwest Bulgaria,	Late Silurian
		Austria	
North America	Spasov &	Suva Planina,	Late Ludlovian
	Veselinović (1963)	Yugoslavia	
	Schulze (1968)	Karawanken Alps,	Gedinnian to late
		Southern Austria	Emsian
Australia	Clark &	Roberts Mts Fm.,	Late Silurian to
	Ethington (1966)	Rabbit Hill Fm., Nevada	Emsian
Australia	Philip (1965)	Coopers Creek Fm.,	Late Gedinnian to
		Victoria	Siegenian
	Druce & Wilson	Yarrol Basin,	Gedinnian
	(1967)	Queensland	
	Druce (1969)	N. Yarrol Basin,	Early Gedinnian
		Queensland	

Yass Basin—This specimen was obtained from the lowest limestone bed in the Cliftonwood Limestone near the confluence of the Yass River and Bango Creek.

Range: Early early Ludlovian (*crassa* Zone) to Emsian.

Genus OZARKODINA Branson & Mehl, 1933

Type species: *Ozarkodina typica* Branson & Mehl, 1933

Remarks: Rhodes (1953, p. 320) and Ethington & Furnish (1962, p. 1276) have referred to the difficulty in distinguishing between the genera *Bryantodus* and *Ozarkodina*. Rhodes has recommended placing specimens with longitudinally extended cavities in *Bryantodus*. The present specimens and many of the figured specimens of ozarkodinids in Walliser (1964) (e.g. *Ozarkodina ortus* Walliser and *O. ziegleri ziegleri* Walliser) show that basal cavities grade from subapically limited to longitudinally extended, in some cases to the bar extremities.

Ethington & Furnish (1962, p. 1277) stated that *Bryantodus* differs from *Ozarkodina* by possessing lateral flanges beneath the bar denticles and a subapical lip. These features are noted, however, within the morphological variations of *O. gaertneri* Walliser and *O. media* Walliser. Therefore, it is not possible to recognize *Bryantodus* and *Ozarkodina* as separate genera in the present Upper Silurian specimens.

OZARKODINA CRASSA Walliser, 1964

(Pl. 6, figs 2, 3; text-fig. 35)

1964 *Ozarkodina crassa* Walliser, p. 55, pl. 7, fig. 9; pl. 24, figs 14-17.

1969 *Ozarkodina* sp. aff. *O. fundamentata* (Walliser); Philip, p. 293, pl. 18, fig. 13.

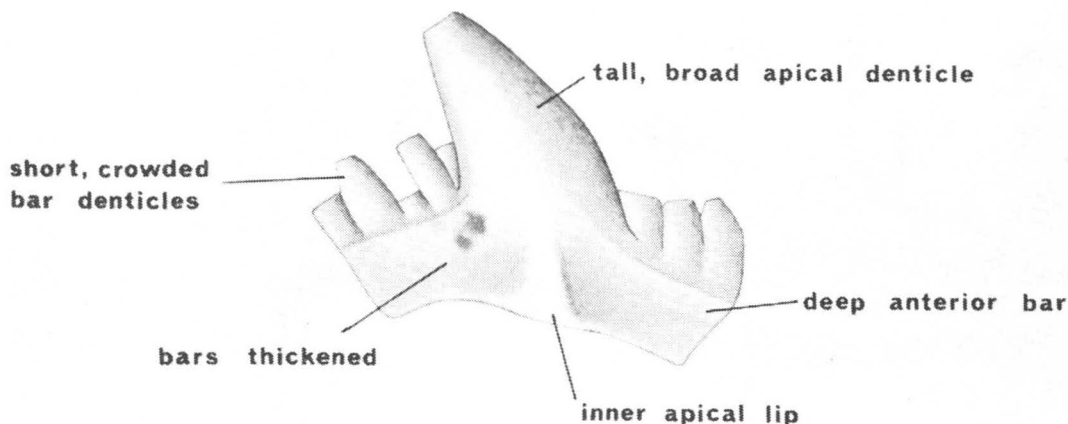


Figure 35. *Ozarkodina crassa* Walliser, 1964 (x80). Inner lateral view of CPC 11234 (Pl. 6, fig. 3)

Material: 9 specimens; CPC 11233, 11234 figured.

Description: A short, robust, slightly arched blade with a tall, basally very broad apical denticle. Anterior bar twice as long as posterior bar, and deeper. Bars laterally thickened, tapering distally from apical denticle. Bar denticles short and crowded. Apical denticle prominent, strongly inclined to posterior. Basal cavity subapical, extending for short distances beneath both bars. Apical lips asymmetrical, posterior of mid-unit; inner lip 2 to 3 times as large as outer lip.

Remarks: The tall broad apical denticle of *Ozarkodina crassa* Walliser characterizes this species.

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Walliser (1964)	Carnic Alps, Germany	<i>crassa</i>

Yass Basin—Specimens of *Ozarkodina crassa* Walliser were obtained from 23 m above the base of the 'Barrandella' Shale Member to 5.7 m in the Hume Limestone Member in the Silverdale quarry.

Range: This Yass occurrence extends the previously known range of this species. Early Ludlovian (*crassa* Zone) to late middle Ludlovian (*siluricus* Zone).

OZARKODINA DENCKMANNI Ziegler, 1956
(Pl. 6, figs 4, 9; text-fig. 36)

- 1956 *Ozarkodina denckmanni* Ziegler, p. 103, pl. 6, figs 30, 31; pl. 7, figs 1, 2.
 1958 *Ozarkodina denckmanni* Ziegler; Bischoff & Sannemann, p. 99, pl. 14, figs 22, 23.
 1960 *Ozarkodina denckmanni* Ziegler; Spasov, p. 68, pl. 1, fig. 15.
 1960 *Ozarkodina denckmanni* Ziegler; Walliser, p. 31, pl. 8, figs 13, 14.
 1960 *Ozarkodina denckmanni* Ziegler; Ziegler, p. 190, pl. 15, figs 13-15.
 1962 *Ozarkodina denckmanni* Ziegler; Jentzsch, p. 970, pl. 2, fig. 6.
 1962 *Ozarkodina denckmanni* Ziegler; Walliser, p. 283, fig. 1, no. 32.
 1963 *Ozarkodina denckmanni* Ziegler; Spasov & Veselinović, p. 246, pl. 1, fig. 10.
 1964 *Ozarkodina typica denckmanni* Ziegler; Walliser, p. 61, pl. 9, fig. 14; pl. 26, figs 3-11.
 1965 *Ozarkodina denckmanni* Ziegler; Philip, p. 106, pl. 9, figs 2, 4, 6-8.
 1966 *Ozarkodina denckmanni* Ziegler; Barnett et al., p. 436, pl. 58, fig. 7.
 1966 *Ozarkodina typica denckmanni* Ziegler; Clark & Ethington, p. 681, pl. 82, figs 13, 23.
 1966 *Ozarkodina denckmanni* Ziegler; Moskalenko, p. 201, pl. 1, fig. 11.
 1966 *Ozarkodina denckmanni* Ziegler; Philip, p. 446, pl. 4, figs 15-20.
 1967 *Ozarkodina typica denckmanni* Ziegler; Philip & Pedder, p. 797, text-fig. 8.
 1968 *Ozarkodina typica denckmanni* Ziegler; Nikiforova & Predtechenskij, pl. 32, fig. 27; pl. 33, fig. 23; pl. 36, fig. 20.
 1968 *Ozarkodina typica denckmanni* Ziegler; Schulze, p. 205, pl. 16, figs 12, 13; text-fig. 17.
 1968 *Ozarkodina typica denckmanni* Ziegler; Legault, p. 15, pl. 1, figs 5, 6.
 1969 *Ozarkodina denckmanni* Ziegler; Druce, p. 54, pl. 10, figs 6a, b.
 1969 *Ozarkodina denckmanni* Ziegler; Klapper, p. 10, pl. 2, figs 40, 41.
 1970 *Ozarkodina denckmanni* Ziegler; Druce, p. 39.

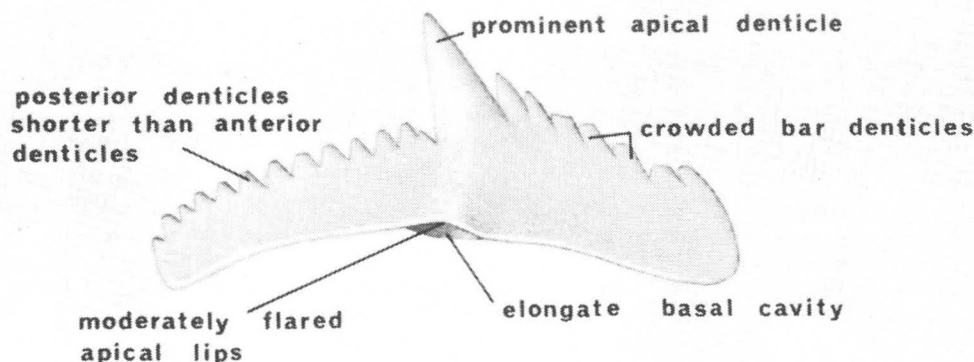


Figure 36. *Ozarkodina denckmanni* Ziegler, 1956 (x70). Outer lateral view of CPC 11235 (Pl. 6, fig. 4)

Material: 49 specimens; CPC 11235, 11236 figured.

Description: Gently arched, long, laterally compressed ozarkodinid with prominent apical denticle and crowded bar denticles. Anterior bar deeper and a little shorter than posterior bar. Oral outline increasing uniformly in height from anteriormost denticle to tip of apical denticle, then suddenly decreasing, remaining approximately parallel with oral surface of posterior bar. Bar denticles with sharp posterior and anterior edges, posteriorly inclined, slender, parallel, and fused, with free chevron tips; 10 to 12 anterior denticles increasing in height towards apical denticle, 10 or more posterior denticles essentially constant in height. Apical denticle posteriorly

inclined, situated at apex of arch, up to 3 times as broad and twice as tall as adjacent denticles.

A subapical elongate basal cavity extends as a narrowing groove along the aboral edge of both bars for a third of their length. Moderately flaring apical lips extend along both bars for a short distance.

Remarks: Some of the specimens tend to be finer than those usually figured in literature.

Occurrence:

	<i>Reference</i>	<i>Formation/Location</i>	<i>Age/Zone</i>
Europe	Ziegler (1956)	Schonauer Kalk, Oberems Kalk, Germany	Early to late Emsian
	Bischoff & Sannemann (1958)	Tentakulitenkalk, Germany	Early Devonian
	Kockel (1958)	Ardales, Spain	Emsian
	Spasov (1960)	Southwest Bulgaria	Late Silurian
	Ziegler (1960)	Rheinisches Schiefergebirge, Germany	Gedinnian
	Jentzsch (1962)	Tentaculite Lst., Germany	Early Devonian
	Walliser (1964)	Carnic Alps, Germany	<i>eosteinhornensis</i> to early Devonian
	Manzoni (1965)	Carnic Alps, Italy	<i>eosteinhornensis</i> to Siegenian
	Moskalenko (1966)	Zeravshan Range, USSR	Mid Siegenian
	Schulze (1968)	Karawanken Alps, Southern Austria	Gedinnian to late Emsian
	Nikiforova & Predtechenskij (1968)	Mitkov, Bogdanovka & Chortkov Beds, Podolia	Gedinnian
North America	Walliser (1960)	Sutherland River Fm., Devon Island, Canada	Gedinnian (Johnson et al., 1967)
	Clark & Ethington (1966)	Roberts Mts Fm., Nevada Fm., Nevada	Late Silurian to Emsian
	Legault (1968)	Stonehouse Fm., Nova Scotia	<i>eosteinhornensis</i>
	Klapper (1969)	Yukon, Devon Island, Canada	Early to mid Gedinnian
Asia	Barnett et al. (1966)	Nowshera Reef Lst., West Pakistan	Late Silurian to early Devonian
Australia	Philip (1965)	Coopers Creek Fm., Gippsland, Victoria	Late Gedinnian to Siegenian
	Philip (1966)	Buchan Caves Lst., Murrindal Lst., Victoria	Early Emsian
	Philip & Pedder (1967)	Lilydale Lst., Victoria	Early Siegenian
	Druce (1969)	N. Yarrol Basin, Queensland	Early Gedinnian
	Druce (1970)	Garra Fm., NSW	Mid Siegenian

Yass Basin—*Ozarkodina denckmanni* Ziegler is limited to the limestone lenses of the Elmside Formation.

Range: Late Silurian (*eosteinhornensis* Zone) to Emsian.

OZARKODINA GAERTNERI Walliser, 1964
(Pl. 6, figs 10, 13; text-fig. 37)

- 1964 *Ozarkodina gaertneri* Walliser, p. 57, pl. 6, fig. 6; pl. 27, figs 12-19.
 1966 *Ozarkodina gaertneri* Walliser; Spasov & Filipovic, p. 44, pl. 1, figs 1, 2.
 1968 *Ozarkodina gaertneri* Walliser; Nicholl & Rexroad, p. 49, pl. 2, figs 12-14.
 1968 *Ozarkodina gaertneri* Walliser; Igo & Koike, p. 14, pl. 1, figs 5-9.

Material: 13 specimens; CPC 11237 figured.

Description: Moderately arched units with rounded terminations and pronounced bar thickening. Bar denticles fused with free chevron tips; increasing uniformly in

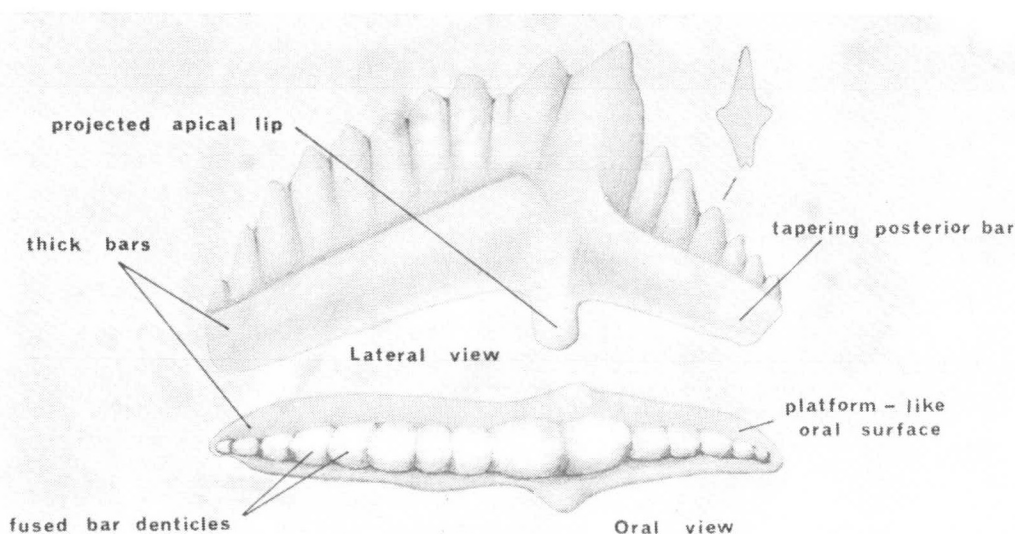


Figure 37. *Ozarkodina gaertneri* Walliser, 1964 (x60). Composite sketch of CPC 11237 (Pl. 6, figs 10, 13) and fig. 14 in Pl. 27 (Walliser, 1964)

height towards apical denticle; 8 to 10 denticles on anterior bar and 4 to 7 on posterior bar. Apical denticle twice as tall as denticles on anterior bar and 3 times as tall as denticles on posterior bar, 4 times as broad as adjacent bar denticles. Platform-like thickened sides equally developed in straight units, but in bowed units thickening on inner side greater. Thickening decreases in width distally from apical denticle.

Basal cavity subapical, deep, extending as grooves under limbs, narrowing towards bar extremities. Apical lips large, projecting downward and limited to apical denticle.

Remarks: The platform-like lateral thickening and the downwardly projecting apical lips of *Ozarkodina gaertneri* are distinctive. *O. adiutricus* Walliser can be distinguished by its apical lip which extends to the posterior termination.

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Walliser (1964)	Carnic Alps, Germany	<i>amorphognathoides</i>
	Spasov & Filipovic (1966)	Southeast Bosnia	<i>amorphognathoides</i>

	Reference	Formation/Location	Age/Zone
North America	Rexroad & Richard (1965)	Niagara Gorge, Ontario	<i>amorphognathoides</i>
	Nicholl & Rexroad (1968)	Salamonie and Lee Ck. Members, Brassfield Fm., Indiana	Upper Bereich I to <i>amorphognathoides</i>
Southeast Asia	Igo & Koike (1968)	Upper Setul Lst., Langkawi Is., Malaya	<i>celloni</i> to <i>amorphognathoides</i>

Yass Basin—*Ozarkodina gaertneri* Walliser extends from 3.6 m above the base of the Bowspring Limestone Member to the topmost beds of the Hume Limestone Member near Limestone Creek. South of the Yass River this species is known from only the Hume Limestone Member near Gums Road.

Range: Previously *O. gaertneri* was recorded from late Llandoveryan to early Wenlockian rocks. The Yass Basin occurrences extend this range from Llandoveryan (Upper Bereich I) to late middle Ludlovian (*siluricus* Zone).

OZARKODINA MEDIA Walliser, 1957
(Pl. 6, figs 11, 12, 14-16, 18; text-fig. 38)

- 1957 *Ozarkodina media* Walliser, p. 40, pl. 1, figs 21-25.
 1958 *Ozarkodina media* Walliser; Bischoff & Sannemann, p. 99, pl. 14, figs 15, 16, 18, 19.
 1960 *Ozarkodina media* Walliser; Spasov, p. 68, pl. 1, figs 7, 10.
 1962 *Ozarkodina media* Walliser; Ethington & Furnish, p. 1278, pl. 173, fig. 9.
 1962 *Ozarkodina media* Walliser; Walliser, p. 283, fig. 1, no. 18.
 1963 *Ozarkodina media* Walliser; Spasov & Veselinović, p. 246, pl. 1, figs 6, 8, 14.
 1964 *Ozarkodina media* Walliser; Walliser, p. 58, pl. 8, fig. 5; pl. 26, figs 19-34.
 1965 *Ozarkodina media* Walliser; Spasov, p. 28, pl. 1, fig. 9.
 1965 *Ozarkodina media* Walliser; Philip, p. 106, pl. 9, figs 1, 3.

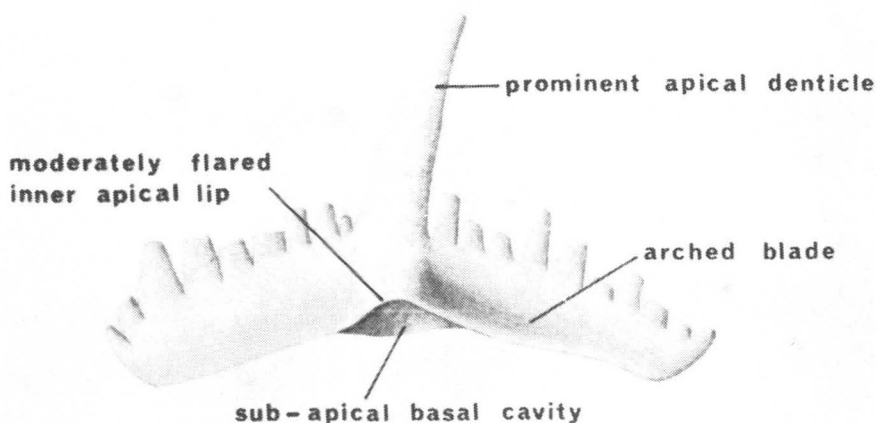


Figure 38. *Ozarkodina media* Walliser, 1957 (x75). Inner lateral view of CPC 11239 (Pl. 6, figs 14, 15)

- 1966 *Ozarkodina media* Walliser; Philip, p. 447, pl. 1, figs 29, 32-33.
 1966 *Ozarkodina media* Walliser; Spasov & Filipovic, p. 44, pl. 2, fig. 7.
 1966 *Ozarkodina media* Walliser; Clark & Ethington, p. 681, pl. 82, fig. 25.
 1968 *Ozarkodina media* Walliser; Igo & Koike, p. 15, pl. 3, fig. 15.
 1968 *Ozarkodina media* Walliser; Schulze, p. 204, pl. 17, figs 1, 2.

Material: 208 specimens; CPC 11238, 11239, 11240 figured.

Description: Arched unit with prominent apical denticle, and anterior and posterior bar of almost equal length and constant depth. Bars long, straight to slightly twisted, and thickened beneath oral surfaces. Oral outline of bar denticles convex, either parallel to aboral margin or increasing in height towards apical denticle. Bar denticles vary from constant size to twice as broad on anterior bar as on posterior bar. Each bar has 7 to 12 denticles. Denticles vary from upright to posteriorly inclined; discrete and peg-like. Apical denticle up to 4 times as tall as bar denticles and tapers to a point. In twisted specimens, it is inwardly inclined.

Basal cavity subapical, extending along both bars as narrowing groove. Inner apical lip moderately flared, enrolled upwards to mid-bar height just posterior to apical denticle.

Remarks: A wide range in morphology has been observed in *O. media* by Walliser (1964, p. 58) and Schulze (1968, p. 204). Some forms are close to *O. jaegeri* Walliser but differ in having only one apical lip projecting below the aboral edge and in having a more upright apical denticle.

Occurrence:

	<i>Reference</i>	<i>Formation/Location</i>	<i>Age/Zone</i>
Europe	Walliser (1957)	Carnic Alps, Germany	Late Wenlockian to Ludlovian
	Bischoff & Sannemann (1958)	Tentakulitenkalk, Germany	Early Devonian
	Kockel (1958)	Ardales, Spain	Late Wenlockian to late Ludlovian
	Spasov (1960)	Southwest Bulgaria, Austria	Late Silurian
	Walliser (1962)		Late Wenlockian
	Spasov & Veselinović (1963)	Suva Planina, Yugoslavia	Late Ludlovian
	Walliser (1964)	Carnic Alps, Germany	<i>patula</i> to early Devonian
	Spasov (1965)	West Macedonia	Late Silurian
	Spasov & Filipovic (1966)	Bosnia	Late Silurian
	Serpagli (1967)	Sardinia	Ludlovian
Africa	Schulze (1968)	Karawanken Alps, Southern Austria	Gedinnian to late Emsian
	Ethington & Furnish (1962)	Tindouf Basin, Spanish Sahara	Silurian
North America	Clark & Ethington (1966)	Rabbit Hill Fm., Nevada	Siegenian to Emsian
Southeast Asia	Igo & Koike (1968)	Upper Setul Lst., Langkawi Is., Malaya	<i>crassa</i>
Australia	Philip (1965)	Coopers Creek Fm., Gippsland, Victoria	Late Gedinnian to Siegenian
	Philip (1966)	Murrindal Lst., Buchan, Victoria	Early Emsian

Yass Basin—*Ozarkodina media* Walliser occurs abundantly throughout the Yass sequence in both the northern and southern areas of the basin.

Range: Wenlockian (*patula* Zone) to Emsian.

OZARKODINA ORTUS Walliser, 1964
(Pl. 6, figs 17, 19-22; pl. 7, figs 1, 2; text-fig. 39)

1964 *Ozarkodina ortus* Walliser, p. 59, pl. 9, fig. 18; pl. 24, figs 7-13.

Material: 4 specimens; CPC 11241, 11242, 11243, 11244 figured.

Description: Short blade with deflected bars, convex oral outline, and straight aboral outline. Anterior bar deeper than posterior bar. Bar denticles discrete, slender, oval in cross-section, pointed and posteriorly inclined. 3 to 5 denticles on anterior bar and 3 to 4 on shorter posterior bar. Basal cavity subapical, wide, shallow, and extending along both bars. Apical lips distinctively inflated.

Remarks: The holotypes of *Ozarkodina ortus* and *O. ortuformis* figured by Walliser (1964, pl. 24, figs 1, 10) are similar in most of their features except the basal

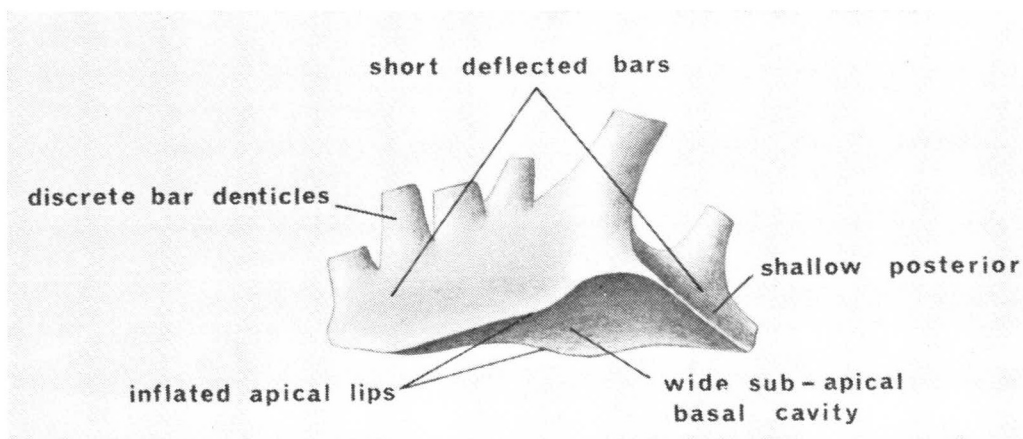


Figure 39. *Ozarkodina ortus* Walliser, 1964 (x100). Composite sketch of CPC 11241 (Pl. 6, fig. 17) and fig. 1 in pl. 24 of Walliser, 1964

cavities. *O. ortus* has an inflated cavity that continues along both bars, whereas *O. ortuformis* has a basal cavity that is subapically restricted and only continues along the bars as a narrow groove. Although they resemble *O. ortuformis*, the four specimens in this study are placed in *O. ortus* because of their inflated basal cavities.

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Walliser (1964)	Carnic Alps, Germany	<i>patula</i> to <i>crassa</i>

Yass Basin—*Ozarkodina ortus* Walliser is present in the Euralie Limestone Member and the Hume Limestone Member in the northern part of the basin, but in the southern part only a single specimen was recovered, from the middle beds of the Hume Limestone Member near Reedy Creek.

Range: Wenlockian (*patula* Zone) to middle Ludlovian.

OZARKODINA TYPICA Branson & Mehl, 1933
(Pl. 7, figs 3, 4; text-fig. 40)

- 1933 *Ozarkodina typica* Branson & Mehl, p. 51, pl. 3, figs 43-45.
 1953 *Ozarkodina typica* Branson & Mehl, Rhodes, p. 320, pl. 23, figs 261, 262.
 1964 *Ozarkodina typica typica* Branson & Mehl; Walliser, p. 61, pl. 9, fig. 21; pl. 25, figs 20, 21; pl. 26, figs 1, 2.
 1967 *Ozarkodina typica* Branson & Mehl; Rexroad, p. 39, pl. 2, figs 7, 8.

Material: 2 specimens; CPC 11245 figured.

Description: A broadly arched ozarkodinid with anterior bar of uniform depth and tapering posterior bar. Oral and aboral outlines roughly parallel. Apical denticle elongate, pointed, posteriorly inclined, 4 to 5 times taller and 3 times broader than bar denticles. Bar denticles basically fused. Subapical cavity conical and extends for only a short distance along both bars.

Remarks: The close resemblance of *Ozarkodina typica* to figured specimens of *O.*

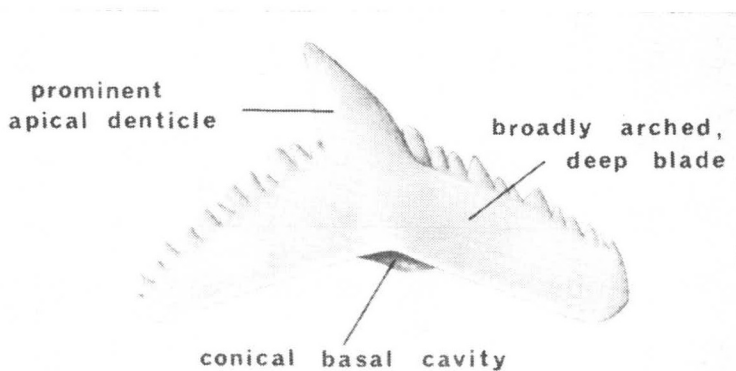


Figure 40. *Ozarkodina typica* Branson & Mehl, 1933 (x55). Composite sketch of CPC 11245 (Pl. 7, figs 3, 4) and fig. 2 in pl. 26 of Walliser, 1964

jaegeri Walliser (1964, pl. 25, figs 15, 17, 18) is striking. However, the latter is distinguished by its narrower apical denticle, more irregular denticles, and its unequal depths of the anterior and posterior bars. Walliser (1964, p. 62) has suggested that *O. typica* developed from *O. media* Walliser. Possibly *O. jaegeri* is intermediate between *O. media* and *O. typica*.

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Branson & Mehl (1933)	Bainbridge Lst., Missouri	Mid Silurian
	Rexroad (1967)	Brassfield Fm., Indiana, Ohio, Kentucky	Early to mid Llandoveryan
Europe	Rhodes (1953)	Aymestry Lst., Shropshire and Staffordshire	Late Silurian
	Walliser (1964)	Carnic Alps, Germany	Mid <i>crispus</i> to <i>eosteinhornensis</i>

Yass Basin—*Ozarkodina typica* Branson & Mehl is confined to the middle beds of the Hume Limestone Member near Silverdale.

Range: Early Llandoveryan to late Silurian (*eosteinhornensis* Zone).

OZARKODINA ZIEGLERI AEQUALIS Walliser, 1964
(Pl. 7, figs 7, 10; text-fig. 41)

1964 *Ozarkodina ziegleri aequalis* Walliser, p. 62, pl. 7, fig. 1; pl. 24, figs 19-21; text-fig. 3f.

Material: 11 specimens; CPC 11248, 11249 figured.

Description: Unit short, symmetrically arched, slightly twisted, thickened near apical denticle at mid-bar level, and tapering posteriorly. Anterior bar denticles increase in height towards apical denticle, larger and more crowded than those on posterior bar. 5 to 6 denticles on each bar, laterally compressed, pointed, knife-edged, and posteriorly inclined. Basal cavity subapical. Apical lips gently flared—inner slightly more than outer in twisted forms.

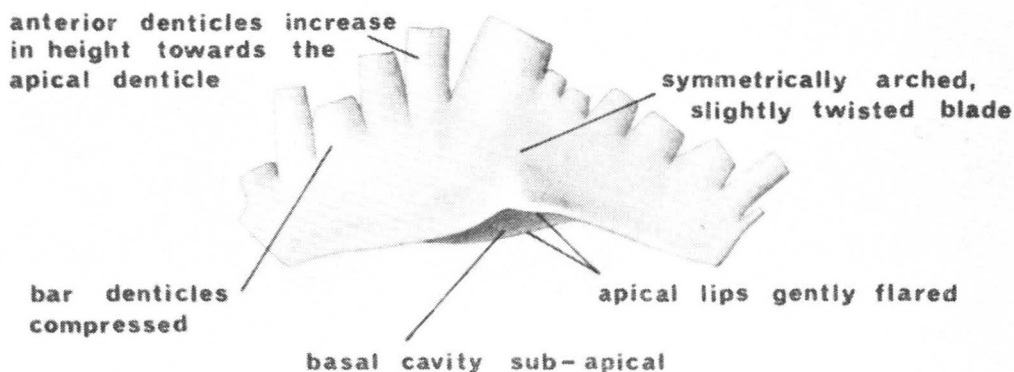


Figure 41. *Ozarkodina ziegleri aequalis* Walliser, 1964 (x55). Inner lateral view of CPC 11248 (Pl. 7, figs 7, 10)

Remarks: The subapically restricted basal cavity and the crowded bar denticles distinguish *Ozarkodina ziegleri aequalis* from *O. ortus* Walliser, *O. ortuformis* Walliser, *O. ziegleri tenuiramea* Walliser, and *O. ziegleri ziegleri* Walliser.

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Walliser (1964)	Carnic Alps, Germany	<i>patula</i>
Yass Basin— <i>Ozarkodina ziegleri aequalis</i> Walliser extends from just above the base of 'Barrandella' Shale Member to the Hume Limestone Member in the Derringullen Creek/Silverdale area. South of the Yass River this species occurs 9 m above the base of the 'Barrandella' Shale Member near Euralie.			

Range: Wenlockian (*patula* Zone) to late middle Ludlovian (*siluricus* Zone).

OZARKODINA sp. cf. OZARKODINA ZIEGLERI TENUIRAMEA Walliser, 1964
(Pl. 7, fig. 5; text-fig. 42)

1964 *Ozarkodina ziegleri tenuiramea* Walliser, p. 62, pl. 3, fig. 15; pl. 24, figs 22-28, text-fig. 3g, h.

1969 *Ozarkodina ziegleri tenuiramea* Walliser; Philip, p. 294, pl. 18, figs 5, 10, 16, 20, 26-28.

Material: 11 specimens; CPC 11246 figured.

Description: Specimens small, arched, gently twisted, having discrete posteriorly inclined bar denticles, large apical denticle; inner apical lip moderately flared and exposes extension of basal cavity along posterior bar.

Remarks: *Ozarkodina ortus* differs from *O. ziegleri tenuiramea* in having an inflated basal cavity that extends anteriorly as well as posteriorly. The anterior extension of the basal cavity in *O. ziegleri ziegleri* is absent in *O. sp. cf. O. ziegleri tenuiramea*. Specimens figured by Walliser (1964) are slightly more robust than the present specimens.

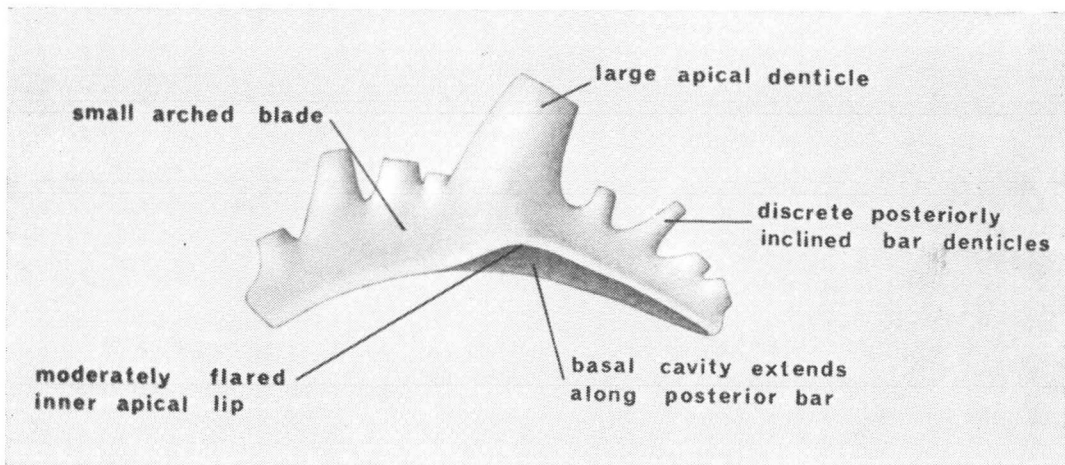


Figure 42. *Ozarkodina ziegleri tenuiramea* Walliser, 1964 (x90). Inner lateral view of fig. 26 in pl. 24 of Walliser, 1964

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Walliser (1964)	Carnic Alps, Southern Austria	<i>crassa</i> to mid- <i>siluricus</i>
Australia	Philip (1969)	Dirk Hartog Fm., Western Australia	Ludlovian

Yass Basin—The specimens were recovered from the uppermost beds of the ‘Barrandella’ Shale Member near Reedy Creek and from the crinoidal micrites of the Hume Limestone Member near Silverdale.

