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AUSTRALIAN DEVONIAN AND CARBONIFEROUS (EMSIAN-VISÉAN) OSTRACOD FAUNAS: A REVIEW

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ABSTRACT

The biostratigraphic application of Devonian and Carboniferous ostracods in Australia has long been limited by the dearth of published investigations which describe large faunas. Some early species have been redescribed, but more revision is needed. More recent work includes the description of faunas from the Lower Devonian (Emsian) of Victoria, and the Upper Devonian of the Bonaparte Gulf Basin. Now that better age-control is being established from conodont studies, it is necessary to concentrate on ostracod taxonomy, and on the construction of several local scales for internal correlations both within and between basins.

AUSTRALIAN DEVONIAN AND CARBONIFEROUS (EMSIAN-VISÉAN) OSTRACOD FAUNAS: A REVIEW

by

P.J. Jones +

I. INTRODUCTION

Investigations of ostracods from Devonian and Carboniferous rocks, like those throughout the entire Palaeozoic sequence of Australia, have been rare and sporadic. Since Strzelecki (1845, p.88) first documented fossil ostracods in Australia, only 13 papers have been published, which include descriptions of about 80 Devonian and Carboniferous species (including Eridostraca; Fig. 1). Of these, 19 are Chapman's species (as revised by Talent 1963, and Willey 1970) of pre-Emsian age - older than the lower stratigraphic limit of this symposium. Because few ostracod faunas have been described, the opinion expressed by Krömmelbein (1954, p.228), "dass sich die australische Ostracoden-Forschung, mehr noch als es in bereits besser bekannten Gebieten der Fall ist, im Stadium des Material-Sammelns befindet", is still valid today. The biostratigraphic value of Palaeozoic ostracods in Australia will be limited while many species remain either undescribed or unrevised. A check list of Ostracoda recorded from Australia recently prepared by DeDeckker & Jones (in prep.) includes a historical review of the investigations of the Palaeozoic faunas.

The present review attempts to place the known Emsian-Viséan ostracod faunas from Australia in a modern stratigraphic and texonomic context. Biostratigraphic control has resulted mainly from conodont studies, which have been reviewed by Druce (this volume). Recent correlation charts and reviews of the biostratigraphic evidence have been prepared for the Lower Devonian (Strusz, 1972), Middle Devonian (Pickett, 1972), Upper Devonian

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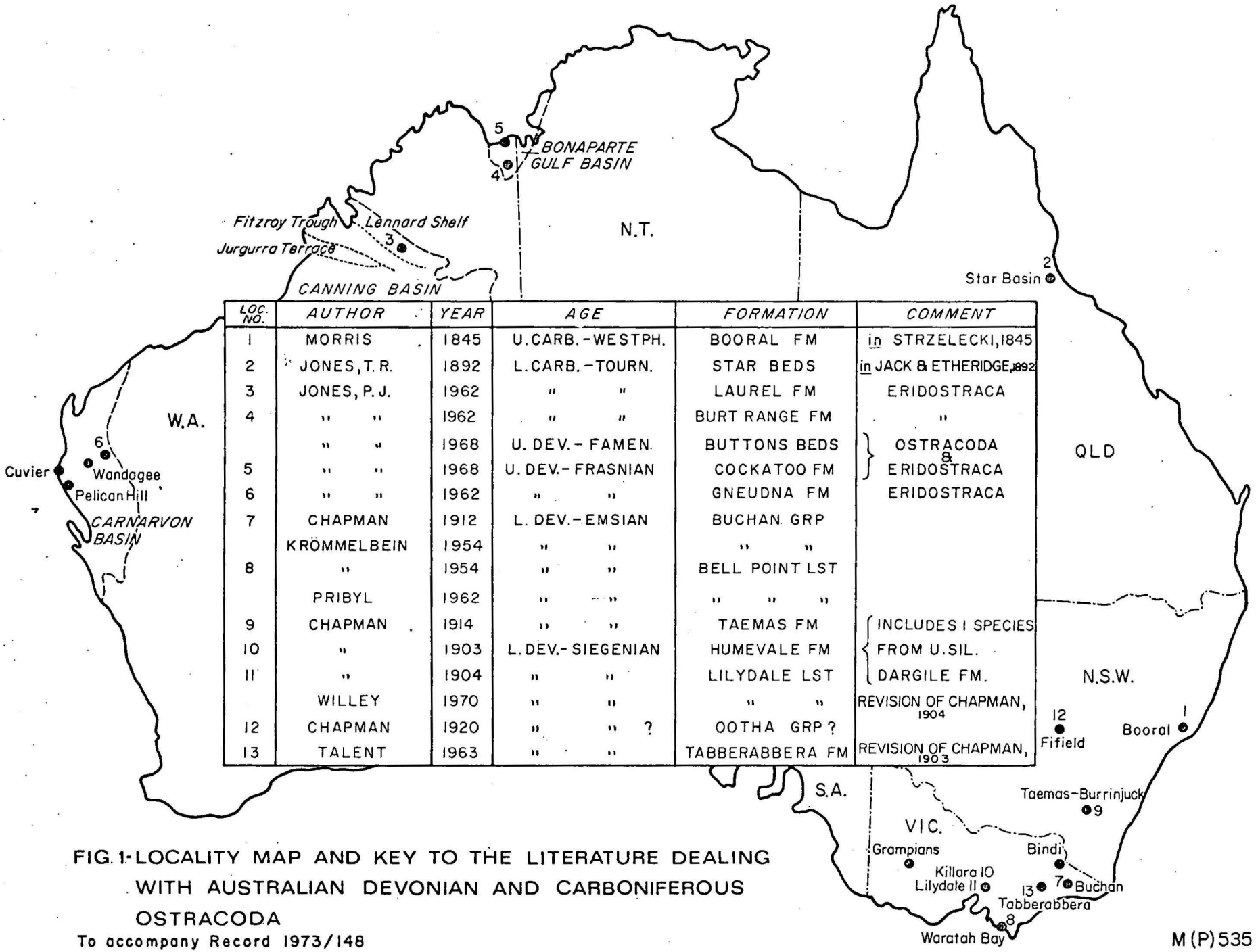

