DEPARTMENT OF NATIONAL RESOURCES
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

BULLETIN 174

Australian Ordovician Pelecypod Molluscs

JOHN POJETA, JR.[1] AND JOYCE GILBERT-TOMLINSON

[1]U.S. Geological Survey, Washington, D.C. 20560, U.S.A.

AUSTRALIAN GOVERNMENT PUBLISHING SERVICE
CANBERRA 1977

DEPARTMENT OF NATIONAL RESOURCES

MINISTER: THE RT HON. J. D. ANTHONY, M.P.

SECRETARY: J. SCULLY

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

DIRECTOR: L. C. NOAKES

ASSISTANT DIRECTOR, GEOLOGICAL BRANCH: J. N. CASEY

Published for the Bureau of Mineral Resources, Geology and Geophysics
by the Australian Government Publishing Service

ISBN 0 642 02693 9

MANUSCRIPT RECEIVED: MAY 1975

REVISED MANUSCRIPT RECEIVED: AUGUST 1975

ISSUED: DECEMBER 1977

Printed by Graphic Services Pty Ltd, 516-518 Grand Junction Road, Northfield, S.A. 5085

CONTENTS

		Page
	Summary	vi
1.	Introduction	1
2.	Stratigraphy	2
3.	Systematic Palaeontology	8
	Phylum MOLLUSCA	8
	Subphylum DIASOMA	8
	Class PELECYPODA	8
	Subclass PALAEOTAXODONTA	8
	Order NUCULOIDA	8
	Superfamily CTENODONTACEA	9
	Family CTENODONTIDAE	9
	Genus *CTENODONTA* Salter, 1852	9
	Ctenodonta youngi sp. nov.	9
	Ctenodonta macalesteri sp. nov.	9
	Ctenodonta jonesii (Johnston, 1888)	10
	Genus *ALOCOCONCHA* nov.	10
	Alococoncha crassatellaeformis (Tate, 1896)	10
	Superfamily NUCULACEA	11
	Family PRAENUCULIDAE	11
	Genus *FIDERA* nov.	11
	Fidera maryae sp. nov.	11
	Genus *DECEPTRIX* Fuchs, 1919	11
	Deceptrix banksi sp.nov.	12
	Deceptrix? sp. A	12
	Genus *ERITROPIS* nov.	12
	Eritropis opiformis (Tate, 1896)	12
	Eritropis sp. A	13
	Superfamily NUCULANACEA	13
	Family MALLETIIDAE	13
	Genus *INAEQUIDENS* nov.	13
	Inaequidens davisi sp.nov.	13
	Inaequidens campbelli sp.nov.	14
	Genus *JOHNMARTINIA* nov.	14
	Johnmartinia cordata sp. nov.	14
	Johnmartinia orbicularis (Tate, 1896)	15
	Genus *LOPHOCONCHA* nov.	15
	Lophoconcha corrugata (Tate, 1896)	15
	Genus *NUCULITES* Conrad, 1841	16
	Nuculites wattii (Tate, 1896)	16
	Genus *PALAEONEILO* Hall & Whitfield, 1869	16
	Palaeoneilo smithi sp. nov.	16
	Genus *STHENODONTA* nov.	17
	Sthenodonta eastii (Tate, 1896)	17
	Sthenodonta jelli sp. nov.	18
	Sthenodonta passmoreae sp. nov.	18
	Sthenodonta etheridgei (Tate, 1896)	18
	Sthenodonta? sp. A.	19
	Genus *ZEEHANIA* nov.	19
	Zeehania jacksoni sp. nov.	19
	Subclass PTERIOMORPHIA	19
	Order ARCOIDA	19
	Superfamily CYRTODONTACEA	20
	Family CYRTODONTIDAE	20

	Page
Genus *CYRTODONTA* Billings, 1858	20
Cyrtodonta carberryi sp. nov.	20
Cyrtodonta hazeli sp. nov.	20
Cyrtodonta staffordae sp. nov.	20
Cyrtodonta wattii (Tate, 1896)	21
Cyrtodonta sp. A	21
Genus *CYRTODONTULA* Tomlin, 1931	21
Cyrtodontula hadzeli sp. nov.	21
Cyrtodontula sohli sp. nov.	22
Genus *PHARCIDOCONCHA* nov.	22
Pharcidoconcha raupi sp. nov.	22
Order PTERIOIDA	22
Family AMBONYCHIIDAE	23
Genus *LECONYCHIA* nov.	23
Leconychia doylei sp. nov.	23
Genus *GLYPTONYCHIA* nov.	23
Glyptonychia wilsoni sp. nov.	23
Genus *PTERONYCHIA* nov.	24
Pteronychia haupti sp. nov.	24
Genus *AMBONYCHIA* Hall, 1847	24
Ambonychia? sp. A	24
Ambonychiid genus A, species A	25
Ambonychiid genus B, species A	25
Family PTERINEIDAE	25
Genus *DENTICELOX* nov.	25
Denticelox tortuosa (Tate, 1896)	25
Genus *PTERINEA* Goldfuss, 1832	26
Pterinea sp. A	26
Subclass ISOFILIBRANCHIA	26
Order MYTILOIDA	26
Superfamily MYTILACEA	26
Family MODIOLOPSIDAE	26
Genus *MODIOLOPSIS* Hall, 1847	26
'Modiolopis' gordonensis Johnston, 1888	26
Modiolopsis? sp. A	26
Genus *RUNNEGARIA* nov.	27
Runnegaria cuneata sp. nov.	27
Family COLPOMYIDAE nov.	27
Genus *COLPANTYX* nov.	27
Colpantyx woolleyi sp. nov.	28
Genus *XESTOCONCHA* nov.	28
Xestoconcha kraciukae sp. nov.	28
Subclass HETEROCONCHIA	28
Order ACTINODONTOIDA	28
Family CYCLOCONCHIDAE	29
Genus *COPIDENS* nov.	29
Copidens browni sp. nov.	29
Family LYRODESMATIDAE	29
Genus *BRACHILYRODESMA* nov.	29
Brachilyrodesma radkei sp. nov.	29
Genus *NORADONTA* nov.	30
Noradonta shergoldi sp. nov.	30
Order VENEROIDA	31
Superfamily SOLENACEA	31
Family ORTHONOTIDAE	31

Page

Genus *SPHENOSOLEN* nov. 31
Sphenosolen draperi sp. nov. 31
Class ROSTROCONCHIA 31
Order RIBEIRIOIDA 31
Family RIBEIRIIDAE 31
Genus *RIBEIRIA* Sharpe, 1853 31
Ribeiria csiro Pojeta, Gilbert-Tomlinson, & Shergold, 1977 31
Genus *PINNOCARIS* Etheridge, 1878 31
Pinnocaris? sp. C 31
Family TECHNOPHORIDAE 32
Genus *TECHNOPHORUS* Miller, 1889 32
Technophorus walteri Pojeta, Gilbert-Tomlinson & Shergold, 1977 32
Genus *TOLMACHOVIA* Howell & Kobayashi, 1936 . . . 32
Tolmachovia corbetti sp. nov. 32
Order CONOCARDIOIDA 32
Conocardioid sp. A 32
Superfamily CONOCARDIACEA 33
Family BRANSONIIDAE 33
Genus *BRANSONIA* Pojeta & Runnegar, 1976 33
Bransonia townleyi sp. nov. 33
Misidentified pelecypods 33
Key to the identification of the named species of Australian Ordovician pelecypods . 34

4. Locality Register 36

5. References 61

Table 1. Listing of described species by locality, basin, and rock unit 5

Figure 1. Locality map, mainland Australia 37

Figure 2. Locality map, Tasmania 38

Plates 1-29 . . . . . following p. 66

SUMMARY

Pelecypod molluscs are widespread and reasonably abundant in the Ordovician rocks of Tasmania and the Amadeus and Georgina Basins of northern Australia. Because the mollusc faunas of these areas are not well known, this study concentrates on their systematics. We deal with 47 species of pelecypods, which are placed in 31 genera; 38 species are named and nine are treated within open nomenclature. Twenty-seven of the named species and 20 of the genera are newly named herein: *Ctenodonta youngi* sp. nov., *C. macalesteri* sp. nov., *Alococoncha* gen. nov., *Fidera maryae* gen. nov. et sp. nov., *Deceptrix banksi* sp. nov., *Eritropis* gen. nov., *Inaequidens davisi* gen. nov. et sp. nov., *I. campbelli* sp. nov., *Johnmartinia cordata* gen. nov. et sp. nov., *Lophoconcha* gen. nov., *Palaeoneilo smithi* sp. nov., *Sthenodonta jelli* gen. nov. et sp. nov., *S. passmoreae* sp. nov., *Zeehania jacksoni* gen. nov. et sp. nov., *Cyrtodonta carberryi* sp. nov., *C. hazeli* sp. nov., *C. staffordae* sp. nov., *Cyrtodontula hadzeli* sp. nov., *C. sohli* sp. nov., *Pharcidoconcha raupi* gen. nov. et sp. nov., *Leconychia doylei* gen. nov. et sp. nov., *Glyptonychia wilsoni* gen. nov. et sp. nov., *Pteronychia haupti* gen. nov. et sp. nov., *Denticelox* gen. nov., *Runnegaria cuneata* gen. nov. et sp. nov., *Colpantyx woolleyi* gen. nov. et sp. nov., *Xestoconcha kraciukae* gen. nov. et sp. nov., *Copidens browni* gen. nov. et sp. nov., *Brachilyrodesma radkei* gen. nov. et sp. nov., *Noradonta shergoldi* gen. nov. et sp. nov., and *Sphenosolen draperi* gen. nov. et sp. nov. The eleven species named by Tate (1896) and Johnston (1888) are considered, and their generic-level assignments are updated. The species *'Pteronites' micans* Tate is based on the genal spine of a trilobite and is not a pinnid pelecypod. A new family Colpomyidae is erected within the superfamily Mytilacea.

Twenty-six of the species are at present known only from the Amadeus Basin, nine only from the Georgina Basin, and two (possibly three) are common to both basins. Ten species are known from Tasmania, none of which are in common with mainland Australian species. The specimens were collected from 91 localities. The age of the pelecypods ranges from Early Ordovician (Arenigian) to Late Ordovician (Richmondian); most species occur in lower Middle Ordovician rocks. Most of the Tasmanian species are found in limestones, whereas most of those from the mainland are in coarse clastic rocks.

In addition to the pelecypods, we comment briefly on six species of rostroconch molluscs, two of which are newly named: *Tolmachovia corbetti* sp. nov. and *Bransonia townleyi* sp. nov.

1. INTRODUCTION

This paper is a systematic study of the pelecypod molluscs from the Ordovician rocks of Tasmania and of the Georgina and Amadeus Basins in western Queensland and the Northern Territory. We recognize 47 species, of which 38 are named and nine are treated within open nomenclature. Ten of the species are known only from Tasmania, 26 occur only in the Amadeus Basin, and nine only in the Georgina Basin. Two, and possibly a third, are common to both the Amadeus and Georgina Basins; there are no known species in common between the mainland and Tasmania (Table 1). Eleven of the named species have been considered previously (Tate, 1896; Johnston, 1888); the remaining 27 species are newly named herein. To our knowledge, only four previous papers have dealt with Australian Ordovician pelecypods: Johnston (1888) figured two species from Tasmania; Etheridge (1894) described one species from the Amadeus Basin; Tate (1896) described nine species from the Amadeus Basin; and Hill, Playford, & Woods (1969) figured some taxa from western Queensland. All the previously figured material, except that of Johnston (1888), is refigured herein; we cannot locate Johnston's material and presume it to be lost. Bigsby (1868, p. 140) and Johnston (1888, p. 49) listed a number of Salter *nomina nuda* for Tasmanian Ordovician pelecypods.

The bulk of the specimens upon which this study is based have been accumulating at the Bureau of Mineral Resources (BMR) since 1955. For the most part, the specimens were collected by various field parties during the mapping of the 1:250 000 map areas and have been maintained intact as a collection by Gilbert-Tomlinson. This collection was supplemented by field work in July-August 1974 by Pojeta and J. H. Shergold and A. T. Wells of BMR. In addition to the BMR collection, we have had the generous co-operation of the Australian Museum, Sydney, the University of Queensland, and the University of Tasmania, all of which have lent us their collections of Australian Ordovician pelecypods. Altogether, we examined more than 1000 specimens. The number of specimens of *Lophoconcha corrugata* (Tate) gen. nov., *Pharcidoconcha raupi* gen. nov. et sp. nov., and *Sthenodonta jelli* gen. nov. et sp. nov. cannot be established because they occur in coquinites where many shells are piled together; of the remaining 44 species discussed, we have 750 specimens. The number of specimens of each species available to us is given in each species description. The specimens are from 91 localities, of which 69 are in the Amadeus Basin, 16 are in the Georgina Basin, and 6 are in Tasmania.

In addition to the pelecypods, we describe and figure some rostroconch molluscs. This section of the paper supplements our monograph of Australian rostroconchs (Pojeta, Gilbert-Tomlinson, & Shergold, 1977), and only such new information as has been obtained since the completion of that work is included.

The Amadeus Basin has been mapped on a scale of 1:250 000 by BMR. The geology and lithostratigraphy of the Basin have been described by Öpik (1956); Prichard & Quinlan (1962); Ranford, Cook, & Wells (1965); Wells, Forman, & Ranford (1965); Forman (1966); Wells, Stewart, & Skwarko (1966); Wells, Ranford, Stewart, Cook, & Shaw (1967); Forman, Milligan, & McCarthy (1967); Wells, Forman, Ranford, & Cook (1970); and Cook (1972a). In contrast, relatively little has been published about the palaeontology and biostratigraphy of the large Ordovician faunas of the area. Tate (1891; 1896), Etheridge (1891a, b; 1892; 1893; 1894), Teichert (1939), Teichert & Glenister (1952), Thomas (1960), Nieper (1970), Crespin (1943), Crockford (1943), and Pojeta, Gilbert-Tomlinson, & Shergold (1977) wrote on the Ordovician fauna. The last paper and this summarize the information presently available on Australian Cambrian and Ordovician bivalved molluscs, based on the major collections. In the sense that these studies are the first to deal with a significant part of the Amadeus fauna, they must be looked on as pioneering studies.

The great bulk of the Amadeus Basin pelecypod fauna is from two clastic formations, the Pacoota Sandstone and the Stairway Sandstone, and thus, most of the specimens are preserved as various kinds of moulds and casts. Most of the specimens from the Stokes Siltstone are from limestone beds and preserve the shell.

The lithostratigraphy and geology of the Georgina Basin have been summarized by Smith (1964, 1972), and the entire Basin has been mapped on the 1:250 000 scale. The Cambrian and Ordovician faunas and biostratigraphy have been studied by Druce & Jones

(1971); Nieper (1970); Gilbert-Tomlinson (1973); Henderson (1974); Henderson & Shergold (1971); Hill, Playford, & Woods (1969); Jones, Shergold, & Druce (1971); Öpik (1958, 1961, 1963, 1967, 1968, 1970a, 1970b); Shergold (1969, 1971a, 1973, 1975); and Pojeta, Gilbert-Tomlinson, & Shergold (1977). To date, most of the published palaeontological and biostratigraphic studies of the Georgina Basin have been in the carbonate facies of western Queensland, with emphasis on the Cambrian faunas. In this study, most of our Ordovician material is from the Carlo Sandstone and the sandy dolomite of the Nora Formation on either side of the Queensland/Northern Territory border. Our pelecypod specimens are largely preserved as moulds and casts of various sorts in clastic rock units. One specimen from the Coolibah Formation is a silicified replica preserved in limestone.

Tasmanian Ordovician geology and stratigraphy has been summarized by Banks (1957, 1962); Blissett (1962); and Corbett & Banks (1974). There is an extensive literature on the Ordovician fauna of Tasmania which has been summarized in the bibliographies of Banks (1962) and Corbett & Banks (1974). Most of our Tasmanian specimens are preserved as silicified replicas in limestone.

The Australian material described herein provides new insights into Ordovician pelecypods in several ways. (1) The taxa described form the first large Ordovician pelecypod fauna known from the Southern Hemisphere. (2) The fauna helps fill in knowledge of pelecypods from a time when the group is not well known elsewhere in the world, Early Ordovician to early Middle Ordovician (Pojeta, 1971, p. 27). (3) The first known occurrences of the following Ordovician pelecypod taxa in the Southern Hemisphere are recorded: *Deceptrix, Nuculites, Cyrtodontula,* Ambonychiidae, Pterineidae, Cycloconchidae, Lyrodesmatidae, and Orthonotidae. (4) The oldest known representatives of the following taxa occur in the Australian Ordovician: Cyrtodontidae, *Cyrtodontula,* Pterineidae, Colpomyidae, and Orthonotidae. (5) The new genera *Alococoncha, Fidera, Eritropis, Inaequidens, Lophoconcha, Sthenodonta, Zeehania, Lecanychia, Glyptonychia, Pteronychia, Denticelox, Runnegaria, Colpantyx, Xestoconcha, Copidens, Brachilyrodesma,* and *Sphenosolen* are at present unique to Australia.

We have borrowed specimens from the following institutions (abbreviated in later pages as shown): Australian Museum, Sydney (AM); British Museum (Natural History) (BM); Geological Survey Queensland (GSQ); South Australian Museum, Adelaide (SAM); University of Queensland (UQ); University of Tasmania (UT). All other specimens are a part of the Commonwealth Palaeontological Collection (CPC) and are on deposit at the Bureau of Mineral Resources, Canberra.

We would like to thank J. M. Dickins, BMR, and Bruce Runnegar, University of New England, for reviewing the manuscript. For the loan of specimens we thank: Alex Ritchie, Australian Museum, Sydney; J. T. Woods and George Fleming, Geological Survey of Queensland; N. S. Pledge, South Australian Museum, Adelaide; D. Hill, J. B. Cameron, J. S. Jell, and J. B. Waterhouse, University of Queensland; and M. R. Banks and Suzanne Cameron, University of Tasmania. At the British Museum (Natural History), we thank Peter Green, N. J. Morris, and C. P. Nuttall for arranging to photograph the specimens of *Tolmachovia corbetti* sp. nov., and for answering our inquiries about Johnston's (1888) types. We thank G. A. Cooper, Smithsonian Institution, for identifying brachiopods from the Stokes Siltstone and Nora Formation for us. Pojeta thanks J. H. Shergold and A. T. Wells, BMR, for taking him to various collecting localities in the Georgina and Amadeus Basins. We thank R. W. Brown, P. W. Davis, H. M. Doyle, and A. T. Wilson, BMR, for their help in photographing the specimens.

Pojeta expresses his gratitude to the administrators of the U.S. Geological Survey and the Bureau of Mineral Resources for making it possible for him to visit Australia. At the U.S. Geological Survey, he particularly thanks Joseph Hazel, R. B. Raup, Jr., and N. F. Sohl. At the Bureau of Mineral Resources he especially thanks D. J. Belford, J. M. Dickins, and M. D. Plane for solving various problems as they arose, thus making the completion of the study possible.

2. STRATIGRAPHY

It is not possible for us to date each of the localities at which we have found Ordovician pelecypods in Australia, as we did for the rostroconch molluscs (Pojeta, Gilbert-Tomlinson, & Shergold, 1977). The pelecypods are among the first fossils described from the rock units considered; often they do not occur with other fossils; and at those localities where

other fossils do occur they have been little studied. The conodonts and trilobites, which have been of especial value in dating the carbonate sequences of the Cambrian and Ordovician rocks of northern Australia, may prove to be of value in dating the clastic Ordovician rocks of the Georgina and Amadeus Basins when these taxa are better known. In most places in the Systematic Palaeontology Section, we have not indicated the Ordovician stage(s) in which the new taxa occur; such information as we have on the stratigraphic distribution of all species is summarized here and in Table 1.

Although we cannot date individual pelecypod localities, we have had some success in dating the formations in which the pelecypods occur by other fossils, by internal evidence provided by the pelecypods themselves, and by superposition of the rock units. All the biostratigraphic information given in this discussion and in Table 1 must be considered as tentative, because rock units often transgress time, and we have no regional biostratigraphic zonal picture. Furthermore, the great majority of pelecypod specimens available to us are from grab samples and were not collected in sequence from measured sections.

Our pelecypod collections are from eight rock units. In the Amadeus Basin, we have samples from the Pacoota Sandstone (localities 1, 2, 3, 4, 5, 6, 19, 23, 27, 28, 35, 36, 37, 38, 39, 40); Stairway Sandstone (localities 7, 9, 16, 17, 18, 21, 22, 24, 25, 30, 31, 32, 33, 34, 42, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 77, 78, 79, 80, 81, 82, 83); and Stokes Siltstone (localities 20, 26, 29, 41). In the Georgina Basin we have pelecypod collections from the Coolibah Formation (locality 72); Nora Formation (localities 10, 11, 12, 13, 14, 43, 44, 84, 86, 87, 88, 89, 90); and Carlo Sandstone (localities 15, 85). From Tasmania we have pelecypod collections from the Gordon Limestone (localities 74, 75, 76, 91) and Westfield Beds (locality 73); we also have one collection of rostroconchs from the Caroline Creek Sandstone (locality 8).

In the Amadeus Basin, the superposition of the Ordovician formations in the Larapinta Group is Pacoota Sandstone, Horn Valley Siltstone, Stairway Sandstone, Stokes Siltstone, and Carmichael Sandstone. The age of the Horn Valley Siltstone is particularly revealing, as this unit has yielded Arenigian conodonts and graptolites (late Early Ordovician). Thomas (1960) noted the occurrence of a graptolite close to *Didymograptus patulus* from Stokes Pass in the Amadeus Basin, which he stated to indicate an Arenigian age. He did not name the rock unit in which the graptolite was found, but Gilbert-Tomlinson, who was on the 1956 field trip when the discovery was made, notes herein that the graptolites identified by Thomas (1960) from Stokes Pass came from the Horn Valley Siltstone. Öpik (1956, 1957, p. 47) discovered the graptolite *Didymograptus nitidus* above the 'No. 4 Quartzite' (Pacoota Sandstone), in the Amadeus Basin; he feels (oral communication, April 1975) that the host rock was probably the Horn Valley Siltstone. *D. nitidus* also indicates an Arenigian age.

Jones (1971, p. 53) noted that the conodont *Drepanodus parallelus* occurs in the Horn Valley Siltstone, where it is probably Arenigian in age, although the total range of the species is latest Tremadocian-Arenigian. Nieper (1970, p. 89) deduced from conodont evidence that the Horn Valley Siltstone was slightly older than early Middle Ordovician. We do not have any pelecypods from the Horn Valley Siltstone on which to date the unit.

Thus, the evidence presently available on the age of the Horn Valley Siltstone suggests that it is Arenigian (late Early Ordovician). We can use this information as a datum plane in trying to date the other Ordovician rock units of the Amadeus Basin.

The Pacoota Sandstone underlies the Horn Valley Siltstone and is known to range in age from Late Cambrian (Payntonian) to Early Ordovician (Arenigian) (Pojeta, Gilbert-Tomlinson, & Shergold, 1977). None of the pelecypods found in the Pacoota have been associated with Cambrian trilobites; most occur with the little-known trilobite *Psilocephalina* Hsü. Hsü and Ma (1948) regarded *Psilocephalina* as Tremadocian (early Ordovician) in age in China, where it occurs with the trilobite *Dactylocephalus* Hsü. In Australia, *Dactylocephalus* occurs in the *Drepanodus? gracilis-Scolopodus sexplicatus* conodont Zone of Arenigian age (late Early Ordovician) in the Daly River Basin (Jones, 1971, p. 21). Thus, *Psilocephalina* may also range into the Arenigian in Australia. Because the pelecypods of the Pacoota Sandstone occur with or above *Psilocephalina* we regard them as Early Ordovician in age. The Pacoota pelecypods are all in the upper third of the formation, which indicates that they are in the youngest (Arenigian) part of the unit. There are only five known species of Tremadocian (early Early

Ordovician) pelecypods in the world (Pojeta, 1975), and none of them is similar to the Pacoota pelecypods. The Pacoota pelecypods represent the oldest yet known in Australia.