Range: Early early Ludlovian (*crassa* Zone) to late middle Ludlovian (*siluricus* Zone).

OZARKODINA sp. cf. OZARKODINA ZIEGLERI ZIEGLERI Walliser, 1964
(Pl. 7, fig. 6; text-fig. 43)

Material: 3 specimens; CPC 11247 figured.

Description: Specimens arched, slightly deflected and twisted. Bar denticles discrete, inwardly and posteriorly inclined, laterally compressed, knife-edged, pointed and uneven. Laterally compressed apical denticle 3 to 4 times larger than adjacent denticles.

Basal cavity deep, conical, just posterior of apical denticle, and extends as broad shallow groove to extremity of posterior bar and to mid-length of anterior bar. Inner apical lip flared and continues to posterior extremity. Outer apical lip subapically limited and only slightly flared.

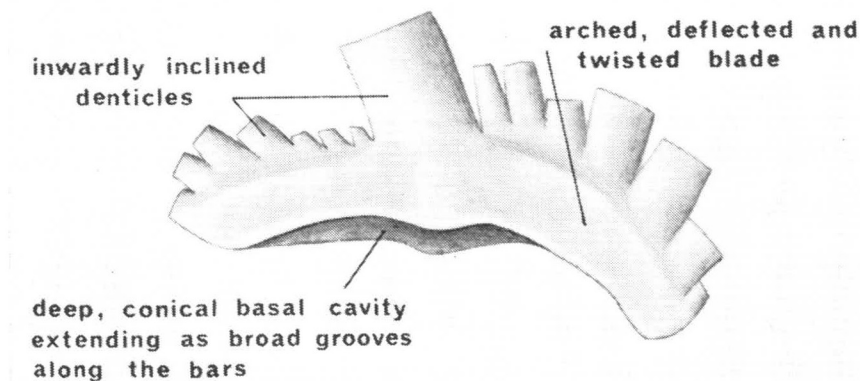


Figure 43. *Ozarkodina ziegleri ziegleri* Walliser, 1964 (x70). Composite sketch of figs 1 and 2 in pl. 25 (Walliser, 1964)

Remarks: The fragmentary nature of these blades hampers their identification, but most of the important elements of *Ozarkodina ziegleri ziegleri* are observable.

Range: Late middle Ludlovian (*siluricus* Zone).

OZARKODINA sp.
(Pl. 7, figs 11, 12; text-fig. 44)

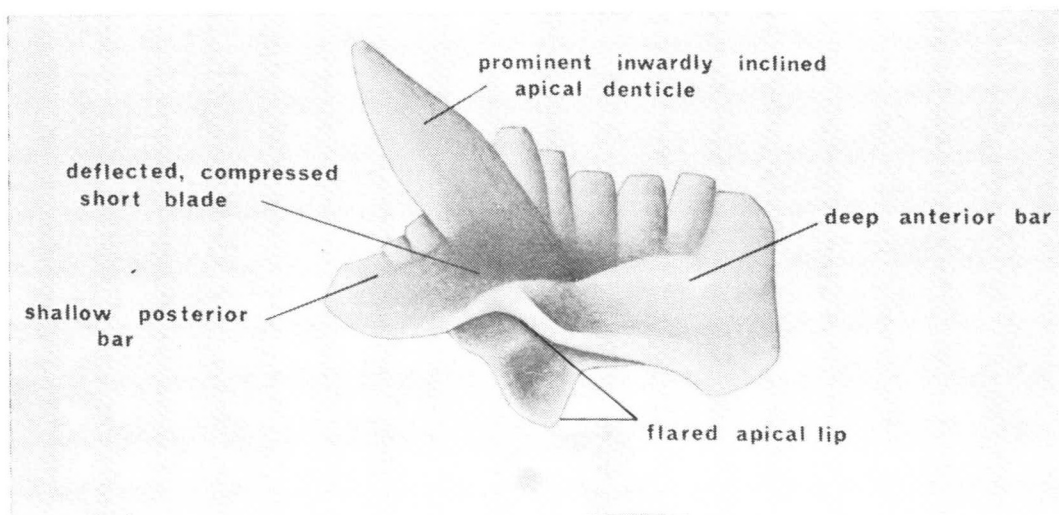


Figure 44. *Ozarkodina* sp. (x55). Inner lateral view of CPC 11250 (Pl. 7, figs 11, 12)

Material: 3 specimens; CPC 11250 figured.

Remarks: These specimens appear to be aberrant forms of either *Ozarkodina crassa* Walliser or *O. ziegleri ziegleri* Walliser. Because they have a large triangular apical denticle and subapical basal cavity, they are probably closest to *O. crassa* Walliser.

Occurrence:

Yass Basin—These specimens were recovered from the upper beds of the Hume Limestone Member near Limestone Creek, and from a limestone lens of the Elmside Formation near the Hume Highway.

Range: Late middle Ludlovian (*siluricus* Zone) to early Gedinnian (*woschmidtii* Zone).

Genus PANDERODUS Ethington, 1959

Type species: *Paltodus unicastatus* Branson & Mehl, 1933.

Generic diagnosis: Asymmetrical costate curved cones with a deep basal cavity.

Remarks: Costate cones, asymmetrically curved and with a shallow basal cavity, were retained by Ethington (1959, p. 284) in *Paltodus* Pander. Clark & Ethington (1966, p. 682) emended the diagnosis for *Panderodus* to include the character of the cusp: 'the cusp is characteristically broadly rounded anteriorly and narrows about mid-width, so that the typical cross section might be described as shaped like a key-hole'. Not embraced by this diagnosis are *Panderodus compressus* Branson & Mehl and *P. simplex* Branson & Mehl. Both species, as pointed out by Clark & Ethington (1966, p. 682), have biconvex cross sections and blunt anterior margins. Either these species should be removed from the genus or the generic diagnosis should be modified to justify the retention of the species in *Panderodus*. To accommodate the latter suggestion the portion '. . . cusp is characteristically broadly rounded anteriorly and . . .' would need to be deleted from the diagnosis.

PANDERODUS GRACILIS (Branson & Mehl, 1933)

(Pl. 7, figs 23, 24; text-fig. 45)

- 1933 *Paltodus gracilis* Branson & Mehl, p. 108, figs 20, 21.
- 1951 *Paltodus gracilis* Branson & Mehl; Branson, Mehl, & Branson, p. 6, pl. 1, figs 1-8.
- 1957 *Paltodus gracilis* Branson & Mehl; Glenister, p. 728, pl. 85, figs 2-5.
- 1959 *Panderodus gracilis* (Branson & Mehl); Ethington, p. 285, pl. 39, fig. 1.
- 1959 *Panderodus gracilis* (Branson & Mehl); Stone & Furnish, p. 225, pl. 31, fig. 2.
- 1961 *Panderodus gracilis* (Branson & Mehl); Wolska, p. 353, pl. 4, fig. 2.
- 1962 *Panderodus gracilis* (Branson & Mehl); Sweet & Bergström, p. 1233, text-fig. 1H.
- 1964 *Panderodus gracilis* (Branson & Mehl); Hamar, p. 271, pl. 1, figs 25, 26.
- 1965 *Panderodus gracilis* (Branson & Mehl); Merrill, p. 385, pl. 2, figs 6, 9.
- 1966 *Panderodus gracilis* (Branson & Mehl); Oberg, p. 140, pl. 16, fig. 3.
- 1966 *Panderodus gracilis* (Branson & Mehl); Webers, p. 39, pl. 3, figs 10-12.
- 1966 *Panderodus gracilis* (Branson & Mehl); Bergström & Sweet, p. 355, pl. 35, figs 5, 6.
- 1966 *Panderodus gracilis* (Branson & Mehl); Spasov & Filipovic, p. 46, pl. 2, fig. 8.
- 1967 *Panderodus unicastatus* (Branson & Mehl); Igo & Koike, p. 21, pl. 1, figs 12-14.

Material: 676 specimens; CPC 11256, 11257 figured.

Description: Cone long, slender, gently curved, tapering gradually to a point, straight to twisted. Anterior broadly rounded, posterior ridged, lateral faces each have long costa. Basal cavity conical, extends to and beyond mid-bar.

Remarks: In strongly twisted units one lateral costa is almost concealed so that the unit resembles *Panderodus unicostatus* (Branson & Mehl).

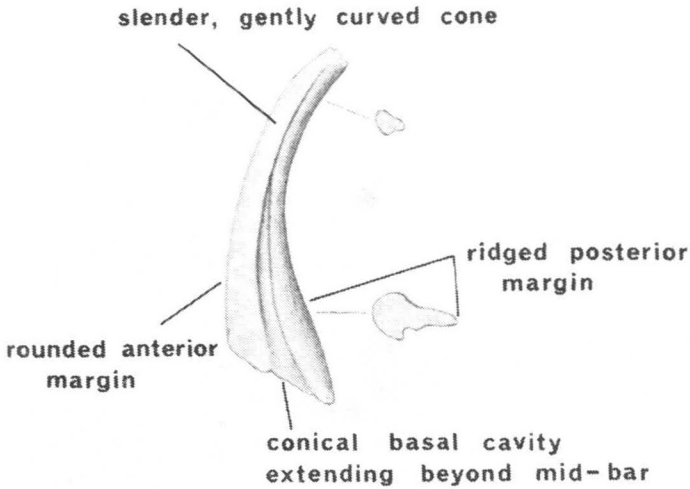


Figure 45. *Panderodus gracilis* (Branson & Mehl, 1933) (x40).
Lateral view of CPC 11257 (Pl. 7, fig. 24)

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Branson & Mehl (1933)	Plattin Fm., Missouri	Mid Ordovician
	Branson, Mehl & Branson (1951)	Richmond Gr., Kentucky, Indiana	Late late Ordovician
	Glenister (1957)	Maquoketa Fm., Iowa	Late Ordovician
	Ethington (1959)	Galena Fm., Minnesota, Iowa	Early late Ordovician
	Stone & Furnish (1959)	Bighorn Dolomite, Wyoming	Late Ordovician
	Sweet & Bergström (1962)	Pratt Ferry Fm., Alabama	Mid Ordovician
	Merrill (1965)	Burnam Lst., Texas	Late Ordovician to Emsian
	Oberg (1966)	Winnipeg Fm., Manitoba	Mid Ordovician
	Webers (1966)	Glenwood Fm., Maquoketa Fm., Minnesota	Mid to late Ordovician
	Bergström & Sweet (1966)	Lexington Lst., Kentucky, Ohio, Indiana	Mid Ordovician
Europe	Hamar (1964)	Ringerike, Norway	Early mid Ordovician
	Spasov & Filipovic (1966)	Bosnia	<i>amorphognathoides</i>
Southeast Asia	Igo & Koike (1968)	Setul Lst., Langkawi Is., Malaya	Late Ordovician to <i>crassa</i>

Yass Basin—*Panderodus gracilis* (Branson & Mehl) occurs throughout the calcareous beds of the Yass Basin. It is also abundant in the reworked limestone pebbles of the Sharpening-stone Conglomerate.

Range: Middle Ordovician to Gedinian.

PANDERODUS PANDERI (Stauffer, 1940)
(Pl. 7, figs 17, 18, 25; pl. 8, fig. 1; text-fig. 46)

- 1940 *Paltodus panderi* Stauffer, p. 427, pl. 60, figs 8, 9.
 1957 *Paltodus panderi* Stauffer; Glenister, p. 728, pl. 85, figs 8, 9.
 1959 *Panderodus panderi* (Stauffer); Ethington, p. 285, pl. 39, fig. 5.
 1959 *Panderodus panderi* (Stauffer); Ethington & Furnish, p. 541, pl. 73, fig. 9.
 1959 *Panderodus panderi* (Stauffer); Stone & Furnish, p. 226, pl. 31, fig. 4.
 1964 *Panderodus panderi* (Stauffer); Serpagli & Greco, p. 205, pl. 36, figs 6, 8.
 1965 *Panderodus panderi* (Stauffer); Merrill, p. 388, pl. 2, figs 13, 15, 17.
 1966 *Panderodus panderi* (Stauffer); Webers, p. 39, pl. 2, figs 1-3, 6.
 1966 *Panderodus panderi* (Stauffer); Bergström & Sweet, p. 359, pl. 35, figs 14, 15.

Material: 314 specimens; CPC 11254, 11258 figured.

Description: Strongly curved panderodids with a prominent posterolateral costa on each face. Cone broadly rounded anteriorly and bluntly keeled posteriorly, tapering rapidly from base to mid-bar height then gradually to pointed apex. Basal cavity subconical; apex close to anterior margin. Cross-section of basal region characteris-

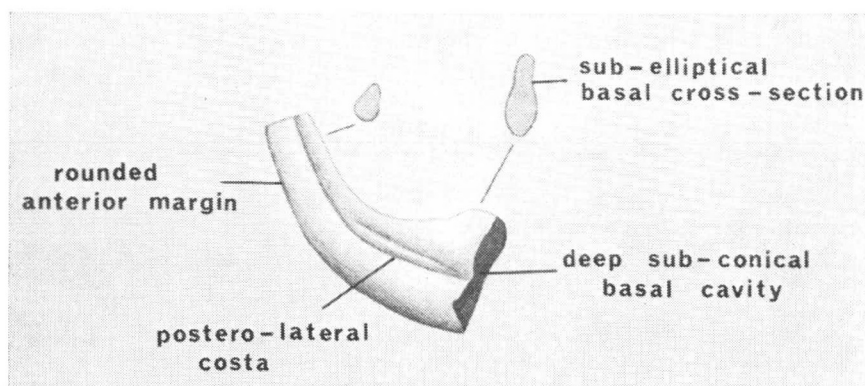


Figure 46. *Panderodus panderi* (Stauffer, 1940) (x70). Lateral view of CPC 11258 (Pl. 7, fig. 25; Pl. 8, fig. 1)

tically elliptical, with small sulcus in each of the flatter parts. Striations usually weakly developed, on lower regions of some cones.

Remarks: Variations in cone curvature and prominence of the costae occur, but the outline of the basal margin is fairly constant and distinguishes *Panderodus panderi*. The anterolateral costa reported in older specimens (Mound, 1968, p. 416) is not present. Glenister (1957) and Bergström & Sweet (1966) have also noted the absence of this costa in young specimens.

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Stauffer (1940)	Cedar Valley Lst., Minnesota	Ordovician
	Glenister (1957)	Maquoketa Fm., Iowa	Late Ordovician
	Ethington (1959)	Galena Fm., Iowa	Early late Ordovician
		Minnesota	
	Ethington & Furnish (1959)	Shamattawa Lst., Manitoba	Late Ordovician

	Reference	Formation/Location	Age/Zone
	Stone & Furnish (1959)	Bighorn Dolomite, Wyoming	Late Ordovician
	Merrill (1965)	Burnam Lst., Texas	Late Ordovician
	Webers (1966)	Glenwood Fm., Maquoketa Fm., Minnesota	Mid to late Ordovician
	Bergström & Sweet (1966)	Lexington Lst., Kentucky, Ohio, Indiana	Mid Ordovician
Europe	Serpagli & Greco (1964)	Carnic Alps, Italy	Silurian

Yass Basin—*Panderodus panderi* (Stauffer) is present in the Derrington Creek/Silverdale area from the base of the Euralie Limestone Member to the topmost beds of the Hurae Limestone Member. South of the Yass River this species first appears close to the base of the Gums Road Limestone Member and extends to the Yarwood Siltstone Member at Humewood.

Range: Middle Ordovician to early late Ludlovian.

PANDERODUS SIMPLEX (Branson & Mehl, 1933)

(Pl. 7, figs 13-16, 21, 22; text-fig. 47)

- 1933 *Paltodus simplex* Branson & Mehl, p. 42, pl. 3, fig. 4.
1947 *Paltodus acostatus* Branson & Branson, p. 554, pl. 82, figs 1-5.
1953 *Paltodus acostatus* Branson & Branson; Rhodes, p. 237, pl. 21, figs 111, 112; pl. 22.
1955 *Paltodus acostatus* Branson & Branson; Rhodes, p. 127, pl. 10, figs 11, 12.
1964 *Panderodus acostatus* (Branson & Branson); Serpagli & Greco, p. 204, pl. 36, fig. 4.
1965 *Paltodus acostatus* Branson & Branson; Philip, p. 108, pl. 8, figs 10, 23, 43.
1966 *Panderodus acostatus* (Branson & Branson); Philip, p. 447, pl. 1, figs 13, 18.
1966 *Panderodus simplex* (Branson & Mehl); Rexroad, p. 45, pl. 4, figs 7, 8.
1968 *Panderodus simplex* (Branson & Mehl); Nicholl & Rexroad, p. 54, pl. 7, fig. 28.
1969 *Panderodus simplex* (Branson & Mehl); Druce, p. 55, pl. 9, figs 5a-6b.
1969 *Panderodus simplex* (Branson & Mehl); Philip, p. 294, pl. 17, figs 2, 3, 5, 12; text-fig. 1c.
1970 *Panderodus simplex* (Branson & Mehl); Druce, p. 41.

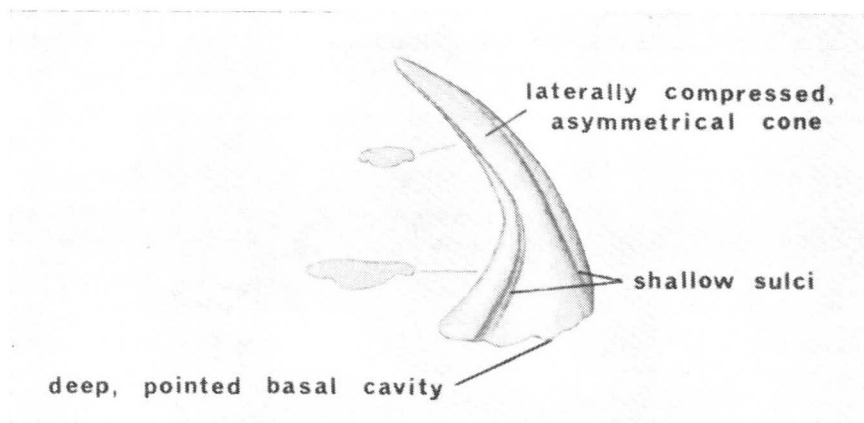


Figure 47. *Panderodus simplex* (Branson & Mehl, 1933) (x70). Lateral view of CPC 11252 (Pl. 7, figs 15, 16)

Material: 425 specimens, CPC 11251, 11252, 11253 figured.

Description: Laterally compressed, asymmetrically curved cones with a blunt posterior edge. Anterior rounded near basal cavity, blunt in median section, and

rounded near apex. Shallow sulcus posterior to longitudinal midline extends from base to apex. Similar sulcus, perhaps with associated low costa, anterior to midline. Cross-section oval near apex, biconvex medially, and subelliptical near base. Basal cavity deep, having pointed apex near anterior margin, moderately compressed.

Remarks: *Panderodus compressus* (Branson & Mehl) is close to *P. simplex*. Clark & Ethington (1966, p. 682), after examining the type collection, concluded that *P. compressus* is more strongly curved than *P. simplex*. Rexroad (1967, p. 46) stated that if these species were not conspecific, *P. compressus* '... is almost certainly the direct ancestor of' *P. simplex*.

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Branson & Mehl (1933)	Bainbridge Fm., Missouri	Mid Silurian
	Branson & Branson (1947)	Brassfield Fm., Kentucky	Early Silurian
	Clark & Ethington (1966)	Roberts Mts Fm., Rabbit Hill Fm., Nevada Fm., Nevada	Silurian to Emsian
	Rexroad (1967)	Brassfield Fm., Kentucky, Ohio, Indiana	Early to mid Llandoveryan
	Nicholl & Rexroad (1968)	Salamonie and Lee Ck Members, Brassfield Fm., Indiana	Late Bereich I to <i>amorphognathoides</i>
Europe	Rhodes (1953)	Pen-y-garnedd Lst., Aymestry Lst., Wales, Staffordshire, Shropshire	Late Ordovician to Late Silurian
	Rhodes (1955)	Keisley Lst., Westmorland	Late Ordovician
	Serpagli & Greco (1964)	Carnic Alps, Italy	Silurian
Australia	Philip (1965)	Coopers Creek Fm., Gippsland, Victoria	Late Gedinnian to Siegenian
	Philip (1966)	Murrindal Lst., Buchan Caves Lst., Victoria	Early Emsian
	Druce (1969)	N. Yarrol Basin, Queensland	Early Gedinnian
	Philip (1969)	Dirk Hartog Fm., Western Australia	Ludlovian
	Druce (1970)	Garra Fm., NSW	Mid Siegenian

Yass Basin—*Panderodus simplex* (Branson & Mehl) occurs abundantly throughout the calcareous beds, including the reworked deposits of the Sharpeningstone Conglomerate.

Range: Late Ordovician to Emsian.

PANDERODUS UNICOSTATUS SERRATUS Rexroad, 1967
(Pl. 8, figs 2-4; text-fig. 48)

1967 *Panderodus unicostatus serratus* Rexroad, p. 36, 47, pl. 4, figs 3, 4.

Material: 3 specimens, CPC 11259, 11260 figured.

Description: With the exception of minute denticles along the posterior margin of the cone, these units are identical with *P. unicostatus unicostatus* (Branson & Mehl). The denticles line up to two-thirds of the posterior margin; they are microscopic, crowded with free chevron tips, and parallel-sided.

Remarks: Although these specimens possess denticles along their posterior margin as do belodids they are not as thin-walled.

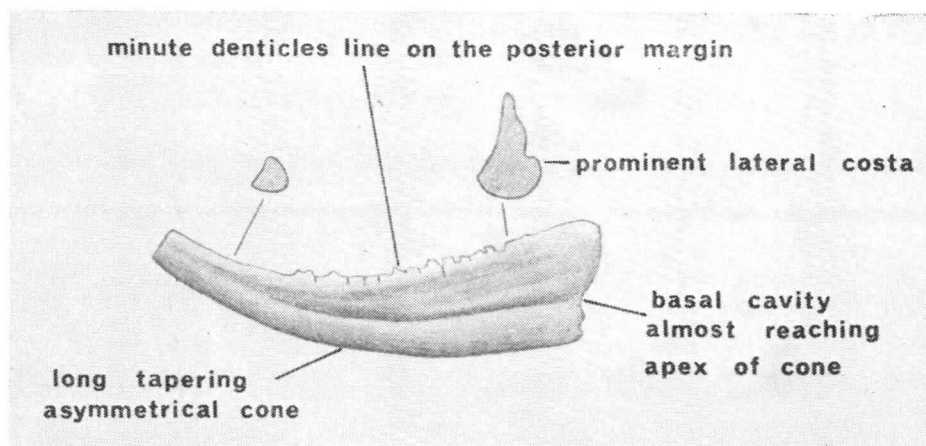


Figure 48. *Panderodus unicostatus serratus* Rexroad, 1967 (x145). Lateral view of CPC 11259 (Pl. 8, figs 2, 3).

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Rexroad (1967)	Noland Fm., Kentucky	Early to mid
		Brassfield Fm., Ohio	Llandoveryan

Yass Basin—*Panderodus unicostatus serratus* Rexroad occurs in the Hume Limestone Member in the Silverdale quarry, and in the Yarwood Siltstone Member near Derringullen Creek. It was also recovered from the Yarwood Siltstone Member near Good Hope Road.

Range: The previously known range of early to middle Llandoveryan is extended to the early late Ludlovian.

PANDERODUS UNICOSTATUS UNICOSTATUS (Branson & Mehl, 1933)
(Pl. 7, figs 19, 20; pl. 11, figs 13, 15; text-fig. 49)

- 1933 *Paltodus unicostatus* Branson & Mehl, p. 42, pl. 3, fig. 3.
- 1947 *Paltodus unicostatus* Branson & Mehl; Branson & Branson, p. 554, pl. 82, figs 14-16.
- 1953 *Paltodus unicostatus* Branson & Mehl; Rhodes, p. 290, pl. 21, figs 84-88; pl. 22, figs 155, 156; pl. 23, figs 214-216.
- 1957 *Paltodus unicostatus* Branson & Mehl; Walliser, p. 43, pl. 2, fig. 1.
- 1957 *Paltodus unicostatus* Branson & Mehl; Glenister, p. 728, pl. 85, figs 2-5.
- 1959 *Panderodus unicostatus* (Branson & Mehl); Sweet, Turco, Warner & Wilkie, p. 1057, pl. 131, fig. 3.
- 1961 *Panderodus unicostatus* (Branson & Mehl); Wolska, p. 353, pl. 4, figs 2a, b.
- 1962 *Panderodus unicostatus* (Branson & Mehl); Sweet & Bergström, p. 1234, text-fig. 1D.
- 1964 *Panderodus unicostatus* (Branson & Mehl); Serpagli & Greco, p. 206, pl. 36, fig. 7; pl. 37, fig. 1.
- 1965 *Panderodus unicostatus* (Branson & Mehl); Merrill, p. 390, pl. 2, fig. 8.
- 1965 *Paltodus unicostatus* Branson & Mehl; Philip, p. 109, pl. 8, fig. 9.
- 1965 *Panderodus unicostatus* (Branson & Mehl); Brooks & Druce, p. 376, pl. 12, fig. 8.
- 1966 *Panderodus unicostatus* (Branson & Mehl); Philip, p. 447, pl. 1, figs 10-12, 19.
- 1966 *Paltodus unicostatus* Branson & Mehl; Moskalenko, p. 195, pl. 1, figs 1-3.
- 1966 *Panderodus unicostatus* (Branson & Mehl); Winder, pl. 9, fig. 27.
- 1966 *Panderodus unicostatus* (Branson & Mehl); Hamar, p. 67, pl. 1, fig. 6.

1966 *Panderodus unicostatus* (Branson & Mehl); Clark & Ethington, p. 683, pl. 82, figs 17, 19.
1967 *Panderodus unicostatus unicostatus* (Branson & Mehl); Rexroad, p. 46, pl. 4, figs 1, 2.
1968 *Panderodus unicostatus unicostatus* (Branson & Mehl); Nicholl & Rexroad, p. 54, pl. 7, figs 29, 30.
1969 *Panderodus unicostatus* (Branson & Mehl); Philip, p. 295, pl. 17, figs 1, 4, 13, 14.
1969 *Panderodus unicostatus* (Branson & Mehl); Druce, p. 55, pl. 9, figs 7a, b.
1970 *Panderodus unicostatus* (Branson & Mehl); Druce, p. 41.

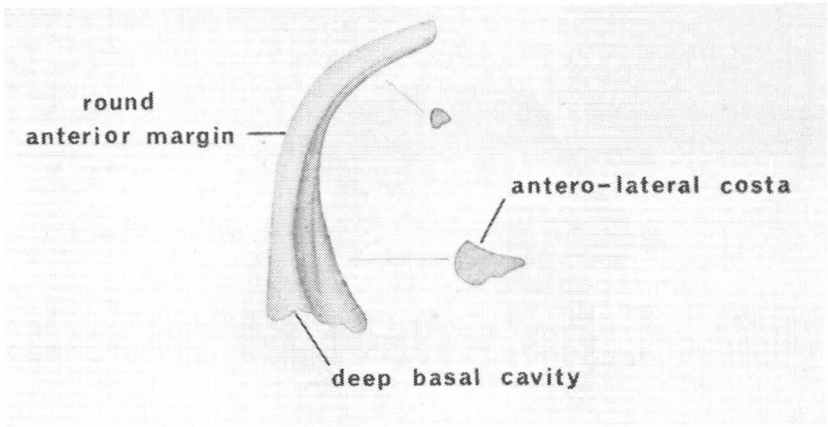


Figure 49. *Panderodus unicostatus unicostatus* (Branson & Mehl, 1933) (x45).
Lateral view of CPC 11255 (Pl. 7, figs 19, 20)

Material: 306 specimens; CPC 11255, 11290 figured.

Description: Slender cone with sharp anterolateral costa extending length of unit. Cone curved, asymmetrical, long, and uniformly tapering to pointed apex. Outer lateral face smooth; inner lateral face with low costa from base to mid-bar height. Basal cavity deep, extending to apex, pointed, terminating near anterior margin.

Remarks: Many of our specimens are twisted so that the low lateral costa is partly obscured for the greater part of the length.

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Branson & Mehl (1933)	Bainbridge Lst., Missouri	Mid Silurian
	Branson & Branson (1947)	Brassfield Lst., Kentucky	Early Silurian
	Sweet et al. (1959)	Eden Fm., Ohio, Kentucky	Late Ordovician
	Sweet & Bergström (1962)	Pratt Ferry Fm., Alabama	Mid Ordovician
	Merrill (1965)	Burnam Lst., Texas	Late Ordovician to Emsian
	Winder (1966)	Cobourg Fm., Ontario	Late mid Ordovician
	Clark & Ethington (1966)	Roberts Mts Fm., Rabbit Hill Fm., Nevada Fm., Nevada	Silurian to Emsian
	Rexroad (1967)	Brassfield Fm., Indiana, Ohio, Kentucky	Early to mid Llandoveryan

	Reference	Formation/Location	Age/Zone
Europe	Nicholl & Rexroad (1968)	Salamonie and Lee Ck Members, Brassfield Fm., Indiana	Late Bereich I to <i>amorphognathoides</i>
	Rhodes (1953)	Gelli-grin Lst., Pen-y-garnedd Lst., Aymestry Lst., Wales, Staffordshire, Shropshire	Late Ordovician to Late Silurian
	Walliser (1957)	Carnic Alps, Germany	Late Wenlockian to Ludlovian
	Serpagli & Greco (1964)	Carnic Alps, Italy	Silurian
	Brooks & Druce (1965)	Malvern Hills, UK	Llandoveryan
Australia	Moskalenko (1966)	Zeravshan Range, USSR	Late Silurian
	Hamar (1966)	Oslo, Norway	Mid Ordovician
	Philip (1965)	Coopers Creek Fm., Gippsland, Victoria	Late Gedinian to Siegenian
	Philip (1966)	Murrindal Lst., Buchan Caves Lst., Victoria	Early Emsian
	Druce (1969)	N. Yarrol Basin, Queensland	Early Gedinian
	Druce (1970)	Garra Fm., NSW.	Mid Siegenian

Yass Basin—*Panderodus unicostatus unicostatus* (Branson & Mehl) is very abundant in all the calcareous beds including limestone pebbles of the Sharpeningstone Conglomerate.

Range: Middle Ordovician to Emsian.

Genus PLECTOSPATHODUS Branson & Mehl, 1933

Type species: *Plectospathodus flexuosus* Branson & Mehl, 1933

PLECTOSPATHODUS EXTENSUS EXTENSUS Rhodes, 1953 (Pl. 8, figs 5-8; text-fig. 50)

- 1953 *Plectospathodus extensus* Rhodes, p. 323, figs 236-240.
- 1957 *Plectospathodus extensus* Rhodes; Walliser, p. 43, pl. 3, figs 1, 2.
- 1958 *Plectospathodus extensus* Rhodes; Bischoff & Sannemann, p. 101, pl. 15, figs 11, 14, 15.
- 1960 *Plectospathodus extensus* Rhodes; Spasov, p. 67, pl. 1, fig. 4.
- 1960 *Plectospathodus extensus* Rhodes; Walliser, p. 32, pl. 8, fig. 20.
- 1962 *Plectospathodus extensus* Rhodes; Ethington & Furnish, p. 1281, pl. 173, fig. 6.
- 1962 *Plectospathodus extensus* Rhodes; Jentzsch, p. 971, pl. 2, figs 1, 5, 12.
- 1962 *Plectospathodus extensus* Rhodes; Walliser, p. 283, fig. 1, no. 19.
- 1963 *Plectospathodus extensus* Rhodes; Spasov & Veselinović, p. 247, pl. 2, fig. 4.
- 1964 *Plectospathodus extensus* Rhodes; Serpagli & Greco, p. 17, pl. 37, fig. 10.
- 1964 *Plectospathodus extensus* Rhodes; Walliser, p. 64, pl. 8, fig. 1; pl. 30, figs 13, 14.
- 1965 *Plectospathodus extensus* Rhodes; Philip, p. 110, pl. 9, figs 9, 10.
- 1966 *Plectospathodus extensus* Rhodes; Spasov & Filipovic, p. 47, pl. 2, figs 13, 17.
- 1968 *Plectospathodus extensus* Rhodes; Igo & Koike, p. 15, pl. 3, fig. 12.
- 1968 *Plectospathodus extensus* Rhodes; Schulze, p. 209, pl. 17, figs 3, 22.
- 1970 *Plectospathodus extensus* Rhodes; Druce, p. 42, pl. 7, figs 5a, b.

Material: 192 specimens; CPC 11261, 11262 figured.

Description: Blade consisting of long posterior and anterior bars, prominent apical denticle, and distinctive inner apical lip outline. Unit slightly arched. Bars elliptical in cross-section, gently twisted, slightly deflected; posterior bar usually slightly

longer and deeper than anterior bar. 8 to 10 denticles on each bar, longer on posterior than on anterior bar. Apical denticle pointed, posteriorly and inwardly inclined, and at least twice size of adjacent bar denticles.

Basal cavity subapical, in some specimens extending beneath bars as grooves. Outer apical lip not flared; inner lip enrolled up inner face of apical denticle as much as mid-bar height.

Remarks: The bar denticles alternate in size in *Plectospathodus alternatus* Walliser and hence differ from the more even denticles in *P. extensus extensus*. *P. extensus lacertosus* Philip has a greater ratio of anterior bar to posterior bar length than the present subspecies.