LOC. NO.	AUTHOR	YEAR	AGE	FORMATION	COMMENT
1	MORRIS	1845	U.CARB.-WESTPH.	BOORAL FM	in STRZELECKI, 1845
2	JONES, T. R.	1892	L.CARB.-TOURN.	STAR BEDS	in JACK & ETHERIDGE, 1892
3	JONES, P. J.	1962	" "	LAUREL FM	ERIDOSTRACA
4	" "	1962	" "	BURT RANGE FM	"
	" "	1968	U. DEV.- FAMEN.	BUTTONS BEDS	OSTRACODA & ERIDOSTRACA
5	" "	1968	U. DEV.- FRASNIAN	COCKATOO FM	
6	" "	1962	" "	GNEUDNA FM	ERIDOSTRACA
7	CHAPMAN	1912	L. DEV.- EMSIAN	BUCHAN GRP	
	KRÖMMELBEIN	1954	" "	" "	
8	"	1954	" "	BELL POINT LST	
	PRIBYL	1962	" "	" " "	
9	CHAPMAN	1914	" "	TAEMAS FM	INCLUDES I SPECIES FROM U.SIL. DARGILE FM.
10	"	1903	L.DEV.- SIEGENIAN	HUMEVALE FM	
11	"	1904	" "	LILYDALE LST	
	WILLEY	1970	" "	" "	REVISION OF CHAPMAN, 1904
12	CHAPMAN	1920	" " ?	OOTHA GRP ?	
13	TALENT	1963	" "	TABBERABBERA FM	REVISION OF CHAPMAN, 1903

FIG. 1- LOCALITY MAP AND KEY TO THE LITERATURE DEALING WITH AUSTRALIAN DEVONIAN AND CARBONIFEROUS OSTRACODA

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(Roberts et al., 1972), and Carboniferous (Jones et al., 1973). These have provided the bases for the construction of figures 2 and 3 of this paper.

II. BIOSTRATIGRAPHIC NOTES

LOWER DEVONIAN

EMSIAN

The two main sequences of marine Devonian rocks in southeastern Australia - the Buchan Group of eastern Victoria and the Murrumbidgee Group of southern New South Wales - long regarded as Middle Devonian (Teichert & Talent, 1958; Browne, 1959), are now known to be wholly Early Devonian (Emsian) in age (Strusz, 1972; see also Chatterton, 1973, and Druce, this volume).

Eastern Victoria

Buchan area

Apart from '*Primitia*' *cuneus* Chapman 1912 (=?*Cavellina*), the rich ostracod fauna from the Buchan Group was virtually unknown until 1946, when Teichert made detailed fossil collections from the Buchan area. Krömmelbein (1954) described 18 new species, mainly belonging to the platycope family Cavellinidae (*Cavellina teicherti*, *C. buchanensis*, *C. cavernarum*, *C. similis*, *Chapmanites crassus*, *C. lophotus*, *C. tectum*, *C.* ? sp. A and *Sulcella australis*)from several localities of the Buchan Group. The remaining part of the fauna includes *Aparchites buchanensis*, *A. regularis*, *A. obliquus*, *Kloedenella indistincta*, *Kirkbyina fragum*, *Coeloenellina subfabiformis*, *Drepanella*? sp. *A*, *Bairdiocypris* ? sp. *A*, *Bairdia* sp. *A*, and several other species yet to be described. The fossiliferous localities were carefully documented by Teichert & Talent (1958, p.12), who demonstrated that the Buchan Caves Limestone contained a faunal break and emphasized the potential value of the ostracods for further zonation and correlation of isolated outcrops of this formation.