The age of the Stairway Sandstone is particularly difficult to determine. It includes an endemic trilobite fauna, and because it crops out over 50 000 km^2, the formation probably varies in age from place to place; it may range across the Early Ordovician/Middle Ordovician boundary. Gilbert-Tomlinson (*in* Wells et al., 1970, p. 71; *in* Cook, 1972a, p. 5) suggested that the Stairway Sandstone ranges in age from late Llanvirnian to Llandeilian (early Middle Ordovician), and (1973, p. 75) suggested that the Stairway is no younger than Llandeilian and that it may be Llanvirnian in age. She has since (unpublished data) found a *Ptyocephalus*-like (=*Kirkella* Kobayashi) trilobite in the Stairway Sandstone which suggests late Canadian (late Early Ordovician) age (Harrington et al., 1959; Hintze, 1952; Ross, 1951).

Druce (oral communication, December 1974) noted that on exceedingly preliminary studies of grab samples, the conodonts of the Stairway Sandstone suggest a possible early Llanvirnian age (early Middle Ordovician).

The Stairway Sandstone has a diverse pelecypod fauna; such diversity is not known elsewhere in the world before the Middle Ordovician. The fauna includes *Cyrtodonta,* ambonychiids, pterineids, and orthonotids, none of which is known elsewhere in the world in rocks older than early Middle Ordovician (Llanvirnian; Chazyan). Thus, the internal evidence from the pelecypods suggests that the Stairway Sandstone is not older than earliest Middle Ordovician. As a working hypothesis, we suggest that the Stairway Sandstone is early Middle Ordovician in age (Llanvirnian-Llandeilian; Chazyan). The *Ptyocephalus*-like trilobite may indicate that in places the Stairway is slightly older.

Although the Stokes Siltstone overlies the Stairway Sandstone, it may in part be coeval with the Stairway. Gilbert-Tomlinson (*in* Wells et al, 1970, p. 78) suggested that the Stokes Siltstone was Caradocian in age (Middle and Late Ordovician). Trepostome bryozoans described by Crockford (1943) reinforce the interpretation that the Stokes is Middle Ordovician or younger. It is likely that the bryozoans are from the Stokes because they occur with *'Orthis' leviensis* Etheridge, which is known only from the Stokes Siltstone. G. A. Cooper (written communication, April 1975) examined some brachiopods from the Stokes for us, which were preserved as exteriors or as pedicle valve interiors. He noted that representatives of the genera *Dinorthis* and *Hesperorthis* might be present which suggest an Ashbyan age (early Middle Ordovician).

In the western and southern Georgina Basin the superposition of the rock units in the Toko Group is Coolibah Formation, Nora Formation, Carlo Sandstone, and Mithaka Formation. From the Coolibah Formation, we know of one poorly preserved pelecypod which may be a cyrtodontid. We accept the age of the Coolibah Formation given by Gilbert-Tomlinson (1973) and regard this collection as Arenigian (late Early Ordovician).

Nieper (1970) regarded the Nora Formation as basal Middle Ordovician (Chazyan), on the basis of conodonts, which she noted were similar to those of the Joins Formation of Oklahoma. Druce (oral communication, March 1975) noted that the fibrous conodonts of the Nora Formation were like those of the early Middle Ordovician of North America, but that the non-fibrous conodonts include zonal species that occur in the Arenigian of Scandinavia. What is known of the trilobites of the Nora Formation also gives an equivocal age. There is a species of *Carolinites* Kobayashi that is more like Arenigian (Early Ordovician) than Llanvirnian (Middle Ordovician) members of the genus. There is also the trilobite cf. *Pliomerina* Chougaeva, which is generally regarded as Middle Ordovician. Some of the brachiopods of the Nora are similar to *Hesperonomia* Ulrich & Cooper, which is not known above the Canadian (late Lower Ordovician) in North America. The Nora Formation also contains actinoceroid cephalopods which are well developed in the Middle Ordovician.

In examining the pelecypods of the Nora Formation, we have found an ambonychiid; elsewhere in the world members of this family are not known from rocks older than early Middle Ordovician (Chazyan). The new genus *Noradonta* is elsewhere probably known from the Lower Ordovician Tabita Formation of New South Wales (Warris, 1967) and the Armoricain Sandstone of Brittany (Barrois, 1891).

Öpik & Gilbert-Tomlinson (*in* Smith, 1972, p. 128) gave the age of the Nora Formation as Middle Ordovician, on the basis of a generalized faunal list; we feel that such a firm determination cannot be made on the basis of what is presently known of the Nora fauna.

The conodonts, trilobites, and pelecypods of the Nora Formation all suggest a mixing of Early and Middle Ordovician faunas. In the present state of knowledge it is not possible to determine whether Middle Ordovician elements occur earlier in Australia, or whether Early Ordovician elements range higher in the sequence, than elsewhere in the world. It seems likely that the Nora Formation is near the Lower/Middle Ordovician boundary, but until a more satisfactory regional picture is developed it will not be possible to determine on which side of the boundary the formation occurs, or if it spans the boundary.

The Carlo Sandstone overlies the Nora Formation and is thus younger than or coeval with the Nora. Little is known of the Carlo Sandstone fauna, although Öpik & Gilbert-Tomlinson (*in* Smith, 1972, p. 129) gave a Middle Ordovician age for the unit, based on a generalized faunal list. The known pelecypod fauna consists of only four species, three of which are ambonychiids; elsewhere in the world, this family is not known to occur in rocks older than early Middle Ordovician (Chazyan), although, as indicated above, an ambonychiid occurs in the Nora Formation. The Carlo Sandstone does have a trilobite in common with the Stairway Sandstone and thus may be of about the same age. As indicated above, we suggest that the Stairway is about Llanvirnian-Llandeilian (early Middle Ordovician) in age.

Our Ordovician pelecypods from Tasmania are from the Gordon Limestone and Westfield Beds, in ascending order. The age of the Gordon Limestone ranges from Upper Canadian (Lower Ordovician) to Edenian (early Late Ordovician), according to M. R. Banks (written and oral comunications, March-April 1975; Banks, 1962). Corbett & Banks (1974) indicated that the most likely age of the Westfield Beds is Richmondian (late Late Ordovician). From Tasmania, we also describe one rostroconch from the Caroline Creek Sandstone, which is regarded as Early Ordovician (Canadian; Arenigian) in age by Banks (1962) and Kobayashi (1940).

There are two known Ordovician pelecypod species in common between the Georgina and Amadeus Basins, *Palaeoneilo smithi* and *Sthenodonta eastii; Pteronychia haupti* may occur in both basins, and the genus *Cyrtodonta* is common to both. No known species or genera occur in both Tasmania and the Georgina Basin; however, four genera are common to both Tasmania and the Amadeus Basin, *Ctenodonta, Deceptrix, Inaequidens,* and *Cyrtodontula.*

TABLE 1

Australian Ordovician pelecypod species and a few rostroconchs listed by locality, basin or state, rock unit, and likely age.

Name	*Locality Number*	*Basin or State*	*Rock Unit*	*Age*
Alococoncha crassatellaeformis	9	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Ambonychia? sp. A	75	Tasmania	Gordon Limestone	Trentonian
Ambonychiid genus A, sp. A	15	Georgina	Carlo Sandstone	Middle Ordovician
Ambonychiid genus B, sp. A	79	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Brachilyrodesma radkei	—	Georgina	Toko Group	Ordovician
Colpantyx woolleyi	3	Amadeus	Pacoota Sandstone	Arenigian
Colpantyx woolleyi	4	Amadeus	Pacoota Sandstone	Arenigian
Colpantyx woolleyi	5	Amadeus	Pacoota Sandstone	Arenigian
Colpantyx woolleyi	6	Amadeus	Pacoota Sandstone	Arenigian
Colpantyx woolleyi	19	Amadeus	Pacoota Sandstone	Arenigian
Colpantyx woolleyi	23	Amadeus	Pacoota Sandstone	Arenigian
Colpantyx woolleyi	27	Amadeus	Pacoota Sandstone	Arenigian
Colpantyx woolleyi	28	Amadeus	Pacoota Sandstone	Arenigian
Colpantyx woolleyi	36	Amadeus	Pacoota Sandstone	Arenigian
Colpantyx woolleyi	38	Amadeus	Pacoota Sandstone	Arenigian
Colpantyx woolleyi	39	Amadeus	Pacoota Sandstone	Arenigian
Copidens browni	11	Georgina	Nora Formation	Ordovician

TABLE 1—(*continued*)

Name	*Locality Number*	*Basin or State*	*Rock Unit*	*Age*
Copidens browni	13	Georgina	Nora Formation	Ordovician
Copidens browni	14	Georgina	Nora Formation	Ordovician
Copidens browni	43	Georgina	Nora Formation	Ordovician
Copidens browni	44	Georgina	Nora Formation	Ordovician
Copidens browni	90	Georgina	Nora Formation	Ordovician
Ctenodonta jonesii	—	Tasmania	Gordon Limestone	Ordovician
Ctenodonta macalesteri	74	Tasmania	Gordon Limestone	Blackriveran
Ctenodonta youngi	81	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta carberryi	65	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta hazeli	48	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta hazeli	69	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta hazeli	70	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta staffordae	64	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta staffordae	66	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta wattii	16	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta wattii	17	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta wattii	24	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta wattii	25	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta wattii	45	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta wattii	46	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta wattii	56	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta wattii	58	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta wattii	59	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta wattii	64	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta wattii	68	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta wattii	81	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Cyrtodonta sp. A	—	Georgina	Toko Group	Ordovician
Cyrtodontula hadzeli	40	Amadeus	Pacoota Sandstone	Arenigian
Cyrtodontula sohli	75	Tasmania	Gordon Limestone	Trentonian
Deceptrix banksi	74	Tasmania	Gordon Limestone	Blackriveran
Deceptrix banksi	75	Tasmania	Gordon Limestone	Trentonian
Deceptrix? sp. A	1	Amadeus	Pacoota Sandstone	Arenigian
Denticelox tortuosa	30	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Eritropis opiformis	30	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Eritropis opiformis	63	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Eritropis opiformis	78	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Eritropis opiformis	82	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Eritropis sp. A	9	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Fidera maryae	75	Tasmania	Gordon Limestone	Trentonian
Fidera maryae	76	Tasmania	Gordon Limestone	Edenian
Fidera maryae	91	Tasmania	Gordon Limestone	Blackriveran-Trentonian
Glyptonychia wilsoni	15	Georgina	Carlo Sandstone	Middle Ordovician
Inaequidens campbelli	71	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Inaequidens davisi	75	Tasmania	Gordon Limestone	Trentonian
Johnmartinia cordata	9	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Johnmartinia cordata	30	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Johnmartinia cordata	33	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Johnmartinia cordata	34	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Johnmartinia orbicularis	9	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Johnmartinia orbicularis	30	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Leconychia doylei	43	Georgina	Nora Formation	Ordovician
Lophoconcha corrugata	—	Amadeus	Stokes Siltstone	Middle Ordovician

TABLE 1—(*continued*)

Name	*Locality Number*	*Basin or State*	*Rock Unit*	*Age*
'Modiolopsis' gordonensis	—	Tasmania	Gordon Limestone	Ordovician
Mordiolopsis? sp. A	81	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Noradonta shergoldi	11	Georgina	Nora Formation	Ordovician
Noradonta shergoldi	13	Georgina	Nora Formation	Ordovician
Noradonta shergoldi	86	Georgina	Nora Formation	Ordovician
Noradonta shergoldi	89	Georgina	Nora Formation	Ordovician
Nuculites wattii	—	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Palaeoneilo smithi	7	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Palaeoneilo smithi	10	Georgina	Nora Formation	Ordovician
Palaeoneilo smithi	11	Georgina	Nora Formation	Ordovician
Palaeoneilo smithi	13	Georgina	Nora Formation	Ordovician
Palaeoneilo smithi	41	Amadeus	Stokes Siltstone	Middle Ordovician
Palaeoneilo smithi	68	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Palaeoneilo smithi	81	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Palaeoneilo smithi	87	Georgina	Nora Formation	Ordovician
Pharcidoconcha raupi	35	Amadeus	Pacoota Sandstone	Arenigian
Pharcidoconcha raupi	37	Amadeus	Pacoota Sandstone	Arenigian
Pterinea sp. A	73	Tasmania	Westfield Beds	Richmondian
Pteronychia haupti	83	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Pteronychia aff. *P. haupti*	85	Georgina	Carlo Sandstone	Middle Ordovician
Runnegaria cuneata	15	Georgina	Carlo Sandstone	Middle Ordovician
Sphenosolen draperi	77	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	16	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	18	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	20	Amadeus	Stokes Siltstone	Middle Ordovician
Sthenodonta eastii	22	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	24	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	25	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	32	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	41	Amadeus	Stokes Siltstone	Middle Ordovician
Sthenodonta eastii	42	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	43	Georgina	Nora Formation	Ordovician
Sthenodonta eastii	47	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	48	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	49	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	51	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	52	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	53	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	54	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	55	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	56	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	57	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	60	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	61	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	62	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	67	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	68	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	70	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	80	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta eastii	81	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Sthenodonta etheridgei	—	Amadeus	Stairway Sandstone & Stokes Siltstone	Middle Ordovician

TABLE 1—(*continued*)

Name	*Locality Number*	*Basin or State*	*Rock Unit*	*Age*
Sthenodonta jelli	26	Amadeus	Stokes Siltstone	Middle Ordovician
Sthenodonta passmoreae	11	Georgina	Nora Formation	Ordovician
Sthenodonta passmoreae	13	Georgina	Nora Formation	Ordovician
Sthenodonta passmoreae	14	Georgina	Nora Formation	Ordovician
Sthenodonta passmoreae	44	Georgina	Nora Formation	Ordovician
Sthenodonta passmoreae	84	Georgina	Nora Formation	Ordovician
Sthenodonta passmoreae	86	Georgina	Nora Formation	Ordovician
Sthenodonta passmoreae	87	Georgina	Nora Formation	Ordovician
Sthenodonta passmoreae	90	Georgina	Nora Formation	Ordovician
Sthenodonta? sp. A	—	Amadeus	Stokes Siltstone	Middle Ordovician
Xestoconcha kraciukae	2	Amadeus	Pacoota Sandstone	Arenigian
Xestoconcha kraciukae	4	Amadeus	Pacoota Sandstone	Arenigian
Xestoconcha kraciukae	5	Amadeus	Pacoota Sandstone	Arenigian
Xestoconcha kraciukae	19	Amadeus	Pacoota Sandstone	Arenigian
Xestoconcha kraciukae	23	Amadeus	Pacoota Sandstone	Arenigian
Xestoconcha kraciukae	27	Amadeus	Pacoota Sandstone	Arenigian
Xestoconcha kraciukae	28	Amadeus	Pacoota Sandstone	Arenigian
Xestoconcha kraciukae	36	Amadeus	Pacoota Sandstone	Arenigian
Xestoconcha kraciukae	39	Amadeus	Pacoota Sandstone	Arenigian
Zeehania jacksoni	75	Tasmania	Gordon Limestone	Trentonian
Bransonia townleyi	75	Tasmania	Gordon Limestone	Trentonian
Conocardioid sp. A.	—	Amadeus	Stokes Siltstone	Middle Ordovician
Pinnocaris? sp. C	5	Amadeus	Pacoota Sandstone	Arenigian
Ribeiria csiro	18	Amadeus	Stairway Sandstone	Llanvirnian-Llandeilian
Technophorus walteri	3	Amadeus	Pacoota Sandstone	Arenigian
Technophorus walteri	4	Amadeus	Pacoota Sandstone	Arenigian
Technophorus walteri	5	Amadeus	Pacoota Sandstone	Arenigian
Tolmachovia corbetti	8	Tasmania	Caroline Creek Sandstone	Arenigian

3. SYSTEMATIC PALAEONTOLOGY

Phylum **MOLLUSCA** Cuvier

Subphylum **DIASOMA** Runnegar & Pojeta, 1974

Class **PELECYPODA** Goldfuss

Subclass **PALAEOTAXODONTA** Korobkov

Diagnosis: Equivalved pelecypods with taxodont dentition, with or without a resilifer, and lacking a byssus as adults.

Stratigraphic distribution: Lower Ordovician (Tremadocian)-Holocene.

Remarks: Proper orientation of fossil representatives of this subclass is difficult because living forms may have prosogyrate or opisthogyrate beaks, and the shell may be elongated anteriorly or posteriorly. When the soft parts are not present, one must determine the correct anterior-posterior orientation of the shell from such hard-part features as the external ligament grooves or space when these are present (Pojeta, 1971), accessory muscle scars (Driscoll, 1964), the arrangment of teeth in the anterior and posterior tooth rows (Bradshaw & Bradshaw, 1971), or comparison with similar forms. The anterior adductor muscle is often more deeply impressed into the shell than the posterior adductor muscle in pelecypods, and in the absence of other criteria, this rule of thumb is sometimes useful in orienting palaeotaxodonts. Often specimens are not well enough preserved to be sure of the correct orientation. For each of the genera described below, we give our reasons for orienting them as we have.

Order **NUCULOIDA** Dall

This is the only order at present assigned to the Palaeotaxodonta, and it has the same definition and stratigraphic range as the subclass.

Superfamily **CTENODONTACEA** Wöhrmann

Diagnosis: More or less equilateral nuculoids lacking a pallial sinus and resilifer.

Stratigraphic distribution: Lower Ordovician (Tremadocian?)-Upper Carboniferous.

Family **CTENODONTIDAE** Wöhrmann

This is the only family at present placed in the Ctenodontacea, and has the same definition and stratigraphic range as the superfamily.

Genus **Ctenodonta** Salter, 1852
Pl. 3

Type species: Tellinomya nasuta Hall, 1847, by subsequent designation of Salter (1859, p. 34).

Diagnosis: Nuculaniform ctenodontids lacking prominent comarginal ornament.

Stratigraphic distribution: Lower Ordovician (Tremadocian?) - Upper Ordovician (Richmondian).

Remarks: Harrington (1938, pl. 3, fig. 6) figured a nuculaniform shell which he called *Palaeoneilo iruyensis* from the Tremadocian rocks (Lower Ordovician) of Argentina; we suggest that this form be tentatively placed in *Ctenodonta* as *C.? iruyensis* (Harrington). The youngest known species assigned to the genus is *Ctenodonta* cf. *C. iphigenia* Billings from the Richmondian (Upper Ordovician) of Ohio (Pojeta, 1971). North American representatives of *Ctenodonta* clearly show external ligament grooves on the rostrate end of the shell (Pojeta, 1971, pl. 4, figs. 4, 5, 14), indicating that this end is posterior and the broad end is anterior. We use this same orientation for the Australian species.

Ctenodonta, as used herein and restricted by McAlester (1969) and Pojeta (1971), is geographically widespread, occurring in North America from Alaska to New York, and in Malaysia, continental Australia, Tasmania, and probably Argentina.

Ctenodonta youngi sp. nov.
Pl. 3, figs. 1-5

Diagnosis: Small *Ctenodonta* with umbo projecting only slightly above dorsal commissure.

Description: Dorsal margin straight; anterior and posterior margins rounded and projecting; ventral margin rounded and projecting anteriorly, straight to slightly indented posteriorly. Posterior part of shell rostrate. Beak anterior to lateral midline of shell, umbo projecting only slightly above dorsal commissure, umbonal ridge poorly defined. Size small.

The only known internal feature is some of the teeth, which are arranged in a straight line anterior and posterior to the beak.

Types and material: Ctenodonta youngi is known from six specimens, of which we figure the holotype (Pl. 3, figs. 4, 5) and three paratypes (Pl. 3, figs. 1-3). The holotype (CPC 15494) is 12.6 mm long and 6.9 mm high. All known specimens of *C. youngi* are internal moulds preserved in sandstone.

Type locality: The holotype and all the paratypes are from the Stairway Sandstone at our locality 81, Amadeus Basin, southern Northern Territory.

Distribution: Ctenodonta youngi is at present known only from the type locality.

Etymology: The species is named for G. C. Young, Bureau of Mineral Resources.

Remarks: Ctenodonta youngi differs from Northern Hemisphere species of *Ctenodonta* in having the beak well anterior to the lateral midline of the shell; Northern Hemisphere forms tend to be more equilateral.

Ctenodonta macalesteri sp. nov.
Pl. 3, figs. 6, 7

Diagnosis: Small *Ctenodonta* with umbo projecting prominently above dorsal commissure.

Description: Dorsal margin straight; anterior margin rounded and projecting, posterior margin nearly erect; ventral margin rounded and projecting anteriorly, nearly straight posteriorly. Posterior part of shell rostrate. Beak anterior to lateral midline of shell, umbo projecting prominently above dorsal commissure, umbonal ridge prominent dorsally. Size small.

The only known internal feature is the dentition, which consists of anterior and posterior tooth rows that meet at a wide angle just below the beak; the anterior row is considerably shorter than the posterior row.

Types and material: C. macalesteri is known only from the holotype (Pl. 3, figs. 6, 7). The holotype (UT 80908) is 10.1 mm long and 6.1 mm high; it is a silicified replica.

Type locality: The only known specimen of *C. macalesteri* is from the Gordon Limestone at our locality 74, central western Tasmania.

Distribution: According to M. R. Banks (written communication, March 1975) at locality 74 the Gordon Limestone is Blackriveran (Middle Ordovician) in age.

Etymology: The species is named for A. L. McAlester, Southern Methodist University, Dallas, Texas.

Remarks: Like *C. youngi, Ctenodonta macalesteri* differs from Northern Hemisphere species of *Ctenodonta* in having the beak well anterior

to the lateral midline of the shell. C. *macalesteri* differs from *C. youngi* in its more projecting umbo and in having the tooth rows meet at a wide angle below the beak, whereas in *C. youngi* both are straight below the beak.

Ctenodonta jonesii (Johnston, 1888)

Remarks: Johnston in his 'Geology of Tasmania' (1888, pl. 5, figs. 11, 11a) figured the species but neither described it nor indicated its size. We have not been able to locate his figured material at the University of Tasmania, the Tasmanian Museum, or the British Museum (Natural History), and presume it to be lost. In the plate explanation, Johnston listed *C. jonesii* as occurring in the 'Gordon Limestones, Tasmania'.

On the basis of Johnston's figures, *C. jonesii* is like the other known Australian species of *Ctenodonta* in having the beaks well anterior to the lateral midline of the shell. If Johnston's figures are natural size, *C. jonesii* is considerably larger than the other known Australian species of *Ctenodonta.* Johnston's figure 11, plate 5, is a lateral view of a right valve which is incomplete posteriorly; it measures 41.5 mm long and 24.9 mm high.

Genus **Alococoncha** nov.

Pl. 2

Type species: Isoarca crassatellaeformis Tate, 1896 (p. 107) is herein designated the type species of the new genus *Alococoncha.*

Diagnosis: Inequilateral, rugose ctenodontids.