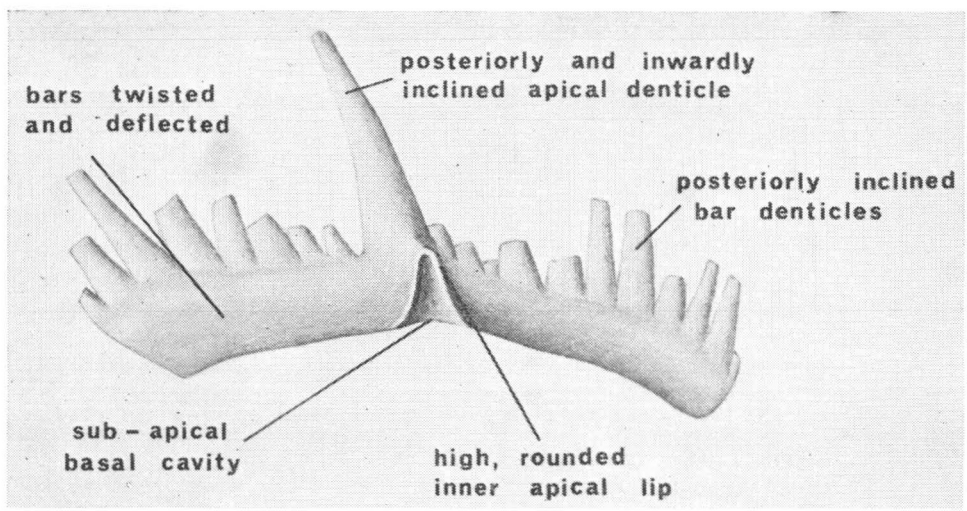


Figure 50. *Plectospathodus extensus extensus* Rhodes, 1953 (x80). Inner lateral view of CPC 11261 (Pl. 8, figs 5, 8)

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Rhodes (1953)	Aymestry Lst., Shropshire, Staffordshire	Late Silurian
	Walliser (1957)	Carnic Alps, Germany	Late Wenlockian to Ludlovian
	Kockel (1958)	Ardales, Spain	Late Wenlockian to late Ludlovian
	Bischoff & Sannemann (1958)	Tentakulitenkalk, Germany	Early Devonian
	Spasov (1960)	Southwest Bulgaria, Austria	Late Silurian
	Walliser (1960)	Sutherland River Fm., Devon Island	Gedinnian (Johnson et al., 1967)
	Ientzsch (1962)	Tentakulite Lst., Germany	Early Devonian
	Walliser (1962)		Late Wenlockian
	Spasov & Veselinović (1963)	Suva Planina, Yugoslavia	Late Ludlovian

	Reference	Formation/Location	Age/Zone
	Serpagli & Greco (1964)	Carnic Alps, Italy	Silurian
	Walliser (1964)	Carnic Alps, Germany	<i>crassa</i> to early Devonian
	Manzoni (1965)	Carnic Alps, Italy	<i>crassa</i> to Devonian
	Spasov & Filipovic (1966)	Bosnia	Silurian
	Serpagli (1967)	Sardinia	Ludlovian
	Schulze (1968)	Karawanken Alps, Southern Austria	Gedinnian to late Emsian
Africa	Ethington & Furnish (1962)	Tindouf Basin, Spanish Sahara	Silurian
Australia	Philip (1965)	Coopers Creek Fm., Gippsland, Victoria	Late Gedinnian to Siegenian
	Druce (1970)	Garra Fm., NSW	Mid Siegenian
Southeast Africa	Igo & Koike (1968)	Upper Setul Lst., Langkawi Is., Malaya	<i>crassa</i>
North America	Rexroad & Richard (1965)	Niagara Gorge, Ontario	late <i>sagitta</i>

Yass Basin—*Plectospathodus extensus extensus* Rhodes is present in all the calcareous rocks in both the northern and southern parts of the basin.

Range: Late Wenlockian (*sagitta* Zone) to Emsian.

PLECTOSPATHODUS EXTENSUS LACERTOSUS Philip, 1966
(Pl. 8, figs 11, 12; text-fig. 51)

1964 *Plectospathodus* sp. Walliser, pl. 30, figs 17, 19.

1966 *Plectospathodus extensus lacertosus* Philip, p. 448, pl. 1, figs 25-28, text-fig. 5.

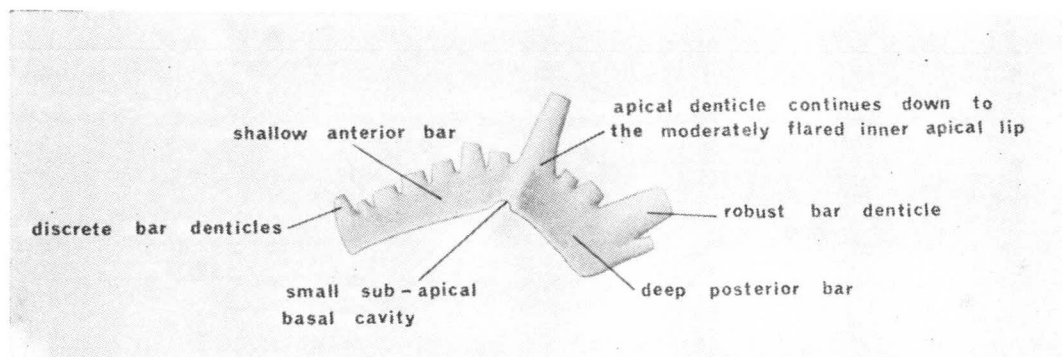


Figure 51. *Plectospathodus extensus lacertosus* Philip, 1966 (x90). Composite sketch of CPC 11264, fig. 17 in pl. 30 of Walliser (1964), and fig. 26 in pl. 1 of Philip (1966)

Material: 34 specimens; CPC 11264 figured.

Remarks: Moderately to strongly arched, slightly twisted plectospathodid with shallow, thin anterior bar almost twice as long as deeper, thicker posterior bar. Bar denticles crowded on posterior bar, becoming more massive distally from apical denticle. Denticles on anterior bar discrete and more uniform in size. Apical

denticle varying in size from barely larger than bar denticles to more than twice as large. All denticles posteriorly inclined. In some specimens apical denticle continues down inner face of unit to cavity lip. Basal cavity small, shallow, and subapical, having only short groove-like extensions along both bars. In gently twisted forms, basal cavity wider and deeper.

Philip (1966, p. 448) pointed out correctly that *Plectospathodus lacertosus* differs from *P. extensus* Rhodes in being more strongly arched and in possessing a smaller basal cavity. Furthermore the ratio of anterior bar length to posterior bar length is greater in *P. lacertosus* than that in *P. extensus extensus*.

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Walliser (1964)	Carnic Alps, Germany	Late Silurian
Australia	Philip (1966)	Murrindal Lst., Buchan, Victoria	Early Emsian

Yass Basin—*Plectospathodus extensus lacertosus* Philip first appears at the base of the Bowspring Limestone Member and extends to 4.1 m above the base of the Hume Limestone Member near Limestone Creek. South of the Yass River, this species occurs in the Yarwood Siltstone Member near Euralie. It is also present in the basal beds of the Cliftonwood Limestone.

Range: Early early Ludlovian (*crassa* Zone) to early Emsian.

PLECTOSPATHODUS FLEXUOSUS Branson & Mehl, 1933
(Pl. 8, figs 9, 10; text-fig. 52)

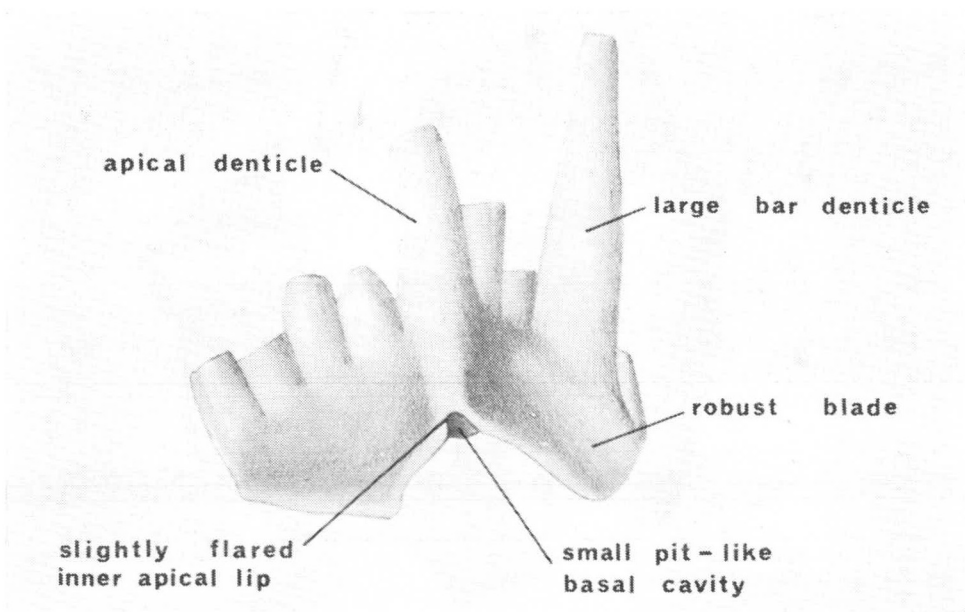


Figure 52. *Plectospathodus flexuosus* Branson & Mehl, 1933 (x70). Inner lateral view of CPC 11263 (Pl. 8, figs 9, 10)

- 1933 *Plectospathodus flexuosus* Branson & Mehl, p. 47, pl. 3, figs 31, 32.
1953 *Plectospathodus elegans* Rhodes, p. 323, pl. 23, figs 255, 263, 264.

1964 *Plectospathodus flexuosus* Branson & Mehl; Walliser, p. 65, pl. 9, fig. 10; pl. 30, figs 15, 16.

Material: 16 specimens; CPC 11263 figured.

Description: Unit moderately arched, massive, with irregular oral outline. Anterior bar bearing up to 7 crowded denticles with free chevron tips, posterior bar up to 6 crowded denticles. Penultimate denticles of both bars more massive than others.

Unit slightly deflected, inner faces of all denticles more convex than outer faces. Basal cavity small, subapical and central, extending along bars as groove for a very short distance. Inner apical lip slightly flared, aboral outline concave.

Remarks: The small basal cavity and the robustness of *Plectospathodus flexuosus* are distinctive features of this species.

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Branson & Mehl (1933)	Bainbridge Lst., Missouri	Mid Silurian
Europe	Rhodes (1953)	Aymestry Lst., Shropshire, Staffordshire	Late Silurian
	Walliser (1964)	Carnic Alps, Germany	<i>siluricus</i> to early Devonian

Yass Basin— *Plectospathodus flexuosus* Branson & Mehl occurs 20 m above the base of the Bowspring Limestone Member to the topmost beds of the Hume Limestone Member near Silverdale. South of the Yass River it extends from 20 m in the Bowspring Limestone Member to 2 m in the Hume Limestone Member near Hattons Corner.

Range: Late early Ludlovian (*ploeckensis* Zone) to Gedinnian (*woschmidtii* Zone).

Genus POLYGNATHOIDES Branson & Mehl, 1933

Type species: *Polygnathoides siluricus* Branson & Mehl, 1933

POLYGNATHOIDES EMARGINATUS (Branson & Mehl, 1933)

(Pl. 8, figs 15-20; text-fig. 53)

1933 *Polygnathellus emarginatus* Branson & Mehl, p. 49, pl. 3, fig. 38.

1933 *Polygnathellus minutus* Branson & Mehl, p. 49, pl. 3, fig. 37.

1957 *Polygnathoides emarginatus* (Branson & Mehl); Walliser, p. 45, pl. 1, figs 35-36.

1964 *Polygnathoides emarginatus* (Branson & Mehl); Walliser, p. 66, pl. 8, fig. 16; pl. 18, figs 1-6.

Material: 15 specimens; CPC 11266, 11267 figured.

Description: Narrow platform marginally projected below unit near apical denticle. Units straight to sigmoidal, and moderately arched. Bars nearly equal in length, shallow and tapering towards bar extremities.

Platform broadest near apical denticle, narrowing to a point distally. Mature specimens have shallow transverse depression in platform near apical denticle; occasional short low ridge or low node interrupts smooth surface of platform.

Each bar bears 5 to 7 pointed denticles, discrete to crowded, posteriorly inclined, and knife-edged, tallest medially. Apical denticle posteriorly inclined, laterally compressed, elliptical to lensoid in cross-section and up to 3 times as broad

as bar denticles. Aborally, 4 secondary keels link small shallow basal cavity with bar ends and tips of pointed downward projections of platform margin.

Remarks: The narrow platform and the row of denticles distinguishes *Polygnathoides emarginatus* from *P. siluricus* Branson & Mehl, which has a wide platform and a longitudinal row of low nodes.

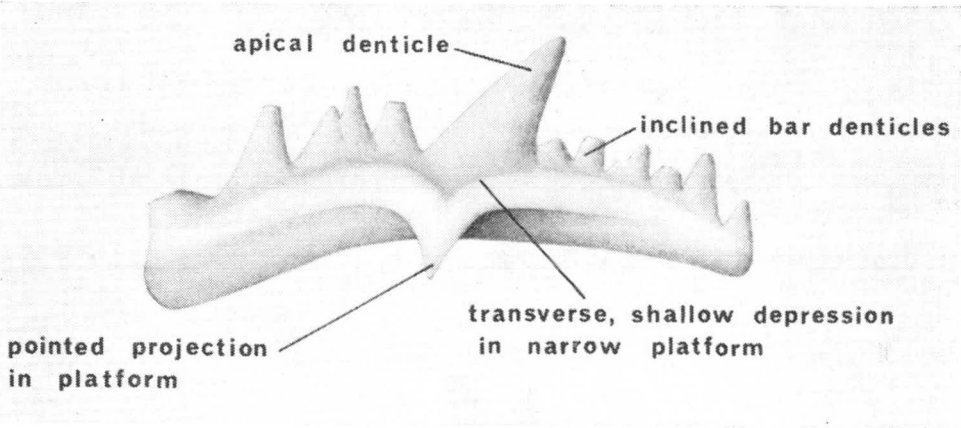


Figure 53. *Polygnathoides emarginatus* (Branson & Mehl, 1933) (x65). Inner lateral view of CPC 11266 (Pl. 8, figs 15, 16, 19, 20)

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Branson & Mehl (1933)	Bainbridge Lst., Missouri	Silurian
Europe	Walliser (1957)	Carnic Alps, Germany	Late Wenlockian
	Walliser (1964)	Carnic Alps, Germany	mid <i>crassa</i> to <i>siluricus</i>

Yass Basin—*Polygnathoides emarginatus* (Branson & Mehl) extends from 19 m above the base of the ‘Barrandella’ Shale Member to 6 m in the Hume Limestone Member of Silverdale quarry.

Range: Middle early Ludlovian (mid *crassa* Zone) to middle Ludlovian (*siluricus* Zone).

POLYGNATHOIDES SILURICUS Branson & Mehl, 1933
(Pl. 8, figs 13, 14; text-fig. 54)

1933 *Polygnathoides siluricus* Branson & Mehl, p. 50, pl. 3, figs 39-42.
 1957 *Polygnathoides siluricus* Branson & Mehl; Walliser, p. 45, pl. 1, fig. 34.
 1964 *Polygnathoides siluricus* Branson & Mehl; Walliser, p. 66, pl. 8, fig. 19; pl. 17, figs 1-11.

Material: 5 specimens; CPC 11265 figured.

Description: Platform with pinnate outline and longitudinally studded with one row of nodes. Platform gently arched, widest medially, having narrow transverse V-shaped trough. Outer margins smoothly rolled upwards, producing longitudinal depression which contains row of nodes. Surface of platform smooth to finely pustulose.

Platform nodes discrete to fused, taller at mid-bar, numbering 4 to 7 anteriorly and 3 to 5 posteriorly. Platform nodes dominated by larger, blunt, centrally positioned apical node. 2 aboral carinae at right angles to each other link unit's extremities with small, diamond-shaped basal cavity. Faint growth-lines parallel to platform margins may exist on aboral surface.

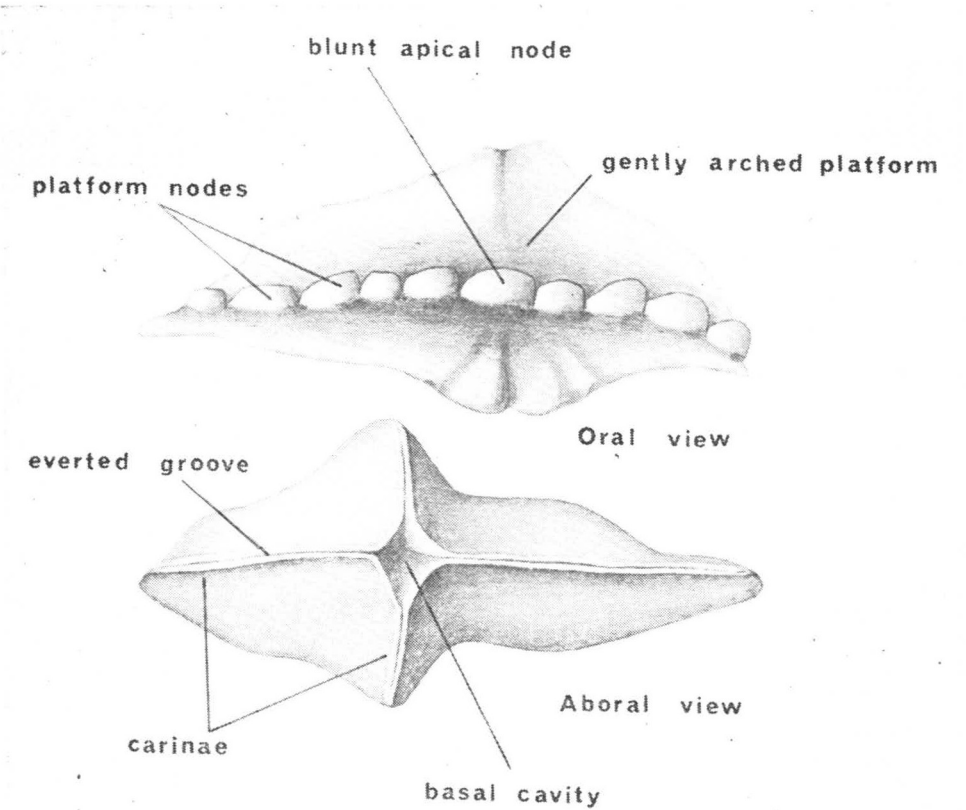


Figure 54. *Polygnathoides siluricus* Branson & Mehl, 1933 (x60). Oral and aboral views of reconstructed CPC 11265 (Pl. 8, figs 13, 14)

Remarks: Adult forms can be readily separated from those of *Polygnathoides emarginatus* Branson & Mehl, as the latter has a narrower platform and denticles instead of nodes. However, as stated by Walliser (1964, p. 65), juvenile forms of the two species are difficult to separate.

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Branson & Mehl (1933)	Bainbridge Lst., Missouri	Mid Silurian
Europe	Walliser (1957)	Carnic Alps, Germany	Late Wenlockian <i>siluricus</i>
	Walliser (1964)	Carnic Alps, Germany	

Yass Basin—*Polygnathoides siluricus* Branson & Mehl is present in the Hume Limestone Member at Silverdale from 0.6 m to the topmost beds of this member.

Range: Late middle Ludlovian to early late Ludlovian.

Genus SCOLOPODUS Pander, 1856

Type species: *Scolopodus sublaevis* Pander, 1856

SCOLOPODUS DIPLICATUS sp. nov.
(Pl. 11, figs 16-19; text-fig. 55)

Material: 36 specimens. Holotype CPC 11291; paratypes 11292, 11293, 11294 figured.

Specific diagnosis: A scolopodid with two lateral carinae and a rounded posterior face.

Derivation of name: From the Greek *di-*, double, and Latin *plicare*, to fold; referring to the sulci on both sides of the rounded posterior face.

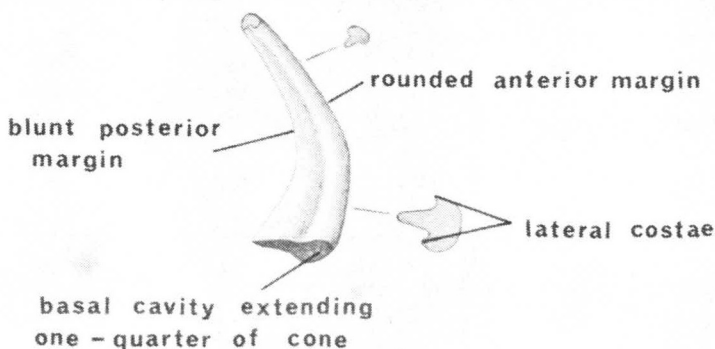


Figure 55. *Scolopodus diplicatus* sp. nov. (x35). Lateral view of CPC 11294 (Pl. 11, fig. 19)

Description: Slightly twisted robust cones, recurved just above base, uppermost three-quarters essentially straight. 2 posterolateral longitudinal troughs, wide and extending from just above base almost to apex. Each anterior side of both troughs forms knife-edge junction with broadly rounded anterior face of unit. Posterior face rounded. Expanded base projecting slightly posteriorly and having irregular oval outline. Subconical basal cavity terminating in a point, almost one-quarter of cone deep.

Remarks: *Scolopodus diplicatus* most closely resembles the Ordovician form *S. triplicatus* Ethington & Clark. However, in the latter the 'troughs are flanked by a pair of rounded posterior carinae and a less prominent anterolateral carina' (Ethington & Clark, 1964, p. 700). *S. diplicatus* has only two lateral carinae and no trough in the posterior face.

Occurrence:

Yass Basin—*Scolopodus diplicatus* sp. nov. extends from the lower beds of the Euralie Limestone Member to the basal beds of the 'Barrandella' Shale Member near Derriggullen Creek.

Range: Middle early Ludlovian (*crassa* Zone) to early middle Ludlovian (*ploeckensis* Zone).

Genus SPATHOGNATHODUS Branson & Mehl, 1941

Type species: *Ctenognathus muchisoni* Pander, 1856

SPATHOGNATHODUS FUNDAMENTATUS Walliser, 1957

(Pl. 9, figs 1-11; text-fig. 56)

1957 *Spathognathodus fundamentatus* Walliser, p. 47, pl. 1, figs 1-14.

1964 *Ozarkodina fundamentata* (Walliser); Walliser, p. 56, pl. 7, fig. 18; pl. 23, figs 5-24, text-figs 3d, e.

1969 *Ozarkodina* sp. affin. *O. fundamentata* (Walliser); Philip, p. 293, pl. 18, figs 1, 6, 11, 17, 21, 22.

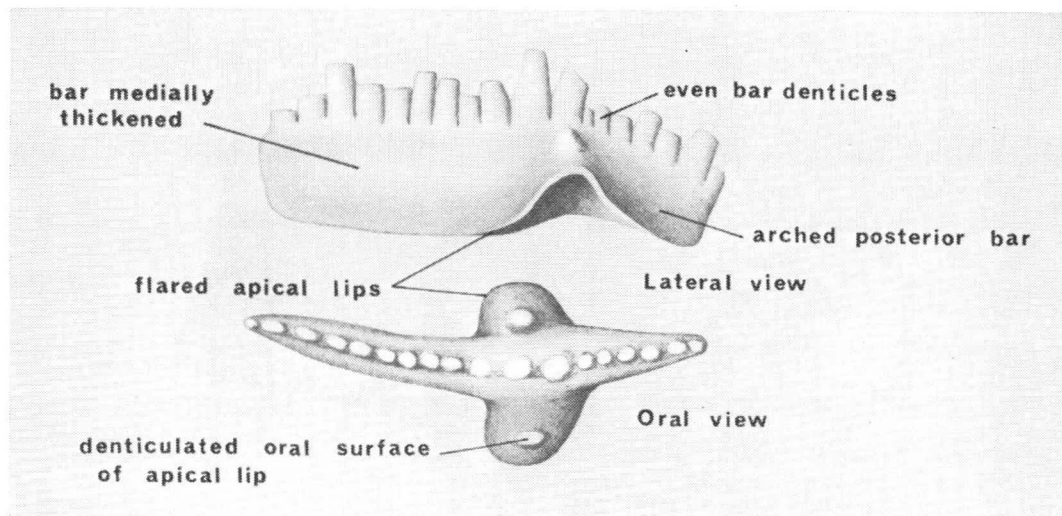


Figure 56. *Spathognathodus fundamentatus* Walliser, 1957 (x80). Composite sketch of CPC 11270 (Pl. 9, figs 8-11) and fig. 17 in pl. 23 (Walliser, 1964)

Material: 23 specimens; CPC 11268, 11269, 11270 figured.

Description: Slightly arched blade with flared apical lips, even bar denticles, long anterior bar, short posterior bar. Anterior bar medially thickened, deep, tapering almost to a point near extremity. Posterior bar arched, straight to deflected, not as deep as anterior bar, tapering distally.

Bar denticles crowded, 9 to 12 on anterior bar, 3 to 8 on posterior bar; moderately laterally compressed, blunt to pointed, vertical to posteriorly inclined. Apical denticle posteriorly inclined; lateral faces convex, anterior and posterior blunt to knife-edged.

Basal cavity wide, deep, in posterior half of unit and extending to posterior extremity. Apical lip outline subcircular to rectangular, asymmetrical, flared; in deflected units inner lip pulled up almost level with oral surface of posterior bar. Oral surface of apical lip of some specimens denticulated.

Remarks: Walliser (1964, p. 56) placed this species in the genus *Ozarkodina* mainly on the basis of a possible origin from *O. ortus* Walliser. In contrast, an origin from *Spathognathodus inclinatus* (Rhodes) is suggested here because (1) the

anterior bar of *S. fundamentatus* more closely resembles that of *S. inclinatus*, the bar is rectangular, and the bar denticles are even; (2) a depressed posterior bar of *S. inclinatus* would closely resemble the posterior bar of *S. fundamentatus*; such depression would also tend to increase the flare of the apical lips of *S. inclinatus*; (3) the ozarkodinid-type apical denticle that *S. fundamentatus* possesses is only a slight modification of *S. inclinatus inclinatus*.

The arched posterior bar of this species distinguishes it from other Silurian spathognathodids; the posterior bars of the latter are not similarly depressed. Forms with denticulated apical lips resemble juvenile specimens of *Kockelella variabilis* Walliser; the latter, however, have a broader and shallower basal cavity, whereas specimens of *Spathognathodus fundamentatus* have a deep, somewhat pit-like basal cavity.

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Walliser (1957)	Carnic Alps, Germany	Ludlovian
	Kockel (1958)	Ardales, Spain	Late Wenlockian to early Ludlovian
Australia	Walliser (1964)	Carnic Alps, Germany	<i>crassa</i> to <i>siluricus</i>
	Philip (1969)	Dirk Hartog Fm., Western Australia	Ludlovian

Yass Basin—*Spathognathodus fundamentatus* Walliser occurs from the topmost beds of the Bowspring Limestone Member to 4.8 m in the Hume Limestone Member near Silverdale. South of the Yass River this species occurs from middle beds of the Bowspring Limestone Member near Euralie to the middle of the Hume Limestone Member near Hattons Corner.

Range: Early early Ludlovian (*crassa* Zone) to late middle Ludlovian (*siluricus* Zone).

SPATHOGNATHODUS INCLINATUS INCLINATUS (Rhodes, 1953)
(Pl. 9, figs 12-19; text-fig. 57)

- 1933 *Ozarkodina simplex* Branson & Mehl, p. 52, pl. 3, figs 46, 47.
 1953 *Prioniodina inclinata* Rhodes, p. 324, pl. 23, figs 233-235.
 1957 *Spathognathodus inclinatus* (Rhodes); Walliser, p. 47, pl. 1, figs 16-20.
 1960 *Spathognathodus inclinatus* (Rhodes); Spasov, p. 66, pl. 1, figs 5, 8, 12.
 1960 *Spathognathodus* n. sp. Walliser, p. 35, pl. 8, fig. 7.
 1962 *Spathognathodus inclinatus* (Rhodes); Walliser, p. 283, fig. 1, no. 30.
 1962 *Spathognathodus dubius* Ethington & Furnish, p. 1286, pl. 172, figs 1, 2.
 1964 *Spathognathodus inclinatus inclinatus* (Rhodes); Walliser, p. 76, pl. 8, fig. 6; pl. 19, figs 6-21.
 1968 *Spathognathodus inclinatus inclinatus* (Rhodes); Schulze, p. 224, pl. 17, figs 8, 28.

Material: 303 specimens; CPC 11271, 11272 figured.

Description: Rectangular spathognathodid with essentially even-sized denticles on anterior and posterior bars. Oral outline even except for apical denticle, which is up to twice as high as adjacent bar denticles. Aboral outline straight, although gently arched outlines occur. Anterior and posterior bars deep, thickened at mid-bar height, having from 8 to 14 and from 3 to 8 denticles respectively. Denticles crowded almost to tips. Apical denticle broad, and, like bar denticles, gently posteriorly inclined.

Basal cavity subapical extending as grooves under bar, becoming gradually narrower and shallower. Inner and outer apical lips slightly flared, just posterior to mid-bar.

Remarks: Variations in bar thickness, denticle height, lip dimensions, number of denticles, degree of arching, and apical denticle prominence were observed, but were considered to be within the morphological range of the species. Some arched specimens resemble *Ozarkodina media* Walliser, but their moderately flared inner and outer apical lips and short apical denticle distinguish them from the unflared outer lip and tall apical denticle of *O. media*.

Spathognathodus inclinatus inclinatus and *S. inclinatus inflatus* Walliser may be unnaturally grouped with *S. inclinatus hamatus* Walliser and *S. inclinatus post-hamatus* Walliser, for, as shown by Walliser (1964, pl. 18, figs 26-28; pl. 19, figs 1-5), the latter two subspecies have markedly deflected posterior bars, inconspicuous apical lips, shallower bars, and platform-like lateral thickening of the bars. Further, the presence of a lateral process in *S. inclinatus hamatus* may be of sufficient morphological importance to elevate it to species rank.

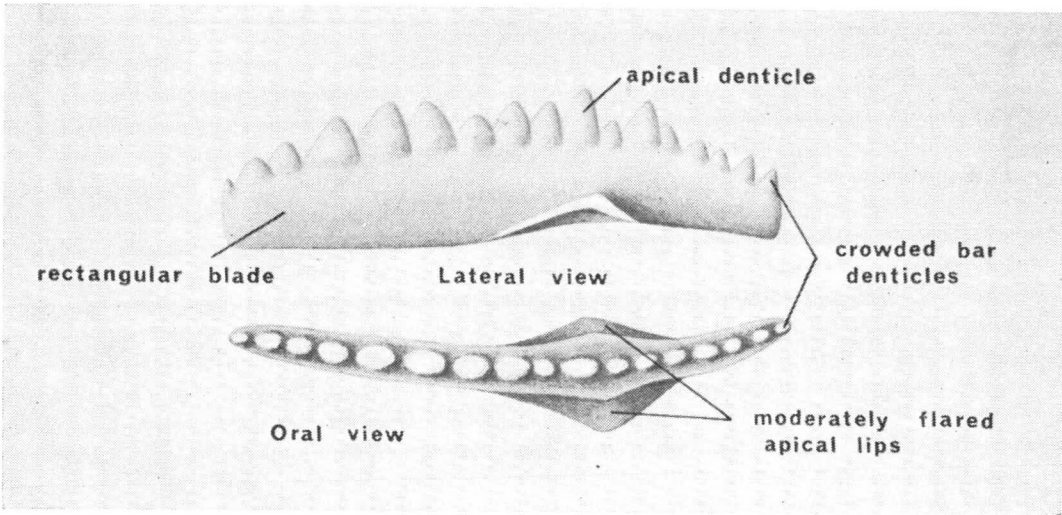


Figure 57. *Spathognathodus inclinatus inclinatus* (Rhodes, 1953) (x50). Lateral and oral views of CPC 11272 (Pl. 9, figs 16-19)

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Branson & Mehl (1933)	Bainbridge Lst., Missouri	Mid Silurian
	Walliser (1960)	Sutherland River Fm., Devon Island, Canada	Gedinnian (Johnson et al., 1967)
Europe	Rhodes (1953)	Aymestry Lst., Shropshire, Staffordshire	Late Silurian
	Walliser (1957)	Carnic Alps, Germany	Late Wenlockian to Ludlovian
	Kockel (1958)	Ardales, Spain	Late Wenlockian to late Ludlovian
	Spasov (1960)	Southwest Bulgaria, Austria	Ludlovian
	Walliser (1962)		Early to mid Ludlovian

	Reference	Formation/Location	Age/Zone
	Walliser (1964)	Carnic Alps, Germany	<i>patula</i> to early Devonian
	Manzoni (1965)	Carnic Alps, Italy	<i>crassa</i> to Gedinnian
	Serpagli (1967)	Sardinia	Ludlovian
	Schulze (1968)	Karawanken Alps, Southern Austria	Gedinnian to late Emsian
Africa	Remack-Petitot (1960)	Regganne, Southern Algeria	Early to late Silurian
	Ethington & Furnish (1962)	Tindouf Basin, Spanish Sahara	Silurian

Yass Basin—*Spathognathodus inclinatus inclinatus* (Rhodes) is abundant throughout all the calcareous beds, including the limestone pebbles of the Sharpeningstone Conglomerate.

Range: Wenlockian (*patula* Zone) to Emsian.

SPATHOGNATHODUS PRIMUS (Branson & Mehl, 1933)
(Pl. 9, figs 20, 21; text-fig. 58)

- 1933 *Spathodus primus* Branson & Mehl, p. 46, pl. 3, figs 25-30.
 1953 *Spathognathodus primus* (Branson & Mehl); Rhodes, p. 325, pl. 23, figs 243, 256, 258.
 1964 *Spathognathodus primus* (Branson & Mehl); Walliser, p. 80, pl. 8, fig. 14; pl. 22, figs 9-25; pl. 23, figs 1-4; text-fig. 8.
 1968 *Spathognathodus primus* (Branson & Mehl); Schulze, p. 226, pl. 17, fig. 6.
 1968 *Spathognathodus primus* (Branson & Mehl); Nikiforova & Predtechenskij, p. 25, fig. 35.