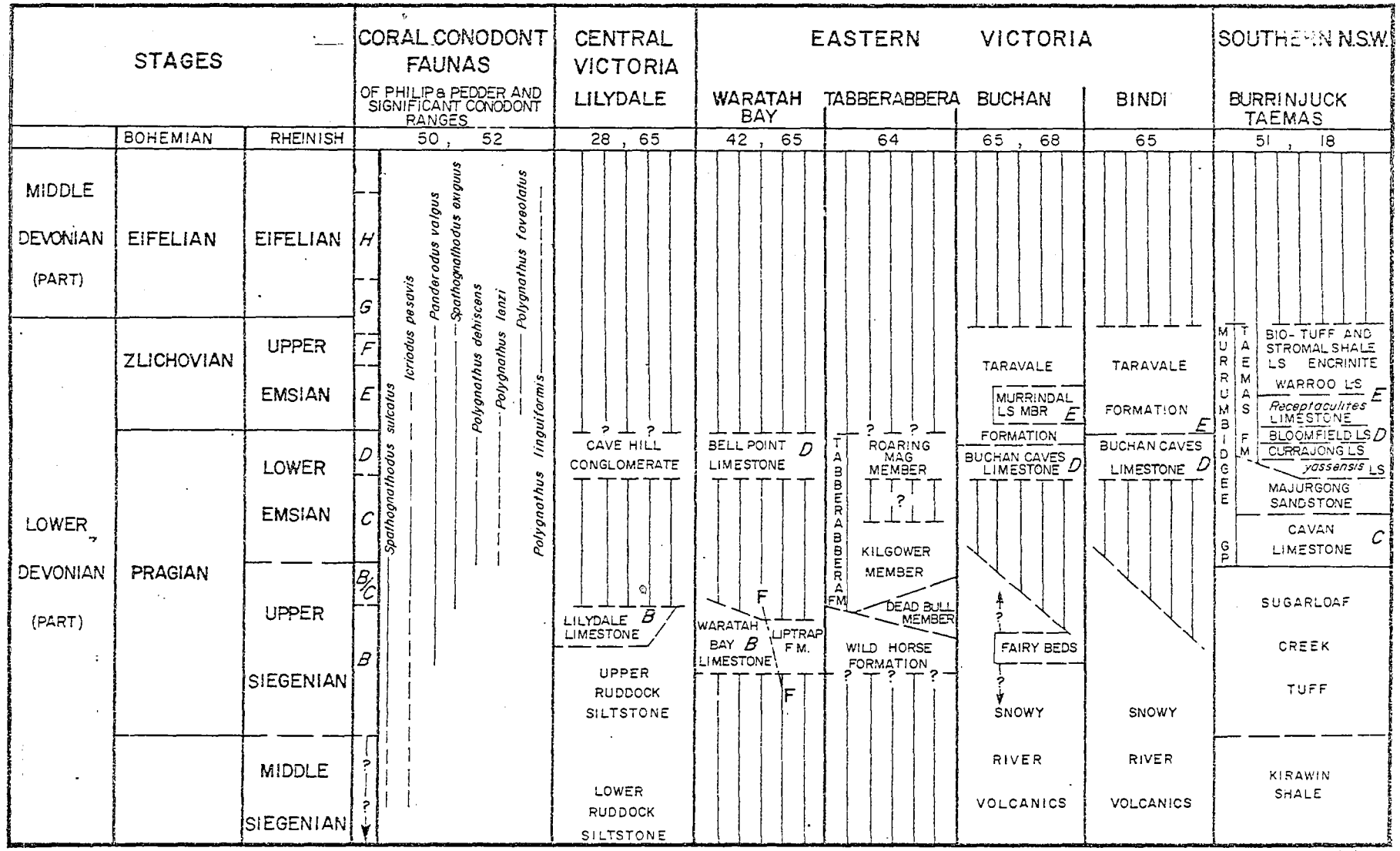

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FIG.2-STRATIGRAPHIC POSITION OF LOWER DEVONIAN SEDIMENTS YIELDING OSTRACODS (adapted from Strusz, 1972).

Hard line – boundaries established, conformity, correlation well known;
Dasned line with queries – formational boundaries poorly known and poorly correlated;
Hard line with F – faulted contact;
Numbers at top of columns refer to references – only the most comprehensive accounts of the stratigraphy are cited.

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Only part of the ostracod faunas of the overlying mudstone and impure limestone of the Taravale Formation has been described. Other species collected are not well enough preserved to be described.

Ostracods are rare in the Murrindal Limestone, in both its bedded limestone and biohermal facies.

Bindi

Talent (1965, p.188) reported the discovery of the genus Poloniella and the coral Calceola-sandalina at the top of the Buchan Caves Limestone at Bindi, where Polygnathus foveolatus (index for Fauna E of Philip & Pedder, 1967a) occurs through most of the overlying Taravale Formation. The first appearance of both P. foveolatus and C. sandalina has been taken by Strusz (1972) as marking the beginning of the Zlichovian.