Description: Slightly posteriorly elongated isomyarian ctenodontids with ornament of reverse imbricate comarginal rugae separated by narrow comarginal grooves, rugae sinuate posteriorly forming a shallow posterior sulcus and not recurved dorsally along the posterior. Slightly rostrate posteriorly. Anterior and posterior tooth-rows of nearly equal length and meeting each other under the beak at a distinct, but widely obtuse, angle. Beaks prosogyral.

Etymology: Aloco, from Greek *alox,* meaning a furrow, referring to the comarginal ornament; *concha,* from Greek *konkhe,* meaning a shell. Gender feminine.

Remarks: At present *Alococoncha* is known only from Australia, where it occurs in the Stairway Sandstone, Amadeus Basin, southern Northern Territory.

The ornament of *Alococoncha* is similar to that of *Praectenodonta* Philip (1962) and *Gotodonta* Soot-Ryen (1964). *Alococoncha* differs from both of these genera in not having the rugae recurved dorsally along the posterior and in having the tooth-rows meet at a distinct angle below the beaks. Also, in *Alococoncha* the beaks are slightly anterior to the lateral midline of the shell, whereas *Praectenodonta* and *Gotodonta* are either equilateral or have the beaks placed posterior to the lateral midline. As in other ctenodontids, we consider the higher end of the shell of *Alococoncha* to be anterior. The rostrate end is thus posterior, as is the slight sulcus in the comarginal ornament.

Alococoncha crassatellaeformis (Tate, 1896)

Pl. 2, figs. 1-10

1896. *Isoarca crassatellaeformis* Tate, p. 107, pl. 2, fig. 19.

Diagnosis: Subcircular to slightly posteriorly elongate *Alococoncha.*

Description: Anterior and posterior parts of dorsal margin meeting beneath beaks at a broad angle, not straight, and producing a subtriangular dorsum; anterior and posterior margins rounded and projecting; ventral margin rounded and projecting anteriorly, sinuate posteriorly; overall shape subcircular to slightly elongated posteriorly. Umbonal ridge set off from rest of shell by posterior sulcus in ornament.

The known internal features are the subequal anterior and posterior tooth-rows and adductor muscle scars; dorsal to, but disconnected from, the posterior adductor muscle scar is a small pedal retractor muscle scar.

Types and material: A. crassatellaeformis is known from 18 specimens. Six of these are syntypes (SAM T 1223a-f), of which two are actual specimens and four are wax replicas of external moulds. It was one of the wax replicas which Tate (1896, pl. 2, fig. 19) figured; we figure it (SAM T 1223a) on Plate 2, fig. 7, and choose the specimen from which it was made as the lectotype of *Isoarca crassatellaeformis* Tate, 1896. The remaining five syntypes are designated as paralectotypes. We cannot locate the specimens from which any of the wax replicas in the type suite were made and presume them to be lost. The wax replica of the lectotype is 19.1 mm long and 13.3 mm high.

All known specimens of *A. crassatellaeformis* are sandstone moulds. Two incomplete specimens preserved as part and counterpart (Pl. 2, figs 1-3) show both the dentition and ornament.

Type locality: Tate (1896, p. 107) gave the locality of the type material as Mount Watt, which is our locality 9, Stairway Sandstone, Amadeus Basin, southern Northern Territory.

Distribution: All specimens of *Alococoncha crassatellaeformis* are from our locality 9, where the

outcrop of Stairway Sandstone forms an Ordovician outlier on Proterozoic rocks.

Remarks: Alococoncha crassatellaeformis differs from all other known Ordovician palaeotaxodonts in its rugose comarginal ornament.

Superfamily **NUCULACEA** Gray

Diagnosis: Posteriorly truncate nuculoids with or without a resilifer.

Stratigraphic distribution: Lower Ordovician (Tremadocian)-Holocene.

Family **PRAENUCULIDAE** McAlester

Diagnosis: Nuculaceans lacking a resilifer.

Stratigraphic distribution: Lower Ordovician (Tremadocian)-Lower Devonian.

Remarks: Harrington (1938) described the species *Cosmogoniophorina tenuicostata* from the lower Tremadocian (Lower Ordovician) rocks of Argentina. *Cosmogoniophorina* is an isofilibranch genus, and the Argentinian specimens probably do not belong in it. One of Harrington's figures of *C. tenuicostata* (1938, pl. 31, fig. 4) suggests the presence of taxodont dentition, and the shape of the species is similar to the praenuculoid *Deceptrix* Fuchs; however, the Argentinian form has fine radial ribs which are not present in *Deceptrix*. It seems likely that Harrington's *Cosmogoniophorina tenuicostata* belongs to a new genus of praenuculids and represents the oldest known member of that family.

Genus **Fidera** nov.

Pl. 5

Type species: Fidera maryae sp. nov. is herein designated the type species of the new genus *Fidera.*

Diagnosis: Praenuculids with comarginal lirae.

Description: Deceptriciform praenuculids with regularly spaced comarginal lirae, interspaces between lirae as wide as or wider than the lirae.

Anterior end of shell elongated and beak posterior to lateral midline of shell. Lunule and escutcheon developed dorsally anterior and posterior to beaks. Beaks prosogyral. Tooth-rows subequal.

Stratigraphic distribution: Middle Ordovician (Blackriveran)-Upper Ordovician (Edenian).

Etymology: Latin *fidus,* meaning faithful; Latin *(H)era,* mistress of house, as opposed to *deceptrix,* meaning female deceiver. Gender feminine.

Remarks: In general shell shape, *Fidera* is much like *Deceptrix* Fuchs (1919) and *Praenucula* Pfab (1934), but differs from both in its regularly spaced prominent comarginal lirae. Anterior and posterior orientation of *Fidera* was determined with reference to *Deceptrix,* which shows the ligament space on the shorter end of the shell (Pojeta, 1971, pl. 5, figs. 9, 17). Bradshaw & Bradshaw (1971) determined the same orientation for *Deceptrix* as Pojeta, using the criterion of variation in tooth form. For *Deceptrix* they used the name *Praeleda* Pfab (1934) which McAlester (1969) placed in synonymy with *Deceptrix.*

Fidera maryae gen. et sp. nov.

Pl. 5, figs. 1-6

Diagnosis: Fidera with anterior and posterior tooth-rows meeting under the beak in a broad but distinct angle.

Description: Anterior and posterior parts of dorsal margin meeting beneath beaks in a broad angle, not straight, and producing a subtriangular dorsum; anterior and posterior margins rounded and projecting; ventral margin broadly rounded, not projecting. Umbonal ridge broadly rounded, umbo prominently projecting dorsally.

The only known internal feature is the teeth, which are arranged in two rows of nearly equal length, meeting at a wide but distinct angle below the beak.

Types and material: Fidera maryae is known from 63 specimens of which we figure the holotype (Pl. 5, figs. 3, 4) and three paratypes (Pl. 5, figs. 1, 2, 5, 6). The holotype (UT 94493) measures 9.2 mm long and 7.2 mm high. All known specimens of *F. maryae* are silicified replicas.

Type locality: The holotype and two of the figured paratypes are from the Gordon Limestone at our locality 76, central western Tasmania.

Distribution: F. maryae is known from our localities 75, 76, and 91, all of which occur in the Gordon Limestone of Tasmania. According to M. R. Banks (oral communication March 1975) at these localities the Gordon Limestone is Blackriveran (Middle Ordovician) to Edenian (early Late Ordovician) in age.

Etymology: The species is named for the wife of the senior author, Mary Louise.

Genus **Deceptrix** Fuchs, 1919

Pl. 7

Type species: Deceptrix carinata Fuchs, 1919 (p. 79) by monotypy.

Diagnosis: Quadrate anteriorly elongated shell with beak at or posterior to lateral midline of shell. Ornament of comarginal growth lines, lacking regularly spaced prominent comarginal lirae.

Stratigraphic distribution: Upper Lower Ordovician (Whiterockian)-Lower Devonian.

Remarks: North American representatives of *Deceptrix* clearly show the ligamental space (Pojeta, 1971, pl. 5, figs. 9, 17) posterior to the prosogyral beaks; this orientation is also used for the Australian species. In the Northern Hemisphere, *Deceptrix* is widespread, occurring throughout the Ordovician of North America (Pojeta, 1971, p. 16) and western Europe (Bradshaw, 1970); Bradshaw used the name *Praeleda* Pfab (1934), which McAlester (1969) placed in synonymy with *Deceptrix*. The new species described here are the first members of *Deceptrix* to be recorded from the Southern Hemisphere.

Deceptrix banksi sp. nov.

Pl. 7, figs. 1-3

Diagnosis: Small nearly equilateral *Deceptrix* with anterior and posterior tooth-rows of about equal length.

Description: Dorsal margin straight; anterior margin rounded and projecting; posterior margin oblique toward dorsum to erect; ventral margin rounded, not projecting. Umbo large, dorsal part projecting prominently above the dorsal commissure, umbonal ridge broadly rounded and merging into rest of shell ventrally. Beaks prosogyral, placed at about lateral midline and producing a nearly equilateral shell. Size small.

The only known internal feature is the teeth, which are arranged in nearly straight anterior and posterior rows of about equal length.

Types and material: Deceptrix banksi is known from 39 specimens, of which we figure the holotype (Pl. 7, figs. 1, 2) and a paratype (Pl. 7, fig. 3). The holotype (UT 94494) measures 13 mm long and 6.5 mm high. All known specimens of *D. banksi* are silicified replicas.

Type locality: The holotype and figured paratype are from the Gordon Limestone at our locality 74, central western Tasmania.

Distribution: D. banksi is known from our localities 74 and 75, at both of which it occurs in the Gordon Limestone of central western Tasmania. According to M. R. Banks (written communication, March 1975) at locality 74, the Gordon Limestone is Blackriveran (Middle Ordovician) in age, and at locality 75, it is Trentonian (late Middle or early Late Ordovician).

Etymology: The species is named for M. R. Banks, University of Tasmania.

Deceptrix? sp. A

Pl. 3, fig. 8

Discussion: This form is known from only one specimen, which is preserved in sandstone and has the general shape of *Deceptrix*. The specimen measures 17.6 mm long and 12.4 mm high. *Deceptrix?* sp. A differs from *D. banksi* in not being equilateral.

Distribution: Deceptrix? sp. A is known only from the Pacoota Sandstone at our locality 1, Amadeus Basin, southern Northern Territory.

Genus **Eritropis** nov.

Pl. 1

Type species: Isoarca opiformis Tate, 1896 (p. 108) is herein designated the type species of the new genus *Eritropis*.

Diagnosis: Praenuculids with single posterior umbonal rib.

Description: Quadrate praenuculids with ornament of comarginal growth lines and a single sharp posterior umbonal radial rib. Posterior part of shell markedly flattened and broad, considerably shorter than part of shell anterior to radial rib. Inequilateral with beak nearer anterior than posterior end of shell; anterior tooth-row shorter than posterior tooth-row. Beaks prosogyral.

Etymology: Eri, Greek intensive particle, very; *tropis,* Greek, meaning keel, referring to the posterior radial rib. Gender feminine.

Remarks: Eritropis differs from all the other known praenuculids in its sharp posterior umbonal rib. The flattened end of the shell is taken as posterior, as the adductor muscle scar at this end of the shell is not as deeply impressed as the adductor muscle at the other end of the shell. Moreover, the adductor muscle scar regarded as anterior is slightly smaller than that regarded as posterior, and in pelecypods, it is most common for the anterior adductor muscle to be slightly smaller than the posterior adductor muscle.

Eritropis opiformis (Tate, 1896)

Pl. 1, figs. 1-9; Pl. 2, figs. 11-13

1896. *Isoarca opiformis* Tate, p. 108, pl. 2, figs. 16a, b.

Diagnosis: Eritropis with length and height subequal.

Description: Dorsal margin gently arcuate; anterior margin rounded and projecting; posterior margin oblique toward dorsum to erect; ventral margin rounded but not projecting anteriorly, sinuate posteriorly. Umbonal ridge broadly rounded and umbo projecting above dorsal commissure. Posterior face of shell cordate.

The known internal features are the teeth and the subequal adductor muscle scars.

Types and material: E. opiformis is known from 34 specimens. Three of these are syntypes (SAM T 1261a-c) of which we choose SAM T 1261a as the lectotype; it was figured by Tate (1896) on his plate 2, figure 16a, and is re-figured herein on Plate 2, figures 11-13. The other two Tate syntypes are herein designated paralectotypes (SAM T 1261b, c). We figure five other specimens of the species (Pl. 1, figs. 1-9), all smaller than those in the type suite. The lectotype is 20.2 mm long and 17.3 mm high. All known specimens of *Eritropis opiformis* are sandstone moulds.

Type locality: Tate (1896, p. 108) gave the type locality of *E. opiformis* as 'In quartzite, between Petermann Creek and Tempe Downs', which is in the Amadeus Basin, southern Northern Territory. Tate's description covers a large area, and we have not been able to locate the precise spot from which his specimens came. The lithology of the type suite of *E. opiformis* suggests the Stairway Sandstone.

Distribution: In addition to the type locality, *E. opiformis* is known from our localities 30, 63, 78, and 82, at all of which it occurs in the Stairway Sandstone.

Remarks: E. opiformis differs from *E.* sp. A in that the length and height of the shell are subequal, whereas *E.* sp. A is considerably longer than high.

Eritropis sp. A

Pl. 1, fig. 10

Discussion: This form is known from only one specimen, which is preserved in sandstone. It has a posterior umbonal radial rib, and the anterior tooth row is shorter than the posterior one; it differs from *E. opiformis* in the ways cited above. The single known specimen is 20.1 mm long and 13.5 mm high.

Distribution: Eritropis sp. A is known from the Stairway Sandstone at our locality 9, Amadeus Basin, southern Northern Territory.

Superfamily **NUCULANACEA** Adams & Adams

Family **MALLETIIDAE** Adams & Adams

Diagnosis: Posteriorly elongate nuculoids with or without a resilifer.

Distribution: Lower Ordovician (Tremadocian?)-Holocene.

Remarks: Harrington (1938) described a malletiid-like shell from the lower Tremadocian (Lower Ordovician) rocks of Argentina as *Ctenodonta famatinensis*. The specimen figured by Harrington (1938, pl. 3, fig. 7) does not have the nuculaniform shape of *Ctenodonta;* rather it is shaped more like Ordovician species placed in *Palaeoneilo,* and we suggest that it be transferred to that genus as *Palaeoneilo? famatinensis* (Harrington), 1938. This species is probably the oldest known representative of the family Malletiidae.

Genus **Inaequidens** nov.

Pls. 4, 5

Type species: Inaequidens davisi sp. nov. is herein designated the type species of the new genus *Inaeqidens.*

Diagnosis: Malletiids with tooth rows of highly unequal length.

Description: Strongly inequilateral malletiids with ornament of comarginal growth-lines and tooth-rows of very unequal length. Posterior tooth-row occupying at least two-thirds of dorsal margin, anterior tooth-row one-third. Posterior teeth chevron-shaped and mostly smaller than peg-shaped anterior teeth. Beaks prosogyral.

Etymology: Inaequus, Latin, meaning unequal, referring to the lengths of the anterior and posterior tooth-rows; *dens,* Latin, meaning tooth. Gender masculine.

Remarks: Orientation of this genus is based largely on the relatively small deeply impressed adductor muscle scar ventral to the shorter row of teeth. This muscle scar is regarded as anterior.

Inaequidens davisi gen. et sp. nov.

Pl. 5, figs. 7-10

Diagnosis: Elongate subquadrate *Inaequidens.*

Description: Dorsal margin straight throughout its length; anterior margin rounded and projecting; posterior margin erect; ventral margin rounded, not projecting. Umbonal ridge broadly rounded, occupying most of lateral part of shell, umbo projecting prominently above dorsal commissure. Shell posteriorly elongated, subquadrate.

Internally the tooth-rows meet in a broadly arcuate junction where there is a marked decrease in the size of the anterior teeth. The anterior adductor muscle scar is small and deeply impressed into the shell.

Types and material: Inaequidens davisi is known from 26 specimens, of which we figure the holotype (Pl. 5, figs. 9, 10) and two paratypes (Pl. 5, figs. 7, 8). The holotype (UT 94498) measures 13.1 mm long and 9.9 mm high. All known specimens of *I. davisi* are silicified replicas.

Type locality: All known specimens of the species are from the Gordon Limestone at our locality 75, central western Tasmania.

Distribution: I. davisi is known only from the Gordon Limestone at our locality 75, central western

Tasmania. According to M. R. Banks (oral communication, March 1975), at this locality, the Gordon Limestone is Trentonian (late Middle or early Late Ordovician) in age.

Etymology: The species is named for P. W. Davis, Bureau of Mineral Resources.

Remarks: I. davisi differs from *I. campbelli* in having a quadrate outline and a straight dorsal margin. *I. campbelli* has a subcircular outline, and the posterior part of the dorsal margin is curved ventrally.

Inaequidens campbelli sp. nov.

Pl. 4, figs. 8, 9

Diagnosis: Subcircular *Inaeqidens.*

Description: Dorsal margin straight in region of beaks, posterior part arcuate and curved ventrally; anterior and posterior margins rounded and projecting; ventral margin rounded, not projecting. Umbo projecting prominently above dorsal commissure. Shell subcircular.

Internally the tooth-rows meet in a broadly arcuate junction where there is a marked decrease in the size of the anterior teeth. Anterior adductor muscle scar small and deeply impressed into shell.

Types and material: I. campbelli is known from 16 specimens, all of which are internal moulds preserved in sandstone. We figure the holotype (Pl. 4, fig. 8) and a paratype (Pl. 4, fig. 9). The holotype (CPC 15504) measures 18.8 mm long and 14.5 mm high.

Type locality: All known specimens of *I. campbelli* are from the Stairway Sandstone at our locality 71, Amadeus Basin, southern Northern Territory.

Distribution: I. campbelli is known only from the Stairway Sandstone at our locality 71, Amadeus Basin, southern Northern Territory.

Etymology: The species is named for K. S. W. Campbell, Australian National University.

Remarks: I. campbelli differs from *I. davisi* in the ways cited above.

Genus **Johnmartinia** nov.

Pls. 8-10

Type species: Johnmartinia cordata sp. nov. is herein designated the type species of the new genus *Johnmartinia.*

Diagnosis: Malletiids with umbos strongly divergent from one another and not enrolled toward midline.

Description: Markedly inequilateral malletiids with ornament of comarginal growth lines. Taxodont teeth in one continuous arcuate row not readily divisible into anterior and posterior tooth-rows; teeth in front of the beak few or absent. Umbos not enrolled toward midline, but strongly divergent from one another so that prosogyral beaks are far from midline near or at lateral extremities of valves. Adductor muscle scars distinctly anisomyarian with anterior adductor muscle scar much smaller than posterior adductor muscle scar.

Etymology: The genus is named for the son of the senior author, John Martin. Gender feminine.

Remarks: Orientation of this genus is largely based on the unequal adductor muscle scars; when the adductor muscle scars of pelecypods are of unequal size, it is usually the anterior that is the smaller.

Reed (1915, p. 17, pl. 3, figs. 13, 14) described *Ctenodonta shanensis* var.? from the Ordovician Lower Naungkangyi Beds of the Northern Shan States, Burma. His figure of the anterior view of this form (pl. 3. fig. 14) shows that the umbos are markedly divergent and that the beak is near the lateral extremity of the right valve; the left valve is not well enough preserved to determine the position of the umbo and beak. These characteristics are suggestive of *Johnmartinia.* Thein (1973, p. 151) and Hamada et al. (1975, p. 32) indicated that the Naungkangyi Stage of the Northern Shan States was Early to Middle Ordovician in age. Krishnan & Jacob (1955, p. 306) noted that the faunas of the Naungkangyi Series 'were originally considered to indicate a Lower Ordovician age, though some authorities would prefer to place the Lower Naungkangyis in the early Middle (Llandeilo) and the Upper Naungkangyis in the earliest Upper Ordovician (Lower Caradoc). . . .'

Johnmartinia cordata gen. et sp. nov.

Pl. 8, figs. 1-14

Diagnosis: Elongate *Johnmartinia* with cordate dorsal profile.

Description: Dorsal margin arcuate, anterior and posterior margins rounded and projecting, ventral margin rounded and projecting. Umbos highly prominent, not projecting above dorsal commissure, strongly divergent with beaks at lateral extremities of shell. Shell markedly inequilateral, lateral profile ovate and elongate, dorsal profile of articulated valves cordate. No teeth anterior to beaks, and therefore no anterior tooth-row.

Types and material: Johnmartinia cordata is known from 34 specimens, of which we figure the holotype (Pl. 8, figs. 4-7) and eight paratypes (Pl. 8, figs. 1-3, 8-14). The holotype (CPC 15514) measures 17.2 mm long and 12.6 mm high; the specimen is incomplete and originally was slightly

larger. All known specimens of *J. cordata* are sandstone moulds.

Type locality: The holotype and seven of the figured paratypes are from the Stairway Sandstone at our locality 30, Amadeus Basin, southern Northern Territory.

Distribution: J. cordata is known from our localities 9, 30, 33, and 34, at all of which it occurs in the Stairway Sandstone, Amadeus Basin, southern Northern Territory.

Etymology: The species name is derived from the Latin word *cordatus,* meaning heart-shaped, referring to the dorsal profile of articulated specimens.

Remarks: J. cordata differs from *J. orbicularis* in its ovate elongate lateral profile and cordate dorsal profile; *J. orbicularis* has a circular lateral profile and a fusiform dorsal profile.

Johnmartinia orbicularis (Tate, 1896)

Pl. 9, figs. 1-8; Pl. 10, figs. 1-10

1896. *Isoarca orbicularis* Tate, p. 107, pl. 2, figs. 18a, b.

Diagnosis: Circular *Johnmartinia* with fusiform dorsal profile.

Description: Dorsal margin arcuate, highly arched; anterior, posterior, and ventral margins rounded. Umbos prominent, not projecting above dorsal commissure, strongly divergent, but beaks not at lateral extremities of shell. Shell markedly inequilaterial, lateral profile circular, dorsal profile of articulated valves fusiform. Anterior tooth-row very short; posterior teeth chevron-shaped, central teeth sigmoidal, anterior teeth peg-like.

Types and material: Johnmartinia orbicularis is known from 30 specimens of which we figure the lectotype (Pl. 10, figs. 8-10) and seven topotypes (Pl. 9, figs. 1-8; Pl. 10, figs. 1-7). The type suite of *Isoarca orbicularis* contains four syntypes; one of these is a wax replica and we cannot locate the specimen from which it was made. We choose as the lectotype (SAM T 1222a) the specimen figured by Tate (1896) on his plate 2, figure 18a, and figured herein on Plate 10, figures 8-10. The other specimens in the type suite are paralectotypes and are not figured. The lectotype measures 25.1 mm long and 21.3 mm high. All known specimens of *Johnmartinia orbicularis* are preserved as sandstone moulds.

Type locality: Tate (1896, p. 107) gave the locality of the type suite of the species as Mount Watt, which is our locality 9, Stairway Sandstone, Amadeus Basin, southern Northern Territory.

Distribution: J. obicularis is known from our localities 9 and 30, where it occurs in the Stairway Sandstone, Amadeus Basin, southern Northern Territory.

Remarks: J. orbicularis differs from *J. cordata* in the ways indicated above.

Genus **Lophoconcha** nov.

Pl. 14

Type species: Isoarca corrugata Tate, 1896 (p. 106) is herein designated the type species of the new genus *Lophoconcha.*

Diagnosis: Malletiids with comarginal lirae and radial umbonal rib.