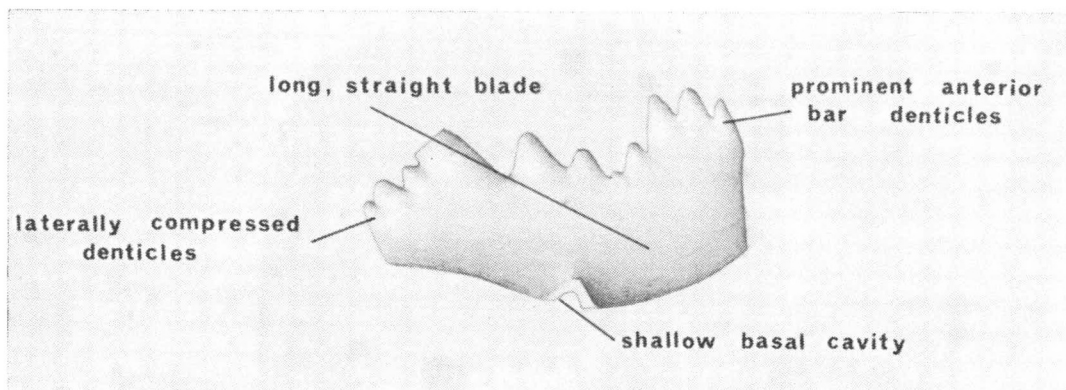


Figure 58. *Spathognathodus primus* (Branson & Mehl, 1933) (x75). Inner lateral view of CPC 11273 (Pl. 9, figs 20, 21)

Material: 3 specimens; CPC 11273 figured.

Description: Long straight unit with shallow, centrally situated basal cavity and 3 to 4 anteriormost denticles larger than remainder. Aboral edge of blade straight to sigmoidal, straight anterior edge meeting aboral edge at 90°. Denticles laterally compressed, and discrete to crowded. Apical lips asymmetrical, semicircular in outline, short, limited to immediate cavity region, and moderately flared.

Basal cavity conical, shallow and extending as shallow narrow groove for short distance along anterior bar and for half length of posterior bar.

Remarks: Walliser (1964, p. 81) has demonstrated that in *S. primus* morphological trends spread over the time interval from the *siluricus* zone to the early Devonian. The specimens illustrated here have an anterior bar characteristic of those specimens (Walliser, 1964, p. 81, fig. 8b) recovered from strata in the Cellon *latialatus* Zone, and a basal cavity and posterior bar similar to those of specimens from the part of the Austrian *eosteinhornensis* Zone (Walliser, 1964, p. 81, fig. 8k). Thus some of the morphological trends as suggested by Walliser for *S. primus* need modification.

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Branson & Mehl (1933)	Bainbridge Lst., Missouri	Mid Silurian
Europe	Rhodes (1953)	Aymestry Lst., Shropshire, Staffordshire	Late Silurian
	Kockel (1958)	Ardales, Spain	Late Wenlockian to early Ludlovian
	Walliser (1964)	Carnic Alps, Germany	<i>siluricus</i> to early Devonian
	Nikiforova & Predtechenskij (1968)	Dzwinogorod Beds, Podolia	Late Ludlovian
	Schulze (1968)	Karawanken Alps, Southern Austria	Gedinnian to mid Siegenian
	Serpagli (1967)	Sardinia	Ludlovian

Yass Basin—*Spathognathodus primus* (Branson & Mehl) occurs near Silverdale in the basal beds of the Euralie Limestone Member and 23 m above the base of the Bowspring Limestone Member.

Range: Middle early Ludlovian (*crassa* Zone) to middle Siegenian.

SPATHOGNATHODUS sp. cf. SPATHOGNATHODUS RANULIFORMIS Walliser, 1964
(Pl. 9, figs 22-29; text-fig. 59)

Material: 49 specimens; CPC 11274, 11275 figured.

Description: Short, rectangular blade with basal cavity at almost posterior extremity. Unit straight, thickened at mid-bar height; anterior and aboral edges meet at almost a point. Bar denticles even to uneven, essentially vertical, laterally compressed, pointed, crowded to their apices, 8 to 10 on anterior bar and 1 to 3 on posterior bar.

Subapical basal cavity deep, extending along anterior bar as narrow groove. Apical lip thin and forming widely flaring subcircular skirt.

Remarks: Although the specimens in this study closely resemble the holotype figured by Walliser (1964, pl. 22, fig. 5) in most respects, they possess a slightly smaller apical denticle.

Occurrence:

Yass Basin—*Spathognathodus* sp. cf. *S. ranuliformis* in the northern part of the basin occurs from near the base of the Euralie Limestone Member to the topmost beds of the Hume Limestone Member. South of the Yass River it is restricted to the lower beds of the 'Barrandella' Shale Member.

Range: Middle early Ludlovian (*crassa* Zone) to late middle Ludlovian (*ploecken-sis* Zone).

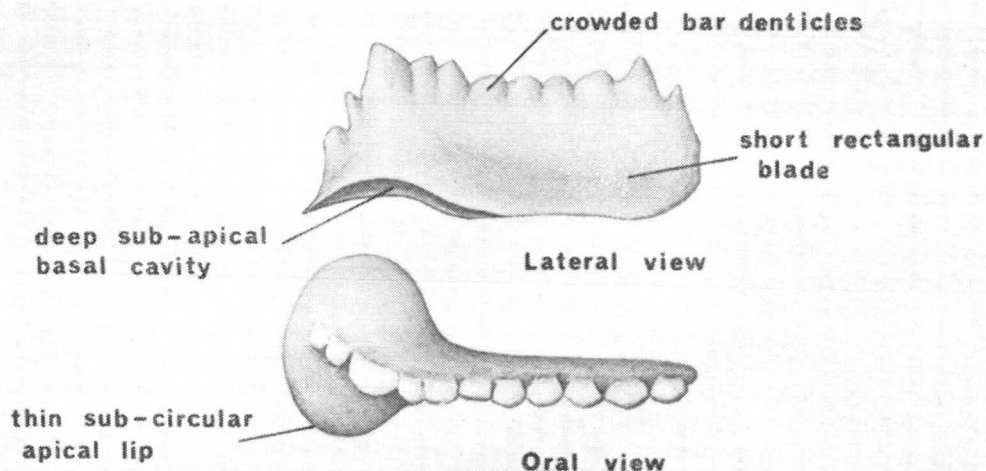


Figure 59. *Spathognathodus ranuliformis* Walliser, 1964 (x80). Lateral and oral view of fig. 5 in pl. 22 of Walliser, 1964

SPATHOGNATHODUS REMSCHEIDENSIS Ziegler, 1960
(Pl. 10, figs 1-7; text-fig. 60)

- 1960 *Spathognathodus remscheidensis* Ziegler, p. 194, pl. 13, figs 1, 2, 5, 7, 8, 10, 14.
- 1960 *Spathognathodus* cf. *S. canadensis* Walliser; Ziegler, p. 196, pl. 13, figs 3, 9, 11.
- 1960 *Spathognathodus* cf. *S. frankenwaldensis* Bischoff & Sannemann; Ziegler, p. 196, pl. 13, fig. 13.
- 1960 *Spathognathodus canadensis* Walliser, p. 34, pl. 8, figs 1-3.
- 1964 *Spathognathodus steinhornensis remscheidensis* Ziegler; Walliser, p. 87, pl. 9, fig. 24; pl. 20, figs 26-28; pl. 21, figs 1, 2.
- 1966 *Spathognathodus remscheidensis* Ziegler; Barnett et al., pl. 58, figs 10, 11, 16, 17, 19, 20.
- 1966 *Spathognathodus remscheidensis* Ziegler; Clark & Ethington, p. 686, pl. 84, fig. 12.
- 1968 *Spathognathodus steinhornensis remscheidensis* Ziegler; Nikiforova & Predtechenskij, pp. 26-28, pl. 28, figs 7, 11; pl. 32, figs 25, 28, 29.
- 1969 *Spathognathodus remscheidensis* Ziegler; Druce, p. 57, pl. 8, figs 4a-d; pl. 9, figs 9a, b.
- 1969 *Spathognathodus remscheidensis* Ziegler; Klapper, p. 21, pl. 4, figs 1-12.
- 1970 *Spathognathodus remscheidensis* Ziegler; Druce, p. 43, pl. 7, figs 6a-c.

Material: 148 specimens; CPC 11276, 11277 figured.

Description: Some of anteriormost bar denticles and apical denticle taller than remainder; asymmetrically flared apical lips and basal cavity both just posterior to middle of unit.

Bar ends tend to be upturned. Bar denticles pointed to blunt, discrete to crowded, uneven in size, and vertical to slightly posteriorly inclined. 6 to 8 denticles on posterior bar, and 4 to 5 on anterior bar. Both bars stoutest just beneath oral surfaces.

Subapical basal cavity deep, extending to ends of both bars as trough that becomes gradually shallow. Apical lips cardiform in oral outline; approach posterior

bar gradually but meet anterior bar at almost 90°. Aborally, lips possess concentric striae.

Remarks: The unequal bar denticles and the gradual approach to the posterior bar of the posterior margins of the apical lips distinguishes this species from *Spathognathodus steinhornensis* Ziegler.

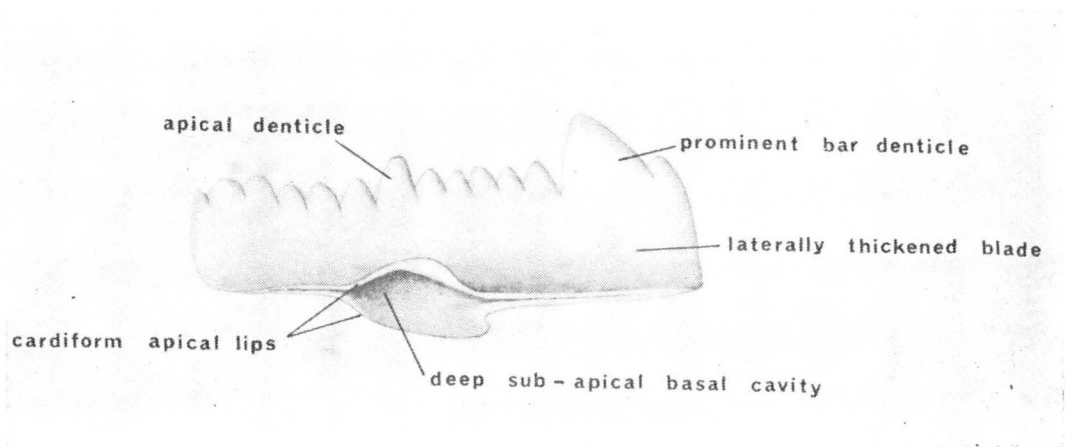


Figure 60. *Spathognathodus remscheidensis* Ziegler, 1960 (x 70). Composite sketch of CPC 11277 (Pl. 10, figs 5-8) and fig. 27 in pl. 20 of Walliser, 1964

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Ziegler (1960)	Rheinisches Schiefergebirge, Germany	Gedinnian
	Walliser (1964)	Carnic Alps, Germany	<i>woschmidti</i>
	Manzoni (1965)	Carnic Alps, Italy	<i>woschmidti</i> to Eifelian
	Nikiforova & Predtechenskij (1968)	Tajna and Mitkov Beds, Podolia	Early Gedinnian
North America	Walliser (1960)	Devon Island, Canada	Gedinnian (Johnson et al., 1967)
	Clark & Ethington (1966)	Nevada	Gedinnian
	Klapper (1969)	Yukon, Devon Island, Canada	Early to mid Gedinnian
Asia	Barnett et al. (1966)	Nowshera Reef Lst., West Pakistan	<i>eosteinhornensis</i> to <i>woschmidti</i>
Australia	Druce & Wilson (1967)	Yarrol Basin, Queensland	Gedinnian
	Druce (1969)	N. Yarrol Basin, Queensland	Early Gedinnian
	Druce (1970)	Garra Formation, NSW	Mid Siegenian

Yass Basin—*Spathognathodus remscheidensis* Ziegler is restricted to the limestone lenses of the Elmside Formation.

Range: Late Silurian (*eosteinhornensis* Zone) to middle Siegenian.

SPATHOGNATHODUS sp. cf. *S. STEINHORNENSIS* *EOSTEINHORNENSIS* Walliser, 1964
(Text-fig. 61)

Material: 1 incomplete specimen.

Description: Part of posterior bar missing. Unit rectangular, straight, medially thickened. Tips of denticles missing; remaining parts indicate that they were of uniform size, vertical, crowded, and moderately laterally compressed. Apical denticle same size as adjacent denticles. Outline of apical lips rounded, cardiform; taper posteriorly. Basal cavity deep, wide, asymmetrical, continues under anterior and posterior bars as narrow but deep groove.

Remarks: The feature of even denticles and rounded cardiform apical lips match those of *Spathognathodus steinhornensis eosteinhornensis*; nevertheless, the missing end of the posterior bar restricts positive identification. Walliser (1964, p. 85) noted an occasional ridge and a denticle in the oral surface of the cavity flare; no such features were observed here.

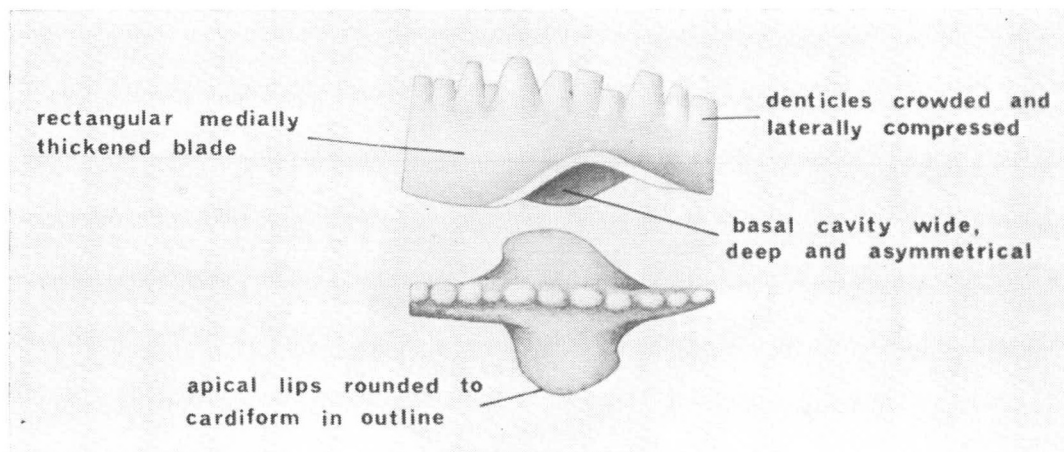


Figure 61. *Spathognathodus* sp. cf. *S. steinhornensis eosteinhornensis* Walliser, 1964 (x70). Sketch of the recovered fragment

Occurrence:

Yass Basin—This specimen was recovered from Yarwood Siltstone Member near the Euralie homestead.

Range: Early late Ludlovian.

Genus *SYNPRIONIODINA* Bassler, 1925

Type species: *Synprioniodina alternata* Bassler, 1925

SYNPRIONIODINA SILURICA Walliser, 1964
(Pl. 10, figs 8, 10, 11, 13; text-fig. 62)

1964 *Synprioniodina silurica* Walliser, p. 88, pl. 6, fig. 12; pl. 8, fig. 18; pl. 29, figs 38-41; pl. 30, figs 1-4, 6.

1967 *Synprioniodina* cf. *Prioniodus bicurvatus* Branson & Mehl; Rexroad, p. 50, pl. 3, figs 9, 10.

- 1968 *Synprioniodina silurica* Walliser; Schulze, p. 231, pl. 19, fig. 5.
 1968 *Synprioniodina silurica* Walliser; Nicholl & Rexroad, p. 61, pl. 4, fig. 10.

Material: 13 specimens; CPC 11279, 11280 figured.

Description: Arched and deflected blade with large apical denticle, small basal cavity, posterior bar with crowded denticles, and antecusp with fused denticles. Posterior bar arched and slightly twisted. Antecusp and bar denticles laterally compressed, discrete to fused with free tips, posteriorly inclined, knife-edged, outer face flat and inner face convex. Apical denticle laterally compressed, knife-edged, and posteriorly and inwardly inclined.

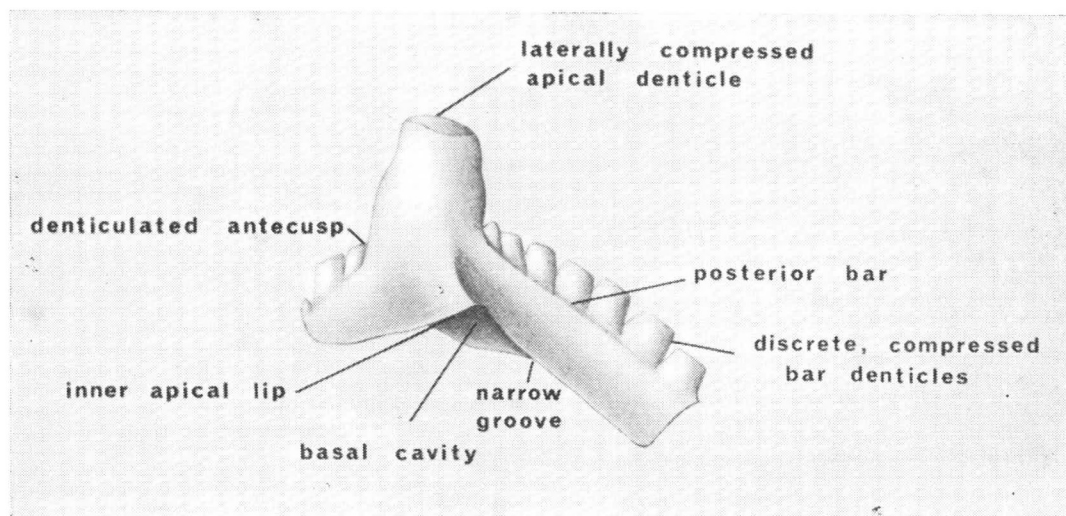


Figure 62. *Synprioniodina silurica* Walliser, 1964 (x90). Composite sketch of CPC 11279 (Pl. 10, figs 8, 11) and fig. 1 in pl. 30 of Walliser, 1964

Narrowing, shallow grooves extend from subconical basal cavity and continue along bars to extremities. Inner apical lip flared with inverted V-shaped outline. In some forms this lip is projected below the unit.

Remarks: Walliser (1964, p. 88) discussed the range in morphology and suggested that, in a large fauna, subdivision of this species may be possible. The specimens in this study closely resemble *Synprionioda alternata* Bassler but differ from it in having bar denticles that alternate in size.

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Walliser (1964)	Carnic Alps, Germany	<i>celloni</i> to <i>eosteinhornensis</i>
	Manzoni (1967)	Carnic Alps, Italy	<i>ploeckensis</i>
	Schulze (1968)	Karawanken Alps, Southern Austria	Gedinnian to mid Siegenian
North America	Rexroad (1967)	Brassfield Fm., Indiana, Ohio, Kentucky	Early to mid Llandoveryian
	Nicholl & Rexroad (1968)	Salamonie and Lee Creek Members, Brassfield Fm., Indiana	Upper Bereich I to <i>amorphognathoides</i>

Yass Basin—*Synprioniodina silurica* Walliser occurs from above the base of the Bowspring Limestone Member to the Hume Limestone Member at the Silverdale quarry. South of the Yass River it occurs from the base of the Euralie Limestone Member to the Yarwood Siltstone Member near Euralie.

Range: Early Llandoveryan to middle Siegenian.

Genus TRICHONODELLA Branson & Mehl, 1948

Type species: *Trichognathus prima* Branson & Mehl, 1933

Remarks: Only symmetrically arched conodonts with a prominent apical denticle, two denticulated lateral bars, and lacking a denticulated posterior bar are here referred to the genus *Trichonodella*.

TRICHONODELLA EXCAVATA (Branson & Mehl, 1933) (Pl. 10, figs 9, 14, 17; text-fig. 63)

- 1933 *Trichognathus excavata* Branson & Mehl, p. 51, pl. 3, figs 35, 36.
1953 *Trichonodella aboroflexa* Rhodes, p. 312, pl. 23, figs 231, 241, 242.
1953 *Trichonodella symmetrica* Rhodes, p. 315, pl. 23, fig. 232.
1957 *Trichonodella excavata* (Branson & Mehl); Walliser, p. 48, pl. 3, figs 3, 4, 6-8; text-fig. 2.
1957 *Trichonodella* cf. *T. excavata* (Branson & Mehl) sp. a; Walliser, p. 50, pl. 3, fig. 5.
1957 *Trichonodella* cf. *T. excavata* (Branson & Mehl) sp. b; Walliser, p. 50, pl. 3, fig. 9.
1958 *Trichonodella excavata* (Branson & Mehl); Bischoff & Sannemann, p. 109, pl. 15, figs 16, 18.
1960 *Trichonodella excavata* (Branson & Mehl); Spasov, p. 66, pl. 1, figs 1, 2, 16.
1962 *Trichonodella excavata* (Branson & Mehl); Ethington & Clark, p. 1287, pl. 173, fig. 8.
1962 *Trichonodella excavata* (Branson & Mehl); Jentzsch, p. 974, pl. 2, fig. 16; pl. 3, fig. 19.
1964 *Trichonodella excavata* (Branson & Mehl); Walliser, p. 89, pl. 8, fig. 2; pl. 31, figs 26, 27.
1964 *Trichonodella excavata* (Branson & Mehl); Serpagli & Greco, p. 209, pl. 37, fig. 12.
1966 *Trichonodella excavata* (Branson & Mehl); Barnett et al., p. 437, pl. 58, fig. 14.
1966 *Trichonodella excavata* (Branson & Mehl); Philip, p. 451, pl. 3, fig. 22.
1968 *Trichonodella excavata* (Branson & Mehl); Nicholl & Rexroad, p. 63, pl. 4, fig. 2.
1968 *Trichonodella excavata* (Branson & Mehl); Schulze, p. 231, pl. 18, fig. 10.
1970 *Trichonodella excavata* (Branson & Mehl); Druce, p. 47.

Material: 11 specimens; CPC 11278, 11281 figured.

Description: Gently arched unit with large basal cavity and flared apical lip extending up to and a little above oral surface of bars. Angle between bars varies between 110° and 165°. 7 denticles on each bar; tall, discrete, and slightly laterally compressed, knife-edged, becoming wider and taller distally from apical denticle. Apical denticle slender and posteriorly inclined, anterior face flat, posterior face convex.

Basal cavity deepest immediately beneath apical denticle, extending up posterior face of denticle, continuing as narrowing groove under each bar. Apical lip outline rounded.

Remarks: If the basal cavity opening is regarded as horizontal the apical denticle is inclined up to 30° to the horizontal; the bar denticles are vertical in forms with a cavity extension up the posterior face of the apical denticle.

Trichonodella excavata is distinguished from *T. trichonodelloides* (Walliser) by its rounded apical lip outline; the latter has an outline that extends beyond the lowest third of the posterior face of the apical denticle and terminates in a sharp inverted V-shaped outline. Walliser (1957, p. 51) suggested that *Plectospathodus extensus* Rhodes and *Lonchodina greilingi* Walliser developed from *T. excavata* with the twisting of the latter's bars.

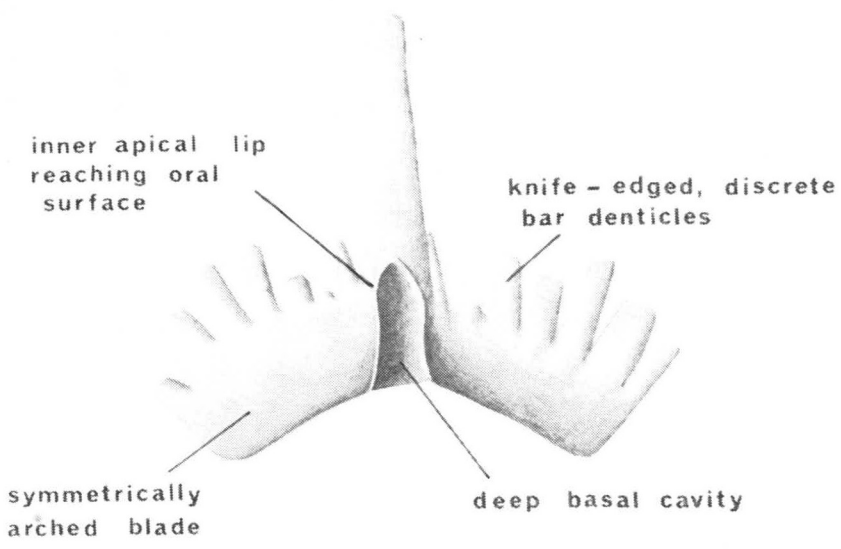


Figure 63. *Trichonodella excavata* (Branson & Mehl, 1933) (x80). Composite sketch of CPC 11278, CPC 11281 (Pl. 10, figs 9, 14, 17) and fig. 27 in pl. 31 of Walliser, 1964

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Branson & Mehl (1933)	Bainbridge Lst., Missouri	Mid Silurian
	Nicholl & Rexroad (1958)	Salamonie and Lee Ck Members, Brassfield Fm., Indiana	Upper Bereich I to <i>amorphognathoides</i>
Europe	Rhodes (1953)	Aymestry Lst., Shropshire, Staffordshire	Late Silurian
	Walliser (1957)	Carnic Alps, Germany	Late Wenlockian to Ludlovian
	Bischoff & Sannemann (1958)	Tentakulitenkalk, Germany	Early Devonian
	Kockel (1958)	Ardales, Spain	Mid to late Ludlovian
	Spasov (1960)	Southwest Bulgaria, Austria	Ludlovian
	Jentsch (1962)	Tentaculite Lst., Germany	Early Devonian
	Serpagli & Greco (1964)	Carnic Alps, Italy	Silurian
	Manzoni (1965)	Carnic Alps, Italy	Late Silurian
	Serpagli (1967)	Sardinia	Ludlovian

	Reference	Formation/Location	Age/Zone
	Schulze (1968)	Karawanken Alps, Southern Austria	Gedinnian to mid Emsian
Africa	Ethington & Furnish (1962)	Tindouf Basin, Spanish Sahara	Silurian
Asia	Barnett et al. (1966)	Nowshera Lst., West Pakistan	<i>eosteinhornensis</i> to <i>woschmidtii</i>
Australia	Philip (1966)	Murrindal Lst., Buchan, Victoria	Early Emsian
	Druce (1970)	Garra Fm., NSW	Mid Siegenian

Yass Basin—*Trichonodella excavata* (Branson & Mehl) is present in all the calcareous rocks in both the northern and southern parts of the basin.

Range: Early Llandoveryan to Emsian.

TRICHONODELLA INCONSTANS Walliser, 1957
(Pl. 10, figs 12, 15, 16, 18, 19; text-fig. 64)

- 1957 *Trichonodella inconstans* Walliser, p. 50, pl. 3, figs 10-17.
1958 *Trichonodella inconstans* Walliser; Bischoff & Sannemann, p. 109, pl. 15, figs 20, 21.
1960 *Trichonodella inconstans* Walliser; Walliser, p. 35, pl. 7, figs 11-12.
1960 *Trichonodella inconstans* Walliser; Ziegler, p. 197, pl. 14, figs 14, 17.
1962 *Trichonodella inconstans* Walliser; Ethington & Furnish, p. 1287, pl. 173, fig. 7.
1962 *Trichonodella inconstans* Walliser; Walliser, p. 283, fig. 1, no. 21.
1963 *Trichonodella inconstans* Walliser; Spasov & Veselinović, p. 251, pl. 2, fig. 7.
1964 *Trichonodella inconstans* Walliser; Walliser, p. 90, pl. 8, fig. 8; pl. 30, figs 10-12.
1965 *Trichonodella inconstans* Walliser; Philip, p. 112, pl. 9, fig. 15.
1966 *Trichonodella inconstans* Walliser; Barnett et al., p. 436, pl. 58, fig. 12.
1966 *Trichonodella inconstans* Walliser; Clark & Ethington, p. 687, pl. 82, fig. 16.

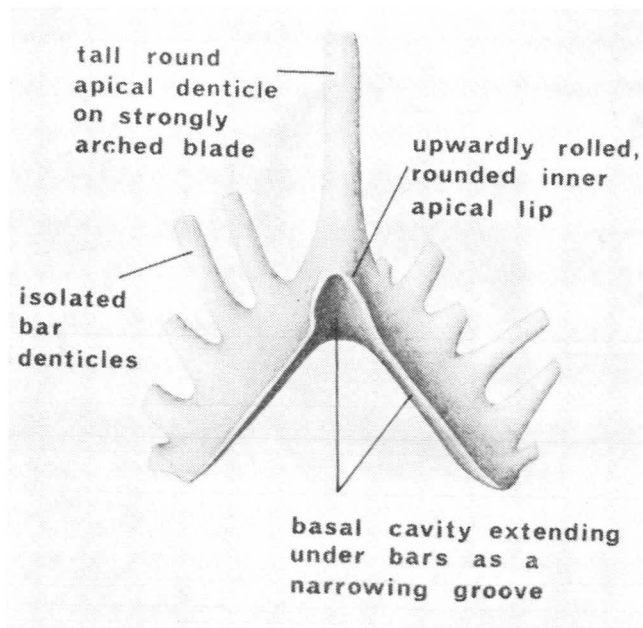


Figure 64. *Trichonodella inconstans* Walliser, 1957 (x65).
Posterior view of CPC 11283 (Pl. 10, figs 16, 18, 19)

- 1968 *Trichonodella inconstans* Walliser; Nicholl & Rexroad, p. 64, pl. 4, fig. 1.
 1968 *Trichonodella inconstans* Walliser; Schulze, p. 232, pl. 18, fig. 13.
 1968 *Trichonodella inconstans* Walliser; Legault, p. 18, pl. 1, figs 7-9.
 1969 *Trichonodella inconstans* Walliser; Druce, p. 60, pl. 11, figs 10a, b.
 1969 *Trichonodella inconstans* Walliser; Philip, p. 295, pl. 18, figs 9, 12, 14, 15.

Material: 15 specimens; CPC 11282, 11283 figured.

Description: Strongly arched bilaterally symmetrical units with isolated bar denticles and prominent central apical denticle and subapical basal cavity. Bars of uniform height and thickness. Bar denticles discrete, tall, slender, ovate in cross section, and posteriorly inclined; increasing in size from apical denticle to maximum at mid-bar length, decreasing towards bar extremities. Apical denticle posteriorly inclined, 2 to 3 times taller than bar denticles. Basal cavity triangular, continuing aborally along each bar as a narrowing groove. No expression of apical lip on anterior face. Inner apical lip forming rounded outline to mid-bar height beneath apical denticle.

Remarks: The strongly arched blade, isolated bar denticles, and thick upwardly rolled, rounded inner apical lip distinguish *Trichonodella inconstans* from *T. excavata* (Branson & Mehl); the latter is more gently arched and has an inner apical lip outline that extends above the oral surface of the bars. The cross-section of the bars of *T. inconstans* varies from compressed to thick and somewhat rectangular. Although Walliser (1957, p. 50) allows a wide range of angles between the bars the angle in the present specimens is close to 85°.

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Walliser (1957)	Carnic Alps, Germany	Late Wenlockian to Ludlovian
	Bischoff & Sannemann (1958)	Tentakulitenkalk, Germany	Early Devonian
	Ziegler (1960)	Rheinisches Schiefergebirge, Germany	Gedinnian
	Walliser (1962)		Late Wenlockian
	Reichstein (1962)	Germany	Early Ludlovian
	Spasov & Veselinović (1963)	Suva Planina, Yugoslavia	Late Ludlovian
	Walliser (1964)	Carnic Alps, Germany	<i>sagitta</i> to early Devonian
	Manzoni (1965)	Carnic Alps, Italy	Late Silurian to early Devonian
	Serpagli (1967)	Sardinia	Ludlovian
	Schulze (1968)	Karawanken Alps, Southern Austria	Gedinnian to early Emsian
North America	Walliser (1960)	Sutherland River Fm., Devon Island, Canada	Gedinnian (Johnson et al., 1967)
	Clark & Ethington (1966)	Rabbit Hill Fm., Nevada	Late Siegenian to Emsian
	Nicholl & Rexroad (1968)	Salamonie and Lee Creek Members, Brassfield Fm., Indiana	Upper Bereich I to <i>amorphognathoides</i>
	Legault (1968)	Stonehouse Fm., Nova Scotia	<i>eosteinhornensis</i>
Asia	Barnett et al. (1966)	Nowshera Reef Lst., West Pakistan	<i>eosteinhornensis</i> to <i>woschmidtii</i>

	Reference	Formation/Location	Age/Zone
Africa	Ethington & Furnish (1962)	Tindouf Basin, Spanish Sahara	Silurian
Australia	Philip (1965)	Coopers Creek Fm., Victoria	Late Gedinnian to Siegenian
	Druce (1969)	N. Yarrol Basin, Queensland	Early Gedinnian
	Philip (1969)	Dirk Hartog Fm., Western Australia	Ludlovian

Yass Basin—*Trichonodella inconstans* Walliser is present from the Gums Road Limestone Member to the topmost beds of the Hume Limestone Member in the Derringullen Creek/Silverdale area. The species also occurs in the uppermost beds of the 'Barrandella' Shale Member near Good Hope Road.

Range: Early Llandoveryan to Emsian.

TRICHONODELLA SYMMETRICA (Branson & Mehl, 1933)

(Pl. 11, figs 1-6; text-fig. 65)

- 1933 *Trichognathus symmetrica* Branson & Mehl, p. 50, pl. 3, figs 33, 34.
 1953 *Trichonodella symmetrica* (Branson & Mehl); Rhodes, p. 315, pl. 23, fig. 246.
 1960 *Trichonodella* n. sp. aff. *T. symmetrica* (Branson & Mehl); Ziegler, p. 197, pl. 15, figs 1, 2.
 1964 *Trichonodella symmetrica* (Branson & Mehl); Walliser, p. 41, 90, pl. 9, fig. 11; pl. 31, figs 28-30.
 1965 *Trichonodella symmetrica* (Branson & Mehl); Philip, p. 112, pl. 9, figs 19, 21.
 1968 *Trichonodella symmetrica* (Branson & Mehl); Igo & Koike, p. 19, pl. 3, figs 10, 11.