Bell Point, Waratah Bay

The ostracod fauna which Krömmelbein (1954) described from the Bell Point Limestone must be stratigraphically reassessed in terms of Talent's (1965, pp.188-190) revision of the geology of Waratah Bay. The Bell Point Limestone (sensu Lindner, 1953, Teichert, 1954, Hill, 1954) consists of two main carbonate formations separated by an unconformity, which coincides with a total faunal break. The Bell Point Limestone is restricted to the dark limestones at Bell Point and the name "Waratah Limestone" introduced for the lighter coloured limestones below the unconformity. Talent (1965) correlated the Waratah Limestone fauna with that of the Coopers Creek Formation (=Fauna II at Tyers of Strusz, 1972); this is supported by Philip & Pedder (1967b, p.1029), who also pointed out its strong affinities to the fauna of the Lilydale Limestone. The Bell Point Limestone (sensu Talent) brachiopod faunas are the same as those of the Buchan Caves Limestone (Talent, 1965, p.189). All eleven ostracod species which Krommelbein described were collected from Bell Point, although Philip & Pedder, (1967b, p.1030) listed

only four of these (Dibolbina sp. A, Mastigobolbina socialis, Eukloedenella subquadrata, and E. sp.) from the Bell Point Limestone (sensu stricto). Consideration of all the localities mentioned by Krömmelbein, however, leads one to conclude that at least nine of his species are from the Bell Point Limestone (restricted). Only at the locality from which Geisina victoriana and Kloedenella waratahensis were described is there any possibility that the Waratah Limestone was sampled. This was recorded by Krömmelbein as "vicinity of Mushroom Rocks", a description also vague enough to include the outcrop of the Bell Point Limestone. As with the Buchan fauna, the platycopes are the dominant group, represented mainly by the Kloedenellidae (Eukloedenella biconcava, E. ellipselloides, E. subquadrata, E. sp. A, E. sp. B, and possibly Kloedenella waratahensis), which appear to replace the Cavellinidae. Cavellinidae is represented by only one species - Chapmanites lophotus - the only species in common with the Buchan fauna. The only other ostracod species which Krömmelbein described, and which is not mentioned above, is Bairdia sp. B.

Because the ostracod species were new, Krömmelbein did not suggest a precise age for the Buchan Group and the Bell Point Limestone, but referred to the coral evidence, which was thought to indicate an early Middle Devonian (Couvinian; Hill, 1950, 1954) age. Phillip (1966), however, regarded the Buchan Caves Limestone as late Lower Devonian on the basis of his conodont studies. Recently, the Buchan coral-conodont faunas (Fauna D of Philip & Pedder, 1967a) have been assigned to the latest Pragian (Strusz, 1972).

Krömmelbein's species Mastigobolbina socialis, was reassigned by Pribyl (1962, p.213) to Kozlowskiella, an identification which he regarded as definite proof of a Middle Devonian (Eifelian) age for the Bell Point Limestone. He noted the similar reticulation concentrically arranged pattern of Kozlowskiella socialis and the late Early Devonian (Zlichovian) species K. dalejensis Pribyl, 1955, and tentatively suggested that K. socialis was derived from the Czech species. However, as K. socialis appears to be older

than K. dalejensis, this relationship is unlikely. A more plausible interpretation would be that both species are at about the same stage of evolution and belong to an undescribed genus, and that they are intermediate between late (M. Siegenian) species of Strepula (e.g., S. rouaulti Weyant, 1965) with concentric cristae, and Middle Devonian species of Kozlowskiella with irregularly shaped reticulae, without concentric cristae.

The genus Chapmanites has been recognized in Europe from the Middle Devonian (Eifelian) of Bashkiria (viz., C. jurjusanicus Rozhdestvenskaya, 1962). Another species of Chapmanites is probably present in the Lower Devonian (middle part of the Tentaculiten - Knollenkalk = Pragian) of East Thuringia, but described under the name Daleiella deubeli Zagora, 1967.

Southern New South Wales

Taemas-Cavan area

'Primitia' yassensis Chapman, 1914 (=?Cavellina), the only ostracod described from the Taemas-Cavan area, belongs in the Taemas Formation. Chatterton (1973, p.3) has reported the presence of ostracods in the Taemas Formation at the top of the 'Receptaculites' limestone and the base of the Warroo Limestone (Fig. 2), which on other grounds he places at or near the Emsian-Eifelian boundary.

Goodradigbee Valley (Burrinjuck Reservoir)

Edgell (1955, p.137) listed 'Primitia' yassensis and six other ostracod species referred to the genera Aechmina, Beyrichia, Hollinella, Kloedenia, Primitiopsis, and Thlipsurella from the 'Wee Jasper Limestone' (=Taemas Formation). The fauna is probably of early Zlichovian age (Fauna E of Philip & Pedder, 1967a), and probably correlates with that of the 'Receptaculites' Limestone.

MIDDLE DEVONIAN

The only known Middle Devonian ostracods from Australia are those reported from thin sections from the Timor Limestone Member of the Yarrimie Formation in northern New South Wales (Pedder, Jackson & Ellenor, 1970).