Description: Inequilateral malletiids with prosogyral beaks and ornament of widely spaced comarginal lirae and a single radial umbonal rib. More or less rostrate posteriorly. Anterior and posterior tooth-rows straight, meeting in a broad arcuate junction below beak. Anterior tooth-row shorter than posterior.

Etymology: Lophos, Greek, meaning crest, referring to the single radial rib; *concha,* from Greek *konkhe,* meaning a shell. Gender feminine.

Remarks: At present *Lophoconcha* is known only from Australia, where it occurs in the Stokes Siltstone, Amadeus Basin, southern Northern Territory. We have oriented this form so that the shorter tooth-row is anterior and the rostrate end of the shell is posterior.

Lophoconcha corrugata (Tate, 1896)

Pl. 14, figs. 6-9

1896. *Isoarca corrugata* Tate, p. 106, pl. 1, fig. 8.

Diagnosis: Lophoconcha with radial rib dividing valve into nearly equal anterior and posterior parts.

Description: Dorsal margin straight; anterior and posterior margins rounded and projecting; ventral margin rounded, not projecting. Umbos not prominent, projecting slightly above dorsal commissure. Comarginal lirae separated by interspaces greater than their width; radial rib dividing valve into nearly equal anterior and posterior parts.

Types and material: All known specimens of *L. corrugata* are on a single small slab of rock which is covered by numerous specimens, and it is not possible to count them. Tate figured one specimen of *Isoarca corrugata* (SAM T 1272a) on his plate 1, figure 8; this specimen is herein figured on Plate 14, figure 6, and is chosen as the lectotype of the species. All other specimens in Tate's original sample are regarded as paralectotypes; three (SAM T 1272b-d) are figured herein on Plate 14, figures 7-9. The lectotype is 5.2 mm long and 3.6 mm high. All the known specimens of *Lophoconcha corrugata* preserve the shell.

Type locality: Tate (1896, p. 107) gave the localities from which he obtained his material as: 'Thickly covering the limestone surfaces at Middle Valley (Tempe Downs), also Ilpilla Gorge', Amadeus Basin, southern Northern Territory. It is not clear from where the one slab preserving the

types came, as the museum label reads: 'Ordovician, R. Finke basin'.

Distribution: L. corrugata is known only from the type locality. The lithology of the rock on which the type suite is preserved suggests that the sample came from what is now called the Stokes Siltstone.

Genus **Nuculites** Conrad, 1841
Pl. 6

Type species: Nuculites oblongatus Conrad, 1841, by subsequent designation of Miller (1889, p. 496).

Diagnosis: Malletiids with comarginal ornament and a prominent myophoric buttress in each valve.

Remarks: The name *Nuculites* is widely used for early Palaeozoic palaeotaxodonts with a prominent anterior buttress. When the species placed in the genus are better studied, the genus will probably be divided into several generic taxa.

Nuculites wattii (Tate, 1896)
Pl. 6, figs. 6, 7

1896. *Isoarca wattii* Tate, p. 108, pl. 2, figs. 17a, b.

Diagnosis: Large tumid *Nuculites* with prominent umbo and deeply inserted anterior adductor muscle scar.

Description: Dorsal margin arcuate; anterior margin rounded; posterior margin rounded to oblique toward the dorsum; ventral margin rounded. Shell tumid, shape ovate. Umbo prominent, projecting well above dorsal commissure; beaks prosogyral. Anterior myophoric buttress strongly developed, extended ventral to mid-height of shell; anterior adductor muscle scar deeply inserted into shell.

Types and material: Nuculites wattii is known only from the type suite, which consists of three syntypes (SAM T 1220a-c). We choose the specimen figured by Tate (1896) on his plate 2, figure 17a, as the lectotype of *Isoarca wattii* (SAM T 1220a); this specimen is figured herein on Plate 6, figures 6, 7.

The other two specimens of the type suite are paralectotypes (SAM T 1220b, c). The lectotype measures 25.6 mm long and 14.9 mm high. All known specimens of *N. wattii* are sandstone moulds.

Type locality: Tate (1896, p. 108) gave the type locality of *Nuculites wattii* as: 'In quartzite between Petermann Creek and Tempe Downs', which is in the Amadeus Basin, southern Northern Territory. Tate noted that *N. wattii* occurs with *Eritropis opiformis.* As given by Tate, the type locality covers a large area, and we have not been able to locate the precise spot from which his specimens came. By its lithology the type suite of *Nuculites wattii* probably came from the Stairway Sandstone.

Distribution: N. wattii is known only from the type locality and probably was collected from what is now called the Stairway Sandstone.

Remarks: Tate (1896, p. 108) in his description of this species, discussed the dentition; the teeth are not preserved on the three specimens of the type suite. The lectotype may preserve a few remnants of the anteriormost teeth, but these apparent remnants may be weathering phenomena. None of the specimens preserves any posterior teeth. Perhaps Tate had additional specimens upon which he based his description of the dentition.

Genus **Palaeoneilo** Hall & Whitfield, 1869
Pl. 4

Type species: Nuculites constricta Conrad, 1842, by subsequent designation of Hall (1885, p. xxvii).

Diagnosis: Small malletiids with comarginal ornament and lacking a myophoric buttress.

Remarks: Like *Nuculites,* the name *Palaeoneilo* is widely used for Palaeozoic palaeotaxodonts and has also been used in the Mesozoic; when the species placed in *Palaeoneilo* are better studied, the genus will probably be divided into several generic taxa.

Palaeoneilo smithi sp. nov.
Pl. 4, figs. 1-7

Diagnosis: Small *Palaeoneilo* with teeth in anterior and posterior tooth-rows of about the same size and shape.

Description: Dorsal margin arcuate, anterior and ventral margins rounded. Umbo projecting prominently above dorsal commissure, beaks prosogyral. Anterior tooth-row shorter than posterior, teeth small under beak; elsewhere teeth of both rows larger, chevron-shaped, and of about the same size.

Types and material: P. smithi is known from 50 specimens of which we figure the holotype (Pl. 4, fig. 1) and six paratypes (Pl. 4, figs. 2-7). The holotype (CPC 15497) is incomplete but was at least 8 mm long. The known specimens of *P. smithi* are preserved either as sandstone moulds or with the shell intact in limestones.

Type locality: The holotype and five of the figured paratypes of *P. smithi* are from the Stokes Siltstone at our locality 41, Amadeus Basin, southern Northern Territory.

Distribution: Palaeoneilo smithi is known from our localities 7, 10, 11, 13, 41, 68, 81, and 87. At localities 7, 68, and 81 it occurs in the Stairway Sandstone, Amadeus Basin, southern Northern

Territory, and at locality 41 it occurs in the Stokes Siltstone of the Amadeus Basin. At localities 10, 11, 13, and 87, *P. smithi* occurs in the Nora Formation of the Georgina Basin, western Queensland and eastern Northern Territory.

Etymology: The species is named for E. L. Smith, Bureau of Mineral Resources.

Genus **Sthenodonta** nov.

Pls. 6, 7, 11-13

Type species: Isoarca eastii Tate, 1896 (p. 106) is herein designated the type species of the new genus *Sthenodonta.*

Diagnosis: Highly inequilateral tumid malletiids with anterior tooth-row directed ventrally.

Description: Highly inequilateral tumid malletiids with terminal or near terminal prosogyral beaks; ornament of weakly developed growth-lines; anterior tooth-row directed ventrally or anteroventrally and much shorter than posterior tooth-row.

Etymology: Sthenos, Greek, meaning strong, referring to the prominent teeth; *odontus,* Greek, meaning tooth. Gender feminine.

Remarks: At present, *Sthenodonta* is known only from the Ordovician rocks of Australia. We orient the genus with the beaks as anterior, largely on the grounds that the smaller more deeply impressed adductor muscle scar is at this end of the shell. Ordinarily in pelecypods the anterior adductor scar is smaller than the posterior and is more deeply impressed into the shell. The longer tooth row is therefore posterior.

Sthenodonta eastii (Tate, 1896)

Pl. 12, figs. 1-10; Pl. 13, figs. 1-8

1896. *Isoarca eastii* Tate, p. 106, pl. 2, figs. 12a.
1896. *Isoarca eastii* var. *modiolaeformis* Tate, p. 106, pl. 2, fig. 12b.

Diagnosis: Sthenodonta with relatively few teeth, elongated posteriorly with ratio of height to length 1:1.2 or larger, and with prominent umbos.

Description: Dorsal margin arcuate; anterior margin rounded and projecting; posterior margin rounded ventrally, oblique toward dorsum dorsally; ventral margin rounded and projecting. Umbos prominent. Shell elongated ovate, ratio of height to length 1:1.2, or larger.

Known internal features are the anterior and posterior adductor muscle scars, of which the anterior is smaller and more deeply impressed. Dorsal to and mediad the posterior adductor muscle scars is a pair of posterior pedal retractor muscle scars. Anterior and posterior tooth-rows well defined, teeth in posterior tooth-row large and relatively few in number, averaging about 15.

Types and material: Sthenodonta eastii is known from 103 specimens. Two of these are the syntypes of *Isoarca eastii* Tate, 1896 (SAM T 1274a, b), of which we choose SAM T 1274a as the lectotype of the species. The lectotype was figured by Tate on his plate 2, figure 12a, and is figured herein on Plate 12, figures 3, 4. Tate did not figure the other syntype; it is here designated a paralectotype and is figured on Plate 12, figure 2. We regard *Isoarca eastii* var. *modiolaeformis* Tate as being based on weathered specimens of *I. eastii* and place it in synonymy with *I. eastii. I. eastii* var. *modiolaeformis* is based on three syntypes (SAM T 1271a-c). We choose SAM T 1271a as the lectotype of *I. eastii* var. *modiolaeformis* Tate, 1896. Tate figured the lectotype on his plate 2, figure 12b, and we figure it on our Plate 12, figure 1. The remaining two syntypes of *I. eastii* var. *modiolaeformis* are herein designated as paralectotypes; they were not figured by Tate and are not figured here.

The lectotype (SAM T 1274a) of *Sthenodonta eastii* measures 42.9 mm long and 32.6 mm high. All known specimens of *S. eastii* are sandstone moulds, or moulds preserved in limestone.

Type locality: Tate (1896, p. 106) gave the type locality of both *Isoarca eastii* and *I. eastii* var. *modiolaeformis* as: 'In sandstone and quartzite underlying the fossiliferous limestone at Middle Valley (Tempe Downs)', which is in the Amadeus Basin, southern Northern Territory. We have not been able to locate the precise spot from which his specimens came, but their lithology suggests that they are from the Stairway Sandstone.

Distribution: Sthenodonta eastii is a widespread species, occurring at our localities 16, 18, 20, 22, 24, 25, 32, 41, 42, 43, 47, 48, 49, 51, 52, 53, 54, 55, 56 57, 60 61, 62, 67, 68, 70, 80, and 81. At localities 20 and 41 it occurs in the Stokes Siltstone, Amadeus Basin, southern Northern Territory. The rock unit at locality 43 is uncertain. It is mapped as Tomahawk Beds (Smith, 1963), but the lithology of the specimens suggests the Nora Formation; we tentatively regard the rock unit at this locality as Nora. Locality 43 is in the southern Georgina Basin, eastern Northern Territory. At all other localities, *S. eastii* occurs in the Stairway Sandstone, Amadeus Basin, southern Northern Territory.

Remarks: Sthenodonta eastii differs from *S. passmoreae* sp. nov. in being elongate ovate rather than quadrate, and from *S. jelli* sp. nov. in having larger and fewer teeth in the posterior tooth-row, and in having more prominent umbos.

Sthenodonta jelli sp. nov.

Pl. 6, figs. 1-5; Pl. 7, figs. 4, 5

Diagnosis: Sthenodonta with subdued umbos and with relatively many teeth.

Description: Dorsal margin straight; anterior, posterior, and ventral margins rounded, not projecting. Umbos subdued. Elongated posteriorly. Ratio of height to length 1:1.2 or larger.

Known internal features are the small deeply impressed anterior adductor muscle scar and the larger posterior adductor muscle scar. Anterior and posterior tooth-rows well defined, teeth in posterior row small and relatively numerous, averaging at least 20.

Types and material: S. jelli is known from a coquinite at locality 26; numerous specimens are piled one upon another parallel to the bedding so that they cannot be counted. The holotype (Pl. 6, fig. 5) and six paratypes (Pl. 6, figs. 1-4; Pl. 7, figs. 4, 5) are figured. The holotype (CPC 15510) measures 25.1 mm long and 19.9 mm high. All known specimens of *S. jelli* preserve the shell in limestone.

Type locality: The holotype and all the paratypes are from the Stokes Siltstone at our locality 26, Amadeus Basin, southern Northern Territory.

Distribution: S. jelli is at present known only from the type locality.

Etymology: The species is named for P. A. Jell, Australian National University.

Remarks: S. jelli differs from other species of *Sthenodonta* in the ways cited above.

Sthenodonta passmoreae sp. nov.

Pl. 11, figs. 1-9

1969. *Praenucula? orbicularis* (Tate); Hill, Playford, & Woods, pl. 0 I, fig. 20.

1969. *Praenucula?* sp.; Hill, Playford, & Woods, pl. 0 I, fig. 19.

Diagnosis: Subquadrate *Sthenodonta,* not posteriorly elongated, with ratio of height to length 1:1.6 or less.

Description: Dorsal margin arcuate, sloping rapidly into posterior margin; anterior margin rounded to oblique toward dorsum, not projecting; posterior margin rounded below, erect to oblique toward dorsum above; ventral margin broadly rounded to nearly straight. Umbos prominent. Shell shape subquadrate, ratio of height to length 1:1.6 or less.

Internal features not well known, although several specimens preserve remnants of the adductor muscle scars and the teeth.

Types and material: S. passmoreae is known from 26 specimens of which we figure the holotype (Pl. 11, figs. 1, 2) and six paratypes (Pl. 11, figs. 3-9). The holotype (GSQ F11678) is 35.9 mm long and 32.7 mm high. Most specimens of *S. passmoreae* are preserved as moulds in sandy dolomite, but the holotype preserves the shell.

Type locality: The holotype is from the Toko Group, Toko Range. The Toko Range is in the Georgina Basin and spans the border between Queensland and the Northern Territory. The Toko Group includes the Coolibah Formation, Nora Formation, Carlo Sandstone, and Mithaka Formation (Smith, 1972).

Distribution: S. passmoreae is known from our localities 11, 13, 14, 44, 84, 86, 87 and 90. At all these localities it occurs in the Nora Formation. Localities 11, 13, and 14 are in the eastern Georgina Basin of western Queensland; the remaining localities are in the southern Georgina Basin of the eastern Northern Territory.

Etymology: The species is named for V. L. Passmore, Bureau of Mineral Resources.

Remarks: S. passmoreae differs from other species of *Sthenodonta* in the ways noted above.

Sthenodonta etheridgei (Tate, 1896)

Pl. 7, figs. 6-9

1896. *Isoarca etheridgei* Tate, p. 105, pl. 2, fig. 15.

Discussion: This poorly understood species is known only from the type suite, which contains four syntypes (SAM T 1221a-d) which are probably not conspecific. The syntype of *Isoarca etheridgei* Tate figured on our Plate 7, figures 6, 7 (SAM T 1221b) is chosen as the lectotype of the species; this specimen was not figured by Tate (1896). The lectotype shows a few prominent growth-lines ventrally (Pl. 7, fig. 7) and the dentition, which consists of a long posterior tooth-row parallel to the dorsal margin and a short anterior tooth-row directed anteroventrally from the beak (Pl. 7, fig. 6). This arrangement of teeth is like that of *Sthenodonta,* and on the basis of the dentition of the lectotype, we assign *Isoarca etheridgei* to the genus *Sthenodonta* as *S. etheridgei.*

We designate the remaining three syntypes in the type suite of *Isoarca etheridgei* as paralectotypes. One of the paralectotypes (SAM T 1221a) was figured by Tate (1896, pl. 2, fig. 15), and is herein refigured on Plate 7, figures 8, 9. It has marked narrow comarginal striae separated by broad raised interspaces; this ornament is similar to the prominent growth-lines seen on the ventral part of the lectotype of the species.

Distribution: Sthenodonta etheridgei is known only from the localities listed by Tate (1896, p. 106): 'In limestone, Middle Valley at Tempe Downs, Petermann Creek, by Camp at Laurie's Creek,

north of Tempe Vale, and Chandler Range'. Hence, the type suite of *S. etheridgei* was probably obtained at several localities. The lithology of most of the syntypes suggests that they came from the Stairway Sandstone. The lithology of the lectotype and the mention of limestone in Tate's locality description suggest that the lectotype may have come from the Stokes Siltstone. All the specimens of *S. etheridgei* in the type suite are from the Amadeus Basin, southern Northern Territory.

Sthenodonta? sp. A

Pl. 14, fig. 5

1894. *Ctenodonta*? Etheridge, p. 24, pl. 3, figs. 6-8.

Discussion: Etheridge (1894) figured two specimens which he placed in *Ctenodonta?* We cannot locate the specimen shown by Etheridge (1894) on his plate 3, figures 6, 7 and we presume it to be lost; this specimen showed the dentition. The specimen which Etheridge figured on his plate 3, figure 8, is refigured on our Plate 14, figure 5 (AM F 46132). It is not well preserved but has a lateral profile reminiscent of species of *Sthenodonta,* and on this basis we tentatively assign it to *Sthenodonta* as *S.*? sp. A.

Tate (1896. p. 105) placed this species in synonymy with *Sthenodonta etheridgei,* apparently because some of the specimens on the same slab with AM F 46132 show remnants of prominent narrow comarginal ornament.

Distribution: Etheridge (1894, p. 23) noted that the fossils he was describing were all probably from the Tempe Downs Station. The museum labels accompanying AM F46132 gives the locality as: 'Macdonnell Ranges, Northern Territory'. Lithology suggests that AM F46132 is from the Stokes Siltstone, Amadeus Basin, southern Northern Territory.

Genus **Zeehania** nov.

Pl. 3

Type species: Zeehania jacksoni sp. nov. is herein designated the type species of the new genus *Zeehania.*

Diagnosis: Goniophoriform malletiids.

Description: Goniophoriform malletiids with beaks set well back from anterior end of shell. Ornament of comarginal growth-lines and a single radial rib extending from beak to posteroventral angle of the shell. Anterior and posterior tooth-rows straight and parallel to dorsal margin.

Stratigraphic distribution: Upper Middle or lower Upper Ordovician (Trentonian).

Etymology: The name *Zeehania* is taken from the town of Zeehan, central western Tasmania. Gender feminine.

Remarks: The shape and ornament of *Zeehania* is much like that of the modiomorphid pelecypod *Goniophora.* That it is only homeomorphic to *Goniophora* is shown by the taxodont dentition of *Zeehania. Zeehania* is at present known only from Tasmania. We regard the radial rib of *Zeehania* as being posterior.

Zeehania jacksoni gen. et sp. nov.

Pl. 3, figs. 9-11

Diagnosis: Zeehania with umbo projecting only slightly above dorsal commissure.

Description: Dorsal margin straight; anterior margin rounded and projecting; posterior margin oblique toward dorsum; ventral margin broadly rounded, almost parallel to dorsal margin. Umbo projecting only slightly above dorsal commissure, beaks orthogyral.

The only known internal feature is the teeth, which are arranged into nearly straight anterior and posterior tooth-rows of which the anterior row is the shorter.

Stratigraphic distribution: Upper Middle or lower Upper Ordovician (Trentonian).

Types and material: Zeehania jacksoni is known from three specimens, of which we figure the holotype (Pl. 3, figs. 9-11). The holotype (CPC 15495) measures 17.5 mm long and 8.4 mm high, and preserves the shell.

Type locality: The holotype is from the Gordon Limestone at our locality 75, central western Tasmania.

Distribution: Zeehania jacksoni is known only from our locality 75, where it occurs in the Gordon Limestone of central western Tasmania. According to M. R. Banks (oral communication, March 1975) at this locality the Gordon Limestone is Trentonian (late Middle or early Late Ordovician) in age.

Etymology: The species is named for M. J. Jackson, Bureau of Mineral Resources.

Subclass **PTERIOMORPHIA** Beurlen

Diagnosis: Equivalved or inequivalved pelecypods characterized by byssal attachment, reduction of the anterior adductor muscle, and the presence of the duplivincular ligament in primitive forms.

Stratigraphic distribution: Ordovician-Holocene.

Order **ARCOIDA** Stoliczka

Diagnosis: Nearly isomyarian equivalved pteriomorphs with significant interumbonal growth, often producing broad flat ligament areas.

Stratigraphic distribution: Ordovician-Holocene.

Superfamily **CYRTODONTACEA** Ulrich

Diagnosis: Arcoids lacking radial ornament and with teeth arranged into elongate posterior laterals located at the posterior extremity of the dorsal margin, and anterior teeth located above the anterior adductor muscle.

Stratigraphic distribution: Lower Ordovician-Lower Devonian.

Family **CYRTODONTIDAE** Ulrich

This is the only family at present assigned to the Cyrtodontacea and has the same definition and stratigraphic range.

Genus **Cyrtodonta** Billings, 1858

Pls. 14-16

Type species: Cyrtodonta rugosa Billings, 1858, by subsequent designation of Williams & Breger (1916, p. 149).

Diagnosis: Cyrtodontids with ornament of comarginal growth increments, not strongly rugose; most anterior teeth in front of beak and positioned like anterior laterals rather than cardinal teeth. Beaks prosogyral.

Remarks: Cyrtodonta is a large genus to which more than a hundred species have been assigned. It is especially abundant in the Middle Ordovician rocks of eastern North America. The Australian occurrences noted herein are the first record of the genus from the Southern Hemisphere.

Cyrtodonta carberryi sp. nov.

Pl. 16, figs. 3-5

Diagnosis: Small oblique *Cyrtodonta* with straight anterior margin.

Description: Dorsal margin straight; anterior margin oblique, straight, not projecting; ventral margin rounded, posterior margin straight, oblique toward the dorsum. Shell shape oblique quadrate. Umbo projecting only slightly above dorsal commissure.

The only known internal feature is the two posterior lateral teeth in the left valve.

Types and material: C. carberryi is known from six specimens, of which we figure the holotype (Pl. 16, fig. 5) and two paratypes (Pl. 16, figs. 3, 4). The holotype (CPC 15549) measures 35 mm long and 30.1 mm high. All known specimens of *C. carberryi* are composite moulds.

Type locality: The holotype and figured paratypes are from the Stairway Sandstone at our locality 65, Amadeus Basin, southern Northern Territory.

Distribution: All known specimens of *Cyrtodonta carberryi* are from the Stairway Sandstone at the type locality.

Etymology: The species is named for V. P. Carberry, Bureau of Mineral Resources.

Remarks: C. carberryi differs from all other Australian species of *Cyrtodonta* in its oblique quadrate shape and straight anterior margin.

Cyrtodonta hazeli sp. nov.

Pl. 16, figs. 1, 2, 6, 7

Diagnosis: Large tumid *Cyrtodonta* with anterior margin rounded and projecting.

Description: Dorsal margin straight for most of its length, rounded and turning ventrally in area of posterior lateral teeth; anterior margin rounded and projecting above, broadly rounded to straight below; ventral margin rounded; posterior margin broadly rounded to nearly erect. Shell large and tumid, shape subcircular. Umbos prominent, projecting only slightly above dorsal commissure.