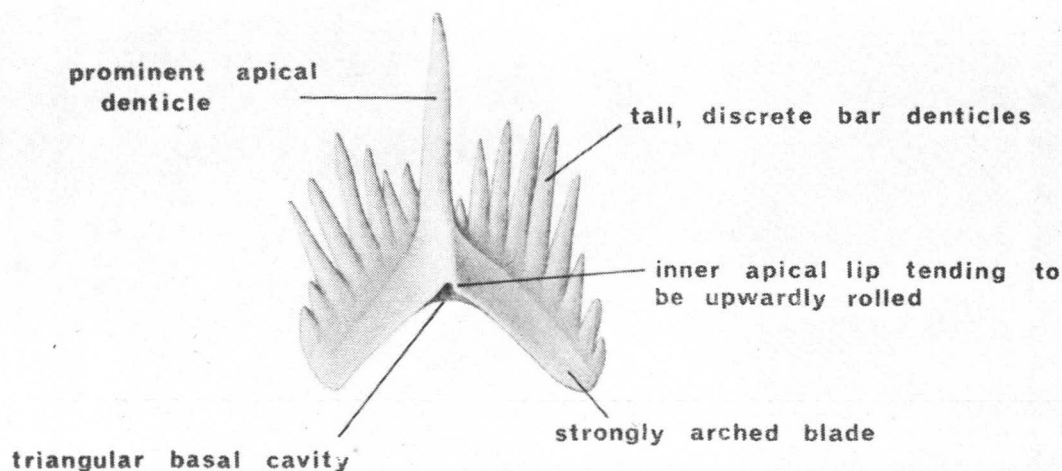


Figure 65. *Trichonodella symmetrica* (Branson & Mehl, 1933) (x45). Posterior view of CPC 11286 (Pl. 11, figs 5, 6)

- 1968 *Trichonodella symmetrica* (Branson & Mehl); Schulze, p. 232, pl. 18, figs 12, 14, 15.
 1968 *Trichonodella symmetrica* (Branson & Mehl); Nikiforova & Predtechenskij, pl. 36, fig. 25.
 1969 *Trichonodella symmetrica* (Branson & Mehl); Druce, p. 61, pl. 10, fig. 7.
 1969 *Trichonodella symmetrica* (Branson & Mehl); Philip, p. 295, pl. 18, fig. 24.
 1970 *Trichonodella symmetrica* (Branson & Mehl); Druce, p. 47, pl. 9, figs 7, 8.

Material: 5 specimens; CPC 11284, 11285, 11286 figured.

Description: A trichonodellid with a small subapical cavity and an inconspicuous apical lip. Blade strongly arched and thin; increasing in depth from apical denticle, deepest at mid-bar length, moderately laterally compressed. Bar denticles crowded, oval in cross-section, vertical, up to 7 on each bar. Apical denticle elliptical in cross-section, twice as broad as bar denticles. Basal cavity having short narrow groove-like extensions along bars, bounded by short, unflared apical lips.

Remarks: *Trichonodella symmetrica* is distinguished from *T. excavata* (Branson & Mehl) and *T. inconstans* Walliser by its smaller basal cavity and inconspicuous apical lips.

Occurrence:

	Reference	Formation/Location	Age/Zone
North America	Branson & Mehl (1933)	Bainbridge Lst., Missouri	Mid Silurian
Europe	Rhodes (1953)	Aymestry Lst., Shropshire, Staffordshire	Late Silurian
	Ziegler (1960)	Rheinisches Schiefergebirge, Germany	Gedinnian
	Walliser (1964)	Carnic Alps, Germany	Mid <i>crispus</i> to early Devonian
	Manzoni (1965)	Carnic Alps, Italy	Late Silurian
	Schulze (1968)	Karawanken Alps, Southern Austria	Gedinnian to early Emsian
	Nikiforova & Predtechenskij (1968)	Chortkov Horizon, Podolia	Gedinnian
Southeast Asia	Igo & Koike	Upper Setul Lst., Langkawi Is., Malaya	<i>crassa</i>
Australia	Philip (1965)	Coopers Creek Fm., Gippsland, Victoria	Late Gedinnian to Siegenian
	Druce (1969)	N. Yarrol Basin, Queensland	Early Gedinnian
	Philip (1969)	Dirk Hartog Fm., Western Australia	Ludlovian
	Druce (1970)	Garra Fm., NSW	Mid Siegenian

Yass Basin—*Trichonodella symmetrica* (Branson & Mehl) occurs in the Yarwood Siltstone Member near Rainbow Hill and in the Elmside Formation.

Range: Early late Ludlovian to Emsian.

TRICHONODELLA TRICHONODELLOIDES (Walliser, 1964)
(Pl. 11, figs 7-10; text-fig. 66)

1964 ?*Roundya trichonodelloides* Walliser, p. 72, pl. 6, fig. 2; pl. 31, figs 22-25.

Material: 54 specimens; CPC 11287, 11288 figured.

Description: Strongly arched trichonodellids with subapical basal cavity extending up posterior face of apical denticle. Blade small and symmetrically arched. Bars laterally compressed. Bar denticles anteriorly inclined, discrete to crowded, pointed and short. Apical denticle up to 5 times as tall as bar denticles, slender, subtriangular in cross-section.

Shallow basal cavity extends as narrow, shallow grooves along each bar; and up apical denticle from about one-third of its height almost to apex. Inner apical lip forming long narrow inverted V-shaped outline to basal cavity.

Remarks: These specimens are referred to the genus *Trichonodella*. Forms in which the basal cavity extension up to the apical denticle is just above the oral surface of the bars strongly resemble *Trichonodella excavata* (Branson & Mehl). However, the apical lip outline of the cavity in the latter is rounded at its apex, whereas in *Trichonodella trichonodelloides* it forms an inverted V-shaped outline. In forms with the cavity extension almost reaching the apical denticle apex, the bars and their denticles are more prominently anteriorly inclined. Some of Walliser's forms (1964, pl. 31, figs 22, 25) have secondary denticles on the anterior face of the apical denticle. No such denticles were observed in the present specimens.

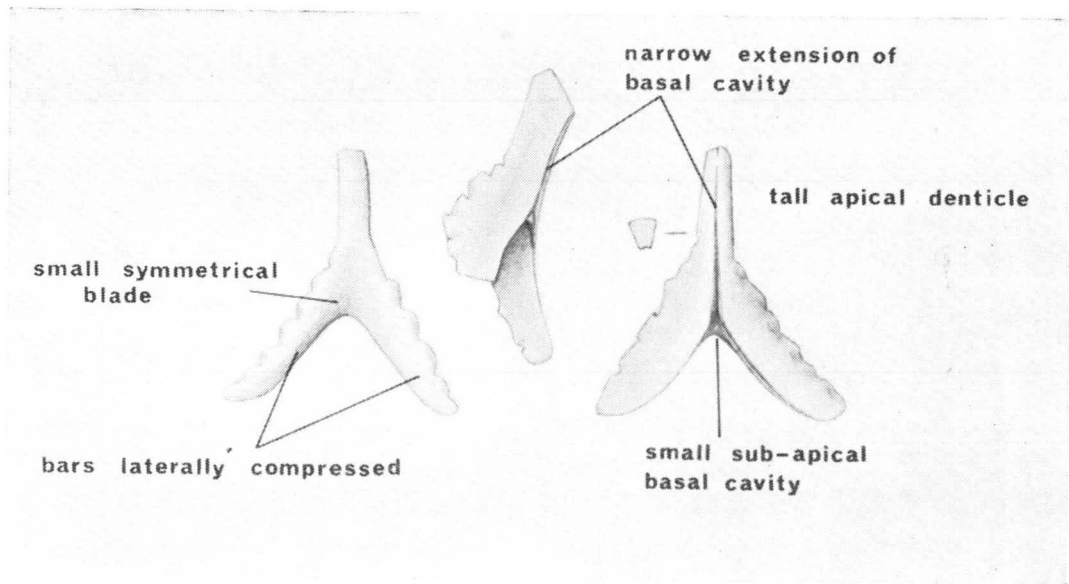


Figure 66. *Trichonodella trichonodelloides* (Walliser, 1964) (x90). Composite sketches of CPC 11287, CPC 11288 (Pl. 11, figs 7-10) and figs 22-24 in pl. 31 of Walliser, 1964

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Walliser (1964)	Carnic Alps, Germany	<i>celloni</i> to <i>amorphognathoides</i>

Yass Basin—*Trichonodella trichonodelloides* (Walliser) occurs from low in the Bowspring Limestone Member to high in the Hume Limestone Member at Silverdale. This species, south of the Yass River, occurs from above the base of the Euralie Limestone Member to the Yarwood Siltstone Member near Booroo Ponds Creek.

Range: Early Llandoveryan (*celloni* Zone) to late middle Ludlovian (*siluricus* Zone).

Gen. et sp. indet.
(Pl. 11, figs 11, 12; text-fig. 67)

1964 Gen. indet., n. sp. b. Walliser, p. 91, pl. 4, fig. 19; pl. 10, figs 10-12.

Material: 1 specimen; CPC 11289 figured.

Description: Large apical denticle with triangular cross-section and three slender, posteriorly inclined bar denticles. Smaller denticle on posterior cavity lip. Basal cavity elongate and deep. Inconspicuous ridge on posterior face of apical denticle from apex to posterior margin of cavity.

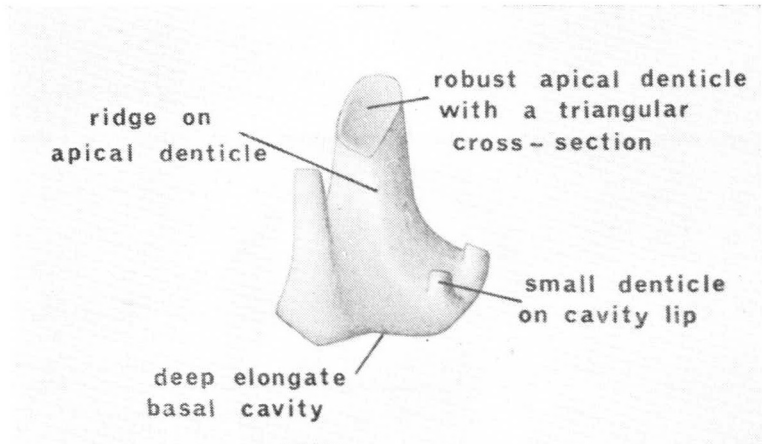


Figure 67. Gen. et sp. indet. (x80). Posterior view of CPC 11289 (Pl. 11, figs 11, 12)

Occurrence:

	Reference	Formation/Location	Age/Zone
Europe	Walliser (1964)	Carnic Alps, Germany	<i>celloni</i>
Yass Basin—The lowest beds of the Bowspring Limestone Member at Allview.			
<i>Range:</i> Early Llandoveryan (<i>celloni</i> Zone) to late Ludlovian (<i>crassa</i> Zone).			

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Note: The number of specimens in each sample is indicated after the specific name.

SAMPLE, LOCALITY, AND FAUNA DETAILS

I. BOWNING GROUP

Sample S1

Locality: Grid Ref. G7

Formation/Member: Sharpeningstone Conglomerate/Conglomerate Beds

Fauna: (23 specimens, 10 species)

<i>Ligonodina salopia</i> Rhodes, 1953	1
<i>Lonchodina greilingi</i> Walliser, 1957	1
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	1
<i>Ozarkodina media</i> Walliser, 1957	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	2
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	8
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	2
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	1
<i>Spathognathodus inclinatus, inclinatus</i> (Rhodes, 1953)	4
<i>Trichonodella inconstans</i> Walliser, 1957	2

Sample S2

Locality: Grid Ref. D9

Formation/Member: Sharpeningstone Conglomerate/Conglomerate Beds

Fauna: (13 specimens, 6 species)

<i>Acodus curvatus</i> Branson & Branson, 1947	1
<i>Ligonodina salopia</i> Rhodes, 1953	1
<i>Ozarkodina media</i> Walliser, 1957	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	7
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	1
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	2

II. BARAMBOGIE GROUP

Sample Z1

Locality: Grid Ref. D9

Formation/Member: Elmside/Limestone lenses

Fauna: (13 specimens, 8 species)

<i>Hindeodella priscilla</i> Stauffer, 1938	2
<i>Neoprioniodus bicurvatooides</i> Walliser, 1964	1
<i>Ozarkodina denckmanni</i> Ziegler, 1956	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	1
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	2
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	1
<i>Spathognathodus remscheidensis</i> Ziegler, 1960	4
<i>Trichonodella excavata</i> (Branson & Mehl, 1933)	1

Sample Z3

Locality: Grid Ref. E9

Formation/Member: Elmside/Limestone lenses

Fauna: (66 specimens, 11 species)

<i>Hindeodella priscilla</i> Stauffer, 1938	4
<i>Ligonodina salopia</i> Rhodes, 1953	3
<i>Neoprioniodus bicurvatooides</i> Walliser, 1964	1
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	1
<i>Ozarkodina denckmanni</i> Ziegler, 1956	10
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	7
<i>Panderodus panderi</i> (Stauffer, 1940)	5
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	8
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	1
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	1
<i>Spathognathodus remscheidensis</i> Ziegler, 1960	25

Locality: Grid Ref. E9
Formation/Member: Elmside/Limestone lenses
Fauna: (133 specimens, 13 species)

<i>Belodella triangularis</i> (Stauffer, 1940)	.....	2
<i>Hindeodella priscilla</i> Stauffer, 1938	.....	10
<i>Neoprioniodus bicurvatooides</i> Walliser, 1964	.....	4
<i>Ozarkodina denckmanni</i> Ziegler, 1956	.....	18
<i>Ozarkodina media</i> Walliser, 1957	.....	1
<i>Ozarkodina</i> sp.	.....	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	.....	19
<i>Panderodus panderi</i> (Stauffer, 1940)	.....	5
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	.....	12
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	.....	10
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	.....	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	.....	2
<i>Spathognathodus remscheidensis</i> Ziegler, 1960	.....	48

Locality: Grid Ref. F10
Formation/Member: Elmside/Limestone lenses
Fauna: (171 specimens, 14 species)

<i>Hindeodella priscilla</i> Stauffer, 1938	32
<i>Icriodus woschmidtii</i> Ziegler, 1960	1
<i>Lonchodina greilingi</i> Walliser, 1957	1
<i>Neoproniodus bicurvatoideus</i> Walliser, 1964	1
<i>Neoproniodus excavatus</i> (Branson & Mehl, 1933)	1
<i>Ozarkodina denckmanni</i> Ziegler, 1956	16
<i>Ozarkodina media</i> Walliser, 1957	3
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	27
<i>Panderodus panderi</i> (Stauffer, 1940)	1
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	6
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	14
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	1
<i>Spathognathodus remscheidensis</i> Ziegler, 1960	64
<i>Trichonodella symmetrica</i> (Branson & Mehl, 1933)	3

Locality: Grid Ref. F9
Formation/Member: Elmside/Limestone lenses
Fauna: (13 specimens, 6 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	1
<i>Hindeodella priscilla</i> Stauffer, 1938	2
<i>Ozarkodina denckmanni</i> Ziegler, 1956	2
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	1
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	1
<i>Spathognathodus remscheidensis</i> Ziegler, 1960	6

Locality: Grid Ref. G8
Formation/Member: Elmside/Limestone lenses
Fauna: (7 specimens, 6 species)

<i>Hindeodella priscilla</i> Stauffer, 1938	....	....	....	....	....	....	1
<i>Ozarkodina denckmanni</i> Ziegler, 1956	....	....	....	....	....	....	2
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	....	....	....	....	....	....	1
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	....	....	....	....	....	....	1
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	....	....	....	....	....	....	1
<i>Spathognathodus remscheidensis</i> Ziegler, 1960	....	....	....	....	....	....	1

III. BOOROO PONDS GROUP

Sample T2

Locality: Grid Ref. D12

Formation/Member: Black Bog Shale/Yarwood Siltstone

Fauna: (115 specimens, 20 species)

<i>Acodus curvatus</i> Branson & Branson, 1947	2
<i>Belodella triangularis</i> (Stauffer, 1940)	1
<i>Distacodus procerus</i> Ethington, 1959	7
<i>Distomodus curvatus</i> Rhodes, 1953	2
<i>Hindeodella equidentata</i> Rhodes, 1953	6
<i>Ligonodina silurica</i> Branson & Mehl, 1933	2
<i>Neoprioniodus bicurvatooides</i> Walliser, 1964	1
<i>Neoprioniodus bicurvatus</i> (Branson & Mehl, 1933)	8
<i>Ozarkodina media</i> Walliser, 1957	8
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	20
<i>Panderodus panderi</i> (Stauffer, 1940)	10
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	19
<i>Panderodus unicostatus serratus</i> Rexroad, 1967	2
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	9
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	9
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	4
<i>Spathognathodus</i> sp. cf. <i>S. steinhornensis eosteinhornensis</i> Walliser, 1964	1
<i>Trichonodella symmetrica</i> (Branson & Mehl, 1933)	1
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	2

Sample T3

Locality: Grid Ref. C18

Formation/Member: Black Bog Shale/Yarwood Siltstone

Fauna: (12 specimens, 9 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	1
<i>Kockelella variabilis</i> Walliser, 1957	1
<i>Ligonodina silurica</i> Branson & Mehl, 1933	4
<i>Neoprioniodus latidentatus</i> Walliser, 1964	1
<i>Ozarkodina gaertneri</i> Walliser, 1964	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	1
<i>Synprioniodina silurica</i> Walliser, 1964	1
<i>Trichonodella symmetrica</i> (Branson & Mehl, 1933)	1
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	1

Sample T7

Locality: Grid Ref. H9

Formation/Member: Black Bog Shale/Yarwood Siltstone

Fauna: (2 specimens, 2 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	1

Sample T8

Locality: Grid Ref. H8

Formation/Member: Black Bog Shale/Yarwood Siltstone

Fauna: (2 specimens, 2 species)

<i>Belodella triangularis</i> (Stauffer, 1940)	1
<i>Hindeodella equidentata</i> Rhodes, 1953	1

Sample T9

Locality: Grid Ref. G11

Formation/Member: Black Bog Shale/Yarwood Siltstone

Fauna: (4 specimens, 3 species)

<i>Ligonodina silurica</i> Branson & Mehl, 1933	2
<i>Ozarkodina gaertneri</i> Walliser, 1964	1
<i>Ozarkodina media</i> Walliser, 1957	1

IV. HATTONS CORNER GROUP

Sample H1

Locality: Grid Ref. C12

Formation/Member: Silverdale/Hume Limestone

Fauna: (4 specimens, 4 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	.....	1
<i>Ligonodina silurica</i> Branson & Mehl, 1933	.....	1
<i>Ozarkodina media</i> Walliser, 1957	.....	1
<i>Panderodus gracilis</i> (Branson & Mehl), 1933	.....	1

Sample H2

Locality: Grid Ref. C14

Formation/Member: Silverdale/Hume Limestone

Fauna: (2 specimens, 2 species)

<i>Panderodus panderi</i> (Stauffer, 1940)	.....	1
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	.....	1

Sample H3

Locality: Grid Ref. C14

Formation/Member: Silverdale/Hume Limestone

Fauna: (18 specimens, 9 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	.....	3
<i>Ozarkodina media</i> Walliser, 1957	.....	4
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	.....	1
<i>Panderodus panderi</i> (Stauffer, 1940)	.....	4
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	.....	2
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	.....	1
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	.....	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	.....	1
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	.....	1

Sample H4

Locality: Grid Ref. D11

Formation/Member: Silverdale/Hume Limestone

Fauna: (9 specimens, 5 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	.....	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	.....	2
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	.....	4
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	.....	1
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	.....	1

Sample H5

Locality: Grid Ref. D10

Formation/Member: Silverdale/Hume Limestone

Fauna: (1 specimen, 1 species)

<i>Plectospathodus flexuosus</i> Branson & Mehl, 1933		1
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Sample H6

Locality: Grid Ref. F13

Formation/Member: Silverdale/Hume Limestone

Fauna: (32 specimens, 10 species)

<i>Belodella triangularis</i> (Stauffer, 1940)	.....	1
<i>Hindeodella equidentata</i> Rhodes, 1953	.....	3
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	.....	6
<i>Panderodus panderi</i> (Stauffer, 1940)	.....	4
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	.....	6
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	.....	5
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	.....	2
<i>Spathognathodus fundamentatus</i> Walliser, 1957	.....	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	.....	2
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	.....	2

Sample H7

Locality: Grid Ref. C19

Formation/Member: Silverdale/Hume Limestone

Fauna: (81 specimens, 15 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	10
<i>Ligonodina silurica</i> Branson & Mehl, 1933	2
<i>Lonchodina greilingi</i> Walliser, 1957	3
<i>Lonchodina walliseri</i> Ziegler, 1960	1
<i>Neoproniodus excavatus</i> (Branson & Mehl, 1933)	2
<i>Ozarkodina media</i> Walliser, 1957	2
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	21
<i>Panderodus panderi</i> (Stauffer, 1940)	13
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	3
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	9
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	7
<i>Plectospathodus flexuosus</i> Branson & Mehl, 1933	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	4
<i>Synprioniodina silurica</i> Walliser, 1964	1
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	2

Sample H8

Locality: Grid Ref. C16

Formation/Member: Silverdale/Hume Limestone (2 m-3.3 m)

Fauna: (258 specimens, 22 species)

<i>Ancoradella ploeckensis</i> Walliser, 1964	1
<i>Belodella devonica</i> (Stauffer, 1940)	1
<i>Belodella triangularis</i> (Stauffer, 1940)	10
<i>Distomodus curvatus</i> Rhodes, 1953	1
<i>Drepanodus acutaconus</i> sp. nov.	8
<i>Hindeodella equidentata</i> Rhodes, 1953	15
<i>Ligonodina silurica</i> Branson & Mehl, 1933	4
<i>Lonchodina greilingi</i> Walliser, 1957	4
<i>Lonchodina walliseri</i> Ziegler, 1960	1
<i>Neoproniodus excavatus</i> (Branson & Mehl, 1933)	7
<i>Neoproniodus latidentatus</i> Walliser, 1964	1
<i>Neoproniodus multififormis</i> Walliser, 1964	1
<i>Ozarkodina gaertneri</i> Walliser, 1964	1
<i>Ozarkodina media</i> Walliser, 1957	6
<i>Ozarkodina ortus</i> Walliser, 1964	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	98
<i>Panderodus panderi</i> (Stauffer, 1940)	12
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	42
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	29
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	5
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	9
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	1

Sample H10

Locality: Grid Ref. F17

Formation/Member: Silverdale/Hume Limestone

Fauna: (26 specimens, 7 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	1
<i>Ligonodina silurica</i> Branson & Mehl, 1933	2
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	3
<i>Panderodus panderi</i> (Stauffer, 1940)	5
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	8
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	2
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	5

Sample H11

Locality: Grid Ref. H15

Formation/Member: Silverdale/Hume Limestone

Fauna: (12 specimens, 7 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	.....	2
<i>Lonchodina greilingi</i> Walliser, 1957	.....	1
<i>Ozarkodina media</i> Walliser, 1957	.....	4
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	.....	2
<i>Panderodus panderi</i> (Stauffer, 1940)	.....	1
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	.....	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	.....	1

Sample H13

Locality: Grid Ref. H9

Formation/Member: Silverdale/Hume Limestone (3 m)

Fauna: (15 specimens, 9 species)

<i>Neoprioniodus multiformis</i> Walliser, 1964	.....	1
<i>Ozarkodina gaertneri</i> Walliser, 1964	.....	1
<i>Ozarkodina media</i> Walliser, 1957	.....	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	.....	1
<i>Panderodus panderi</i> (Stauffer, 1940)	.....	2
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	.....	3
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	.....	4
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	.....	1
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	.....	1

Sample H14

Locality: Grid Ref. H9

Formation/Member: Silverdale/Hume Limestone (5 m)

Fauna: (34 specimens, 12 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	.....	5
<i>Kockelella variabilis</i> Walliser, 1957	.....	1
<i>Ligonodina silurica</i> Branson & Mehl, 1933	.....	2
<i>Lonchodina walliseri</i> Ziegler, 1960	.....	1
<i>Ozarkodina media</i> Walliser, 1957	.....	10
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	.....	1
<i>Panderodus panderi</i> (Stauffer, 1940)	.....	3
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	.....	1
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	.....	2
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	.....	4
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	.....	3
<i>Trichonodella inconstans</i> Walliser, 1957	.....	1

Sample H19

Locality: Grid Ref. H8

Formation/Member: Silverdale/Hume Limestone

Fauna: (37 specimens, 15 species)

<i>Ancoradella ploeckensis</i> Walliser, 1964	.....	1
<i>Drepanodus acutaconus</i> sp. nov.	.....	1
<i>Hindeodella equidentata</i> Rhodes, 1953	.....	1
<i>Ligonodina silurica</i> Branson & Mehl, 1933	.....	1
<i>Neoprioniodus multiformis</i> Walliser, 1964	.....	4
<i>Ozarkodina typica</i> Branson & Mehl, 1933	.....	1
<i>Ozarkodina</i> sp. cf. <i>O. ziegleri tenuiramea</i> Walliser, 1964	.....	4
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	.....	2
<i>Panderodus panderi</i> (Stauffer, 1940)	.....	5
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	.....	6
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	.....	5
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	.....	1

<i>Plectospathodus flexuosus</i> Branson & Mehl, 1933	1
<i>Polygnathoides emarginatus</i> (Branson & Mehl, 1933)	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	3

Sample H20

Locality: Grid Ref. H8

Formation/Member: Silverdale/Hume Limestone (0-3 m)

Fauna: (38 specimens, 17 species)

<i>Belodella triangularis</i> (Stauffer, 1940)	1
<i>Hindeodella equidentata</i> Rhodes, 1953	2
<i>Ligonodina salopia</i> Rhodes, 1953	1
<i>Lonchodina walliseri</i> Ziegler, 1960	2
<i>Neoprioniodus multiformis</i> Walliser, 1964	1
<i>Ozarkodina ziegleri aequalis</i> Walliser, 1964	2
<i>Ozarkodina</i> sp. cf. <i>O. ziegleri tenuiramea</i> Walliser, 1964	5
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	3
<i>Panderodus panderi</i> (Stauffer, 1940)	5
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	3
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	2
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	3
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	2
<i>Plectospathodus flexuosus</i> Branson & Mehl, 1933	2
<i>Spathognathodus fundamentatus</i> Walliser, 1957	2
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	2
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> Walliser, 1964	2

Sample H21

Locality: Grid Ref. H8

Formation/Member: Silverdale/Hume Limestone (3-6.5 m)

Fauna: (28 specimens, 13 species)

<i>Distomodus curvatus</i> Rhodes, 1953	1
<i>Hindeodella equidentata</i> Rhodes, 1953	5
<i>Ligonodina silurica</i> Branson & Mehl, 1933	2
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	2
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	2
<i>Panderodus panderi</i> (Stauffer, 1940)	1
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	3
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	3
<i>Polygnathoides emarginatus</i> (Branson & Mehl, 1933)	1
<i>Spathognathodus fundamentatus</i> Walliser, 1957	2
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	4
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> Walliser, 1964	1
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	1

Sample H22

Locality: Grid Ref. H7

Formation/Member: Silverdale/Hume Limestone (0-1 m)

Fauna: (47 specimens, 20 species)

<i>Ancoradella ploeckensis</i> Walliser, 1964	2
<i>Hindeodella equidentata</i> Rhodes, 1953	2
<i>Kockelella variabilis</i> Walliser, 1964	1
<i>Ligonodina salopia</i> Rhodes, 1953	2
<i>Lonchodina walliseri</i> Ziegler, 1960	1
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	1
<i>Neoprioniodus latidentatus</i> Walliser, 1964	1
<i>Neoprioniodus multiformis</i> Walliser, 1964	1
<i>Ozarkodina crassa</i> Walliser, 1964	1
<i>Ozarkodina media</i> Walliser, 1957	3
<i>Ozarkodina ziegleri aequalis</i> Walliser, 1964	2

<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	4
<i>Panderodus panderi</i> (Stauffer, 1940)	3
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	3
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	2
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	6
<i>Plectospathodus flexuosus</i> Branson & Mehl, 1933	2
<i>Polygnathoides siluricus</i> Branson & Mehl, 1933	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	8
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	1

Sample H23

Locality: Grid Ref. H7

Formation/Member: Silverdale/Hume Limestone (1-3 m)

Fauna: (60 specimens, 17 species)

<i>Ancoradella ploeckensis</i> Walliser, 1964	1
<i>Hindeodella equidentata</i> Rhodes, 1953	7
<i>Ligonodina salopia</i> Rhodes, 1953	1
<i>Neoprioniodus bicurvatoideus</i> Walliser, 1964	1
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	3
<i>Ozarkodina crassa</i> Walliser, 1964	1
<i>Ozarkodina media</i> Walliser, 1957	4
<i>Ozarkodina ziegleri aequalis</i> Walliser, 1964	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	11
<i>Panderodus panderi</i> (Stauffer, 1940)	7
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	6
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	3
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	2
<i>Plectospathodus extensus lacertus</i> Philip, 1966	1
<i>Polygnathoides siluricus</i> Branson & Mehl, 1933	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	6
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> Walliser, 1964	4

Sample H24

Locality: Grid Ref. H7

Formation/Member: Silverdale/Hume Limestone (3-4.5 m)

Fauna: (73 specimens, 17 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	6
<i>Ligonodina salopia</i> Rhodes, 1953	1
<i>Lonchodina walliseri</i> Ziegler, 1960	1
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	5
<i>Neoprioniodus latidentatus</i> Walliser, 1964	1
<i>Ozarkodina crassa</i> Walliser, 1964	1
<i>Ozarkodina gaertneri</i> Walliser, 1964	1
<i>Ozarkodina media</i> Walliser, 1957	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	4
<i>Panderodus panderi</i> (Stauffer, 1940)	7
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	6
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	4
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	5
<i>Polygnathoides siluricus</i> Branson & Mehl, 1933	1
<i>Spathognathodus fundamentatus</i> Walliser, 1957	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	27
<i>Synprioniodina silurica</i> Walliser, 1964	1

Sample H25

Locality: Grid Ref. H7

Formation/Member: Silverdale/Hume Limestone (4.5-7 m)

Fauna: (98 specimens, 20 species)

<i>Ancoradella ploeckensis</i> Walliser, 1964	1
<i>Belodella triangularis</i> (Stauffer, 1940)	1

<i>Distomodus curvatus</i> Rhodes, 1953	1
<i>Drepanodus acutaconus</i> sp. nov.	1
<i>Hindeodella equidentata</i> Rhodes, 1953	14
<i>Kockelella variabilis</i> Walliser, 1957	1
<i>Ligonodina salopia</i> Rhodes, 1953	2
<i>Lonchodina greilingi</i> Walliser, 1957	1
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	1
<i>Ozarkodina crassa</i> Walliser, 1964	1
<i>Ozarkodina gaertneri</i> Walliser, 1964	2
<i>Ozarkodina media</i> Walliser, 1957	9
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	14
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	11
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	3
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	7
<i>Plectospathodus flexuosus</i> Branson & Mehl, 1933	1
<i>Polygnathoides emarginatus</i> (Branson & Mehl, 1933)	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	23
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	3

Sample H26

Locality: Grid Ref. H6

Formation/Member: Silverdale/Hume Limestone (3.2 m)

Fauna: (51 specimens, 16 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	1
<i>Kockelella variabilis</i> Walliser, 1957	1
<i>Ligonodina salopia</i> Rhodes, 1953	1
<i>Ligonodina silurica</i> Branson & Mehl, 1933	2
<i>Lonchodina greilingi</i> Walliser, 1957	3
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	1
<i>Ozarkodina media</i> Walliser, 1957	6
<i>Ozarkodina</i> sp.	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	6
<i>Panderodus panderi</i> (Stauffer, 1940)	4
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	5
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	12
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	1
<i>Polygnathoides siluricus</i> Branson & Mehl, 1933	1
<i>Trichonodella inconstans</i> Walliser, 1957	3
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	3

Sample H29

Locality: Grid Ref. H5

Formation/Member: Silverdale/Hume Limestone (0-2.2 m)

Fauna: (23 specimens, 14 species)

<i>Ancoradella ploeckensis</i> Walliser, 1964	2
<i>Drepanodus acutaconus</i> sp. nov.	1
<i>Hindeodella equidentata</i> Rhodes, 1953	3
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	2
<i>Ozarkodina crassa</i> Walliser, 1964	1
<i>Ozarkodina ortus</i> Walliser, 1964	1
<i>Ozarkodina</i> sp.	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	2
<i>Panderodus panderi</i> (Stauffer, 1940)	3
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	1
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	3
<i>Polygnathoides siluricus</i> Branson & Mehl, 1933	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	1
<i>Trichonodella inconstans</i> Walliser, 1957	1

Sample H30

Locality: Grid Ref. H5

Formation/Member: Silverdale/Hume Limestone (2.2 m-7.2 m)

Fauna: (522 specimens, 35 species)

<i>Ancoradella ploeckensis</i> Walliser, 1964	3
<i>Belodella triangularis</i> (Stauffer, 1940)	18
<i>Hindeodella equidentata</i> Rhodes, 1953	54
<i>Kockelella variabilis</i> Walliser, 1957	3
<i>Ligonodina elegans</i> Walliser, 1964	1
<i>Ligonodina salopia</i> Rhodes, 1953	1
<i>Ligonodina silurica</i> Branson & Mehl, 1933	6
<i>Lonchodina greilingi</i> Walliser, 1957	3
<i>Lonchodina walliseri</i> Ziegler, 1960	6
<i>Neoproniodus bicurvatooides</i> Walliser, 1964	2
<i>Neoproniodus excavatus</i> (Branson & Mehl, 1933)	17
<i>Neoproniodus latidentatus</i> Walliser, 1964	3
<i>Neoproniodus multiformis</i> Walliser, 1964	8
<i>Ozarkodina crassa</i> Walliser, 1964	2
<i>Ozarkodina gaertneri</i> Walliser, 1964	3
<i>Ozarkodina media</i> Walliser, 1957	32
<i>Ozarkodina typica</i> Branson & Mehl, 1933	1
<i>Ozarkodina ziegleri aequalis</i> Walliser, 1964	1
<i>Ozarkodina</i> sp. cf. <i>O. ziegleri tenuiramea</i> Walliser, 1964	1
<i>Ozarkodina</i> sp. cf. <i>O. ziegleri ziegleri</i> Walliser, 1964	3
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	108
<i>Panderodus panderi</i> (Stauffer, 1940)	68
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	29
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	25
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	29
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	1
<i>Plectospathodus flexuosus</i> Branson & Mehl, 1933	2
<i>Polygnathoides emarginatus</i> (Branson & Mehl, 1933)	1
<i>Spathognathodus fundamentatus</i> Walliser, 1957	5
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	61
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> (Walliser, 1964)	9
<i>Synprioniodina silurica</i> Walliser, 1964	3
<i>Trichonodella excavata</i> (Branson & Mehl, 1933)	1
<i>Trichonodella inconstans</i> Walliser, 1957	2
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	10

Sample H31

Locality: Grid Ref. F3

Formation/Member: Silverdale/Hume Limestone

Fauna: (239 specimens, 27 species)

<i>Belodella devonica</i> (Stauffer, 1940)	1
<i>Belodella</i> sp.	1
<i>Cordylodus ? dubius</i> Rhodes, 1953	1
<i>Drepanodus acutaconus</i> sp. nov.	3
<i>Hindeodella equidentata</i> Rhodes, 1953	28
<i>Kockelella variabilis</i> Walliser, 1957	1
<i>Ligonodina elegans</i> Walliser, 1964	2
<i>Ligonodina salopia</i> Rhodes, 1953	7
<i>Lonchodina greilingi</i> Walliser, 1957	4
<i>Lonchodina walliseri</i> Ziegler, 1960	1
<i>Neoproniodus bicurvatooides</i> Walliser, 1964	2
<i>Neoproniodus excavatus</i> (Branson & Mehl, 1933)	11
<i>Neoproniodus latidentatus</i> Walliser, 1964	3
<i>Ozarkodina gaertneri</i> Walliser, 1964	1
<i>Ozarkodina media</i> Walliser, 1957	14
<i>Ozarkodina ziegleri aequalis</i> Walliser, 1964	1