UPPER DEVONIAN

Late Devonian and Early Carboniferous ostracods, like the contemporaneous conodont faunas, are more common in the intracratonic basins of Western Australia than in the Tasman Geosyncline on the eastern margin of the continent. Of these, the Late Devonian ostracod fauna of the Bonaparte Gulf Basin (Jones, 1968) is the best known. In addition, the Eridostraca (?Branchiopoda), represented by four species of Cryptophyllus, and one belonging to Eridoconcha, are common in the Upper Devonian and Lower Carboniferous rocks of Western Australia (Jones, 1962, 1968).

FRASNIAN

Carnarvon Basin

Species belonging to Cavellina, Selebratina, Svantovites, and several other genera, are known from the Gneudna Formation, but are undescribed. Cryptophyllus sp. A is known from the type section (Jones, 1962), Pelican Hill Bore, Cape Cuvier No. 1 Well, and Wandagee No. 1 Well. Roberts et al. (1972, p.477) concluded that the Gneudna Formation is early Frasnian (toIα), but allowed for the possibility that its base ranges into the Givetian.

Canning Basin

Poorly preserved silicified ostracods from Sadler Ridge have not been treated systematically, but the genera Amphissites, Acratia, Bairdia, Bekena, Tubulibairdia, amongst others, are known from the Sadler Limestone (fore-reef facies), dated on conodont evidence as early Frasnian (toIα; lower Polygnathus asymmetricus Zone - Seddon, 1970; Roberts et al., 1972).

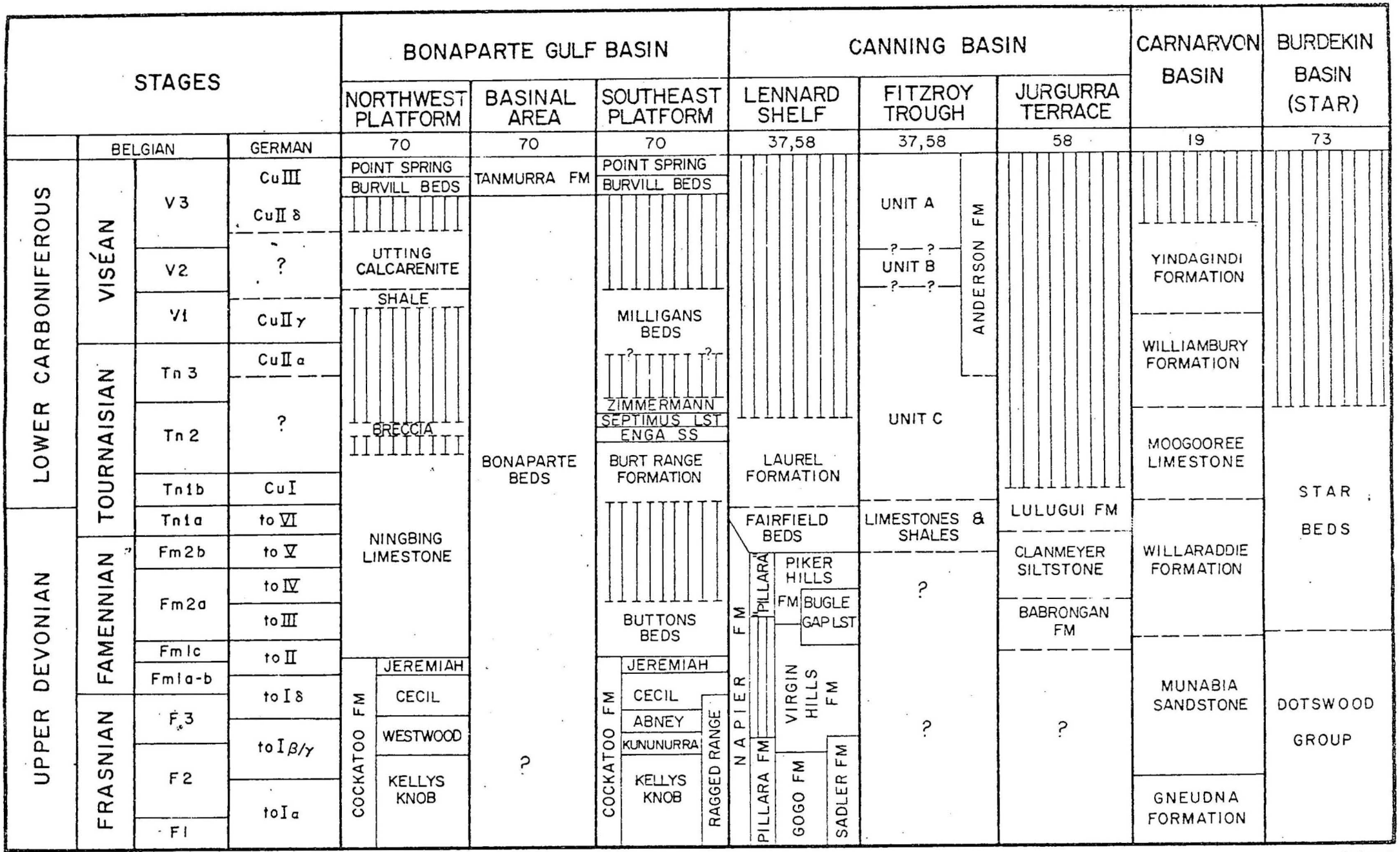

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FIG.3-STRATIGRAPHIC POSITION OF UPPER DEVONIAN AND LOWER CARBONIFEROUS SEDIMENTS YIELDING OSTRACODS. (See fig.2 for explanation of symbols).