Known internal features are the anterior adductor muscle scar, a small segment of the pallial line ventral to this scar, and the dentition. The teeth of the right valve consist of three elongated posterior laterals and at least three anteriors, of which the centre one is chevron-shaped.

Types and material: Cyrtodonta hazeli is known from seven specimens, of which we figure the holotype (Pl. 16, figs. 1, 2) and a paratype (Pl. 16, figs. 6, 7). The holotype (CPC 15546) measures 50.1 mm long and 43.9 mm high. All known specimens of the species are sandstone moulds.

Type locality: The holotype is from the Stairway Sandstone at our locality 69, Amadeus Basin, southern Northern Territory.

Distribution: C. hazeli is known from our localities 48, 69 and 70, at all of which it occurs in the Stairway Sandstone, Amadeus Basin, southern Northern Territory.

Etymology: The species is named for J. E. Hazel, U.S. Geological Survey.

Remarks: C. hazeli differs from other Australian species of *Cyrtodonta* in being large and tumid and in having a subcircular shape.

Cyrtodonta staffordae sp. nov.

Pl. 14, figs. 1-3

Diagnosis: Subquadrate *Cyrtodonta* with broadly rounded anterior and posterior margins.

Description: Dorsal margin straight; anterior, ventral, and posterior margins broadly rounded. Umbo subdued, projecting only slightly above dorsal commissure. Shell subquadrate.

The only known internal feature is a single posterior lateral tooth in the right valve.

Types and material: C. staffordae is known from two specimens, both of which are figured. The holotype is shown on Plate 14, figures 1, 2, and the paratype on Plate 14, figure 3. The holotype (CPC 15541) measures 26.7 mm long and 21.4 mm high. Both specimens are sandstone moulds.

Type locality: The holotype is from the Stairway Sandstone at our locality 64, Amadeus Basin, southern Northern Territory.

Distribution: C. staffordae is known from our localities 64 and 66, at both of which it occurs in the Stairway Sandstone, Amadeus Basin, southern Northern Territory.

Etymology: The species is named for L. A. Stafford, Bureau of Mineral Resources.

Remarks: C. staffordae is subquadrate like *C. carberryi* but differs from that species in having broadly rounded anterior and posterior margins rather than straight oblique ones.

Cyrtodonta wattii (Tate, 1896)
Pl. 15, figs. 1-7

1896. *Palaearca wattii* Tate, p. 108, pl. 2, fig. 14.

Diagnosis: Obliquely ovate *Cyrtodonta* with rounded and projecting anterodorsal margin.

Description: Dorsal margin straight; anterior margin rounded and projecting dorsally, straight and oblique ventrally; ventral and posterior margins rounded. Umbo prominent, projecting only slightly above dorsal commissure. Shape obliquely elongated.

Known internal features include the anterior adductor muscle, a short length of pallial line ventral to it, and the dentition. The left valve has three elongate posterior lateral teeth and at least three anterior teeth; right valve with two elongate posterior lateral teeth, anterior teeth unknown.

Types and material: The type suite of *Palaearca wattii* consists of five syntypes (SAM T 1258a-e), of which we choose the specimen figured by Tate (1896) on his plate 2, figure 14, as the lectotype (SAM T 1258a). The lectotype is figured herein on Plate 15, figure 1; it measures 35.7 mm long and 26.3 mm high. The remaining syntypes in the type suite are designated paralectotypes. In addition to the type suite we have 44 other specimens of *Cyrtodonta wattii* of which four are figured on Plate 15, figures 2-7. All known specimens of *C. wattii* are sandstone moulds.

Type locality: Tate (1896, p. 109) gave the type locality of *Cyrtodonta wattii* as: 'In quartzite and sandstone, Tempe Downs, north of Tempe Vale, and Finke Gorge', which are in the Amadeus Basin, southern Northern Territory. He therefore obtained his specimens from at least two places. We have not been able to locate the precise spots from which they came, but their lithology suggests that they are from the Stairway Sandstone.

Distribution: C. wattii is known from our localities 16, 17, 24, 25, 45, 46, 56, 58, 59, 64, 68, and 81, at all of which it occurs in the Stairway Sandstone, Amadeus Basin, southern Northern Territory..

Cyrtodonta sp. A
Pl. 14, fig. 4

1969. cf. *Edmondia* sp., Hill, Playford, & Woods, pl. 0 I, fig. 22.

Discussion: This form is known from only one specimen (GSQ F 11677) which is large and tumid like many cyrtodontids; it has only comarginal ornament and is herein placed in the genus *Cyrtodonta* as *C.* sp. A. No undoubted species of *Edmondia* are known from rocks older than Late Devonian, and it seems unlikely that this Ordovician form could belong to that genus. Unfortunately the single known specimen does not preserve any of the teeth.

Distribution: The single known specimen is from the Toko Group, Toko Range, Northern Territory. The Toko Group includes the Coolibah Formation, Nora Formation, Carlo Sandstone, and Mithaka Formation (Smith, 1972).

Genus **Cyrtodontula** Tomlin, 1931
Pls. 17, 18

Type species: Whitella obliquata Ulrich, 1890, by original designation of Tomlin (1931, p. 175).

Diagnosis: Noetiaform cyrtodontids with highly prominent umbos; posterior umbonal slope subcarinate to carinate.

Remarks: The species of *Cyrtodontula* described herein are the first records of the genus from the Southern Hemisphere.

Cyrtodontula hadzeli sp. nov.
Pl. 17, figs. 8-11

Diagnosis: Small obliquely elongated *Cyrtodontula.*

Description: Dorsal margin straight to gently convex; anterior margin rounded and projecting; ventral margin broadly rounded to straight, subangulate where it meets posterior margin; posterior margin straight, oblique towards dorsum. Umbo carinate along posterior slope, projecting only slightly above dorsal commissure. Shell obliquely elongated.

The known internal features are the anterior adductor muscle scar and two posterior lateral teeth in the right valve.

Types and material: C. hadzeli is known from five specimens, of which the holotype (Pl. 17, fig. 8) and two paratypes (Pl. 17, figs. 9-11) are figured. The holotype (CPC 15557) measures 18.5 mm long and 12.4 mm high. All known specimens of the species are sandstone moulds.

Type locality: All figured specimens of *C. hadzeli* are from the Pacoota Sandstone at our locality 40, Amadeus Basin, southern Northern Territory.

Distribution: C. hadzeli is known only from the type locality, our locality 40, where it occurs in the Pacoota Sandstone, Amadeus Basin, southern Northern Territory.

Etymology: The species is named for Franciszek Hadzel, Bureau of Mineral Resources.

Remarks: Cyrtodontula hadzeli differs from *C. sohli,* the other known Australian Ordovician species of *Cyrtodontula,* in being elongate rather than quadrate, in having a carinate umbonal ridge, and in being less tumid.

Cyrtodontula sohli sp. nov.

Pl. 18, figs. 4, 5

Diagnosis: Large, tumid, subquadrate *Cyrtodontula.*

Description: Dorsal margin straight; anterior margin rounded and projecting; ventral margin broadly rounded, not projecting; posterior margin straight, oblique toward the dorsum. Umbos very prominent, umbonal ridge subcarinate posteriorly with wide posterior slope. Shell large, tumid, and subquadrate.

Types and material: Cyrtodontula sohli is known from only two specimens, both of which are figured (Pl. 18, figs. 4, 5). The holotype (UT 81815) measures 31.9 mm long and 32.2 mm high. The paratype (UT 81805) is an incomplete specimen. Both specimens preserve the shell in limestone.

Type locality: The holotype and paratype are from the Gordon Limestone at our locality 75, central western Tasmania.

Distribution: C. sohli is known only from our locality 75, where it ocurs in the Gordon Limestone, central western Tasmania. According to M. R. Banks (written communication, March 1975) at locality 75 the Gordon Limestone is Trentonian in age (late Middle or early Late Ordovician).

Etymology: The species is named for N. F. Sohl, U.S. Geological Survey.

Remarks: C. sohli differs from *C. hadzeli* in the ways indicated above.

Genus **Pharcidoconcha** nov.

Pl. 17

Type species: Pharcidoconcha raupi sp. nov. is herein designated the type species of the new genus *Pharcidoconcha.*

Diagnosis: Rugose cyrtodontids.

Description: Strongly inequilateral prosogyral cyrtodontids with ornament of broad rounded prominent comarginal rugae, each ruga with a posteroventral angulation. Umbos broadly rounded, not carinate.

Etymology: Pharkis, Greek, meaning wrinkle; *concha,* from Greek *konkhe,* meaning a shell. Gender feminine.

Remarks: Pharcidoconcha is placed in the Cyrtodontidae because of the presence of posterior lateral teeth at the posterior end of the dorsal margin. The genus occurs in the Ordovician rocks of Australia and the Ichangian Stage (Tremadocian?, Lower Ordovician) of China. The Chinese species was called *Modiolopsis parallelus* by Hsü *in* Hsü & Ma (1948). It has the prominent rugose comarginal ornament of *Pharcidoconcha,* and we transfer it to that genus as *Pharcidoconcha parallela* (Hsü).

Pharcidoconcha raupi gen. et sp. nov.

Pl. 17, figs. 1-7

Diagnosis: Pharcidoconcha with interspaces between rugae not strongly incised.

Description: Dorsal margin nearly straight; anterior margin rounded; ventral margin broadly rounded to straight; posterior margin straight, oblique toward dorsum. Umbonal ridge prominent. Shell elongated posteriorly, ovate. Rugae broadly rounded, interspaces between rugae narrow, not strongly incised.

The known internal features are the anterior adductor muscle scar and two posterolateral teeth.

Types and material: P. raupi is known from coquinites at two localities; at both places there are numerous specimens piled upon one another parallel to the bedding so that they cannot be counted. The holotype (Pl. 17, figs. 3, 4) and five paratypes (Pl. 17, figs. 1, 2, 5-7) are figured. The holotype (CPC 15553) measures 15.2 mm long and 9.2 mm high. All known specimens of *P. raupi* are sandstone moulds.

Type locality: The holotype and one of the figured paratypes are from the Pacoota Sandstone at our locality 35, Amadeus Basin, southern Northern Territory.

Distribution: P. raupi occurs in the Pacoota Sandstone at our localities 35 and 37, Amadeus Basin, southern Northern Territory.

Etymology: The species is named for R. B. Raup, Jr, U.S. Geological Survey.

Remarks: Pharcidoconcha raupi differs from the other known species of the genus, *P. parallela* (Hsü), in not having the interspaces between the rugae strongly incised.

Order **PTERIOIDA** Newell

Diagnosis: Equivalved or inequivalved pteriomorphians with heteromyarian or monomyarian musculature, integripalliate pallial line,

and duplivincular ligament in primitive forms. *Stratigraphic distribution:* Ordovician-Holocene.

Family **AMBONYCHIIDAE** Miller

Diagnosis: Equivalved, inequilateral pterioids which possess a byssus, duplivincular ligament, discontinuous and integripalliate pallial line, anisomyarian musculature, and variable dentition.

Stratigraphic distribution: Chazyan (lower Middle Ordovician)-Late Devonian.

Remarks: The species described herein are the first Ordovician members of the family recorded from the Southern Hemisphere.

Genus **Leconychia** nov.

Pl. 18

Type species: Leconychia doylei sp. nov. is herein designated the type species of the new genus *Leconychia.*

Diagnosis: Comarginally ornamented ambonychiids with globose anterior lobe.

Description: Comarginally ornamented, prosogyral, markedly elongated ambonychiids in which the length of the shell is significantly greater than the height, and which have a globose anterior lobe strongly separated from the rest of the shell by a linear shell thickening. This linear shell thickening forms an incised line in internal moulds.

Etymology: Lekos, Greek, meaning dish or plate, referring to the globose anterior lobe; *onyx,* Greek, meaning claw or talon. *Onychia* is a standard combining form for genera of the Ambonychiidae. Gender feminine.

Remarks: In its shape and globose anterior lobe, *Leconychia* is most similar to *Allonychia* Foerste (Pojeta, 1966, 1968); it differs from that genus in lacking radial ornament. At present, *Leconychia* is known only from Australia.

Leconychia doylei gen. et sp. nov.

Pl. 18, figs. 1-3

Diagnosis: Leconychia in which the height is equal to about two-thirds the length of the shell.

Description: Dorsal margin nearly straight; anterior margin broadly rounded, anterior lobe projecting forward of rest of shell; ventral margin broadly rounded anteriorly, straight posteriorly. Shell more or less rectangular, highly tumid, height equal to about two-thirds the length. Umbonal ridge prominent, beak nearly terminal.

Types and material: Leconychia doylei is known only from the holotype (CPC 15560) which is shown on Plate 18, figures 1-3. The holotype is an internal mould in sandstone, it measures 64.4 mm in length and 41.3 mm in height.

Type locality: The holotype was collected at our locality 43, southern Georgina Basin, eastern Northern Territory. The rock unit at locality 43 is mapped as Tomahawk Beds (Smith, 1963), but the lithology of the specimen suggests that it is from the Nora Formation.

Distribution: Leconychia doylei is presently known only from the type locality.

Etymology: The species is named for H. M. Doyle, Bureau of Mineral Resources.

Genus **Glyptonychia** nov.

Pls. 19, 20

Type species: Glyptonychia wilsoni sp. nov. is herein designated the type species of the new genus *Glyptonychia.*

Diagnosis: Ambonychiids with radial ribs limited to body of shell.

Description: Ambonychiids with prominent anterior lobe which is not separated from the rest of the shell by a pronounced linear shell thickening. Beaks prosogyral and not terminal, umbonal ridge prominent. Ornament of comarginal growth lines and 4-6 radial ribs (plicae?) in each valve. Radial ribs limited to body of shell, not present on auricle or anterior lobe.

The only known internal feature is two posterior lateral teeth in the right valve.

Etymology: Glyptos, Greek, meaning carved, referring to the ribs; *onyx,* Greek, meaning claw or talon. *Onychia* is a standard combining form for genera of the Ambonychiidae. Gender feminine.

Remarks: Glyptonychia differs from all other radially ribbed genera of the Ambonychiidae in having the ribs limited to the body of the shell. In all other known radially ribbed ambonychiids, the ribs cover both the body and auricle of the shell (Isberg, 1934; Pojeta, 1962, 1966, 1968). At present, *Glyptonychia* is known only from Australia.

Glyptonychia wilsoni gen. et sp. nov.

Pl. 19, figs. 5-7; Pl. 20, figs. 1-6

1969. *Actinopteria*?, Hill, Playford, & Woods, pl. 0 I, figs. 16-18.

Diagnosis: Glyptonychia with length of shell greater than height.

Description: Dorsal margin straight; anterior margin protruding in region of anterior lobe, concave to nearly straight ventral to lobe; ventral margin broadly rounded; posterior margin straight, oblique toward dorsum. Anterior lobe subglobose. Umbo projecting only slightly above dorsal commissure. Shell obliquely elongated with length greater than height; shell width markedly decreases posterodorsally, producing a prominent auricle.

Types and material: Glyptonychia wilsoni is known from 23 specimens, of which we figure the holotype (Pl. 20, figs. 1-3) and six paratypes (Pl. 19, figs. 5-7; Pl. 20, figs. 4-6). The holotype UQ F 67208) measures 27.6 mm long and 21.5 mm high. All known specimens of *G. wilsoni* are preserved as moulds in sandstone.

Type locality: The holotype and figured paratypes are from the Carlo Sandstone at our locality 15, eastern Georgina Basin, western Queensland.

Distribution: All known specimens of *G. wilsoni* are from our locality 15, where they occur in the Carlo Sandstone, eastern Georgina Basin, western Queensland.

Etymology: The species is named for A. T. Wilson, Bureau of Mineral Resources.

Remarks: The fauna of the Carlo Sandstone is poorly known, and the fossils discussed herein are among the first described from the formation.

Genus **Pteronychia** nov.
Pl. 21

Type species: Pteronychia haupti sp. nov. is herein designated the type species of the new genus *Pteronychia.*

Diagnosis: Ambonychiids with comarginal ornament and a midumbonal carina.

Description: Ambonychiids lacking an anterior lobe. Beaks prosogyral and terminal. Umbonal ridge prominent. Shell triangular in lateral profile. Ornament of fine comarginal growth lines and a midumbonal carina.

Etymology: Pteria, a genus of pelecypods; *onyx,* Greek, meaning claw or talon. *Onychia* is a standard combining form for genera of the Ambonychiidae. Gender feminine.

Remarks: Among ambonychiids, only *Pteronychia* and some species of *Opisthoptera* Meek (Pojeta, 1966) have a midumbonal carina. *Opisthoptera* differs from *Pteronychia* in being multicostellate. At present, *Pteronychia* is known only from Australia.

Pteronychia haupti gen. et sp. nov.
Pl. 21, figs. 1-6

Diagnosis: Pteronychia with prominently flattened anterior face.

Description: Dorsal margin straight, anteroventral margin gently convex to straight, meeting posterior margin at an acute angle. Umbos prominent, carinate, and projecting little or not at all above dorsal commissure. Anteroventral face broad and flattened. Shell obliquely elongated, triangular, with a marked decrease in shell width posterodorsally producing a prominent auricle.

Types and material: Pteronychia haupti is known from nine specimens, of which we figure the holotype (Pl. 21, figs. 4-6) and one paratype (Pl. 21, figs. 1, 2). The holotype (CPC 15564) measures 23.4 mm long and 18.9 mm high. The figured paratype (CPC 15562) appears to have a posterodorsal wing (Pl. 21, fig. 2); this may be the result of preparation, as none of the other specimens of the species shows a posterior alation. All known specimens of *P. haupti* are sandstone moulds.

The specimen shown on Plate 21, figure 3, is tentatively placed in this species as *Pteronychia* aff. *P. haupti;* it shows two posterior lateral teeth and an umbonal carination, but it is incomplete, and the carina does not appear to be midumbonal. The specimen is probably a composite mould.

Type locality: The holotype and figured paratype are from the Stairway Sandstone at our locality 83, Amadeus Basin, southern Northern Territory.

Distribution: All the specimens assigned unequivocally to *P. haupti* are from our locality 83, Stairway Sandstone, Amadeus Basin, southern Northern Territory. The specimen tentatively placed in the species (Pl. 21, fig. 3) is from our locality 85, Carlo Sandstone, southern Georgina Basin, eastern Northern Territory.

Etymology: The species is named for Adolf Haupt, Bureau of Mineral Resources.

Genus **Ambonychia** Hall, 1847

Type species: Ambonychia radiata Hall, 1847, by subsequent designation of Stoliczka (1870, p. xxi; 1871, p. 387).

Diagnosis: Simplicicostate monomyarian Ambonychiidae with cardinal and posterior lateral teeth.

Ambonychia? sp. A
Pl. 29, figs. 1-3

Discussion: This form is known from only one coarsely silicified specimen (UT 94499), which is incomplete. It has the simple radial ribs and anterodorsal gape of the ambonychiid genus *Ambonychia. Ambonychia* is homeomorphic to the rostroconch genus *Euchasma* Billings (Pojeta, Tomlinson, & Shergold, 1977), which also has simple radial ribs and an anterodorsal gape. Not enough of the single known specimen of *Ambonychia*? sp. A is preserved to determine unequivocally that it is a pelecypod

rather than a rostroconch; we place it tentatively in the Pelecypoda.

Distribution: Ambonychia? sp. A occurs in the Gordon Limestone at our locality 75, central western Tasmania. According to M. R. Banks (written communication, March 1975) the Gordon Limestone at locality 75 is Trentonian in age (late Middle or early Late Ordovician). *Euchasma* is not known to occur after the Early Ordovician.

Ambonychiid genus A, species A

Pl. 19, figs. 1-3

1969. *Actinopteria*? sp., Hill, Playford, & Woods, pl. 0 I, figs. 14, 15.

Discussion: This taxon is known from two specimens which are comarginally ornamented, have a small anterior lobe, and have terminal beaks. Because the specimens are not well preserved and are not easily compared with other more or less similar ambonychiids, we do not propose a new name for this form. Ambonychiid genus A, species A, cannot be placed in *Actinopteria* as suggested by Hill, Playford, & Woods, because it lacks radial ornament and is equivalved. The specimen shown on Plate 19, figures 1, 2, measures 20.8 mm long and 17.7 mm high.

Distribution: The two known specimens of this taxon are from the Carlo Sandstone at our locality 15, eastern Georgina Basin, western Queensland. The fauna of the Carlo Sandstone is poorly known, and the fossils discussed herein are among the first described from the Formation.

Ambonychiid genus B, species A

Pl. 19, fig. 4

Discussion: This taxon is known from one internal mould which has ambonychiid shape, seems to lack an anterior lobe, and has two posterior lateral teeth; it is too poorly preserved to assign to a genus. The specimen (CPC 15561) measures 10.8 mm long and 9.7 mm high.

Distribution: The single known specimen of Ambonychiid genus B, species A, is from the Stairway Sandstone at our locality 79, Amadeus Basin, southern Northern Territory.

Family **PTERINEIDAE** Miller

Diagnosis: Inequivalved, inequilateral pterioids with left valve more convex than right valve, anterior auricle, duplivincular ligament, anisomyarian musculature, and variable dentition.

Stratigraphic distribution: Ordovician-Permian.

Genus **Denticelox** nov.

Pls. 21, 22

Type species: Palaearca tortuosa Tate, 1896 (p. 109), is herein designated the type species of the new genus *Denticelox*.

Diagnosis: Biconvex pterineids with posterior umbonal carina.

Description: Prosogyral, biconvex pterineids with right valve slightly less convex than left valve. Umbos of both valves prominent, carinate posteriorly. Anterior and posterior auricles well developed, not alate posteriorly.

The only known internal feature is three posterior lateral teeth in the left valve.

Etymology: Dens, Latin, meaning tooth, referring to the posterior teeth; *celox*, Latin, meaning cutter or yacht, referring to the shape of the shell. Gender feminine.

Remarks: Denticelox differs from other Ordovician pterineids in being biconvex and having an umbonal carina (Pojeta, 1971). At present the genus is known only from Australia.

Denticelox tortuosa (Tate, 1896)

Pl. 21, fig. 8; Pl. 22, figs. 1-6

1896. *Palaearca tortuosa* Tate, p. 109, pl. 3, fig. 31.

Diagnosis: Obliquely elongated *Denticelox*.

Description: Dorsal margin straight; anteroventral margin broadly rounded; posterior margin oblique toward dorsum. Shell obliquely elongated. Umbo projecting only slightly above dorsal commissure. Anterior and posterior auricles large and prominent. Posterior lateral teeth mounted on posterior auricle.

Types and material: Denticelox tortuosa is known from 16 specimens. Three of these are the syntypes of the species (SAM T 1719a-c), of which we choose SAM T 1719a as the lectotype of *Palaearca tortuosa* Tate. The lectotype was figured by Tate (1896) on his plate 3, figure 31, and is figured herein on Plate 22, figures 1-3. The other Tate syntypes (SAM T 1719b, c) are herein designated paralectotypes of the species. The lectotype measures 24.4 mm long and 18.2 mm high. All known specimens of *Denticelox tortuosa* are moulds in sandstone.

Type locality: Tate (1896, p. 109) gave the locality information for this species as: 'In quartzite, Mount Watt and between Petermann Creek and Tempe Downs', Amadeus Basin, southern Northern Territory. It is not clear from the museum label from which of the localities each of the types came. Mount Watt is our locality 9, and the only Ordovician rock unit that crops out here is the Stairway Sandstone. The lithology of the type specimens also suggests that they come from the Stairway Sandstone.

Distribution: In addition to the type locality, *Denticelox tortuosa* occurs at our locality 30, which is in the Stairway Sandstone, Amadeus Basin, southern Northern Territory.