<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	39
<i>Panderodus panderi</i> (Stauffer, 1940)	26
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	19
<i>Panderodus unicostatus serratus</i> Rexroad, 1967	1
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	27
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	15
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	3
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	21
<i>Synprioniodina silurica</i> Walliser, 1964	1
<i>Trichonodella excavata</i> (Branson & Mehl, 1933)	1
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	5
Sample Ba1	
Locality: Grid Ref. D10	
Formation/Member: Silverdale/'Barrandella' Shale (33 m)	
Fauna: (26 specimens, 8 species)	
<i>Hindeodella equidentata</i> Rhodes, 1953	4
<i>Ozarkodina media</i> Walliser, 1957	4
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	4
<i>Panderodus panderi</i> (Stauffer, 1940)	2
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	6
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	1
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	4
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	1
Sample Ba2	
Locality: Grid Ref. D10	
Formation/Member: Silverdale/'Barrandella' Shale (25 m)	
Fauna: (1 specimen, 1 species)	
<i>Panderodus panderi</i> (Stauffer, 1940)	1
Sample Ba9	
Locality: Grid Ref. H15	
Formation/Member: Silverdale/'Barrandella' Shale (67 m)	
Fauna: (161 specimens, 21 species)	
<i>Ancoradella ploeckensis</i> Walliser, 1964	2
<i>Drepanodus acutaconus</i> sp. nov.	3
<i>Hindeodella equidentata</i> Rhodes, 1953	12
<i>Ligonodina salopia</i> Rhodes, 1953	4
<i>Lonchodina greilingi</i> Walliser, 1957	1
<i>Lonchodina walliseri</i> Ziegler, 1960	1
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	8
<i>Neoprioniodus latidentatus</i> Walliser, 1964	1
<i>Neoprioniodus multiformis</i> Walliser, 1964	1
<i>Ozarkodina crassa</i> Walliser, 1964	1
<i>Ozarkodina media</i> Walliser, 1957	9
<i>Ozarkodina</i> sp. cf. <i>O. ziegleri tenuiramea</i> Walliser, 1964	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	39
<i>Panderodus panderi</i> (Stauffer, 1940)	23
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	25
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	13
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	2
<i>Spathognathodus fundamentatus</i> Walliser, 1957	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	12
<i>Trichonodella inconstans</i> Walliser, 1957	1
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	1
Sample Ba11	
Locality: Grid Ref. D12	
Formation/Member: Silverdale/'Barrandella' Shale (13 m)	
Fauna: (6 specimens, 4 species)	

<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	3
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	1
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1933)	1

Sample Ba15

Locality: Grid Ref. F13

Formation/Member: Silverdale/'Barrandella' Shale (3 m)

Fauna: (1 specimen, 1 species)

<i>Plectospathodus extensus extensus</i> Rhodes, 1953	1
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Sample Ba16

Locality: Grid Ref. F13

Formation/Member: Silverdale/'Barrandella' Shale (4.3-13.8 m)

Fauna: (27 specimens, 14 species)

<i>Ancoradella ploeckensis</i> Walliser, 1964	1
<i>Hindeodella equidentata</i> Rhodes, 1953	1
<i>Neoprioniodus latidentatus</i> (Walliser, 1964)	1
<i>Neoprioniodus multififormis</i> Walliser, 1964	1
<i>Ozarkodina media</i> Walliser, 1957	3
<i>Ozarkodina gaertneri</i> Walliser, 1964	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	4
<i>Panderodus panderi</i> (Stauffer, 1940)	3
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	2
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	3
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	3
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> Walliser, 1964	2
<i>Trichonodella excavata</i> (Branson & Mehl, 1933)	1
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	1

Sample Ba22

Locality: Grid Ref. H8

Formation/Member: Silverdale/'Barrandella' Shale (3 m)

Fauna: (13 specimens, 7 species)

<i>Belodella triangularis</i> (Stauffer, 1940)	1
<i>Distomodus curvatus</i> Rhodes, 1953	1
<i>Ozarkodina ziegleri aequalis</i> Walliser, 1964	1
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	2
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	3
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	1
<i>Polygnathoides emarginatus</i> (Branson & Mehl, 1933)	4

Sample Ba24

Locality: Grid Ref. H7

Formation/Member: Silverdale/'Barrandella' Shale (0-1 m)

Fauna: (13 specimens, 8 species)

<i>Ligonodina silurica</i> Branson & Mehl, 1933	2
<i>Neoprioniodus latidentatus</i> Walliser, 1964	1
<i>Ozarkodina media</i> Walliser, 1957	2
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	1
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	3
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> Walliser, 1964	2
<i>Synprioniodina silurica</i> Walliser, 1964	1

Sample Ba25

Locality: Grid Ref. H7

Formation/Member: Silverdale/'Barrandella' Shale (1-3 m)

Fauna: (6 specimens, 4 species)

<i>Ozarkodina media</i> Walliser, 1957	1
<i>Panderodus panderi</i> (Stauffer, 1940)	1
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	3

Sample Ba26

Locality: Grid Ref. H7

Formation/Member: Silverdale/'Barrandella' Shale (3-4 m)

Fauna: (31 specimens, 14 species)

<i>Ancoradella ploeckensis</i> Walliser, 1964	1
<i>Belodella triangularis</i> (Stauffer, 1940)	1
<i>Drepanodus acutaconus</i> sp. nov.	1
<i>Hindeodella equidentata</i> Rhodes, 1953	4
<i>Ligonodina silurica</i> Branson & Mehl, 1933	1
<i>Ozarkodina media</i> Walliser, 1957	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	5
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	8
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	4
<i>Plectospathodus extensus extensus</i> , Rhodes, 1953	1
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	1
<i>Plectospathodus flexuosus</i> Branson & Mehl, 1933	1
<i>Scolopodus duplicatus</i> sp. nov.	1
<i>Spathognathodus inclinatus inclinatus</i> Rhodes, 1953	1

Sample Ba27

Locality: Grid Ref. H7

Formation/Member: Silverdale/'Barrandella' Shale (4-6 m)

Fauna: (23 specimens, 12 species)

<i>Distomodus curvatus</i> Rhodes, 1953	2
<i>Drepanodus acutaconus</i> sp. nov.	1
<i>Hindeodella equidentata</i> Rhodes, 1953	1
<i>Neoproniodus latidentatus</i> Walliser, 1964	1
<i>Ozarkodina media</i> Walliser, 1957	4
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	5
<i>Panderodus panderi</i> (Stauffer, 1940)	1
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	2
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	3
<i>Plectospathodus flexuosus</i> Branson & Mehl, 1933	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	1
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	1

Sample Ba28

Locality: Grid Ref. H7

Formation/Member: Silverdale/'Barrandella' Shale (6-9 m)

Fauna: (64 specimens, 17 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	4
<i>Ligonodina salopia</i> Rhodes, 1953	2
<i>Ligonodina silurica</i> Branson & Mehl, 1933	1
<i>Lonchodina greilingi</i> Walliser, 1957	1
<i>Neoproniodus excavatus</i> (Branson & Mehl, 1933)	4
<i>Ozarkodina media</i> Walliser, 1957	6
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	13
<i>Panderodus panderi</i> (Stauffer, 1940)	5
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	4
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	5
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	8
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	1
<i>Plectospathodus flexuosus</i> Branson & Mehl, 1933	2
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	3

<i>Synprioniodina silurica</i> Walliser, 1964	1
<i>Trichonodella inconstans</i> Walliser, 1957	1
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	3
Sample Ba29	
Locality: Grid Ref. H7	
Formation/Member: Silverdale/'Barrandella' Shale (9-13 m)	
Fauna: (106 specimens, 19 species)	
<i>Ancoradella ploeckensis</i> Walliser, 1964	1
<i>Hindeodella equidentata</i> Rhodes, 1953	15
<i>Ligonodina salopia</i> Rhodes, 1953	2
<i>Ligonodina silurica</i> Branson & Mehl, 1933	3
<i>Lonchodina greilingi</i> Walliser, 1957	3
<i>Lonchodina walliseri</i> Ziegler, 1960	2
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	6
<i>Neoprioniodus multiformis</i> Walliser, 1964	1
<i>Ozarkodina media</i> Walliser, 1957	8
<i>Ozarkodina ziegleri aequalis</i> Walliser, 1964	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	9
<i>Panderodus panderi</i> (Stauffer, 1940)	1
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	10
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	7
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	11
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	2
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	18
<i>Trichonodella inconstans</i> Walliser, 1957	1
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	5
Sample Ba30	
Locality: Grid Ref. H7	
Formation/Member: Silverdale/'Barrandella' Shale (13-16 m)	
Fauna: (45 specimens, 14 species)	
<i>Hindeodella equidentata</i> Rhodes, 1953	1
<i>Ligonodina silurica</i> Branson & Mehl, 1933	2
<i>Lonchodina greilingi</i> Walliser, 1957	2
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	1
<i>Ozarkodina media</i> Walliser, 1957	4
<i>Ozarkodina ortus</i> Walliser, 1964	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	3
<i>Panderodus panderi</i> (Stauffer, 1940)	7
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	6
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	6
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	2
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	4
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> Walliser, 1964	3
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	3
Sample Ba31	
Locality: Grid Ref. H7	
Formation/Member: Silverdale/'Barrandella' Shale (16-19 m)	
Fauna: (49 specimens, 14 species)	
<i>Ancoradella ploeckensis</i> Walliser, 1964	1
<i>Hindeodella equidentata</i> Rhodes, 1953	2
<i>Ligonodina silurica</i> Branson & Mehl, 1933	2
<i>Lonchodina walliseri</i> Ziegler, 1960	2
<i>Neoprioniodus bicurvatus</i> (Branson & Mehl, 1933)	2
<i>Ozarkodina media</i> Walliser, 1957	6
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	6
<i>Panderodus panderi</i> (Stauffer, 1940)	2
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	9
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	1

<i>Plectospathodus extensus extensus</i> Rhodes, 1953	6
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	1
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> Walliser, 1964	6
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	3

Sample Ba33

Locality: Grid Ref. H7

Formation/Member: Silverdale/'Barrandella' Shale (19-23 m)

Fauna: (34 specimens, 16 species)

<i>Drepanodus acutaconus</i> sp. nov.	1
<i>Hindeodella equidentata</i> Rhodes, 1953	3
<i>Ligonodina salopia</i> Rhodes, 1953	4
<i>Lonchodina walliseri</i> Ziegler, 1960	1
<i>Ozarkodina gaertneri</i> Walliser, 1964	1
<i>Ozarkodina media</i> Walliser, 1957	4
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	1
<i>Panderodus panderi</i> (Stauffer, 1940)	1
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	3
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	2
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	1
<i>Polygnathoides emarginatus</i> (Branson & Mehl, 1933)	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	5
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> Walliser, 1964	4
<i>Synprionodina silurica</i> Walliser, 1964	1
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	1

Sample Ba34

Locality: Grid Ref. H7

Formation/Member: Silverdale/'Barrandella' Shale (23-26 m)

Fauna: (34 specimens, 13 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	2
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	2
<i>Ozarkodina crassa</i> Walliser, 1964	1
<i>Ozarkodina media</i> Walliser, 1957	2
<i>Ozarkodina ziegleri aequalis</i> Walliser, 1964	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	2
<i>Panderodus panderi</i> (Stauffer, 1940)	2
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	3
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	3
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	8
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	4
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> Walliser, 1964	3
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	1

Sample Ba35

Locality: Grid Ref. H7

Formation/Member: Silverdale/'Barrandella' Shale (26-28 m)

Fauna: (6 specimens, 5 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	2
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	1
<i>Spathognathodus fundamentatus</i> Walliser, 1957	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	1

Sample Ba35(a)

Locality: Grid Ref. H7

Formation/Member: Silverdale/'Barrandella' Shale (28-30 m)

Fauna: (29 specimens, 11 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	3
<i>Ligonodina salopia</i> Rhodes, 1953	1
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	1
<i>Neoprioniodus multiformis</i> Walliser, 1964	1
<i>Ozarkodina media</i> Walliser, 1957	2
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	4
<i>Panderodus panderi</i> (Stauffer, 1940)	5
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	2
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	5
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	3
<i>Trichonodella inconstans</i> Walliser, 1957	2
Sample Ba36	
Locality: Grid Ref. H5	
Formation/Member: Silverdale/'Barrandella' Shale (2 m)	
Fauna: (2 specimens, 2 species)	
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	1
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	1
Sample Ba37	
Locality: Grid Ref. H5	
Formation/Member: Silverdale/'Barrandella' Shale	
Fauna: (30 specimens, 8 species)	
<i>Hindeodella equidentata</i> Rhodes, 1953	5
<i>Neoprioniodus multiformis</i> Walliser, 1964	2
<i>Ozarkodina media</i> Walliser, 1957	1
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	1
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	8
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	6
<i>Polygnathoides emarginatus</i> (Branson & Mehl, 1933)	6
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	1
Sample Ba38	
Locality: Grid Ref. H5	
Formation/Member: Silverdale/'Barrandella' Shale	
Fauna: (7 specimens, 5 species)	
<i>Ligonodina silurica</i> Branson & Mehl, 1933	1
<i>Lonchodina greilingi</i> Walliser, 1957	1
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	1
<i>Ozarkodina gaertneri</i> Walliser, 1964	1
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	3
Sample B5	
Locality: Grid Ref. D10	
Formation/Member: Silverdale/Bowspring Limestone (17 m)	
Fauna: (1 specimen, 1 species)	
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	1
Sample B18	
Locality: Grid Ref. D12	
Formation/Member: Silverdale/Bowspring Limestone (32 m)	
Fauna: (2 specimens, 2 species)	
<i>Ozarkodina media</i> Walliser, 1957	1
<i>Panderodus panderi</i> (Stauffer, 1940)	1
Sample B21	
Locality: Grid Ref. D13	
Formation/Member: Silverdale/Bowspring Limestone	
Fauna: (59 specimens, 11 species)	

<i>Drepanodus acutaconus</i> sp. nov.	1
<i>Hindeodella equidentata</i> Rhodes, 1953	4
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	2
<i>Ozarkodina media</i> Walliser, 1957	5
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	13
<i>Panderodus panderi</i> (Stauffer, 1940)	12
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	8
<i>Panderodus uncostatus uncostatus</i> (Branson & Mehl, 1933)	6
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	5
<i>Spathognathodus fundamentatus</i> Walliser, 1957	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	2
Sample B22	
Locality: Grid Ref. C14	
Formation/Member: Silverdale/Bowspring Limestone (28 m)	
Fauna: (4 specimens, 3 species)	
<i>Hindeodella equidentata</i> Rhodes, 1953	1
<i>Ozarkodina media</i> Walliser, 1957	2
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	1
Sample B23	
Locality: Grid Ref. C14	
Formation/Member: Silverdale/Bowspring Limestone (16 m)	
Fauna: (3 specimens, 3 species)	
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	1
<i>Trichonodella excavata</i> (Branson & Mehl, 1933)	1
Sample B25	
Locality: Grid Ref. B20	
Formation/Member: Silverdale/Bowspring Limestone	
Fauna: (4 specimens, 3 species)	
<i>Hindeodella equidentata</i> Rhodes, 1953	1
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	2
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	1
Sample B29	
Locality: Grid Ref. D19	
Formation/Member: Silverdale/Bowspring Limestone	
Fauna: (18 specimens, 6 species)	
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	3
<i>Panderodus panderi</i> (Stauffer, 1940)	4
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	1
<i>Panderodus uncostatus uncostatus</i> (Branson & Mehl, 1933)	6
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	3
Sample B30	
Locality: Grid Ref. B21	
Formation/Member: Silverdale/Bowspring Limestone	
Fauna: (2 specimens, 1 species)	
<i>Ozarkodina media</i> Walliser, 1957	2
Sample B31	
Locality: Grid Ref. G17	
Formation/Member: Silverdale/Bowspring Limestone	
Fauna: (4 specimens, 4 species)	

<i>Hindeodella equidentata</i> Rhodes, 1953	....	....	....	....	....	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	....	....	....	....	....	1
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	....	....	....	....	....	1
<i>Plectospathodus flexuosus</i> Branson & Mehl, 1933	....	....	....	....	....	1
Sample B33						
Locality: Grid Ref. G17						
Formation/Member: Silverdale/Bowspring Limestone						
Fauna: (4 specimens, 3 species)						
<i>Belodella devonica</i> (Stauffer, 1940)	....	....	....	....	....	1
<i>Neoprioniodus</i> sp.	....	....	....	....	....	1
<i>Panderodus simplex</i> (Branson & Mehl, 1953)	....	....	....	....	....	2
Sample B35						
Locality: Grid Ref. G12						
Formation/Member: Silverdale/Bowspring Limestone (1-5 m)						
Fauna: (2 specimens, 2 species)						
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	....	....	....	....	....	1
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	....	....	....	....	....	1
Sample B36						
Locality: Grid Ref. G12						
Formation/Member: Silverdale/Bowspring Limestone (12 m)						
Fauna: (11 specimens, 3 species)						
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	....	....	....	....	....	8
<i>Panderodus panderi</i> (Stauffer, 1940)	....	....	....	....	....	1
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	....	....	....	....	....	2
Sample B37						
Locality: Grid Ref. G12						
Formation/Member: Silverdale/Bowspring Limestone (14-18 m)						
Fauna: (3 specimens, 3 species)						
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	....	....	....	....	....	1
<i>Panderodus panderi</i> (Stauffer, 1940)	....	....	....	....	....	1
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	....	....	....	....	....	1
Sample B40						
Locality: Grid Ref. G13						
Formation/Member: Silverdale/Bowspring Limestone (16 m)						
Fauna: (1 specimen, 1 species)						
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	....	....	....	....	....	1
Sample B43						
Locality: Grid Ref. H10						
Formation/Member: Silverdale/Bowspring Limestone (1 m)						
Fauna: (1 specimen, 1 species)						
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	....	....	....	....	....	1
Sample B45						
Locality: Grid Ref. H10						
Formation/Member: Silverdale/Bowspring Limestone (17 m)						
Fauna: (9 specimens, 6 species)						
<i>Hindeodella equidentata</i> Rhodes, 1953	....	....	....	....	....	1
<i>Ozarkodina media</i> Walliser, 1957	....	....	....	....	....	3
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	....	....	....	....	....	2
<i>Panderodus panderi</i> (Stauffer, 1940)	....	....	....	....	....	1
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	....	....	....	....	....	1
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	....	....	....	....	....	1

Sample B46

Locality: Grid Ref. H10

Formation/Member: Silverdale/Bowspring Limestone (20 m)

Fauna: (109 specimens, 18 species)

<i>Ancoradella ploeckensis</i> Walliser, 1964	3
<i>Belodella devonica</i> (Stauffer, 1940)	1
<i>Hindeodella equidentata</i> Rhodes, 1953	6
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	5
<i>Neoprioniodus latidentatus</i> Walliser, 1964	1
<i>Neoprioniodus multififormis</i> Walliser, 1964	2
<i>Ozarkodina media</i> Walliser, 1957	5
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	18
<i>Panderodus panderi</i> (Stauffer, 1940)	13
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	14
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	5
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	5
<i>Plectospathodus flexuosus</i> Branson & Mehl, 1933	1
<i>Spathognathodus fundamentatus</i> Walliser, 1957	9
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	13
<i>Spathognathodus primus</i> (Branson & Mehl, 1933)	1
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> Walliser, 1964	6
<i>Synprioniodina silurica</i> Walliser, 1964	1

Sample B47

Location: Grid Ref. H9

Formation/Member: Silverdale/Bowspring Limestone (4 m)

Fauna: (15 specimens, 9 species)

<i>Ancoradella ploeckensis</i> Walliser, 1964	2
<i>Hindeodella equidentata</i> Rhodes, 1953	2
<i>Lonchodina greilingi</i> Walliser, 1957	1
<i>Ozarkodina gaertneri</i> Walliser, 1964	1
<i>Ozarkodina media</i> Walliser, 1957	3
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	3
<i>Panderodus panderi</i> (Stauffer, 1940)	1
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	1

Sample B48

Locality: Grid Ref. H9

Formation/Member: Silverdale/Bowspring Limestone (8 m)

Fauna: (4 specimens, 2 species)

<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	2
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> Walliser, 1964	2

Sample B49

Locality: Grid Ref. H9

Formation/Member: Silverdale/Bowspring Limestone (11-13 m)

Fauna: (9 specimens, 6 species)

<i>Lonchodina greilingi</i> Walliser, 1957	1
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	1
<i>Ozarkodina media</i> Walliser, 1957	2
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	3
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	1
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	1

Sample B56

Locality: Grid Ref. H8

Formation/Member: Silverdale/Bowspring Limestone (0-3 m)

Fauna: (5 specimens, 4 species)

<i>Ozarkodina media</i> Walliser, 1957	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	2
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	1
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	1
Sample B57	
Locality: Grid Ref. H8	
Formation/Member: Silverdale/Bowspring Limestone (3-7 m)	
Fauna: (3 specimens, 3 species)	
<i>Kockelella variabilis</i> Walliser, 1957	1
<i>Panderodus panderi</i> (Stauffer, 1940)	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	1
Sample B58	
Locality: Grid Ref. H8	
Formation/Member: Silverdale/Bowspring Limestone (7-10 m)	
Fauna: (6 specimens, 5 species)	
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	2
<i>Panderodus panderi</i> (Stauffer, 1940)	1
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	1
<i>Synprioniodina silurica</i> Walliser, 1964	1
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	1
Sample B59	
Locality: Grid Ref. H8	
Formation/Member: Silverdale/Bowspring Limestone (10-13 m)	
Fauna: (9 specimens, 6 species)	
<i>Distomodus curvatus</i> Rhodes, 1953	1
<i>Hindeodella equidentata</i> Rhodes, 1953	1
<i>Kockelella variabilis</i> Walliser, 1957	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	2
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	2
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	2
Sample B67	
Locality: Grid Ref. H7	
Formation/Member: Silverdale/Bowspring Limestone (1.5-3 m)	
Fauna: (2 specimens, 2 species)	
<i>Distomodus curvatus</i> Rhodes, 1953	1
<i>Scolopodus duplicatus</i> sp. nov.	1
Sample B71	
Locality: Grid Ref. H7	
Formation/Member: Silverdale/Bowspring Limestone (13-17 m)	
Fauna: (4 specimens, 3 species)	
<i>Ligonodina salopia</i> Rhodes, 1953	2
<i>Lonchodina greilingi</i> Walliser, 1957	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	1
Sample B74	
Locality: Grid Ref. H7	
Formation/Member: Silverdale/Bowspring Limestone (21-23 m)	
Fauna: (5 specimens, 5 species)	
<i>Ancoradella ploeckensis</i> Walliser, 1964	1
<i>Hindeodella equidentata</i> Rhodes, 1953	1
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	1
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	1
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> Walliser, 1964	1

Sample B75

Locality: Grid Ref. H7

Formation/Member: Silverdale/Bowspring Limestone (23-25 m)

Fauna: (11 specimens, 10 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	....	....	....	....	....	....	....	....	....	2
<i>Ligonodina salopia</i> Rhodes, 1953	....	....	....	....	....	....	....	....	....	1
<i>Ligonodina silurica</i> Branson & Mehl, 1933	....	....	....	....	....	....	....	....	....	1
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	....	....	....	....	....	....	....	....	....	1
<i>Panderodus panderi</i> (Stauffer, 1940)	....	....	....	....	....	....	....	....	....	1
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	....	....	....	....	....	....	....	....	....	1
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	....	....	....	....	....	....	....	....	....	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	....	....	....	....	....	....	....	....	....	1
<i>Spathognathodus primus</i> (Branson & Mehl, 1933)	....	....	....	....	....	....	....	....	....	1
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> Walliser, 1964	....	....	....	....	....	....	....	....	....	1

Sample B76

Locality: Grid Ref. H7

Formation/Member: Silverdale/Bowspring Limestone (25-27 m)

Fauna: (5 specimens, 5 species)

<i>Ligonodina silurica</i> Branson & Mehl, 1933	....	....	....	....	....	....	....	....	....	1
<i>Lonchodina walliseri</i> Ziegler, 1960	....	....	....	....	....	....	....	....	....	1
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	....	....	....	....	....	....	....	....	....	1
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	....	....	....	....	....	....	....	....	....	1
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	....	....	....	....	....	....	....	....	....	1

Sample B77

Locality: Grid Ref. H7

Formation/Member: Silverdale/Bowspring Limestone (27-28.5 m)

Fauna: (8 specimens, 8 species)

<i>Ancoradella ploeckensis</i> Walliser, 1964	....	....	....	....	....	....	....	....	....	1
<i>Hindeodella equidentata</i> Rhodes, 1953	....	....	....	....	....	....	....	....	....	1
<i>Ozarkodina media</i> Walliser, 1957	....	....	....	....	....	....	....	....	....	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	....	....	....	....	....	....	....	....	....	1
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	....	....	....	....	....	....	....	....	....	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	....	....	....	....	....	....	....	....	....	1
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> Walliser, 1964	....	....	....	....	....	....	....	....	....	1
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)	....	....	....	....	....	....	....	....	....	1

Sample B78

Locality: Grid Ref. H7

Formation/Member: Silverdale/Bowspring Limestone (28.5-30 m)

Fauna: (7 specimens, 5 species)

<i>Ancoradella ploeckensis</i> Walliser, 1964	....	....	....	....	....	....	....	....	....	3
<i>Hindeodella equidentata</i> Rhodes, 1953	....	....	....	....	....	....	....	....	....	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	....	....	....	....	....	....	....	....	....	1
<i>Panderodus panderi</i> (Stauffer, 1940)	....	....	....	....	....	....	....	....	....	1
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	....	....	....	....	....	....	....	....	....	1

Sample B79

Locality: Grid Ref. H7

Formation/Member: Silverdale/Bowspring Limestone (30-32 m)

Fauna: (10 specimens, 7 species)

<i>Ancoradella ploeckensis</i> Walliser, 1964	....	....	....	....	....	....	....	....	....	1
<i>Hindeodella equidentata</i> Rhodes, 1953	....	....	....	....	....	....	....	....	....	1
<i>Ligonodina salopia</i> Rhodes, 1953	....	....	....	....	....	....	....	....	....	1
<i>Neoprioniodus multiformis</i> Walliser, 1964	....	....	....	....	....	....	....	....	....	1
<i>Ozarkodina media</i> Walliser, 1957	....	....	....	....	....	....	....	....	....	4
<i>Plectospathodus extensus lacertus</i> Philip, 1966	....	....	....	....	....	....	....	....	....	1
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> Walliser, 1964	....	....	....	....	....	....	....	....	....	1

Sample B88

Locality: Grid Ref. H1

Formation/Member: Silverdale/Bowspring Limestone

Fauna: (3 specimens, 2 species)

<i>Ozarkodina media</i> Walliser, 1957	.....	.....	.....	.....	.....	.....	.....	2
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	.....	.....	.....	.....	.....	.....	.....	1

Sample B90

Locality: Grid Ref. H6

Formation/Member: Silverdale/Bowspring Limestone

Fauna: (1 specimen, 1 species)

<i>Lonchodina greilingi</i> Walliser, 1957								1
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Sample B92

Locality: Grid Ref. H6

Formation/Member: Silverdale/Bowspring Limestone

Fauna: (1 specimen, 1 species)

Gen. et sp. indet.								1
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Sample B94

Locality: Grid Ref. H5

Formation/Member: Silverdale/Bowspring Limestone (17 m)

Fauna: (6 specimens, 4 species)

<i>Neoprioniodus multiformis</i> Walliser, 1964	.....	.....	.....	.....	.....	.....	.....	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	.....	.....	.....	.....	.....	.....	.....	2
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	.....	.....	.....	.....	.....	.....	.....	2
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	.....	.....	.....	.....	.....	.....	.....	1

Sample B95

Locality: Grid Ref. H5

Formation/Member: Silverdale/Bowspring Limestone (18 m)

Fauna: (13 specimens, 7 species)

<i>Kockelella variabilis</i> Walliser, 1957	.....	.....	.....	.....	.....	.....	.....	2
<i>Ozarkodina media</i> Walliser, 1957	.....	.....	.....	.....	.....	.....	.....	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	.....	.....	.....	.....	.....	.....	.....	3
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	.....	.....	.....	.....	.....	.....	.....	2
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	.....	.....	.....	.....	.....	.....	.....	2
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	.....	.....	.....	.....	.....	.....	.....	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	.....	.....	.....	.....	.....	.....	.....	2

Sample B97

Locality: Grid Ref. H4

Formation/Member: Silverdale/Bowspring Limestone (1 m)

Fauna: (28 specimens, 9 species)

<i>Distomodus curvatus</i> Rhodes, 1953	.....	.....	.....	.....	.....	.....	.....	1
<i>Hindeodella equidentata</i> Rhodes, 1953	.....	.....	.....	.....	.....	.....	.....	1
<i>Ozarkodina media</i> Walliser, 1957	.....	.....	.....	.....	.....	.....	.....	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	.....	.....	.....	.....	.....	.....	.....	9
<i>Panderodus panderi</i> (Stauffer, 1940)	.....	.....	.....	.....	.....	.....	.....	1
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	.....	.....	.....	.....	.....	.....	.....	10
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	.....	.....	.....	.....	.....	.....	.....	3
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	.....	.....	.....	.....	.....	.....	.....	1
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	.....	.....	.....	.....	.....	.....	.....	1

Sample G3

Locality: Grid Ref. C10

Formation/Member: Silverdale/Gums Road Limestone (1 m)

Fauna: (2 specimens, 2 species)

<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	.....	.....	.....	.....	.....	.....	.....	1
<i>Panderodus panderi</i> (Stauffer, 1940)	.....	.....	.....	.....	.....	.....	.....	1

<i>Neoprioniodus multiformis</i> Walliser, 1964	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	3
<i>Panderodus panderi</i> (Stauffer, 1940)	4
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	5
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	3

Sample G82

Locality: Grid Ref. H7

Formation/Member: Silverdale/Gums Road Limestone (1.5-3 m)

Fauna: (6 specimens, 2 species)

<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	5
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	1

Sample G83

Locality: Grid Ref. H7

Formation/Member: Silverdale/Gums Road Limestone (3-5 m)

Fauna: (9 specimens, 4 species)

<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	1
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	3
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	4
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	1

Sample G84

Locality: Grid Ref. H7

Formation/Member: Silverdale/Gums Road Limestone (5-6.5 m)

Fauna: (3 specimens, 2 species)

<i>Distomodus curvatus</i> Rhodes, 1953	1
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	2

Sample G85

Locality: Grid Ref. H7

Formation/Member: Silverdale/Gums Road Limestone (6.5-8 m)

Fauna: (43 specimens, 7 species)

<i>Distomodus curvatus</i> Rhodes, 1953	1
<i>Drepanodus acutaconus</i> sp. nov.	3
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	10
<i>Panderodus panderi</i> (Stauffer, 1940)	8
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	15
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	5
<i>Trichonodella excavata</i> (Branson & Mehl, 1933)	1

Sample G86

Locality: Grid Ref. H7

Formation/Member: Silverdale/Gums Road Limestone (8-10 m)

Fauna: (3 specimens, 2 species)

<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	2
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	1

Sample E1

Formation/Member: Laidlaw/Euralie Limestone

Fauna: (51 specimens, 13 species)

<i>Distomodus curvatus</i> Rhodes, 1953	3
<i>Hindeodella brevimembra</i> sp. nov.	1
<i>Hindeodella equidentata</i> Rhodes, 1953	1
<i>Lonchodina greilingi</i> Walliser, 1957	1
<i>Lonchodina walliseri</i> Ziegler, 1960	1
<i>Neoprioniodus latidentatus</i> Walliser, 1964	1
<i>Neoprioniodus multiformis</i> Walliser, 1964	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	16

<i>Panderodus simplex</i> (Branson & Mehl, 1933)	16
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	7
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	1
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> Walliser, 1964	1
<i>Trichonodella excavata</i> (Branson & Mehl, 1933)	1

Sample E3

Locality: Grid Ref. H8

Formation/Member: Laidlaw/Euralie Limestone (6.5 m)

Fauna: (71 specimens, 14 species)

<i>Cordylodus ? dubius</i> Rhodes, 1953	1
<i>Corysognathus dentatus</i> sp. nov.	1
<i>Distomodus curvatus</i> Rhodes, 1953	31
<i>Hindeodella equidentata</i> Rhodes, 1953	3
<i>Lonchodina detorta</i> Walliser, 1964	1
<i>Lonchodina greilingi</i> Walliser, 1957	1
<i>Lonchodina walliseri</i> Ziegler, 1960	1
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	7
<i>Panderodus panderi</i> (Stauffer, 1940)	3
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	2
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	1
<i>Scolopodus diplicatus</i> sp. nov.	17
<i>Spathognathodus</i> sp. cf. <i>S. ranuliformis</i> Walliser, 1964	1

Sample E4

Locality: Grid Ref. H8

Formation/Member: Laidlaw/Euralie Limestone (2 m)

Fauna: (81 specimens, 18 species)

<i>Distomodus curvatus</i> Rhodes, 1953	18
<i>Hindeodella equidentata</i> Rhodes, 1953	1
<i>Lonchodina detorta</i> Walliser, 1964	1
<i>Lonchodina greilingi</i> Walliser, 1957	1
<i>Lonchodina walliseri</i> Ziegler, 1960	4
<i>Neoprioniodus latidentatus</i> Walliser, 1964	1
<i>Neoprioniodus multiformis</i> Walliser, 1964	2
<i>Ozarkodina ortus</i> Walliser, 1964	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	14
<i>Panderodus panderi</i> (Stauffer, 1940)	2
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	9
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	1
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	2
<i>Scolopodus diplicatus</i> sp. nov.	17
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	2
<i>Spathognathodus primus</i> (Branson & Mehl, 1933)	1
<i>Trichonodella excavata</i> (Branson & Mehl, 1933)	3
<i>Trichonodella inconstans</i> Walliser, 1957	1

Sample E10

Locality: Grid Ref. D13

Formation/Member: Laidlaw/Euralie Limestone (12 m)

Fauna: (14 specimens, 7 species)

<i>Hindeodella brevimembra</i> sp. nov.	1
<i>Lonchodina greilingi</i> Walliser, 1957	1
<i>Neoprioniodus latidentatus</i> Walliser, 1964	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	2
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	2
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	6
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	1

Sample E11

Locality: Grid Ref. D13

Formation/Member: Laidlaw/Euralie Limestone (13 m)

Fauna: (22 specimens, 9 species)

<i>Coryssognathus dentatus</i> sp. nov.	.....	7
<i>Distomodus curvatus</i> Rhodes, 1953	.....	1
<i>Hindeodella equidentata</i> Rhodes, 1953	.....	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	.....	3
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	.....	4
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	.....	3
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	.....	1
<i>Synprioniodina silurica</i> Walliser, 1964		1
<i>Trichonodella trichonodelloides</i> (Walliser, 1964)		1

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Sample Y2

Locality: Grid Ref. K5

Formation/Member: Cliftonwood Limestone/Limestone Beds (2 m)

Fauna: (9 specimens, 7 species)

<i>Cordylodus ? dubius</i> Rhodes, 1953	.....	1
<i>Hindeodella equidentata</i> Rhodes, 1953	.....	1
<i>Ligonodina salopia</i> Rhodes, 1953	.....	1
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	.....	1
<i>Ozarkodina media</i> Walliser, 1957	.....	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	.....	2
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	.....	2

Sample Y3

Locality: Grid Ref. K5

Formation/Member: Cliftonwood Limestone/Limestone Beds

Fauna: (6 specimens, 3 species)

<i>Panderodus simplex</i> (Branson & Mehl, 1933)	.....	2
<i>Panderodus unicostatus unicostatus</i> (Branson & Mehl, 1933)	.....	3
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	.....	1

Sample Y7

Locality: Grid Ref. J9

Formation/Member: Cliftonwood Limestone/Limestone Beds (3 m)

Fauna: (2 specimens, 2 species)

<i>Distomodus curvatus</i> Rhodes, 1953	.....	1
<i>Hindeodella equidentata</i> Rhodes, 1953	.....	1

Sample Y8

Locality: Grid Ref. J9

Formation/Member: Cliftonwood Limestone/Limestone Beds (9 m)

Fauna: (1 specimen, 1 species)

<i>Plectospathodus extensus extensus</i> Rhodes, 1953		1
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Sample Y19

Locality: Grid Ref. H13

Formation/Member: Cliftonwood Limestone/Limestone Beds (0-3 m)

Fauna: (18 specimens, 10 species)

<i>Coryssognathus dentatus</i> sp. nov.	.....	1
<i>Hindeodella brevimembra</i> sp. nov.	.....	1
<i>Hindeodella equidentata</i> Rhodes, 1953	.....	2
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	.....	1

<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	....	....	....	....	....	2
<i>Panderodus simplex</i> (Branson & Mehl, 1933)	....	....	....	....	....	4
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	....	....	....	....	....	3
<i>Plectospathodus extensus lacertosus</i> Philip, 1966	....	....	....	....	....	1
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	....	....	....	....	....	2
<i>Trichonodella excavata</i> (Branson & Mehl, 1933)	....	....	....	....	....	1

Sample Y21

Locality: Grid Ref. I15

Formation/Member: Cliftonwood Limestone/Limestone Beds (1.5 m)

Fauna: (3 specimens, 3 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	....	....	....	....	....	1
<i>Oneotodus ? beckmanni</i> Bischoff & Sannemann, 1958	....	....	....	....	....	1
<i>Ozarkodina media</i> Walliser, 1957	....	....	....	....	....	1

Sample Y27

Locality: Grid Ref. H17

Formation/Member: Cliftonwood Limestone/Limestone Beds (3 m)

Fauna: (9 specimens, 7 species)

<i>Hindeodella equidentata</i> Rhodes, 1953	....	....	....	....	....	1
<i>Neoprioniodus excavatus</i> (Branson & Mehl, 1933)	....	....	....	....	....	1
<i>Ozarkodina media</i> Walliser, 1957	....	....	....	....	....	1
<i>Panderodus gracilis</i> (Branson & Mehl, 1933)	....	....	....	....	....	1
<i>Panderodus unicastatus unicastatus</i> (Branson & Mehl, 1933)	....	....	....	....	....	1
<i>Plectospathodus extensus extensus</i> Rhodes, 1953	....	....	....	....	....	3
<i>Spathognathodus inclinatus inclinatus</i> (Rhodes, 1953)	....	....	....	....	....	1

PLATE 1

All specimens are X40

Acodus curvatus Branson & Branson, 1947

Figures

- 1 Lateral view of CPC 11181
(Sample T2, Yarwood Siltstone Member)

Ancoradella ploeckensis Walliser, 1964

- 2, 3 Oral and aboral views of CPC 11182
(Sample B46, Bowspring Limestone Member)
4, 7 Oral and aboral views of CPC 11183
(Sample B78, Bowspring Limestone Member)
5, 6 Aboral and oral views of CPC 11184
(Sample B74, Bowspring Limestone Member)
8, 9 Oral and aboral views of CPC 11185
(Sample H24, Hume Limestone Member)



PLATE 2

All specimens are X40

Belodella devonica (Stauffer, 1940)

Figures

- 1, 4 Lateral views of CPC 11186
(Sample B33, Bowspring Limestone Member)

Belodella sp.