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Fewer genera occur in the Sadler Limestone, of the same age, at McWhae Ridge in the Bugle Gap area. Owing to facies problems, age control on the ostracods is lost in the back-reef facies (Pillara Limestone), where conodonts are virtually absent (Seddon, 1970; Druce, in press).

Bonaparte Gulf Basin

The Frasnian ostracod fauna described from the Westwood Member of the Cockatoo Formation, the 'hanaicus' Zone (Jones, 1968), is dated on the combined evidence of conodonts, foraminifers, and brachiopods as toIγ (Roberts et al., 1972). The nominate species is not conspecific with Pribylites (Parapribylites) hanaicus Pokorny (Becker, 1970, p.53), but is probably a new species. Several species of this zone appear to have affinities with species from the Frasnian of Europe and North America.

Amphissites sp. A appears to fall within the range of variation of A. irinae Glebovskaya & Zaspelova (sensu Egorov, 1953), as discussed by Blumenstengel (1969, p.12). It is also similar to A. carmeni Gibson, 1955, from the Cerro Gordo Member of the Lime Creek Formation, Iowa (toIγ age, Anderson, 1966) and to A. albertensis Loranger 1954, (Braun, 1967; Becker, 1971, p.19) from the Frasnian of Alberta. Becker (op. cit.), however, has noted that many Late Devonian and Early Carboniferous species of Amphissites are superficially similar to one another, because they lack sufficient diagnostic features. He added that distinction between them may only be possible by the study of topotype material.

Two species of Bairdia appear to be closely comparable to Egorov's species B. nalivkini and B. naumovae from the Frasnian of the Russian Platform (Egorov, 1953) and the Harz Mountains (Blumenstengel, 1965, 1969). Blumenstengel (op. cit.) has already compared these species with some from the Cerro Gordo Member of the Lime Creek Formation, Iowa (Gibson, 1955): B. naumovae with B. lancelata and B. extenda Gibson, and B. nalivkini with

B. rockfordensis Gibson. Braun's (1967, p.650) species Bairdiacypris sp. 231, from the Frasnian of Alberta, appears to include specimens similar to those from the 'hanaicus' zone, assigned to Bairdia cf. nalivkini and B. cf. naumovae. Moreover, Bairdia (Cryptobairdia) sp. A of Becker (1971, p.62, pl.12, fig. 114) from the Frasnian (F2i) of Belgium resembles B. cf. nalivkini.

The Australian species of Indivisia and I. variolata Zanina, 1960, from the late Frasnian and early Famennian of the USSR, probably both belong to the same species-group (Jones, 1968, p.39). Finally, a species of Limbatula was described, though not named: all other described spcies of Limbatula come from the Frasnian of the USSR and Germany.

The 'hanaicus' Zone has been used for local correlation of isolated measured sections of the Westwood Member of the Cockatoo Formation (Jones, 1968, p.10, fig. 5). It has not been found, however, in the equivalent calcareous members in the south (the Hargreaves and Kununurra Members), presumably for environmental reasons.

FAMENNIAN

Bonaparte Gulf Basin

Four provisional concurrent range-zones have been proposed by Jones (1968), based upon the overlapping ranges of the ostracod species Sulcella altifrons, Diphyochilina tryphera, and Orthobairdia ordensis in the type section of the early Famennian Buttons Beds. The altifrons-ordensis zonal sequence, by superposition, must be latest Frasnian or younger, and the conodont evidence (Druce, 1969), admittedly not strong, suggests an early Famennian age. Recent systematic work on early Famennian ostracods from Bashkiria, USSR, by Rozhdestvenskaya (1972), shows striking similarities to some of those described from the altifrons-ordensis zonal sequence - previously

thought to be endemic. Her species Diphyochilina abushikae closely resembles D. tryphera Jones, 1968; Geisina multa and G. fecunda she compares with the Australian G. monothele and Marginia reticulata respectively; and Uchtovia famenica with U. altifrons (Jones). Indivisia variolata appears to be more common in the Famennian than the Frasnian, both in Australia and the USSR.

The species of the altifrons-ordensis zonal sequence are particularly useful for the correlation of isolated outcrops of the Buttons Beds in the Burt Range area, and the type section of the Ningbing Limestone, where conodonts are absent.