The specimen figured on Plate 21, figure 8, and Plate 22, figures 5, 6, is the only known articulated specimen of *D. tortuosa*. The lithology suggests that it comes from the Carlo Sandstone, but the locality is uncertain; the specimen comes from an unidentified mesa adjacent to the Tarlton Range, Georgina Basin, Northern Territory.

Genus **Pterinea** Goldfuss, 1832

Pl. 21

Type species: Pterinea laevis Goldfuss, 1832, by monotypy and by subsequent designation of Stoliczka (1870, p. xxi; 1871, p. 389).

Diagnosis: Suborbicular pterineids without radial ornament and possessing well-defined anterior and posterior auricles, usually with a posterior wing.

Stratigraphic range: Upper Ordovician-Lower Devonian.

Pterinea sp. A

Pl. 21, fig. 7

Discussion: This species is known from four specimens on a single small slab of rock; one of the specimens is reasonably complete and is figured here on Plate 21, figure 7 (UT 81383); it measures about 12 mm long and 10 mm high. *Pterinea* sp. A has only comarginal ornament and well-developed anterior and posterior auricles, although there is little development of a posterior wing. Northern Hemisphere Ordovician species of *Pterinea* have a prominent posterior wing (Pojeta, 1971, pl. 11, figs. 10-13).

Distribution: Pterinea sp. A occurs in the Westfield Beds of western Tasmania at our locality 73; this is locality 15 of Corbett & Banks (1974). They suggested a Richmondian (late Late Ordovician) age for the Westfield Beds.

Subclass **ISOFILIBRANCHIA** Iredale

Diagnosis: Equivalved, inequilateral byssate pelecypods, with opisthodetic elongate ligament, not duplivincular. Hinge edentulous or with dysodont teeth. Anisomyarian.

Stratigraphic distribution: Lower Ordovician (Arenigian)-Holocene.

Order **MYTILOIDA** Ferussac

This is the only order at present assigned to the Isofilibranchia; it has the same definition and stratigraphic range as the subclass.

Superfamily **MYTILACEA** Rafinesque

This is the only superfamily at present assigned to the Mytiloida and Isofilibranchia and it has the same definition and stratigraphic range as those taxa.

Family **MODIOLOPSIDAE** Fischer

Diagnosis: Modioliform mytilaceans with expanded posterior end; edentulous or with discrete small cardinal teeth, lacking a resilial ridge to support the ligament; anterior adductor present, smaller than posterior adductor.

Stratigraphic distribution: Lower Ordovician (Arenigian)-Lower Permian.

Genus **Modiolopsis** Hall, 1847

Pl. 23

Type species: Pterinea modiolaris Conrad, 1838, by original designation of Hall (1847, p. 157).

Diagnosis: Edentulous modiolopsids with a distinctly modioliform shell and multiple accessory muscle scars anterior to the beak.

'Modiolopsis' gordonensis Johnston, 1888

Remarks: Johnston (1888, pl. 5, fig. 12) figured but did not describe or indicate the size of this species. We have not been able to locate his figured specimen at the University of Tasmania, the Tasmanian Museum, or the British Museum (Natural History) and presume it to be lost. In the plate explanation, Johnston listed *Modiolopsis gordonensis* as occurring in the 'Gordon Limestones, Tasmania'.

On the basis of Johnston's figure, it is not possible to tell to what genus the specimen belongs. It appears to be a modiolopsid, but is sharply truncated anteriorly so that the beak is terminal. This feature is not known in other modiolopsids, and the original specimen may have been distorted or broken anteriorly. If Johnston's figure be natural size, the single known specimen of this species measures 34.6 mm long and 16.7 mm high.

Modiolopsis? sp. A

Pl. 23, fig. 10

Discussion: This taxon is known from three specimens preserved in sandstone. They have a lateral profile more or less like *Modiolopsis*, but are not as high posteriorly as Northern Hemisphere members of that genus; they are tentatively placed in *Modiolopsis*. The figured specimen (CPC 15567; Pl. 23, fig. 10) measures 18.4 mm long and 8.1 mm high.

Distribution: All known specimens of *Modiolopsis*? sp. A are from the Stairway Sandstone at our locality 81, Amadeus Basin, southern Northern Territory.

Genus **Runnegaria** nov.
Pl. 23

Type species: Runnegaria cuneata sp. nov. is herein designated the type species of the new genus *Runnegaria.*

Diagnosis: Modiolopsids with horn-shaped anterior adductor muscle scars.

Description: Prosogyral modiolopsids with comarginal ornament of growth lines, a slight carination of the posterior umbonal slope, and a marked decrease in shell convexity posterodorsally which produces a small auricle. Anterior adductor muscle scars horn shaped, placed on anterior rather than lateral face of shell; behind each of them is a distinct myophoric buttress.

Etymology: The genus is named for Bruce Runnegar, University of New England. Gender feminine.

Remarks: Runnegaria differs from other Ordovician modiolopsids in the horn-shaped anterior adductor muscle scars placed on the anterior face of the shell, and in the presence of the narrow distinct myophoric buttresses. At present, the genus is known only from Australia.

Runnegaria cuneata gen. et sp. nov.
Pl. 23, figs. 1-9

Diagnosis: Wedge-shaped *Runnegaria.*

Description: Dorsal margin straight to gently convex; anterior margin rounded and projecting; posterior margin straight and oblique toward dorsum dorsally, rounded and projecting ventrally; ventral margin broadly rounded. Umbonal ridge prominent, umbos projecting prominently above dorsal commissure. Shell wedge shaped.

Types and material: R. cuneata is known from 21 specimens, of which we figure the holotype (Pl. 23, figs. 1-3) and four paratypes (Pl. 23, figs. 4-9). The holotype (UQ F 67212) measures 25.4 mm long and 13.6 mm high. All known specimens are sandstone moulds.

Type locality: The holotype and figured paratypes are from the Carlo Sandstone at our locality 15, eastern Georgina Basin, western Queensland.

Distribution: All known specimens of *R. cuneata* are from the Carlo Sandstone at the type locality. The fauna of the Carlo Sandstone is poorly known, and the fossils discussed herein are among the first described from the formation.

Etymology: Cuneatus, Latin, meaning wedge shaped.

Family **COLPOMYIDAE** nov.

Type genus: Colpomya Ulrich, 1895 (p. 659) is herein designated the type genus of the new family Colpomyidae.

Description: Small mytilaceans in which the cardinal dentition consists of a large bulbous articulating device in the right valve. The left valve may have a similar cardinal dentition as in *Colpomya,* where the two bulbous cardinal articulating devices are offset from one another, or the cardinal dentition may be lamellar and elongated anteriorly-posteriorly as in *Colpantyx.* In *Colpantyx,* the lamellar tooth of the left valve probably fits over the bulbous tooth of the right valve. Anterior hinge plate and anterior and posterior lateral teeth lacking.

Stratigraphic distribution: Lower Ordovician (Arenigian)-Upper Ordovician (Maysvillian).

Remarks: The Colpomyidae differs from the Modiolopsidae in its dentition. In the Modiolopsidae, teeth are either absent as in *Modiolopsis* (Pojeta, 1971, pls. 14-16) or else consist of a few discrete cardinal teeth mounted on a hinge plate as in *Modiolodon* (Pojeta, 1971, pl. 13); the teeth are never bulbous as in the Colpomyidae. The Colpomyidae is known from the Ordovician rocks of eastern North America and the Amadeus Basin, southern Northern Territory. At present it includes three genera: *Colpomya* Ulrich, *Colpantyx* gen. nov., and *Xestoconcha* gen. nov.

Genus **Colpantyx** nov.
Pl. 24

Type species: Colpantyx woolleyi sp. nov. is herein designated the type species of the new genus *Colpantyx.*

Diagnosis: Colpomyids with prominent comarginal ornament and one or more posterior radial ribs.

Description: Posteriorly elongated prosogyral colpomyids with pronounced comarginal ornament and one or two posterior umbonal radial ribs. Posterior ventral margin projecting where intersected by radial ribs; inter-rib area indented. Dentition consists of a large bulbous cardinal tooth in the right valve and an elongated lamellar cardinal tooth in the left valve. The only other known internal feature is the anterior adductor muscle scar.

Stratigraphic distribution: Early Ordovician (Arenigian).

Etymology: Kolpos, Greek, meaning fold; *antyx,* Greek, meaning border, referring to the folded posteroventral margin. Gender feminine.

Remarks: Colpantyx is at present known only from Australia; it differs from all other colpomyids in its prominent comarginal orna-

ment, posterior umbonal ribs, and sinuous posteroventral margin.

Colpantyx woolleyi gen. et sp. nov.

Pl. 24, figs. 1-17

Diagnosis: Colpantyx with angulate anterior umbonal rib.

Description: Dorsal margin straight; anterior margin rounded; ventral margin broadly rounded anteriorly, sinuate posteriorly; posterior margin more or less straight, oblique toward the dorsum. Umbo prominent, anterior umbonal rib angulate. Comarginal ornament consisting of thread-like lirae or lamellose growth lines.

Types and material: C. woolleyi is known from 87 specimens, of which we figure the holotype (Pl. 24, figs. 13-15) and 14 paratypes (Pl. 24, figs. 1-12, 16-17). The holotype (CPC 15580) measures 15.4 mm long and 8.9 mm high. All known specimens are moulds in sandstone.

Type locality: The holotype and three of the paratypes are from the Pacoota Sandstone at our locality 27, Amadeus Basin, southern Northern Territory.

Distribution: Colpantyx woolleyi occurs in the Pacoota Sandstone at our localities, 3, 4, 5, 6, 19, 23, 27, 28, 36, 38, and 39, Amadeus Basin, southern Northern Territory. The Pacoota Sandstone ranges in age from Late Cambrian (Payntonian) to Early Ordovician (Arenigian); the occurrences of *Colpantyx woolleyi* are all in the Arenigian part of the Pacoota.

Etymology: The species is named for Donald Woolley, formerly with the Bureau of Mineral Resources and now with the New South Wales Water Conservation and Irrigation Commission.

Genus **Xestoconcha** nov.

Pl. 25

Type species: Xestoconcha kraciukae sp. nov. is herein designated the type species of the new genus *Xestoconcha.*

Diagnosis: Colpomyids with greatest height of shell anterior to lateral midline.

Description: Posteriorly elongated prosogyral colpomyids with nearly smooth shells ornamented only by faint growth-lines. Greatest height of shell anterior to lateral midline, shell tapering posteriorly. Dentition of right valve consists of a large bulbous cardinal tooth; dentition of left valve unknown.

Stratigraphic distribution: Lower Ordovician (Arenigian).

Etymology: Xestos, Greek, meaning smoothed or polished, referring to the lack of obvious ornament; *concha,* from Greek *konkhe,* meaning a shell. Gender feminine.

Remarks: Xestoconcha is at present known only from Australia. It is most similar to *Colpomya* in its nearly unornamented shell, but differs from that genus in having the greatest height of the shell anterior to the lateral midline; *Colpomya* has the greatest height of the shell posterior to the lateral midline (Pojeta, 1971, pl. 12). Both *Colpomya* and *Xestoconcha* differ from *Colpantyx* in lacking prominent comarginal ornament.

Xestoconcha kraciukae gen. et sp. nov.

Pl. 25, figs. 3-12

Diagnosis: Xestoconcha with length about twice the height of the shell.

Description: Dorsal margin straight to gently convex; anterior margin rounded and protruding; ventral margin broadly rounded; posterior margin rounded. Shell ovate, rostrate posteriorly, length equal to about twice the height. Umbo broadly rounded, not prominent, projecting only slightly above the dorsal commissure.

Types and material: Xestoconcha kraciukae is known from 18 specimens, of which we figure the holotype (Pl. 25, figs. 10, 11) and five paratypes (Pl. 25, figs. 3-9, 12). The holotype (CPC 15588) measures 31.9 mm long and 15.2 mm high. All known specimens are sandstone moulds.

Type locality: The holotype and one of the figured paratypes are from the Pacoota Sandstone at our locality 4, Amadeus Basin, southern Northern Territory.

Distribution: Xestoconcha kraciukae occurs in the Pacoota Sandstone at our localities 2, 4, 5, 19, 23, 27, 28, 36 and 39, Amadeus Basin, southern Northern Territory. The Pacoota Sandstone ranges in age from Late Cambrian (Payntonian) to Early Ordovician (Arenigian); the occurrences of *X. kraciukae* are all in the Arenigian part of the Pacoota.

Etymology: The species is named for L. J. Kraciuk, Bureau of Mineral Resources.

Subclass **HETEROCONCHIA** Hertwig

Diagnosis: Equivalved usually burrowing pelecypods with closed margins, lacking a byssus as adults. Dentition variable, seldom taxodont, ligament without lithodesma.

Stratigraphic distribution: Lower Cambrian-Holocene.

Order **ACTINODONTOIDA** Douvillé

Diagnosis: Heteroconchs with ornament of comarginal growth lines, sometimes with a few radial ribs. Ligament opisthodetic, elongated, and parivincular. Adductor muscles subequal, anterior adductor often supported by a myo-

phoric buttress. Dentition flaring, ventrally divergent, with all of the teeth reaching or nearly reaching the beaks, primitively, posterior teeth extend the full length of the dorsal margin posterior to the beaks.

Stratigraphic distribution: Lower Ordovician (Arenigian)-Devonian?.

Family **CYCLOCONCHIDAE** Ulrich

Diagnosis: Actinodontoids with numerous elongate teeth which lack denticles.

Stratigraphic distribution: Lower Ordovician (Arenigian)-Upper Ordovician (Richmondian).

Genus **Copidens** nov.

Pl. 28

Type species: Copidens browni sp. nov. is herein designated the type species of the new genus *Copidens*.

Diagnosis: Cycloconchids with teeth mounted on hinge plate.

Description: Approximately isomyarian prosogyral cycloconchids with eight or more teeth radiating ventrally from the beak. Teeth not divisible into cardinal, and anterior and posterior lateral elements because they are not separated by edentulous intervals. The teeth that are directed posteriorly are elongate, those that are directed anteriorly are short. All teeth are mounted on a stout continuous hinge-plate.

Etymology: Copia, Latin, meaning abundance, many, referring to the teeth; *dens,* Latin, meaning tooth. Gender masculine.

Remarks: Copidens differs from other cycloconchids (Pojeta, 1971, pl. 2), in that its teeth are mounted on a continuous and stout hinge plate. At present, the genus is known only from Australia.

Copidens browni gen. et sp. nov.

Pl. 28, figs. 1-8

1969. *Dysodonta*? sp., Hill, Playford, & Woods, pl. 0 I, fig. 21.

Diagnosis: Subcircular *Copidens*.

Description: All shell margins broadly rounded, shell subcircular. Hinge plate higher posteriorly than anteriorly. Anterior adductor muscle scar with slight shell thickening along posterior face.

Types and material: Copidens browni is known from 17 specimens, of which we figure the holotype (Pl. 28, fig. 6) and six paratypes (Pl. 28, figs. 1-5, 7, 8). The holotype (CPC 15595) measures 13.2 mm long and 12.8 mm high. All known specimens are preserved as moulds in dolomite.

Type locality: The holotype is from the Nora Formation at our locality 90, southern Georgina Basin, eastern Northern Territory.

Distribution: C. browni occurs in the Nora Formation at our localities 11, 13, 14, 43, 44, and 90, southern and eastern Georgina Basin, western Queensland and eastern Northern Territory.

Etymology: The species is named for R. W. Brown, Bureau of Mineral Resources.

Family **LYRODESMATIDAE** Ulrich

Diagnosis: Actinodontoids with most or all of the teeth short and radiating ventrally from immediately below the beak; sometimes with one or two elongate posterior teeth; teeth often with denticles.

Stratigraphic distribution: Lower Ordovician (Arenigian)-Lower Silurian.

Genus **Brachilyrodesma** nov.

Pl. 26

Type species: Brachilyrodesma radkei sp. nov. is herein designated the type species of the new genus *Brachilyrodesma*.

Diagnosis: Lyrodesmatids lacking a posterior rostrum.

Description: Lyrodesmatids which are not rostrate posteriorly. Ornament over most of shell comarginal, but with radial ribs on posterodorsal part of shell. All teeth short and radiating ventrally from below beak, no elongate teeth.

Etymology: Brachys, Greek, meaning short, referring to the lack of a rostrum; *lyrodesma,* a genus of pelecypods. Gender feminine.

Remarks: Brachilyrodesma differs from *Lyrodesma* in not being rostrate posteriorly and from *Noradonta* in lacking elongate posterior teeth. At present, *Brachilyrodesma* is known only from Australia. The relationship to the Lyrodesmatidae is shown by the radial ribs on the posterodorsal part of the shell and the short teeth radiating from the beak, both of which are common features in *Lyrodesma*.

Brachilyrodesma radkei gen. et sp. nov.

Pl. 26, figs. 1-5

1969. Heterodont? bivalve; Hill, Playford, & Woods, pl. 0 I, fig. 23.

Diagnosis: Brachilyrodesma which is subcircular ventrally and subtriangular dorsally.

Description: Dorsal margin straight and short; anterior margin rounded and projecting; ventral margin broadly rounded; posterior margin erect and truncate. Shell tumid and wedge shaped with prominent umbonal ridge; umbo projecting only slightly above dorsal commis-

sure. Teeth short and small. Shell subcircular ventrally and subtriangular dorsally.

Types and material: B. radkei is known from only one specimen, the holotype (Pl. 26, figs. 1-5). The holotype (GSQ F 11679) preserves the shell; it was originally articulated, but had been sawn in half before being borrowed by us. It measures 26.8 mm long and 23.2 mm high.

Type locality: The holotype is from the Toko Group, Toko Range. The Toko Range is in the Georgina Basin and spans the border between western Queensland and the eastern Northern Territory. The Toko Group includes the Coolibah Formation, Nora Formation, Carlo Sandstone, and Mithaka Formation (Smith, 1972).

Distribution: B. radkei is known only from the type locality.

Etymology: The species is named for B. M. Radke, Bureau of Mineral Resources.

Remarks: It is difficult to classify *B. radkei* because we have only the single specimen. The radial ribs limited to the posterodorsal part of the shell suggest a relationship to the Lyrodesmatidae. The fact that the holotype has been sawn in half is helpful to us, as we have polished the median face of the left valve and were able to observe the dentition in section. The polished surface is shown in Plate 26, figure 4. In Plate 26, figure 5, we have outlined the ventral edges of the teeth with ink and the teeth are much like those of *Lyrodesma* figured by Pojeta (1971, pl. 3, figs. 10, 15, 21).

Genus **Noradonta** nov.

Pl. 27

Type species: Noradonta shergoldi sp. nov. is herein designated the type species of the new genus *Noradonta.*

Diagnosis: Lyrodesmatids with elongate posterior teeth.

Description: Prosogyral lyrodesmatids with anterior teeth short, radiating, and mounted on a hinge plate below the beak; posteriorly from the beak are one or two elongate teeth which extend the length of the posterodorsal margin and have denticles.

Etymology: Nora, from the Nora Formation; *odontus,* Greek, meaning tooth. Gender feminine.

Remarks: Noradonta is placed in the Lyrodesmatidae on the basis of the short radiating anterior teeth mounted on a hinge plate and the denticles on the posterior teeth. It differs from both *Brachilyrodesma* and *Lyrodesma* in having elongate posterior teeth.

Warris (1967) described a species of pelecypod from the Tabita Formation (Arenigian, Lower Ordovician; Shergold, 1971b; Warris, 1969) of northwestern New South Wales which he assigned to *Redonia* Rouault. This species has elongate denticulate teeth extending from the beak along the entire posterodorsal margin; it probably belongs to *Noradonta.* Warris (1967, p. 238) noted that the form he was describing lacked cardinal teeth; this may have been preservational, as only a few of the specimens of *Noradonta* described herein preserve the anterior teeth. We suggest that *Noradonta* occurs in the Tabita Formation.

Barrois (1891, pl. 1, figs. 1a-d) figured specimens of *Lyrodesma armoricana* Tromelin & Lebesconte that have a dentition consisting of short anterior teeth mounted on a hinge-plate and elongate teeth that start at the beak and extend along the entire posterodorsal margin of the shell. Barrois's material comes from the Armoricain Sandstone (Arenigian, Lower Ordovician; Babin, 1966) of Brittany. Both Barrois (1891, p. 177) and Babin (1966, p. 241) noted that the anterior teeth of *L. armoricana* have denticles (crenulations), but did not mention the occurrence of these on the elongate posterior teeth. Pojeta (1971, pl. 3, fig. 11) figured a specimen of *L. armoricana* which suggests the presence of denticles on the elongate posterior teeth. We tentatively place *L. armoricana* in *Noradonta* as *N.? armoricana* (Tromelin & Lebesconte).

Noradonta shergoldi gen. et sp. nov.

Pl. 27, figs. 1-6

Diagnosis: Elongate *Noradonta* with anterior teeth projecting posteroventrally.

Description: Dorsal margin broadly convex; anterior margin rounded and projecting; ventral margin broadly rounded; posterior margin nearly erect. Shell elongate ovate. Umbo projecting only slightly above dorsal commissure. Anterior adductor muscle scar far forward and deeply impressed into shell. Anterior teeth directed posteroventrally.

Types and material: Noradonta shergoldi is known from 10 specimens, of which we figure the holotype (Pl. 27, figs. 2, 3) and four paratypes (Pl. 27, figs. 1, 4-6). The holotype (UQ F 67217) is incomplete but was at least 13.3 mm long and 8.9 mm high.

Type locality: The holotype is from the Nora Formation at our locality 13, eastern Georgina Basin, western Queensland.

Distribution: N. shergoldi occurs in the Nora Formation at our localities 11, 13, 14, 86, and 89, southern and eastern Georgina Basin, western Queensland and eastern Northern Territory.

Etymology: The species is named for J. H. Shergold, Bureau of Mineral Resources.

Remarks: N. shergoldi differs from *N.? armoricana,* in that in the latter species the anterior teeth radiate ventrally rather than posteroventrally.

Order **VENEROIDA** Adams & Adams

Diagnosis: Teeth, when present, differentiated into cardinals and laterals, or few cardinals only; posterior laterals entirely behind ligament.

Superfamily **SOLENACEA** Lamarck

Diagnosis: Valves markedly elongate, cylindrical to flattened, gaping at both ends, hinge weak.

Family **ORTHONOTIDAE** Miller

Diagnosis: Soleniform Palaeozoic pelecypods with lunule and escutcheon generally absent.

Remarks: We follow Runnegar (1974, p. 927) in placing the Orthonotidae in the Heteroconchia (Heterodonta), rather than the Anomalodesmata (Newell & LaRocque, 1969; Pojeta, 1971).

Genus **Sphenosolen** nov.

Pl. 25

Type species: Sphenosolen draperi sp. nov. is herein designated the type species of the new genus *Sphenosolen.*

Diagnosis: Wedge-shaped orthonotids lacking radial ribs.

Description: Wedge-shaped orthonotids with flat shell, posterior end of shell higher than anterior, dorsal and ventral margins not parallel and lacking radial ribs.

Etymology: Sphen, Greek, meaning wedge, referring to the shape of the shell; *solen,* a genus of pelecypods. Gender masculine.