- 2, 3 Lateral views of CPC 11187
(Sample H31, Hume Limestone Member)

Belodella triangularis (Stauffer, 1940)

- 5, 6 Lateral views of CPC 11188
(Sample Z4, Elmside Formation)
7, 8 Lateral views of CPC 11189
(Sample T8, Yarwood Siltstone Member)
9, 10 Lateral views of CPC 11190
(Sample H8, Hume Limestone Member)

Cordylodus ? dubius Rhodes, 1953

- 11, 12 Lateral views of CPC 11191
(Sample Y2, Cliftonwood Limestone Member)

Coryssognathus dentatus gen. et sp. nov.

- 13, 14 Lateral views of paratype, CPC 11192
(Sample Y19, Cliftonwood Limestone Member)
15, 18, 19 Lateral, aboral, and oral views of **holotype**, CPC 11193
(Sample E11, Euralie Limestone Member)
16, 17 Lateral and aboral/lateral views of paratype, CPC 11194
(Sample E3, Euralie Limestone Member)

Distomodus curvatus Rhodes, 1953

- 20, 21 Anterior and posterior views of CPC 11195
(Sample E4, Euralie Limestone Member)
22, 25 Lateral views of CPC 11196
(Sample B59, Bowspring Limestone Member)

Drepanodus acutaconus sp. nov.

- 23, 24 Lateral views of paratype, CPC 11197
(Sample H8, Hume Limestone Member)
30, 31 Lateral views of **holotype**, CPC 11200
(Sample Ba26, 'Barrandella' Shale Member)

Distacodus procerus Ethington, 1959

- 26, 27 Lateral views of CPC 11198
28, 29 Lateral views of CPC 11199
(Sample T2, Yarwood Siltstone Member)

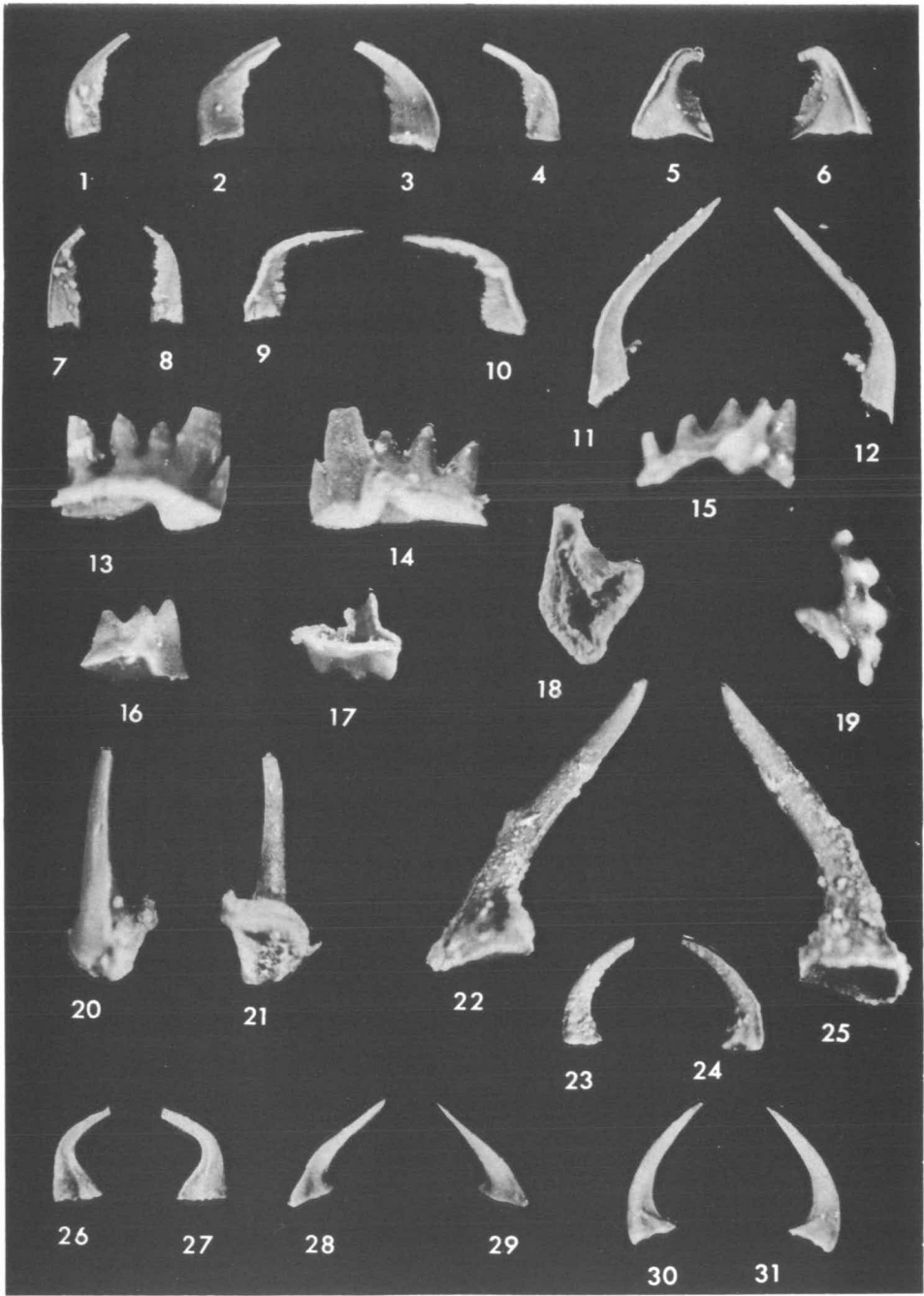


PLATE 3

All specimens are X40

Hindeodella equidentata Rhodes, 1953

Figures

- 1, 3 Inner and outer lateral views of CPC 11201
(Sample H24, Hume Limestone Member)
- 2, 4 Inner lateral and aboral views of CPC 11202
(Sample H23, Hume Limestone Member)

Hindeodella priscilla Stauffer, 1938

- 5 Inner lateral view of CPC 11203
(Sample Z5, Elmside Formation)
- 6, 7 Outer and inner lateral views of CPC 11204
(Sample Z3, Elmside Formation)

Hindeodella brevimbrea sp. nov.

- 8, 9 Inner and outer lateral views of **holotype**, CPC 11205
(Sample E10, Euralie Limestone Member)

Icriodus woschmidti Ziegler, 1960

- 10, 13, 14 Outer lateral, aboral, and oral views of CPC 11206
(Sample Z5, Elmside Formation)

Kockelella variabilis Walliser, 1957

- 11, 12, 15, 16 Aboral, oral, inner lateral, and outer lateral views of CPC 11207
(Sample H22, Hume Limestone Member)

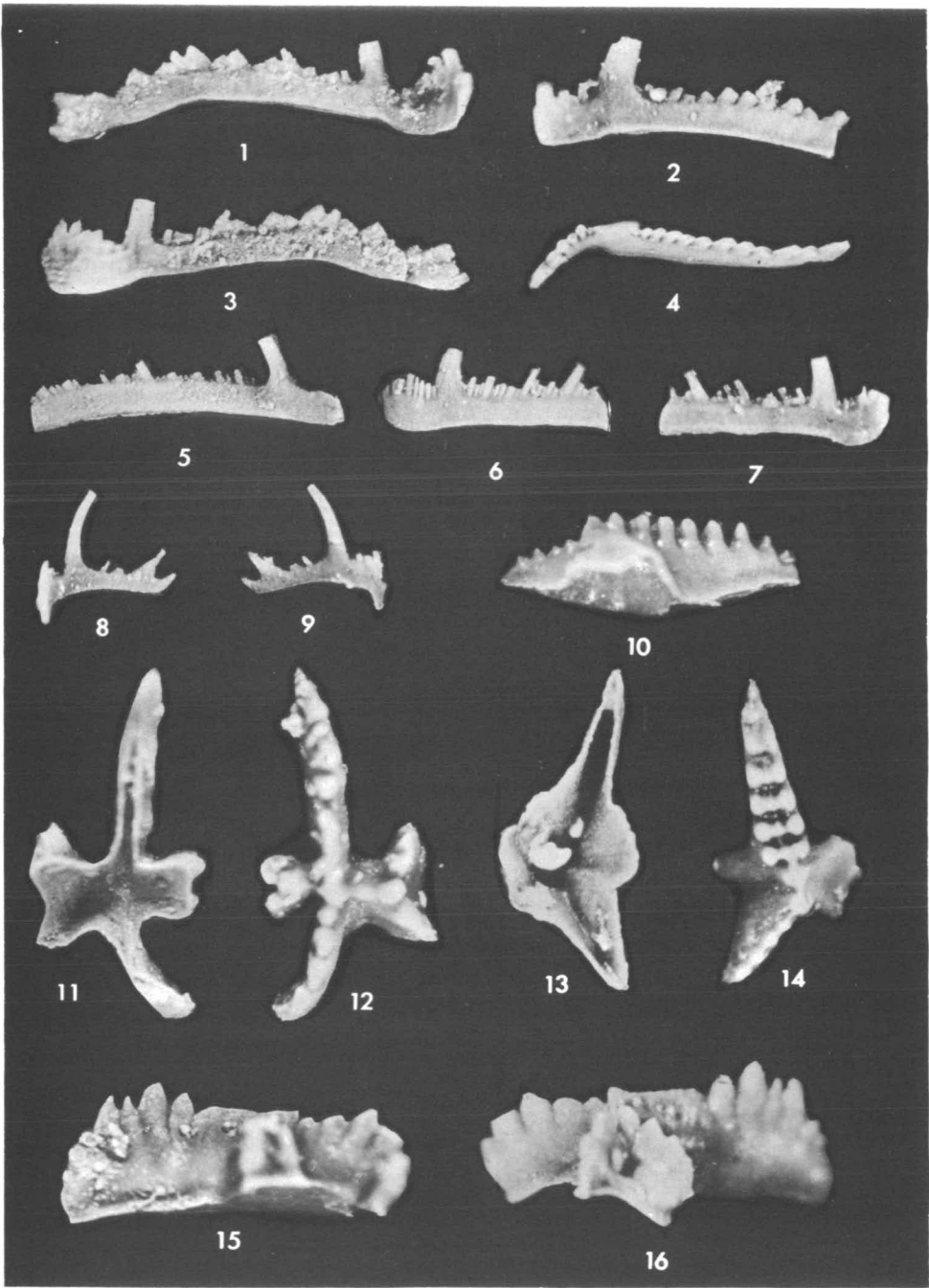


PLATE 4

All specimens are X40

Kockelella variabilis Walliser, 1957

Figures

- 1, 4, 5 Outer lateral, oral, and aboral views of CPC 11208
(Sample B59, Bowspring Limestone Member)

Ligonodina elegans Walliser, 1964

- 2, 3 Inner and outer lateral views of CPC 11209
(Sample H31, Hume Limestone Member)
6, 7 Outer and inner lateral views of CPC 11210
(Sample H30, Hume Limestone Member)

Ligonodina salopia Rhodes, 1953

- 8, 9 Oral and aboral views of CPC 11211
(Sample Ba9, 'Barrandella' Shale Member)

Ligonodina silurica Branson & Mehl, 1933

- 10, 11 Oral and outer lateral views of CPC 11212
(Sample T2, Yarwood Siltstone Member)

Lonchodina greilingi Walliser, 1964

- 12, 13 Outer and inner lateral views of CPC 11213
(Sample E4, Euralie Limestone Member)
14, 15 Inner and outer lateral views of CPC 11214
(Sample E3, Euralie Limestone Member)
17, 18 Outer and inner lateral views of CPC 11216
(Sample H11, Hume Limestone Member)

Lonchodina detorta Walliser, 1957

- 16, 19 Aboral and outer lateral views of CPC 11215
(Sample Ba38, 'Barrandella' Shale Member)

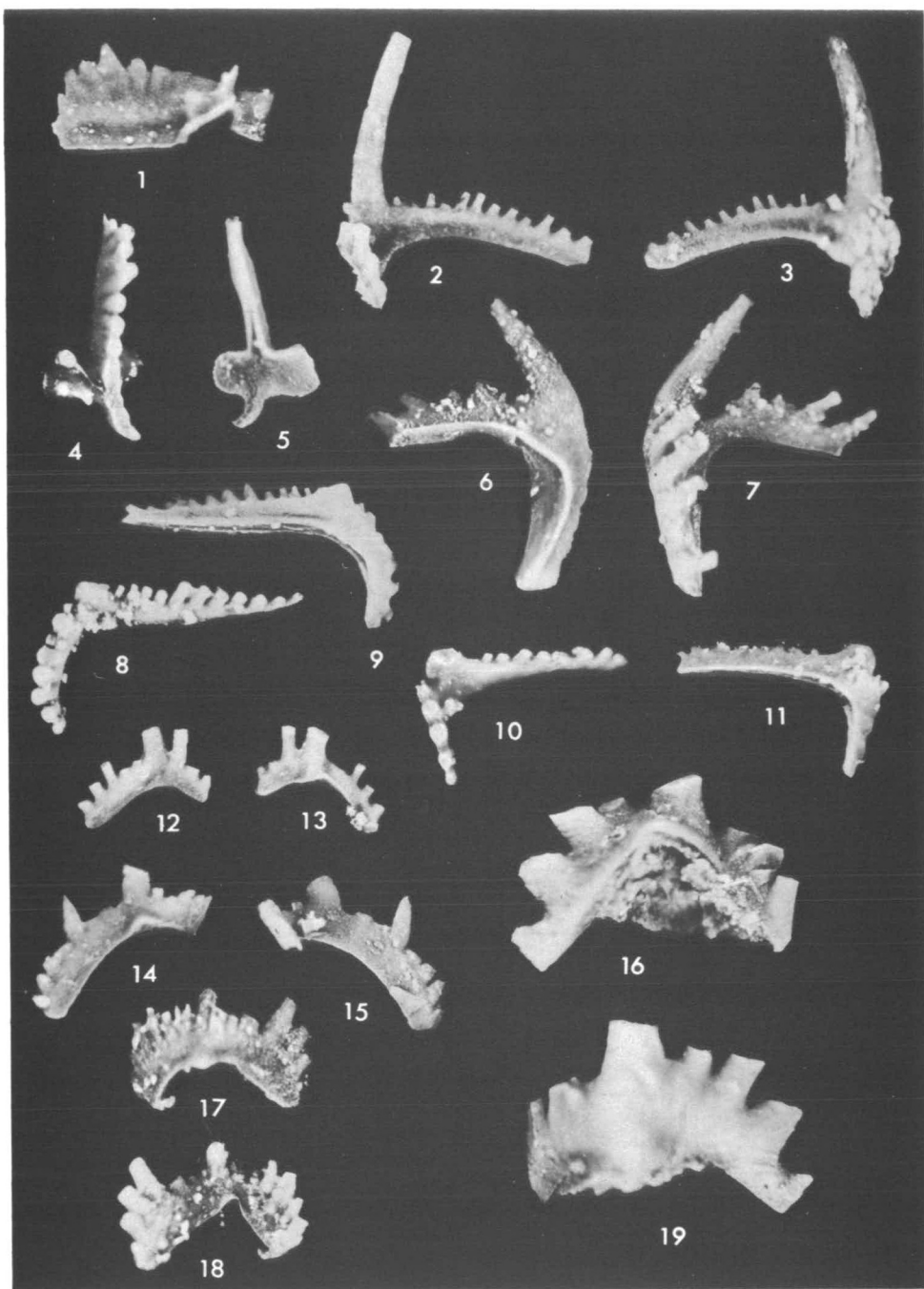


PLATE 5

All specimens are X40

Lonchodina greilingi Walliser, 1957

Figures

- 1, 2 Outer and inner lateral views of CPC 11217
(Sample E3, Euralie Limestone Member)

Lonchodina walliseri Ziegler, 1960

- 3, 6 Outer and inner lateral views of CPC 11218
(Sample B76, Bowspring Limestone Member)
4, 7 Inner lateral and aboral views of CPC 11219
(Sample Ba9, 'Barrandella' Shale Member)
5 Lateral view of CPC 11220

Neoprioniodus bicurvatus Walliser, 1964

- 8, 9 Outer and inner lateral views of CPC 11221
26, 27 Outer and inner lateral views of CPC 11231
(Sample T2, Yarwood Siltstone Member)

Neoprioniodus bicurvatus (Branson & Mehl, 1933)

- 10, 11 Inner and outer lateral views of CPC 11222
(Sample Z4, Elmside Formation)

Neoprioniodus excavatus (Branson & Mehl, 1933)

- 12, 13 Outer and inner lateral views of CPC 11223
(Sample H8, Hume Limestone Member)
14, 15 Inner and outer lateral views of CPC 11224
(Sample B75, Bowspring Limestone Member)

Neoprioniodus latidentatus Walliser, 1964

- 16, 17 Inner and outer lateral views of CPC 11225
(Sample H8, Hume Limestone Member)
18 Oral view of CPC 11226
(Sample Ba24, 'Barrandella' Shale Member)

Neoprioniodus multiformis Walliser, 1964

- 19, 23 Inner and outer lateral views of CPC 11227
(Sample H13, Hume Limestone Member)
20, 21 Outer and inner lateral views of CPC 11228
(Sample Ba29, 'Barrandella' Shale Member)
24, 25 Outer and inner views of CPC 11230
(Sample B79, Bowspring Limestone Member)

Neoprioniodus sp.

- 22 Inner lateral view of CPC 11229
(Sample B33, Bowspring Limestone Member)

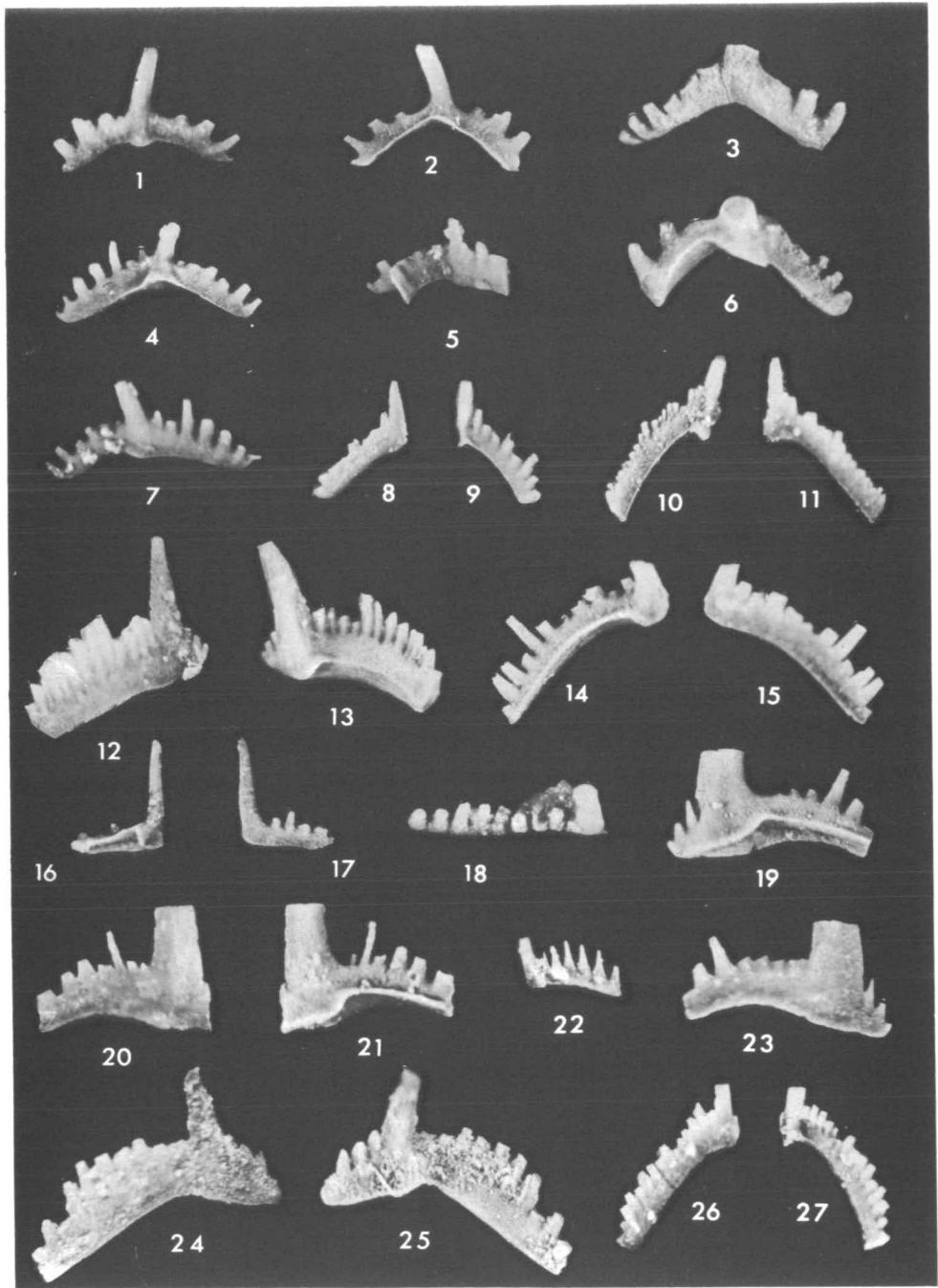


PLATE 6

All specimens are X40

Oneotodus ? beckmanni Bischoff & Sannemann, 1958

Figures

- 1 Aboral/lateral view of CPC 11232
(Sample Y21, Cliftonwood Limestone)

Ozarkodina crassa Walliser, 1964

- 2 Inner lateral view of CPC 11233
(Sample H25, Hume Limestone Member)
3 Inner lateral view of CPC 11234
(Sample Ba9, 'Barrandella' Shale Member)

Ozarkodina denckmanni Ziegler, 1956

- 4, 7 Outer and inner lateral views of CPC 11235
(Sample Z3, Elmside Formation)
5, 6 Outer and inner lateral views of specimen
8, 9 Inner and outer lateral views of CPC 11236
(Sample Z4, Elmside Formation)

Ozarkodina gaertneri Walliser, 1964

- 10, 13 Inner and outer lateral views of CPC 11237
(Sample B33, 'Barrandella' Shale Member)

Ozarkodina media Walliser, 1957

- 11, 12 Outer lateral and inner lateral views of CPC 11238
(Sample Ba31, 'Barrandella' Shale Member)
14, 15 Outer and inner lateral views of CPC 11239
16, 18 Inner and outer lateral views of CPC 11240
(Sample H30, Hume Limestone Member)

Ozarkodina ortus Walliser, 1964

- 17 Inner lateral view of CPC 11241
(Sample H8, Hume Limestone Member)
19, 20 Inner lateral and outer lateral views of CPC 11242
(Sample H29, Hume Limestone Member)
21, 22 Outer lateral and inner lateral views of CPC 11243
(Sample E4, Euralie Limestone Member)

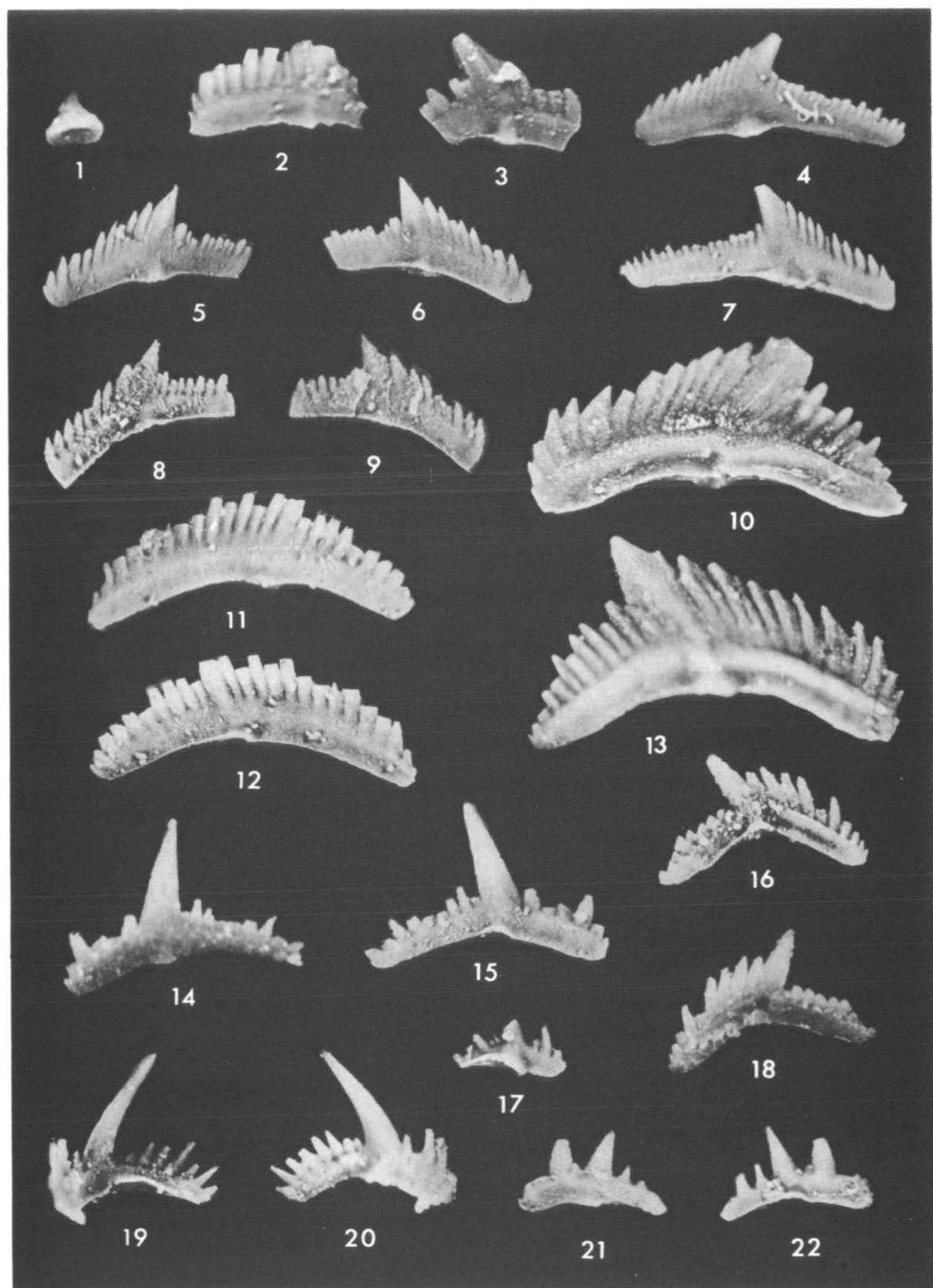


PLATE 7

All specimens are X40

Ozarkodina ortus Walliser, 1964

Figures

- 1, 2 Outer and inner lateral views of CPC 11244
(Sample Ba30, 'Barrandella' Shale Member)

Ozarkodina typica Branson & Mehl, 1933

- 3, 4 Outer and inner lateral views of CPC 11245
(Sample H30, Hume Limestone Member)

Ozarkodina sp. cf. *O. ziegleri tenuiramea* Walliser, 1964

- 5 Inner lateral view of CPC 11246
(Sample H30, Hume Limestone Member)

Ozarkodina sp. cf. *O. ziegleri ziegleri* Walliser, 1964

- 6 Inner lateral view of CPC 11247
(Sample H30, Hume Limestone Member)

Ozarkodina ziegleri aequalis Walliser, 1964

- 7, 10 Inner and outer lateral views of CPC 11248
(Sample Ba29, 'Barrandella' Shale Member)
8, 9 Inner and outer lateral views of CPC 11249
(Sample Ba34, 'Barrandella' Shale Member)

Ozarkodina sp.