Canning Basin

The Famennian ostracod faunas of the Canning Basin have yet to be described. They appear to include more species the Frasnian, and in general are better preserved. The pelagic family Entomozoidae, which is important in the biostratigraphy of the Late Devonian of Europe, is well represented in the inter-reef beds. They are present on the Lennard Shelf in the Virgin Hills Formation, and the upper part of the Napier Formation, and on the Jurgurra Terrace, in the Clanmeyer Siltstone.

The benthonic fauna includes several species known from the Late Devonian of the Bonaparte Gulf Basin - Marginia venula, M. reticulata*, Beyrichiopsis? perplexa, Cavellina sp. A*, Coeloenellina cf. fabiformis,* Geisina monothele, Indivisia variolata*, Orthobairdia ordensis from the Buttons Beds, and Knoxiella sp. A* from the Westwood Member of the Cockatoo Formation. Those marked* form part of ostracod Assemblage A (of Jones, 1961), present in outcrops of the Fairfield Beds (sensu Guppy et al., 1958) of late toV-toVI age, and subsurface sections of the Lulugui and Napier Formations. This assemblage is approximately equivalent in age to that of the upper part of the 'Avonia' proteus Zone (of Veevers, 1959); its lower limit, however,

is as yet undefined in terms of the concdont zonation. Other species included in Assemblage A belong to Aparchites, Glyptopleura, Knoxites, Shishaella, and several other genera.

DEVONIAN-CARBONIFEROUS BOUNDARY

In the absence of goniatites, the Devonian-Carboniferous boundary (sensu Heerlen Congress decision, 1935; Jongmans & Gothan, 1937) can often be recognized by conodont and spore studies, and these, where available, can provide useful age-control on the ostracod faunas. All three fossil groups are being studied in sediments of this age in the Canning and Bonaparte Gulf Basins.

Bonaparte Gulf Basin

Ostracods are abundant in the southeastern part of the platform carbonate province (Veevers & Roberts, 1968), where the late Famennian appears to be missing. The Buttons Beds (early Famennian) are overlain paraconformably by the Burt Range Formation, which on conodont evidence is Early Carboniferous (Jones & Druce, 1966; Roberts et al., 1967; Druce, 1969), though its basal beds may include the Devonian-Carboniferous boundary (Druce, op. cit.; this volume).

There is an abrupt change in the ostracod faunas about the junction between the Buttons Beds and the Burt Range Formation, where the basal altifrons-ordensis Zone is replaced by Assemblage B (of Jones, 1961). The species belonging to this assemblage are being described, and for the present, it is sufficient to refer them to the genera Amphissites, Acutiangulata, Acratia, Bairdia, Bairdiacypris, Carbonita, Cavellina, Coryellina, Hastacypris, Knoxiella, 'Leviella', Microcheilinella, Praepilatina, Pseudochilina, Pseudoleperditia, Pustulobairdia, Rectobairdia Shishaella, Shivaella, and Silenites.

In the basinal shale province continuity of deposition across the Devonian-Carboniferous boundary has not been proved; neither ostracods nor conodonts have been found over this interval.

Canning Basin

Ostracod Assemblage A, which is briefly described above (p.), is associated with spores of the Hymenozonotriletes lepidophytus Zone (Balme & Hassell, 1962; Roberts et al., 1972) in subsurface sections, and conodonts of the Spathognathodus costatus Zone (sensu Ziegler; toVI) in outcrop. Marker species of Assemblage B (including those belonging to Bairdiacypris and Pseudochilina) first appear about 30 m above Assemblage A in the BMR 2 (Laurel Downs) bore. They are also present in the basinal shale facies of the Fitzroy Trough in Yulleroo No. 1 Well, immediately above the Spathognathodus costatus Zone (sensu Ziegler; Bischoff, 1968).

Therefore, for all practical purposes, the Devonian-Carboniferous boundary (sensu Heerlen, 1935), in terms of ostracod chronology may be taken to lie between Assemblages A and B.

LOWER CARBONIFEROUS

TOURNAISIAN

Bonaparte Gulf Basin

The ostracod faunas of the Tournaisian of the Bonaparte Gulf Basin are being described. Many of the species show strong affinities to Siberian species, especially those described by Bushmina (1968, 1970) from the Kuznetsk Basin, and the area bordering the mouth of the River Lena. Ostracod Assemblage B is present in the lower part of the Burt Range Formation and ranges from the Spathognathodus plumulus Assemblage Zone to the Siphonodella isosticha - Polygnathus inornatus nodulosus Assemblage Zone (of Druce, 1969). This section is equivalent to the cuI Zone of Germany and the Tn1b of the standard Belgian sequence (Jones et al., 1973). Ostracod Assemblage B is succeeded by Assemblage C, which is present in the upper part of the Burt Range

Formation, the basal Enga Sandstone, and throughout the Septimus Limestone. This sequence, from conodont evidence, is approximately equivalent to the Tn2 of Belgium (Jones et al., 1973). It contains many species in common with Assemblage B (e.g., species belonging to the genera Acutiangulata, Acratia, Bairdia, Carbonita, Cavellina, Knoxiella, "Leviella", Microcheilinella, Praepilatina, Rectobairdia, Shishaella, Shivaella, and Silenites), with additional species appearing for the first time (e.g. species belonging to the genera Lenacypris, Glyptopleurites, Orthobairdia). The eridostracan Cryptophyllus diatropus is present in both Assemblages B and C.