Remarks: Four other genera of orthonotids or orthonotid-like shells are known from the Ordovician (Pojeta, 1971; Soot-Ryen, 1966). *Cymatonota* Ulrich and *Psiloconcha* Ulrich differ from *Sphenosolen* in having parallel dorsal and ventral margins. *Orthodesma* Hall & Whitfield differs from *Sphenosolen* in having a marked decrease in shell height anterior to the beaks so that the shell is nasute anteriorly. *Palaeosolen* Hall is wedge shaped like *Sphenosolen,* but has a prominent radial rib extending from the umbo to the posteroventral margin.

Sphenosolen draperi gen. et sp. nov.

Pl. 25, figs. 1, 2

Diagnosis: Sphenosolen in which length of shell is about three times the maximum shell height.

Description: Dorsal margin straight; anterior margin rounded; posterior margin rounded to straight and oblique toward the dorsum; ventral margin broadly rounded anteriorly, straight posteriorly. Shell flat, umbo hardly discernible, beak placed far forward on dorsal margin.

Types and material: S. draperi is known from nine specimens, of which we figure the holotype (Pl. 25, fig. 1) and a paratype (Pl. 25, fig. 2). The holotype measures 37.9 mm long and 12.3 mm high.

Type locality: The holotype and figured paratype are from the Stairway Sandstone at our locality 77, Amadeus Basin, southern Northern Territory.

Distribution: All known specimens of *S. draperi* are from the type locality.

Etymology: The species is named for J. J. Draper, Bureau of Mineral Resources.

Class **ROSTROCONCHIA** Pojeta, Runnegar, Morris, & Newell

This section is a brief appendix to the present work; it supplements the information published on Australian Ordovician rostroconchs by Pojeta, Gilbert-Tomlinson, and Shergold (1977). Only the new information obtained since that study is included, and two new taxa are defined; definitions of previously established taxa are given in Pojeta, Gilbert-Tomlinson, & Shergold (1977).

Order **RIBEIRIOIDA** Kobayashi

Family **RIBEIRIIDAE** Kobayashi

Genus **Ribeiria** Sharpe, 1853

Pl. 29

Ribeiria csiro Pojeta, Gilbert-Tomlinson, & Shergold, 1977

Pl. 29, fig. 17

Discussion: This species was previously known from only two specimens at one locality. We now figure an additional specimen (CPC 15601), which is 12 mm long and 7.2 mm high, from a new locality.

Distribution The new specimen is from the Stairway Sandstone at our locality 18, Amadeus Basin, southern Northern Territory. The previously described specimens are also from the Stairway Sandstone, Amadeus Basin, southern Northern Territory, but come from our locality 82 (locality 86, Pojeta *et al.,* 1977).

Genus **Pinnocaris** Etheridge, 1878

Pl. 29

Pinnocaris? sp. C

Pl. 29, fig. 12

Discussion: This taxon is a posteriorly elongated ribeiriid and in this regard is similar to species placed in *Pinnocaris.* It differs from

species placed in that genus in being elongated and nasute anteriorly. At present, *Pinnocaris*? sp. C is known from only one specimen (CPC 15598), which measures 24.2 mm long and 7.4 mm high.

Distribution: The single known specimen of *Pinnocaris*? sp. C is from the Pacoota Sandstone at our locality 5, Amadeus Basin, southern Northern Territory. At this locality the Pacoota Sandstone is probably Early Ordovician (Arenigian) in age.

Family **TECHNOPHORIDAE** Miller

Genus **Technophorus** Miller, 1889

Pl. 29

Technophorus walteri Pojeta, Gilbert-Tomlinson, & Shergold, 1977

Pl. 29, figs. 13-16

Discussion: Previously, *T. walteri* was known only from internal moulds at one locality; we have now found the species at three more localities. In addition, we have found an external mould of the species (CPC 15600), which shows prominent comarginal ornament anterior to the radial rib and an almost smooth shell posterior to the rib (Pl. 29, fig. 16). We also figure (Pl. 29, figs. 13-15) a free articulated internal mould (CPC 15599) of *T. walteri*.

Distribution: T. walteri was previously known only at our locality 23 (locality 56, Pojeta et al. 1977). It is now also known from our localities 3, 4, 5, and 6. At all localities it occurs in the Pacoota Sandstone, Amadeus Basin, southern Northern Territory. At all the localities where *T. walteri* occurs, the Pacoota Sandstone is probably Early Ordovician (Arenigian) in age.

Genus **Tolmachovia** Howell & Kobayashi, 1936

Pl. 29

Tolmachovia corbetti sp. nov.

Pl. 29, figs. 8-11

1883. Peculiar bivalve, Etheridge, p. 158, pl. 2, figs. 15a, b.

Diagnosis: Tolmachovia with pegmas of about equal length, and with anterodorsal margin nearly as high as beak.

Description: Tolmachovia with beak forming high point on dorsal margin, beak subcentral; anterodorsal margin nearly as high as beak. Anterior, posterior, and ventral margins broadly rounded. Pegmas of about equal length, anterior pegma erect, posterior pegma oblique.

Types and material: T. corbetti is known from four free specimens and a small slab of rock containing about 20 specimens. The four free specimens are figured here; of these the specimen shown on Plate 29, figure 10 is the holotype (BM L 11637c) and the specimens shown on Plate 29, figures 8, 9, 11, are paratypes (BM L 11637a, b, d). The holotype is almost 14 mm long and 11 mm high.

Type locality: All of the types of *T. corbetti* are from the Caroline Creek Sandstone at our locality 8, northwestern Tasmania.

Distribution: The species is known only from the type locality. The Caroline Creek Sandstone is Early Ordovician (Arenigian) in age (Kobayashi, 1940; Banks, 1962).

Etymology: The species is named for K. D. Corbett, Tasmanian Department of Mines.

Remarks: Pojeta, Gilbert-Tomlinson, & Shergold (1977) could not locate Etheridge's (1883) specimens, and mentioned only that on the basis of his figures they were probably assignable to the genus *Tolmachovia.* Since then, M. D. Plane (Bureau of Mineral Resources) on a visit to the British Museum (Natural History), and with the kind help of N. J. Morris, was able to find Etheridge's specimens in the British Museum collection. The British Museum kindly photographed the specimens for us, and their photographs are used here.

T. corbetti differs from *T. belfordi* Pojeta, Gilbert-Tomlinson, & Shergold (1977), in having pegmas of equal length. It differs from *T. concentrica* Howell & Kobayashi (1936) in lacking anterior comarginal rugae.

Order **CONOCARDIOIDA** Neumayr

Conocardioid sp. A

Pl. 29, fig. 18

Discussion: This specimen (SAM T 1267) was described by Tate (1896, p. 110, pl. 2, fig. 13) as *Conocardium* sp. ind. It is a conocardioid but is not well enough preserved to determine to what genus it belongs; it is probably assignable to the superfamily Conocardiacea. The specimen measures 15.7 mm long and 10.6 mm high.

Distribution: Tate (1896, p. 110) gave the locality of Conocardioid sp. A as 'In limestone, Tempe Downs', Amadeus Basin, southern Northern Territory. On the basis of the lithology of the small slab on which the specimen occurs, it probably comes from the Stokes Siltstone.

Superfamily **CONOCARDIACEA** Miller

Family **BRANSONIIDAE** Pojeta & Runnegar

Genus **Bransonia** Pojeta & Runnegar, 1976

Pl. 29

Bransonia townleyi sp. nov.

Pl. 29, figs. 4-7

Diagnosis: Oblique *Bransonia* with rostral clefts, coarse radial ribs, and lacking radial ornament on snout of shell.

Description: Dorsal margin of rostrum and snout straight; anterior margin rounded; posterior margin almost straight and erect; beak subcentral. Rostrum small, not projecting beyond posterior margin, and with rostral clefts. Radial ribs coarse, limited to body and rostral areas of shell; snout of shell ornamented only with comarginal growth lines.

Types and material: B. townleyi is known from two specimens, of which the holotype (CPC 15597) is figured (Pl. 29, figs. 4-7). The holotype measures 5.2 mm long and 4.5 mm high.

Type locality: The holotype is from the Gordon Limestone at our locality 75, central western Tasmania.

Distribution: B. townleyi is known only from the type locality. According to M. R. Banks, at locality 75 the Gordon Limestone is Trentonian (late Middle or early Late Ordovician) in age.

Etymology: The species is named for the late K. A. Townley, Bureau of Mineral Resources.

Remarks: The only other known Australian Ordovician species of *Bransonia* is *B. chapronierei* Pojeta, Gilbert-Tomlinson, & Shergold. It differs from *B. townleyi* in having much finer radial ornament.

MISIDENTIFIED PELECYPODS

'Pteronites' micans Tate, 1896

Pl. 6, fig. 8

1896. *Pteronites micans* Tate, p. 109, pl. 1, fig. 9.

Remarks: This form was placed in the pinnid genus *Pteronites* by Tate (1896). On the basis of its size, shape, and the presence of terrace lines, we regard the single known specimen as the genal spine of an asaphoid trilobite. The holotype (SAM T 1268), and only known specimen, measures 9.2 mm long. Tate (1896, p. 110) gave the locality as 'In limestone, Tempe Downs', which is in the Amadeus Basin, southern Northern Territory. The lithology of the slab preserving the holotype suggests that it is from the Stokes Siltstone. This species name is available for trilobites.

KEY TO THE IDENTIFICATION OF THE NAMED SPECIES OF AUSTRALIAN ORDOVICIAN PELECYPODS

1. (a) Taxodont dentition present 2
   (b) Taxodont dentition absent 18
2. (a) Prominent comarginal ornament present 3
   (b) Prominent comarginal ornament lacking 5
3. (a) Single radial rib present ..... *Lophoconcha corrugata*
   (b) Radial ribs absent 4
4. (a) Ornament of comarginal rugae, shell elongated posteriorly ..... *Alococoncha crassatellaeformis*
   (b) Ornament of comarginal lirae, shell elongated anteriorly ..... *Fidera maryae*
5. (a) Single posterior radial rib present 6
   (b) Radial ornament lacking 7
6. (a) Shell truncate posteriorly ..... *Eritropis opiformis*
   (b) Shell elongated posteriorly ..... *Zeehania jacksoni*
7. (a) Umbos divergent, not enrolled toward midline, beaks far from midline 8
   (b) Umbos enrolled toward midline, beaks adjacent to midline 9
8. (a) Shell elongate, dorsal profile cordate ..... *Johnmartinia cordata*
   (b) Shell subcircular, dorsal profile fusiform ..... *Johnmartinia orbicularis*
9. (a) Myophoric buttress present ..... *Nuculites wattii*
   (b) Myophoric buttress absent 10
10. (a) Shell rostrate posteriorly 11
    (b) Shell not rostrate posteriorly 12
11. (a) Umbo projecting only slightly above dorsal commissure ..... *Ctenodonta youngi*
    (b) Umbo projecting prominently above dorsal commissure ..... *Ctenodonta macalesteri*
12. (a) Anterior and posterior tooth-rows straight and horizontal ..... *Deceptrix banksi*
    (b) Anterior and posterior tooth-rows meet at distinct angle, one or neither horizontal 13
13. (a) Teeth in anterior tooth-row larger and of different shape than those in posterior tooth-row 14
    (b) Teeth in anterior and posterior tooth-rows of about same size and shape 15
14. (a) Shell elongate subquadrate ..... *Inaequidens davisi*
    (b) Shell subcircular ..... *Inaequidens campbelli*
15. (a) Teeth in anterior and posterior tooth-rows arranged in a continuous semicircle ..... *Palaeoneilo smithi*
    (b) Anterior tooth-row at sharp angle to posterior tooth-row and directed ventrally 16
16. (a) Ratio of height to length of shell 1:2 or larger 17
    (b) Ratio of height to length of shell 1:1.6 or smaller ..... *Sthenodonta passmoreae*
17. (a) Umbos prominent, relatively few teeth in posterior tooth row, averaging about 15 ..... *Sthenodonta eastii*
    (b) Umbos subdued, relatively many teeth in posterior tooth row, averaging about 20 ..... *Sthenodonta jelli*
18. (a) Shape soleniform ..... *Sphenosolen draperi*
    (b) Shape not soleniform 19
19. (a) Prominent thin myophoric buttress present ..... *Runnegaria cuneata*
    (b) Prominent thin myophoric buttress absent 20
20. (a) Shell inequivalved ..... *Denticelox tortuosa*
    (b) Shell equivalved 21
21. (a) Large globose anterior lobe present ..... *Leconychia doylei*
    (b) Large globose anterior lobe absent 22
22. (a) Umbos carinate 23
    (b) Umbos not carinate 25
23. (a) Midumbonal carina present ..... *Pteronychia haupti*
    (b) Carina on posterior umbonal slope 24
24. (a) Posterior umbonal slope wide ..... *Cyrtodontula sohli*
    (b) Posterior umbonal slope narrow ..... *Cyrtodontula hadzeli*
25. (a) Radial ornament present 26
    (b) Radial ornament absent 28

26. (a) Radial ornament of one or two posterior ribs ..... *Colpantyx woolleyi*
(b) Radial ornament of more than two ribs 27

27. (a) Radial ornament limited to posterodorsal part of shell ..... *Brachilyrodesma radkei*
(b) Radial ornament limited to body of shell, absent from posterodorsal part *Glyptonychia wilsoni*

28. (a) Dentition of single bulbous or lamellar tooth in each valve ..... *Xestoconcha kraciukae*
(b) Dentition of several teeth in each valve 29

29. (a) Anterior and posterior teeth separated by edentulous area 30
(b) Anterior and posterior teeth all reach or nearly reach the beak, not separated by edentulous area 34

30. (a) Ornament of comarginal rugae ..... *Pharcidoconcha raupi*
(b) Shell lacking comarginal rugae 31

31. (a) Anterior margin straight, not projecting ..... *Cyrtodonta carberryi*
(b) Anterior margin rounded and projecting 32

32. (a) Shell large and tumid ..... *Cyrtodonta hazeli*
(b) Shell not large or tumid 33

33. (a) Shell subquadrate ..... *Cyrtodonta staffordae*
(b) Shell obliquely ovate ..... *Cyrtodonta wattii*

34. (a) Posterior teeth with denticles ..... *Noradonta shergoldi*
(b) Posterior teeth lacking denticles ..... *Copidens browni*

4. LOCALITY REGISTER

Localities are numbered sequentially from 1-91. The numbers are assigned alphabetically according to the name of the 1:250 000 map area in which the localities occur and then in order of field numbers on the map; localities 59 and 91 are not arranged in proper sequence because the data for these were received late in the study. The numbers in parentheses after some of the locality numbers are BMR computer register numbers for the newer collections from the Georgina Basin. An asterisk after a field number or section number indicates that the locality or section is printed on the map; such localities are usually indicated on the map by a fossil symbol and the field number but a few are indicated by a rock sample symbol and the field number. For the Amadeus and Georgina Basins the localities are all plotted on 1:250 000 scale geological maps published by the Bureau of Mineral Resources. Such scale geological maps do not exist for all of Tasmania, and our Tasmanian localities are plotted on 1:250 000 scale topographic maps prepared by the Royal Australian Survey Corps from the State Map of Tasmania produced by the Department of Lands and Survey, Hobart.

The 1:250 000 scale map areas from which we have collections in the Amadeus and Georgina Basins are: Alice Springs, N.T. (Wells, 1969a; locs. 1-6); Ayers Rock, N.T. (Forman, 1965; locs. 7, 59); Finke, N.T. (Wells, 1969b; loc. 9); Glenormiston, Qld (Reynolds, 1965; locs. 10-15); Henbury, N.T. (Cook, 1968a; locs. 16-34); Hermannsburg, N.T. (Quinlan & Forman, 1968; locs. 35-42); Huckitta, N.T. (Smith, 1963; locs. 43-44); Kulgera, N.T. (Stewart, 1967; locs. 45-46); Lake Amadeus, N.T. (Cook, 1968b; locs. 47-58, 60-62); Mount Liebig, N.T. (Ranford, 1969; locs. 63-71); Mount Whelan, Qld (Reynolds, 1968; loc. 72); Rodinga, N.T. (Cook, 1972b; loc. 77-83); and Tobermory, N.T. (Smith, 1965; locs. 84-90). The 1:250 000 topographic maps of Tasmania do not give the names of the compilers, or the dates when the maps were made; the maps do have a name and number. Our collections are from the following map areas: Burnie, T. (SK/55-3, edition 1, series R 502; loc. 8); Hobart, T. (SK/55-8, edition 1, series R 502; loc. 91); Queenstown, T. (SK/55-5, edition 1, series R 502; locs. 73-76). The locations on all map areas are shown in Figures 1 and 2.

We have tried to indicate each locality geographically and with a set of co-ordinates. The co-ordinates are given in millimetres measured first east and then north from the southwest corner of the 1:250 000 sheet. For example the position of locality 1 on the Alice Springs 1:250 000 sheet is 392 mm east of the southwest corner and 195 mm north of the 392 mm mark. Wherever possible we have indicated the run, photo, and point numbers of localities that are marked on air photos; often the points are not marked. These air photos are at the Bureau of Mineral Resources, Geology and Geophysics, Canberra, where they are catalogued for each map area. Except where otherwise stated, the localities are marked on the K-17 series of air photos. We have tried to assemble all the available information for each locality; because of the loss of information over the years since some of the collections were made we have more information for some localities than others. All available information for each locality is given in the register.

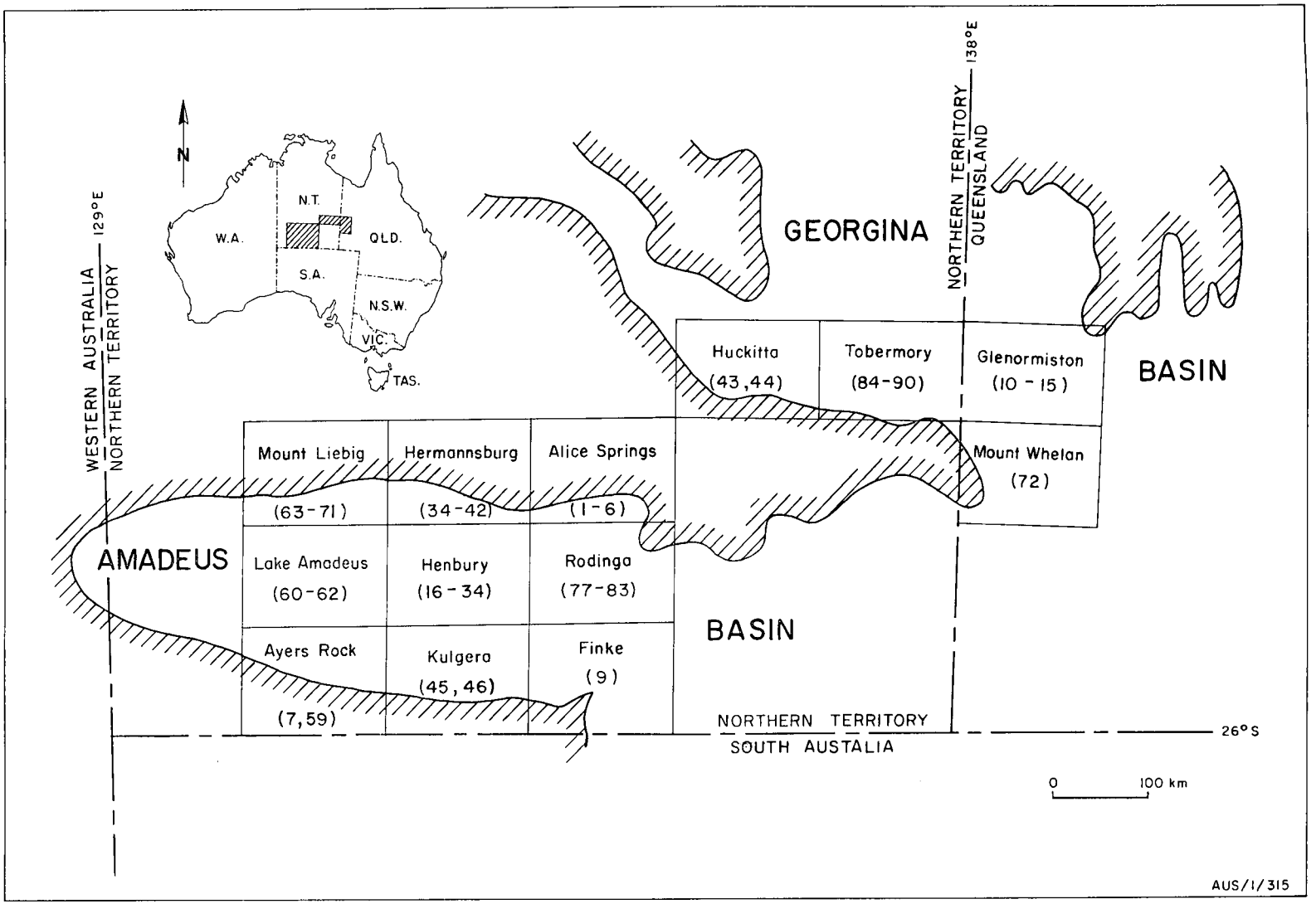


Fig. 1. Locality map showing all 1:250 000 sheets from which the pelecypods and rostroconchs described here were collected in mainland Australia. The numbers under the names of the map sheets are the localities within each map area. Hachured areas are boundaries of the basins.

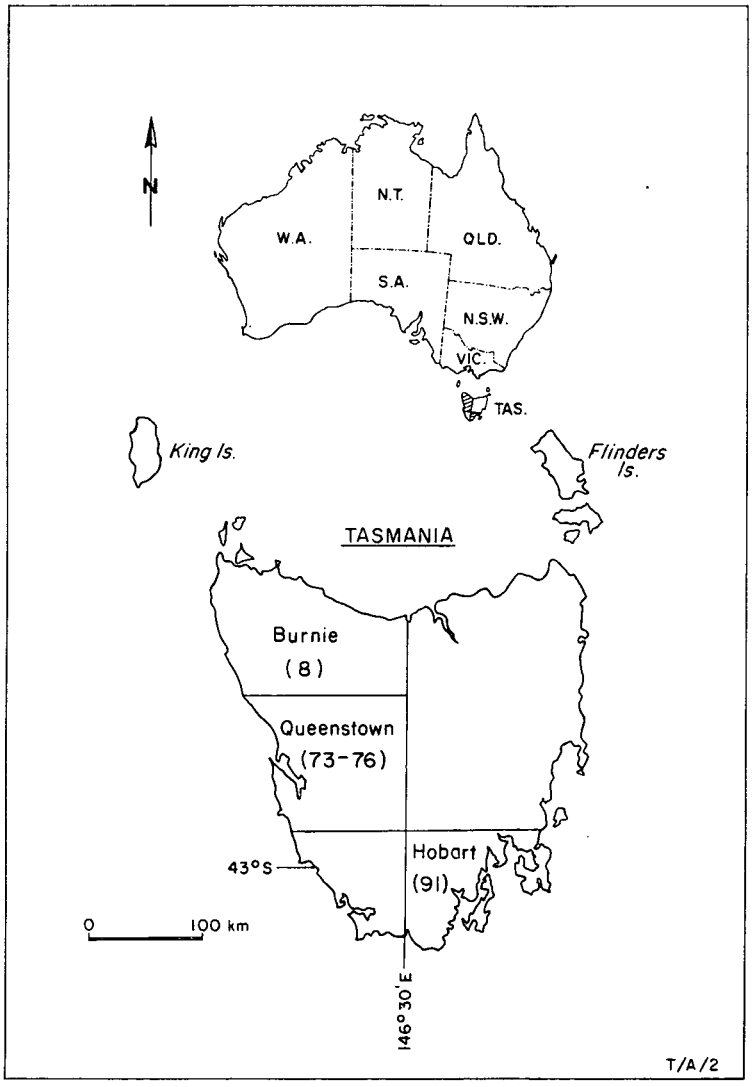


Fig. 2. Locality map showing the 1:250 000 sheets from which the pelecypods and rostroconchs described herein were collected in Tasmania. The numbers under the names of the map sheets are the localities within each map area.