- 11, 12 Inner and outer lateral views of CPC 11250
(Sample H29, Hume Limestone Member)

Panderodus simplex (Branson & Mehl, 1933)

- 13, 14 Lateral views of CPC 11251
(Sample G39, Gums Road Limestone Member)
15, 16 Lateral views of CPC 11252
(Sample Ba9, 'Barrandella' Shale Member)
21, 22 Lateral views of CPC 11253
(Sample H8, Hume Limestone Member)

Panderodus panderi (Stauffer, 1940)

- 17, 18 Lateral views of CPC 11254
(Sample G53, Gums Road Limestone Member)
25 Lateral view of CPC 11258
(Sample B58, Bowspring Limestone Member)

Panderodus unicastatus unicastatus (Branson & Mehl, 1933)

- 19, 20 Lateral and posterior views of CPC 11255
(Sample E10, Euralie Limestone Member)

Panderodus gracilis (Branson & Mehl, 1933)

- 23 Posterior view of CPC 11256
(Sample Ba9, 'Barrandella' Shale Member)
24 Posterior view of CPC 11257
(Sample Z5, Elmside Formation)

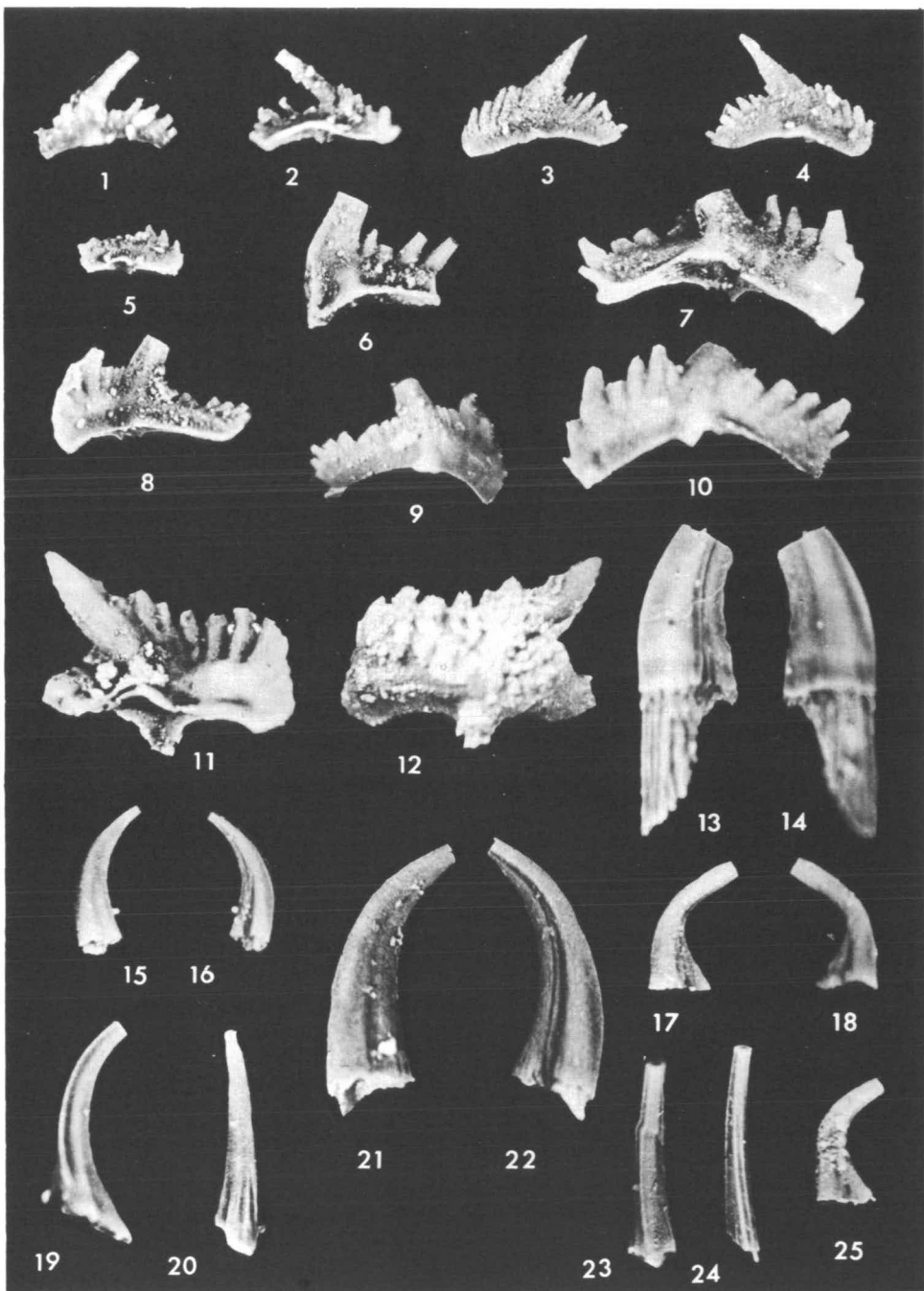


PLATE 8

All specimens are X40

Panderodus panderi (Stauffer, 1940)

Figures

- 1 Lateral view of CPC 11258
(Sample B58, Bowspring Limestone Member)

Panderodus unicostatus serratus Rexroad, 1967

- 2, 3 Lateral views of CPC 11259
(Sample H31, Hume Limestone Member)
4 Lateral view of CPC 11260
(Sample T2, Yarwood Siltstone Member)

Plectospathodus extensus extensus Rhodes, 1953

- 5, 8 Inner and outer lateral views of CPC 11261
(Sample H31, Hume Limestone Member)
6, 7 Outer and inner lateral views of CPC 11262
(Sample T2, Yarwood Siltstone Member)

Plectospathodus flexuosus Branson & Mehl, 1933

- 9, 10 Inner and outer lateral views of CPC 11263
(Sample H25, Hume Limestone Member)

Plectospathodus extensus lacertosus Philip, 1966

- 11, 12 Inner and outer lateral views of CPC 11264
(Sample B46, Bowspring Limestone Member)

Polygnathoides siluricus Branson & Mehl, 1933

- 13, 14 Oral and aboral views of CPC 11265
(Sample H22, Hume Limestone Member)

Polygnathoides emarginatus (Branson & Mehl, 1933)

- 15, 16, 19, 20 Inner lateral, outer lateral, aboral, and oral views
of CPC 11266
(Sample H20(b), Hume Limestone Member)
17, 18 Lateral-aboral and oral views of CPC 11267
(Sample Ba33, 'Barrandella' Shale Member)

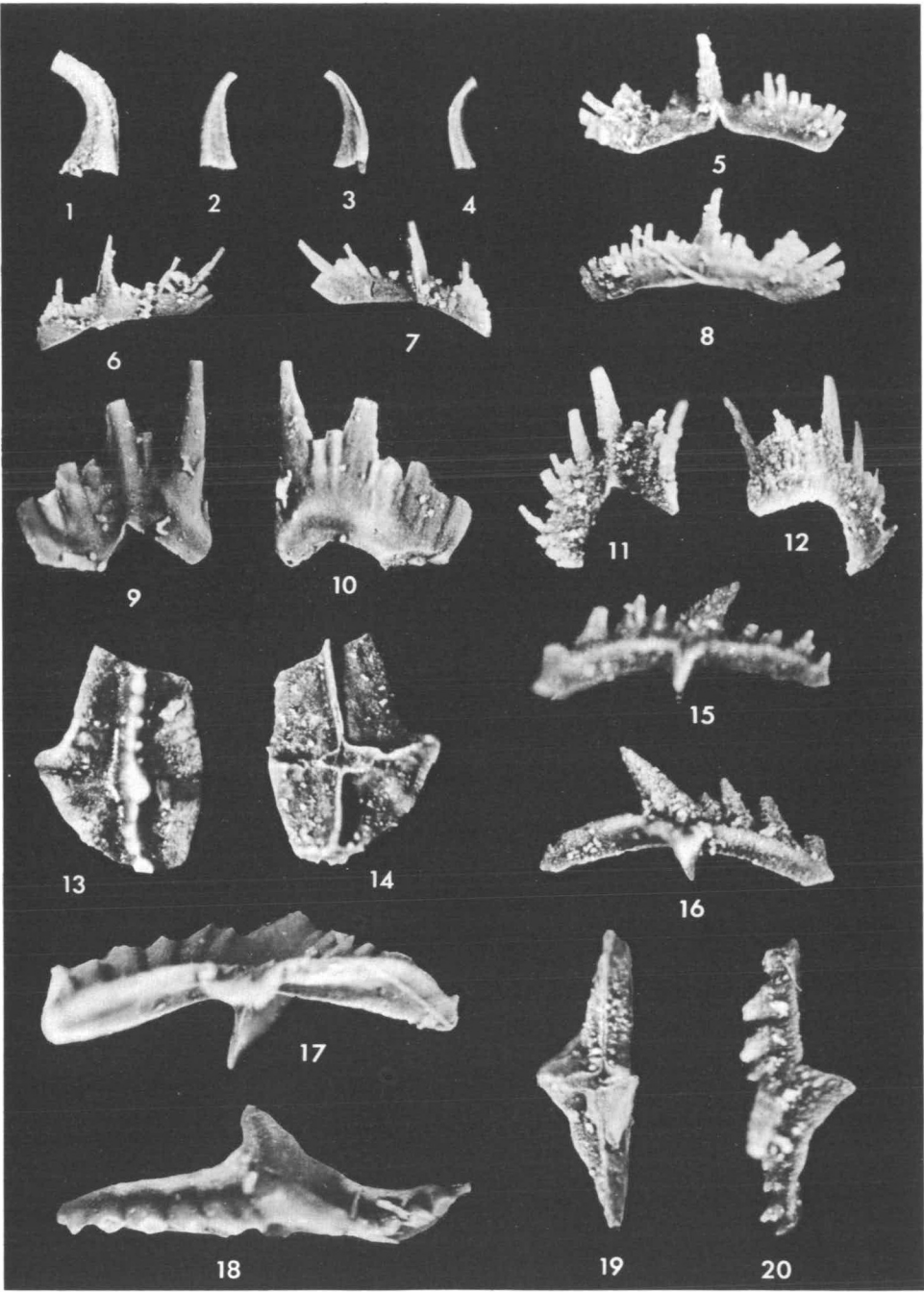


PLATE 9

All specimens are X40

Spathognathodus fundamentatus Walliser, 1957

Figures

- 1-3 Outer lateral, inner lateral, and aboral views of CPC 11268
- 4-7 Outer lateral, inner lateral, aboral, and oral views of CPC 11269
(Sample B46, Bowspring Limestone Member)
- 8-11 Outer lateral, inner lateral, aboral, and oral views of CPC 11270
(Sample H20(b), Hume Limestone Member)

Spathognathodus inclinatus inclinatus (Rhodes, 1953)

- 12-15 Inner lateral, outer lateral, oral, and aboral views of CPC 11271
(Sample H24, Hume Limestone Member)
- 16-19 Outer lateral, inner lateral, aboral, and oral views of CPC 11272

Spathognathodus primus (Branson & Mehl, 1933)

- 20-21 Inner and outer lateral views of CPC 11273
(Sample E4, Euralie Limestone Member)

Spathognathodus sp. cf. *S. ranuliformis* Walliser, 1964

- 23-26 Two lateral and aboral and oral views of CPC 11274
(Sample Ba31, 'Barrandella' Shale Member)
- 22, 27, 28 Lateral, aboral, and oral views of CPC 11275
(Sample H30, Hume Limestone Member)

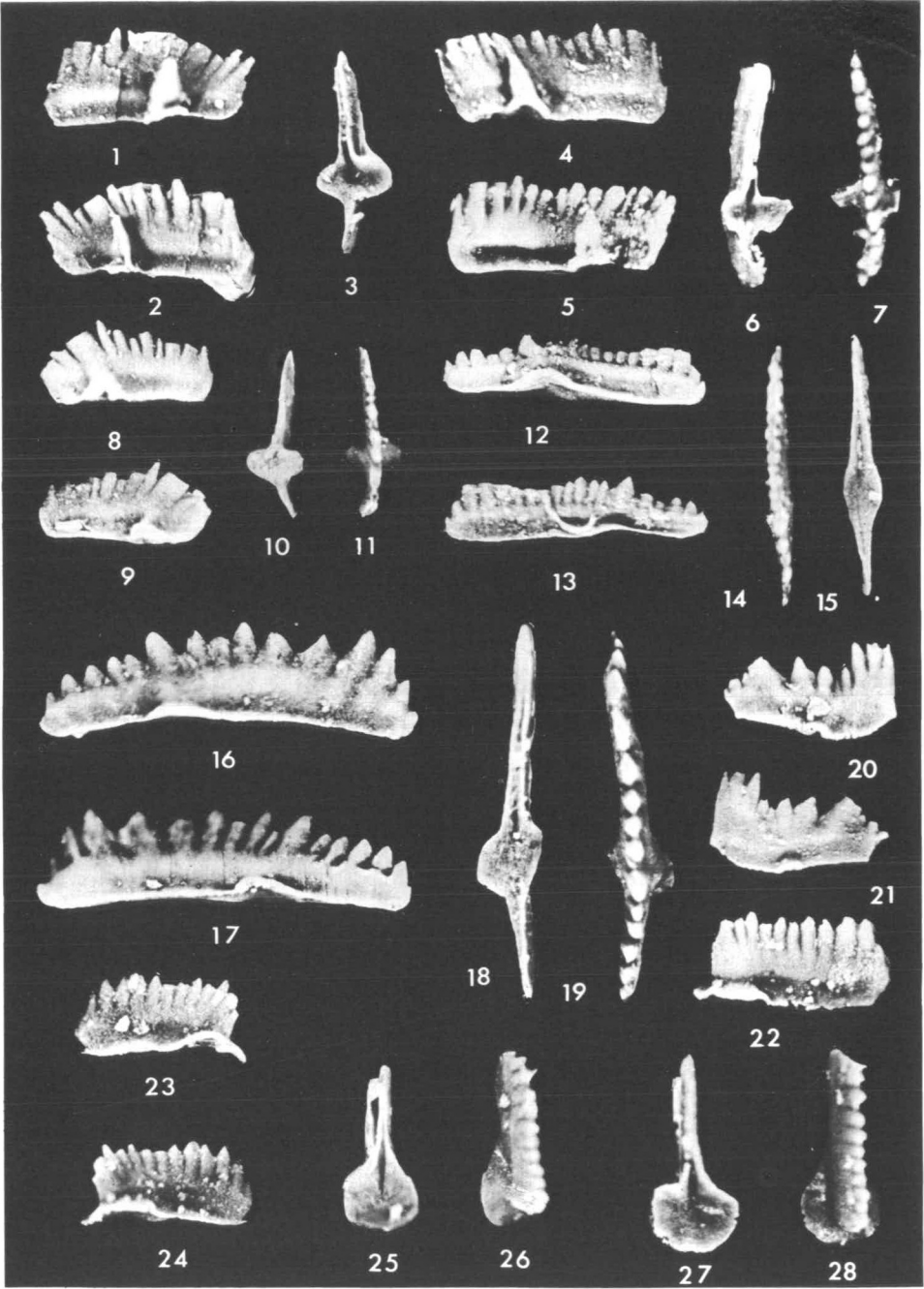


PLATE 10

All specimens are X40

Spathognathodus remscheidensis Ziegler, 1960

Figures

- 1-4 Two inner lateral, and aboral and oral views of CPC 11276
- 5-7 Inner lateral, aboral, and oral views of CPC 11277
(Sample Z5, Elmside Formation)

Synprioniodina silurica Walliser, 1964

- 8, 11 Inner and outer lateral views of CPC 11279
(Sample H30, Hume Limestone Member)
- 10, 13 Outer and inner lateral views of CPC 11280
(Sample H24, Hume Limestone Member)

Trichonodella excavata (Branson & Mehl, 1933)

- 9 Anterior view of CPC 11278
(Sample E1, Euralie Limestone Member)
- 14, 17 Posterior and anterior views of CPC 11281
(Sample H31, Hume Limestone Member)

Trichonodella inconstans Walliser, 1957

- 12, 15 Anterior and posterior views of CPC 11282
(Sample H29, Hume Limestone Member)
- 16, 18, 19 Posterior, and two anterior views of CPC 11283
(Sample Ba29, 'Barrandella' Shale Member)

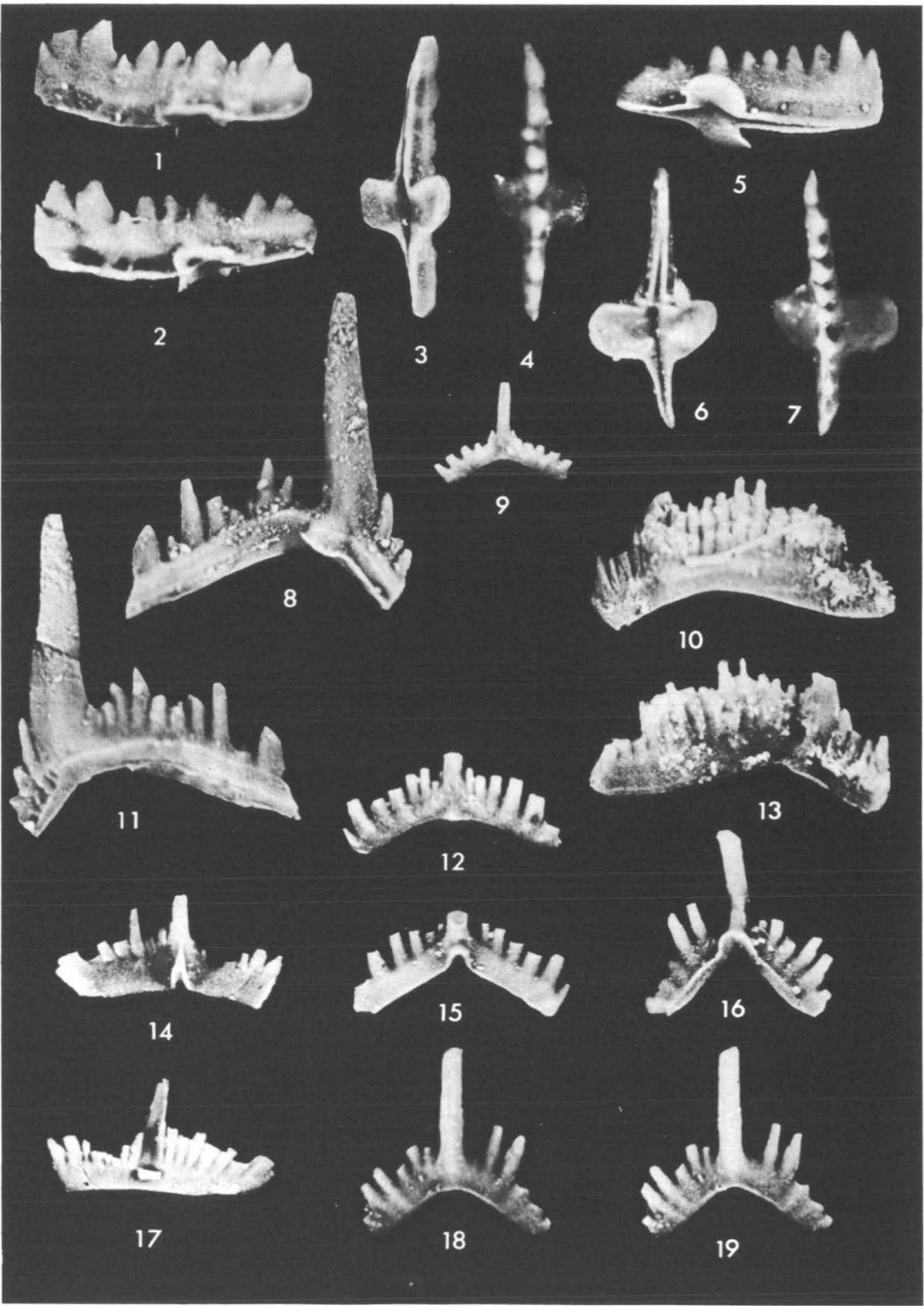


PLATE 11

All specimens are X40

Trichonodella symmetrica (Branson & Mehl, 1933)

Figures

- 1, 2 Posterior and anterior views of CPC 11284
(Sample T2, Yarwood Siltstone Member)
- 3, 4 Anterior and posterior views of CPC 11285
(Sample Z5, Elmside Formation)
- 5, 6 Anterior and posterior views of CPC 11286
(Sample T3, Yarwood Siltstone Member)

Trichonodella trichonodelloides (Walliser, 1964)

- 7, 8 Posterior and anterior views of CPC 11287
(Sample E11, Euralie Limestone Member)
- 9, 10 Anterior and posterior views of CPC 11288
(Sample H30, Hume Limestone Member)

Gen. et sp. indet.

- 11, 12 Posterior and lateral views of CPC 11289
(Sample B92, Bowspring Limestone Member)

Panderodus unicostatus unicostatus (Branson & Mehl, 1933)

- 13, 15 Lateral views of CPC 11290
(Sample G85, Gums Road Limestone Member)

Lonchodina walliseri Ziegler, 1960

- 14 Inner lateral view showing aberrant growth of lateral process

Scolopodus duplicatus sp. nov.

- 16 Lateral view of **holotype**, CPC 11291
- 17 Posterior view of paratype, CPC 11292
- 18 Posterior view of paratype, CPC 11293
- 19 Lateral view of paratype, CPC 11294
(Sample E4, Euralie Limestone Member)

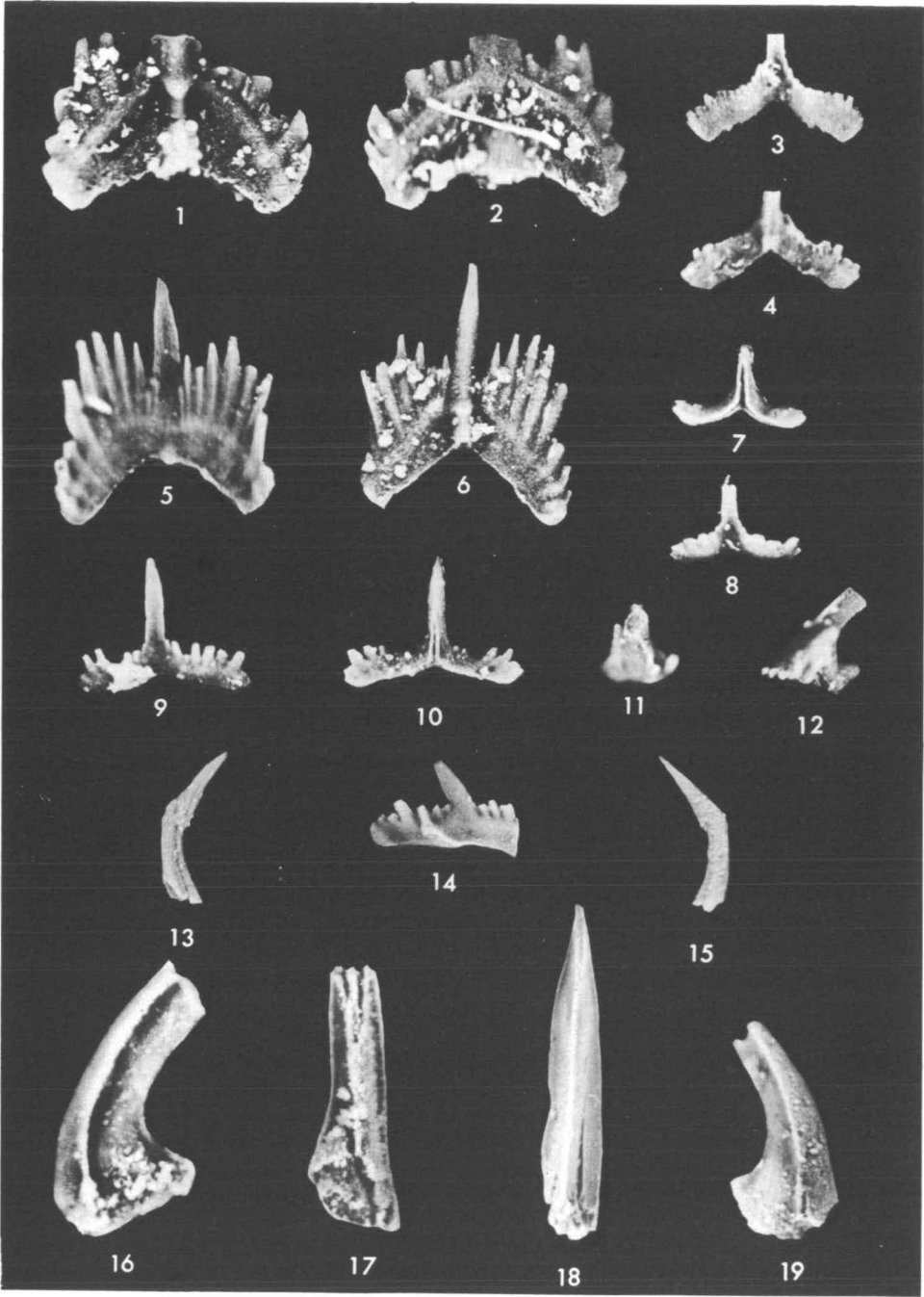
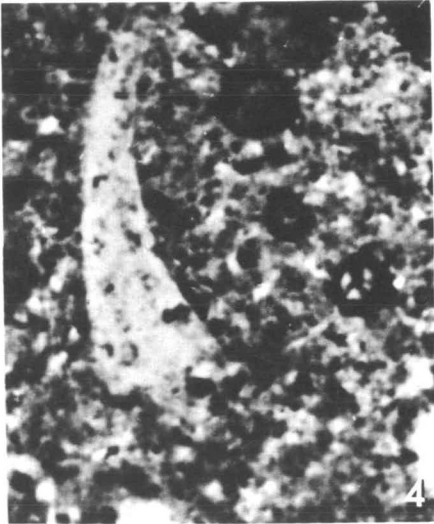
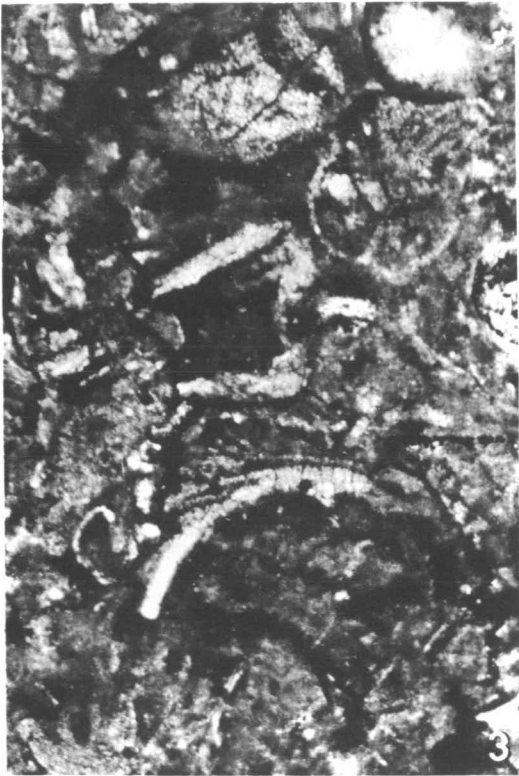


PLATE 12

Conodonts in thin sections of limestones

Figures

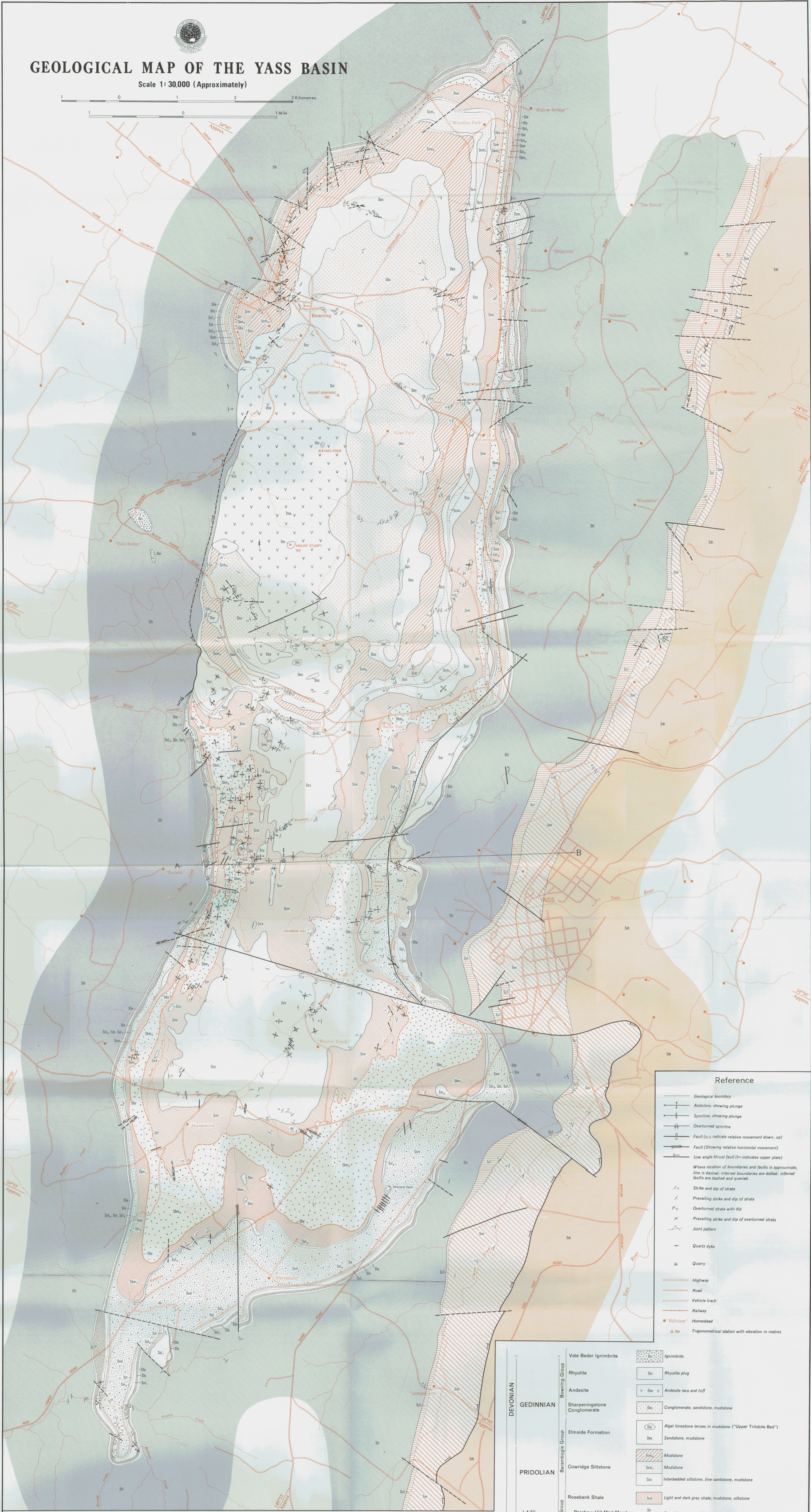
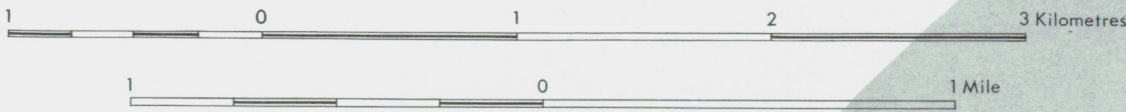
- 1 A cluster of cones (? arranged as in life) (X33)
- 2 Fine filaments of alga, *Sphaerocodium* sp. surrounding a cone
- 3 The cones in the middle of the section (X33) appear to be clustered in an orderly manner
- 4 A thin section (X60) of (?) *Panderodus simplex* (Branson & Mehl)





GEOLOGICAL MAP OF THE YASS BASIN

Scale 1:30,000 (Approximately)



Reference

Geological boundary

Anticline, showing plunge

Syncline, showing plunge

Overturned syncline

Fault (D, U indicate relative movement down, up)

Fault (Showing relative horizontal movement)

Low angle thrust fault (— indicates upper plate)

Where location of boundaries and faults is approximate, line is dashed; inferred boundaries are dotted; inferred faults are dashed and queried

Strike and dip of strata

Prevailing strike and dip of strata

Overturned strata with dip

Prevailing strike and dip of overturned strata

Joint pattern

Quartz dyke

Quarry

Highway

Road

Vehicle track

Railway

Homestead

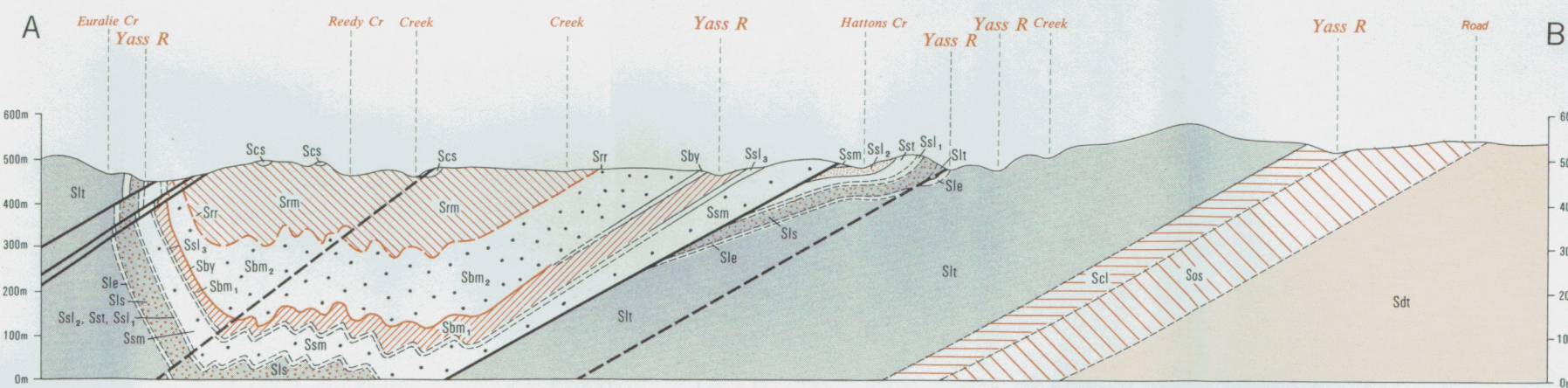
Trigonometrical station with elevation in metres

Published by the Bureau of Mineral Resources, Geology and Geophysics, Department of National Development, issued under the authority of the Hon. R. W. Swartz, M.B.E., E.D., Minister for National Development. Base Map compiled from Lands Department of N.S.W. uncontrolled aerial photography (1962-63). Complete vertical coverage at 1:45,000 Scale. Crown Copyright Reserved.

Geology and compilation 1967-69 by A. G. Link (Australian National University) Cartography by Geological Branch, BMR Drawn 1971 by M. R. Moffat Printed by

Section

Scale $\frac{V}{H} = 2$



FIRST EDITION 1971

Copies of this map may be obtained from the Bureau of Mineral Resources, Geology and Geophysics, Canberra, A.C.T., or the Geological Survey of New South Wales, Sydney

PALAEOZOIC	
DEVONIAN	Vale Beder Ignimbrite
	Bowing Group
	Rhyolite
	Andesite
	Sharpeningstone Conglomerate
	Elmside Formation
	Cowdrie Siltstone
	Rosebank Shale
	Rainbow Hill Marl Member
	Black Bog Shale
PRIDOLIAN	Yarwood Siltstone Member
	Silverdale Formation
	Hume Limestone Member
	Barrandella Shale Member
	Bowspring Limestone Member
	Tullerah Sandstone Member
	Gums Road Limestone Member
	Laidlaw Formation
	Excursion Creek Sandstone Member
	Euralie Limestone Member
LATE LUDLOVIAN	Willow Bridge Tuff Member
	Cliftonwood Limestone
	O'Briens Creek Sandstone
	Douro Volcanics
	Vale Beder Ignimbrite
	Rhyolite
	Andesite
	Sharpeningstone Conglomerate
	Elmside Formation
	Cowdrie Siltstone
MIDDLE LUDLOVIAN	Rosebank Shale
	Rainbow Hill Marl Member
	Black Bog Shale
	Yarwood Siltstone Member
	Silverdale Formation
	Hume Limestone Member
	Barrandella Shale Member
	Bowspring Limestone Member
	Tullerah Sandstone Member
	Gums Road Limestone Member
EARLY LUDLOVIAN	Laidlaw Formation
	Excursion Creek Sandstone Member
	Euralie Limestone Member
	Willow Bridge Tuff Member
	Cliftonwood Limestone
	O'Briens Creek Sandstone
	Douro Volcanics
	Vale Beder Ignimbrite
	Rhyolite
	Andesite