Canning Basin

Preliminary studies of the Tournaisian ostracods from the Laurel Formation (Jones, 1959, 1961) show that both Assemblages B and C are present in BMR 2 (Laurel Downs) Bore. Assemblage C contains several species not present in the Bonaparte Gulf Basin, e.g. species belonging to Evlanovia, Graphiadactyllis and Mennerites. It can be recognized over wide areas in the northern Canning Basin, both in surface and subsurface samples.

Eastern Australia

Star Basin, northern Queensland

The species listed by McKellar (in Wyatt et al., 1970, p.31) as Hollinella sp. from the middle Tournaisian (Spirifer sol Zone; Campbell & McKellar, 1969) Corner Creek locality of the Star Beds is probably 'Beyrichia' varicosa Jones, 1892 (in Jack & Etheridge, p.214, pl.7, fig.15). From the illustrations, the Queensland species does not appear to be conspecific with Beyrichia varicosa Jones & Kirkby (1886, p.259, pl.8, figs. 10, 11) from the Early Carboniferous of Scotland.

Grampians area, western Victoria

Talent (Talent & Spencer-Jones, 1963) described two species of smooth ostracods ('gen. et. sp. indet.') with Lingula and fish remains from the Silverband Formation - a fauna diagnostic neither of Devonian, nor Carboniferous.

VISÉAN

Bonaparte Gulf Basin

Two ostracod faunas are known from the shaly Milligans Beds (Veevers & Roberts, 1968, p.88). The older, (here provisionally called Assemblage D), is present in the type section. It consists of species belonging to the genera Acutiangulata Carboprimitia, Cavellina, Copelandella, Coryellina, Healdia, Kirkbya, Monoceratina, Rectobairdia, Shivaella and Youngiella, together with the eridostracan Cryptophyllus platyogmus. This assemblage is Viséan on spore evidence (Playford, 1971); however the presence of a species of Polygnathus of the lacinatus-group suggests an early Viséan or late Tournaisian age.

The younger fauna appears to be transitional between Assemblage D and the fauna of the Bonaparte Beds (here provisionally called Assemblage E) encountered in the basinal shale province. It contains species belonging to the genera Carboprimitia, Cavellina, Libumella, Shivaella, and Rectobairdia, and is associated with endothyrid foraminifers and Tetrataxis. This transitional assemblage succeeds Assemblage D in Milligans No. 2 Bore.

Assemblage E (species belonging to the genera Amphissites, Acutiangulata, Cavellina, Ectodemites, Healdia, Hollinella, Kirkbya, Kirkbyella, Libumella, Microcheilinella, Orthobairdia, Phlyctiscapha, Polycope, Rectobairdia, Scrobicula, Selebratina, Shivaella, Tetrasacculus, and Youngiella) is present in the subsurface Bonaparte Beds (associated with V3b foraminifers; Mamet & Belford, 1968) and in outcrops of Utting Calcarenite (V2 or V3a; Jones et al., 1973).

Canning Basin

Viséan ostracods are known only from the subsurface of the Fitzroy Trough, in association with the eridostracan Cryptophyllus sp. B Jones. This species is present in the Anderson Formation, a unit originally regarded on conchostracan evidence as Westphalian (Öpik, in McWhae et al., 1958), but now assigned to the Early Carboniferous, (Bischoff, fide Jones et al., 1973).

Eastern Australia (Hunter Valley, New South Wales)

The ostracods which McCoy (1847, p.229) listed from a Carboniferous shale at Dunvegan were probably collected from the Wiragulla Beds of the Delepinea aspinosa Zone (see Jones et al., 1973, chart, column 21). Clarke's original locality, however, can no longer be found (J. Roberts, pers. comm.).

There seems little doubt that Bairdia affinis Morris, 1845, which Strzelecki (1845) collected from a "dark bituminous limestone at Booral" belongs to the Levipustula levis Zone of the Upper Carboniferous (Westphalian) Booral Formation (See Druce & Jones, in press).

III CONCLUSIONS

Investigation of Devonian and Carboniferous Ostracoda in Australia is still at an early stage. The faunas need to be described, and many of those previously described are in need of revision. Until this is done, the biostratigraphic application of ostracods for intercontinental correlations will be limited. Therefore, at present, the work on the Australian faunas must necessarily consist of basic taxonomy, together with the construction of several local scales for internal correlations both within and between basins.

Both Krömmelbein (1954) and Jones (1968) have suggested that the Devonian ostracod faunas which they described from Australia are endemic. There is some evidence, however, at least for the Bonaparte Gulf Basin, to suggest that such endemism is more apparent than real. As more overseas faunas are described, Australian Devonian and Carboniferous ostracod faunas may prove to be more cosmopolitan than previously thought.

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