Locality No. 1

Field No.:
AS 263
1:250 000 Sheet:
ALICE SPRINGS, N.T.
Run, Photo, Point Nos.:
10/5094/-
Formation:
Pacoota Sandstone
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
Ross River syncline, S flank; W slope of unnamed gorge E of N'Dahla Gorge, W of Ross River
Co-ordinates:
392 mm E; 195 mm N
Lithology:
Decalcified, silicified buff fine-grained silty sandstone; pinkish-brown staining
Occurrence:
Float in same section as, but lower than, AS 260 (Rostroconch loc. 5; Pojeta et al., 1977); about 65 m below local top of Pacoota Sandstone; Mereenie Sandstone overlies
Collector:
J. Gilbert-Tomlinson, 1964
Pelecypods:
Deceptrix? sp. A
Associated fossils:
None

Locality No. 2

Field No.:
NT 195
1:250 000 Sheet
ALICE SPRINGS, N.T.
Run, Photo, Point Nos.:
5093/10/B2697
Formation:
Pacoota Sandstone
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
Creek bed, Ross River area, 8 km SSW of Old Love's Creek hstd
Co-ordinates:
ca. 387 mm E; 154 mm N
Lithology:
Decalcified flaggy sandstone, yellow/white; fossils as yellow or brown films
Occurrence:
Float
Collector:
J. Gilbert-Tomlinson, 1956
Pelecypods:
Xestoconcha kraciukae
Associated fossils:
Rostroconchs: *?Ribeiria, Technophorus nicolli*?
Trilobites: asaphelloid indet.

Locality No. 3

Field No.:
NT 237A (=A4)
1:250 000 Sheet:
ALICE SPRINGS, N.T.
Run, Photo, Point Nos.: 13/5171/-
Formation:
Pacoota Sandstone
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
12 km SW of Alice Springs on Owen Springs road; E of road near aboriginal rock paintings
Lithology:
Decalcified compact fine-grained silty sandstone, pinkish-buff with reddish-brown staining; fossils abundant
Collector:
N. O. Jones, 1955 (loc. A4)
Pelecypods:
Colpantyx woolleyi
Associated fossils:
Molluscs: *Technophorus walteri;* nautiloid indet.
Trilobite: cf. *Psilocephalina*

Locality No. 4

Field No.:
NT 237 B
1:250 000 Sheet:
ALICE SPRINGS, N.T.
Run, Photo, Point Nos.:
13/5171/-
Formation:
Pacoota Sandstone
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
See locality 3
Lithology:
Decalcified fine-grained silty sandstone, pinkish-buff with brown and purple staining; fossils smaller and less abundant than in locality 3
Collector:
N. O. Jones, 1955
Pelecypods:
Colpantyx woolleyi, Xestoconcha kraciukae
Associated fossils:
Molluscs: monoplacophoran indet.; *Technophorus walteri;* nautiloid indet.
Trilobite: *Psilocephalina*
Brachiopods: inarticulates indet.

Locality No. 5

Field No.:
NT 237 C
1:250 000 Sheet:
ALICE SPRINGS, N.T.

Run, Photo, Point Nos.:
13/5171/-
Formation:
Pacoota Sandstone
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
See locality 3
Lithology:
Decalcified fine-grained micaceous sandstone, pale grey, with purple and brown staining
Collector:
N. O. Jones, 1955
Pelecypods:
Colpantyx woolleyi, Xestoconcha kraciukae
Associated fossils:
Mollusc: *Technophorus walteri*
Trilobite: *Psilocephalina*

Locality No. 6

Field No.:
NT 335
1:250 000 Sheet:
ALICE SPRINGS, N.T.
Run, Photo, Point Nos.:
13/5170/-
Formation:
Pacoota Sandstone
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
3.2 km E of Native Pine Gap, SW of Alice Springs
Co-ordinates:
Base of section 109 mm E; 87 mm N.
Top of section 109 mm E; 82 mm N.
Lithology:
Decalcified lightly silicified fine-grained sandstone, pinkish-grey with purple-brown staining
Occurrence:
Sample 15 in measured section, float from interval 333.6 m above rostroconch locality 12 (Pojeta et al., 1977)
Collectors:
D. Woolley and P. J. Jones, 1962
Pelecypods:
Colpantyx woolleyi
Associated fossils:
Trilobites: asaphid frag. indet.
Rostroconchs: *Technophorus walteri*

Locality No. 7

Field No.:
A1/63
1:250 000 Sheet:
AYERS ROCK, N.T.
Run, Photo, Point Nos.:
1 E-W/5119/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
NE corner of Ayers Rock (1:250 000) Sheet
Lithology:
Decalcified fine-grained silty sandstone, grey to yellow, orange-brown staining
Collector:
Frome-Broken Hill Pty Ltd, 1959
Pelecypods:
Palaeoneilo smithi
Associated fossils:
Molluscs: ?*Clathrospira*
Trilobites: asaphid fragments indet.
Brachiopods: orthid and plectambonitid indet.

Locality No. 8

Field No.:
None
1:250 000 Sheet:
BURNIE, T.
Formation:
Caroline Creek Sandstone
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
Caroline Creek, 2.5 km SSW of Latrobe
Co-ordinates:
627 mm E; 229 mm N
Lithology:
Decalcified ochrous silty sandstone; grey staining
Collector:
T. Stephens c. 1882
Rostroconch:
Tolmachovia corbetti
Associated fossils (*fide* Kobayashi, 1940):
Molluscs: euomphalid indet., *Cryptolites* (sic.) [*Cyrtolites*?] sp. indet.
Trilobites: *'Asaphellus' lewisi, Carolinites bulbosa, C. quadrata, C.? tasmaniensis, Etheridgaspis carolinensis, E. johnstoni, 'Prosopiscus' subquadratus, Tasmanocephalus stephensi*
Brachiopods: indet.

Locality No. 9

Field Nos.:
CW3, CW200, NT639
1:250 000 Sheet:
FINKE, N.T.
Run, Photo, Point Nos.:
6/5109/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Mt Watt, 38 km WSW of Horseshoe Bend
Co-ordinates:
156 mm E; 297 mm N

Lithology:
Decalcified heavily silicified fine to medium-grained sandstone; orange-yellow staining; some clay pellets
Occurrence:
Float from sandstone capping of mesa; Upper Proterozoic Winnall Beds unconformably underlies
Collectors:
S. K. Skwarko, C. G. Gatehouse, 1963;
J. Gilbert-Tomlinson, 1964
Pelecypods:
Alococoncha crassatellaeformis, Johnmartinia orbicularis, J. cordata, Eritropis sp. A
Associated fossils:
Molluscs: endoceroid indet.
Vertebrates: agnathans
Ichnolites: cf. *Cruziana*

Locality No. 10

Field No.:
G327
1:250 000 Sheet:
GLENORMISTON, Qld
Formation:
Nora Formation
Age, Stage:
Ordovician
Geographical position:
Oodatra Point, Toko Range
Co-ordinates:
101 mm E; 50 mm N
Pelecypods:
Palaeoneilo smithi
Associated fossils:
None

Locality No. 11 (74713106)

Field No.:
306/1-74
1:250 000 Sheet:
GLENORMISTON, Qld
Formation:
Nora Formation
Age, Stage:
Ordovician
Geographical position:
Neeyamba Hill, Toko Range (= Rostroconch locality 55; Pojeta et al., 1977)
Co-ordinates:
125 mm E; 22 mm N
Lithology:
Flaggy brown sandy limestone with interbedded fine-grained decalcified brown sandstone
Occurrence:
Topmost outcropping layer (number 14 painted on limestone block); overlies ichnofossil stratum
Collectors:
J. H. Shergold and John Pojeta, 1974
Pelecypods:
Palaeoneilo smithi, Sthenodonta passmoreae, Cyrtodonta sp., *Copidens browni, Noradonta shergoldi*
Associated fossils:
Molluscs: *Technophorus* sp.; ?*Raphistomina, ?Helicotoma*
Trilobites: *Carolinites, ?'Asaphus' howchini, ?'A.' thorntoni,* aff. *Prosopiscus*
Bryozoans: trepostome indet.
Brachiopods: orthid and plectambonitid indet.
Echinoderms: stem ossicles
Ichnolites: *Skolithos*

Locality No. 12

Field No.:
UQL 2865
1:250 000 Sheet:
GLENORMISTON, Qld
Formation:
Nora Formation
Age, Stage:
Ordovician
Geographical position:
See locality 11
Lithology:
Brown sandy limestone (some calcite blebs and stringers); interbedded brown decalcified sandstone
Occurrence:
Between 7.5 m and 16.6 m from base
Collectors:
J. S. Jell, T. Haskell, and B. Runnegar, 1964
Pelecypods:
Cyrtodonta sp.
Associated fossils:
Molluscs: *Helicotoma;* nautiloid indet.
Trilobites: asaphid indet.
Brachiopods: orthid and plectambonitid indet.
Echinoderms: stem ossicles

Locality No. 13

Field No.:
UQL 2866
1:250 000 Sheet:
GLENORMISTON, Qld
Formation:
Nora Formation
Age, Stage:
Ordovician
Geographical position:
See locality 11
Lithology:
Recrystallized grey-brown sandy limestone and fine-grained brown decalcified sandstone
Occurrence:
Between 16.6 m and 21.1 m above base

Collectors:
J. S. Jell, T. Haskell, and B. Runnegar, 1964
Pelecypods:
Palaeoneilo smithi, Sthenodonta passmoreae, Copidens browni, Noradonta shergoldi
Associated fossils:
Molluscs: monoplacophoran; ?*Lophospira*, ?*Helicotoma;* nautiloid indet.
Trilobites: asaphid indet.
Brachiopods: orthid and plectambonitid
Echinoderms: stem ossicles

Locality No. 14

Field No.:
UQL 2867
1:250 000 Sheet:
GLENORMISTON, Qld
Formation:
Nora Formation
Age, Stage:
Ordovician
Geographical position:
See locality 11
Lithology:
Reddish-brown sandy limestone and micaceous silty sandstone
Occurrence:
Top 3 m of section
Collectors:
J. S. Jell, T. Haskell, and B. Runnegar, 1964
Pelecypods:
Sthenodonta passmoreae, Copidens browni, Noradonta shergoldi
Associated fossils:
Molluscs: ?*Helicotoma*, ?*Raphistomina;* actinoceroid and ?endoceroid nautiloids
Trilobites: asaphid indet.
Brachiopods: orthid and plectambonitid
Echinoderms: ossicles indet.

Locality No. 15

Field No.:
UQL 2871
1:250 000 Sheet:
GLENORMISTON, Qld
Formation:
Carlo Sandstone
Age, Stage:
Middle Ordovician
Geographical position:
5.2 km by road W of escarpment of Toko Range on road W from Glenormiston Homestead
Lithology:
Fine-grained decalcified sandstone, white/yellow/orange/pinkish-brown. Dark reddish-brown staining; surface silicification
Collectors:
J. S. Jell, T. Haskell, B. Runnegar, 1964
Pelecypods:
Ambonychiid genus A species A, *Glyptonychia wilsoni, Runnegaria cuneata*
Associated fossils:
Trilobites: ?*'Asaphus' thorntoni*

Locality No. 16

Field No.:
Hy 8* [Plotted as rock sample locality]
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
8/5165/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
SE nose of Parana Hill anticline, 32 km WSW of Tempe Downs
Co-ordinates:
45 mm E; 250 mm N
Lithology:
Sandstone and phosphorite
Occurrence:
Rubble, in situ
Collector:
C. G. Gatehouse, 1962
Pelecypods: *Cyrtodonta wattii, Sthenodonta eastii*
Associated fossils:
Molluscs: euomphaloid and other gastropods
Trilobites: asaphid indet.
Brachiopods: orthids indet.

Locality No. 17

Field No.:
Hy 11 F*
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
8/5167/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
3.5 km NE of Mt Levi
Co-ordinates:
69 mm E; 256 mm N
Lithology: Decalcified fine-grained silty sandstone; orange and brown staining
Occurrence:
Underlain by Horn Valley Siltstone; overlain by Stokes Siltstone
Collector:
C. G. Gatehouse, 1962
Pelecypods:
Cyrtodonta wattii
Associated fossils:
None

Locality No. 18

Field No.:
Hy 13 F*
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
8/5167/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
0.8 km SE of Locality 17
Co-ordinates:
72 mm E; 249 mm N
Lithology:
Decalcified silicified grey-white sandstone
Occurrence:
Underlain by Horn Valley Siltstone; overlain by Stokes Siltstone
Collector:
C. G. Gatehouse, 1962
Pelecypods:
Sthenodonta eastii
Associated fossils:
Molluscs: *Ribeiria*
Trilobites: asaphid indet.

Locality No. 19

Field No.:
Hy 80
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
3/5090/-
Formation:
Pacoota Sandstone
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
Strike Valley 4 km S of Areyonga Native Settlement on track to Tempe Downs hstd
Co-ordinates:
102 mm E; 393 mm N
Lithology:
Decalcified silicified fine-grained yellow/grey glauconitic sandstone
Occurrence:
Overlain by Horn Valley Siltstone
Collectors:
L. C. Ranford, J. Gilbert-Tomlinson, 1963
Pelecypods:
Colpantyx woolleyi, Xestoconcha kraciukae
Associated fossils:
Molluscs: nautiloid indet.
Trilobites: asaphid indet., kainellid indet.

Locality No. 20

Field No.:
Hy 117*
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
6/5090/-
Formation:
Stokes Siltstone
Age, Stage:
Middle Ordovician
Geographical position:
9 km SE of Mt Caldwell; 0.8 km E of Five Mile Creek on track from Illamurta Yard to Running Water Yard
Co-ordinates:
327 mm E; 287 mm N
Lithology:
Calcareous siltstone
Collector:
P. J. Cook, 1963
Pelecypods:
Sthenodonta eastii
Associated fossils:
Molluscs: gastropods indet.
Trilobites: asaphids indet.
Echinoderms: crinoidal ossicles

Locality No. 21

Field No.:
Hy 119 F*
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
6/5090/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
3.5 km E of locality 20, S of track
Co-ordinates:
344 mm E; 287 mm N
Lithology:
Decalcified silicified grey sandstone
Collector:
P. J. Cook, 1963
Pelecypods:
Cyrtodonta sp.
Associated fossils:
Trilobites: *'Asaphus' thorntoni*

Locality No. 22

Field No.:
Hy 216*
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
4/5026/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Measured section HyCl, south flank of James Range A anticline

Co-ordinates:
395 mm E; 355 mm N
Lithology:
Sandstone containing phosphatic nodules
Occurrence:
Underlain by Horn Valley Siltstone; overlain by Stokes Siltstone
Collector:
P. J. Cook, 1963
Pelecypods:
Sthenodonta eastii, Cyrtodonta sp.
Associated fossils:
Molluscs: ?*Helicotoma*
Brachiopods: orthid indet.

Locality No. 23

Field No.:
Hy 269*
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
1/5188/-
Formation:
Pacoota Sandstone
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
Waterhouse Range, S flank, 1188 m above dog-leg bend and 91 m E up a side creek of a tributary creek to the Hugh River (= Rostroconch locality 56, Pojeta et al., 1977)
Co-ordinates:
548 mm E; 429 mm N
Lithology:
Decalcified fine-grained silty sandstone
Collectors:
J. Gilbert-Tomlinson, L. C. Ranford, 1963
Pelecypods:
Colpantyx woolleyi, Xestoconcha kraciukae
Associated fossils:
Molluscs: *Technophorus walteri;* gastropods, nautiloids indet.
Trilobites: cf. *Psilocephalina*

Locality No. 24

Field No.:
Hy 702
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
Kulgera 1/5101/5124
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
About 19 km ENE of 'Angas Downs'; low mounds on valley-floor between strike-ridges of sandstone (= Rostroconch locality 57, Pojeta et al., 1977).
Co-ordinates:
165 mm E; 9 mm N
Lithology:
Decalcified silty sandstone, cream to buff, orange staining; surface silicification
Collector:
A. T. Wells, 1963
Pelecypods:
Sthenodonta eastii, Cyrtodonta wattii
Associated fossils:
Molluscs: *Pinnocaris* sp. A; ?*Clathrospira*, ?*Helicotoma*
Trilobites: asaphid indet.; aff. *Prosopiscus*
Brachiopod: orthid indet.

Locality No. 25

Field No.:
Hy 710
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
14 A. W-C/5165/5139 (Phosphate sample 705; close to Hy 247*)
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
20.9 km NE of Angas Downs hstd on Mount Quinn Road
Co-ordinates:
159 mm E; 34 mm N
Lithology:
Decalcified fine-grained silty sandstone, buff to brown, orange staining
Collector:
J. Gilbert-Tomlinson, A. T. Wells, 1963
Pelecypods:
Sthenodonta eastii, Cyrtodonta wattii
Associated fossils:
Molluscs: monoplacophoran; ?*Clathrospira*
Trilobites: asaphid indet.
Brachiopods: orthid indet.
Echinoderms: crinoid ossicles

Locality No. 26

Field No.:
Hy 717*
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
14/5207/5307
Formation:
Stokes Siltstone
Age, Stage:
Middle Ordovician
Geographical position:
Briscoe Tent Hill
Co-ordinates:
503 mm E; 77 mm N
Lithology:
Yellow/buff calcareous siltstone and dolomite

Collector:
A. T. Wells, 1963
Pelecypods:
Sthenodonta jelli
Associated fossils:
Trilobite: indet.

Locality No. 27

Field No.:
NT 255 (H 28)
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
6/5097/-
Formation:
Pacoota Sandstone
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
Parkes Pass, S of Running Water Yard
Lithology:
Decalcified fine-grained glauconitic silty sandstone, greyish-white/yellow; some clay pellets
Collector:
N. O. Jones, 1955
Pelecypods:
Colpantyx woolleyi, Xestoconcha kraciukae
Associated fossils:
Molluscs: gastropod indet.
Trilobites: indet.

Locality No. 28

Field No.:
PW-14-74
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
2/0927/- (RC9 Series)
Formation:
Pacoota Sandstone
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
Lawrence Gorge, S flank of Waterhouse Range, ridge overlooking W bank of Hugh River
Co-ordinates:
568 mm E; 430 mm N
Lithology:
Decalcified silicified micaceous slightly glauconitic sandstone, purple/brown staining
Occurrence:
Horn Valley Siltstone overlies
Collectors:
John Pojeta and A. T. Wells, 1974
Pelecypods:
Colpantyx woolleyi, Xestoconcha kraciukae
Associated fossils:
Trilobites: hystricuroid, kainelloid, cf. *Psilocephalina, Koraipsis*

Locality No. 29

Field No.:
PW-15-74
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
2/0927/- (RC9 Series)
Formation:
Stokes Siltstone
Age, Stage:
Middle Ordovician
Geographical position:
c. 10 km W of Hugh River on N flank of James Range 'B' Anticline
Co-ordinates:
509 mm E; 351 mm N
Lithology:
Red calcarenite
Occurrence:
Underlain by Stairway Sandstone
Collectors:
John Pojeta and A. T. Wells, 1974
Pelecypods:
Cyrtodonta sp.
Associated fossils:
Trilobites: asaphid indet.
Brachiopod: strophomenoid indet.
Echinoderms: crinoid ossicles

Locality No. 30

Field No.:
PW-16-74
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
2/0923/- (RC9 Series)
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
c. 11.5 km E of Mount Keartland on N flank of James Range 'A' anticline
Co-ordinates:
527 mm E; 353 mm N
Lithology:
Decalcified fine-grained sandstone; greyish-white, with brown staining
Pelecypods:
Eritropis opiformis, Johnmartinia cordata, J. orbicularis, Denticelox tortuosa
Associated fossils:
Trilobites: '*Asaphus*' *thorntoni*, other asaphids indet.

Locality No. 31

Field No.:
E-57-2645
1:250 000 Sheet:
HENBURY, N.T.

Run, Photo, Point Nos.:
6/5082/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Tempe Downs
Lithology:
Brown-grey calcareous siltstone
Collector:
Caltex (Queensland), 1957
Pelecypods:
Cyrtodonta sp.
Associated fossils:
Molluscs: euomphaloid
Trilobites: ?*'Asaphus' thorntoni*

Locality No. 32

Field No.:
A 1/3
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
6/5077/-
Formation:
Probably Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Very narrow valley on south flank of Walker Creek anticline, c. 17 km WNW of Tempe Downs hstd
Lithology:
Flaggy white sandstone
Occurrence:
Sandstone float on outcrop of Horn Valley Siltstone
Collector:
Frome-Broken Hill Pty Ltd, 1959
Pelecypods:
Sthenodonta eastii
Associated fossils:
None

Locality No. 33

Field No.:
A 1/38
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
9 C-E/5046/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Chandler Range, NE of Henbury hstd
Lithology:
Sandstone, pink, orange staining
Collector:
Frome-Broken Hill Pty Ltd, 1959
Pelecypods:
Johnmartinia cordata
Associated Fossils:
Molluscs: endoceroid indet.

Locality No. 34

Field No.:
A 1/62
1:250 000 Sheet:
HENBURY, N.T.
Run, Photo, Point Nos.:
14A, W-C/5161/-
Formation:
Stairway sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Vicinity of Angas Downs hstd
Lithology:
Decalcified yellow silty sandstone; fossil moulds lined with limonite
Collector:
Frome-Broken Hill Pty Ltd, 1959
Pelecypods:
Johnmartinia cordata
Associated fossils:
Trilobites: asaphid indet.

Locality No. 35

Field No.:
NT 147
1:250 000 Sheet:
HERMANNSBURG, N.T.
Run, Photo, Point Nos.:
9/5047/10 (B2648)
Formation:
Pacoota Sandstone
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
Stokes Pass, western MacDonnell Ranges
Co-ordinates:
118 mm E; 178 mm N
Lithology:
Decalcified medium to fine-grained silty sandstone, orange-brown staining
Occurrence:
Horn Valley Siltstone overlies
Collectors:
T. Quinlan and J. Gilbert-Tomlinson, 1956
Pelecypods:
Pharcidoconcha raupi
Associated fossils:
Ichnolites: *Skolithos* in adjacent layers

Locality No. 36

Field No.:
NT 252
1:250 000 Sheet:
HERMANNSBURG, N.T.
Run, Photo, Point Nos.:
13/5028/-
Formation:
Pacoota Sandstone
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
Ellery Creek, western MacDonnell Range, narrow strike valley
Co-ordinates:
433 mm E; 80 mm N
Lithology:
Buff to yellow micaceous silty sandstone; brown staining
Occurrence:
556 m above base of formation and 120 m above rostroconch locality 59 (Pojeta et al., 1977)
Collector:
M. A. Condon, 1957
Pelecypods:
Colpantyx woolleyi, Xestoconcha kraciukae
Associated fossils:
Molluscs: nautiloid indet.
Trilobites: kainellid indet., *Psilocephalina, Koraipsis*
Brachiopods: linguloid

Locality No. 37

Field No.:
NT 615
1:250 000 Sheet:
HERMANNSBURG, N.T.
Run, Photo, Point Nos.:
13/5028/-
Formation:
Pacoota Sandstone
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
Left bank of Ellery Creek, western MacDonnell Range
Co-ordinates:
433 mm E; 80 mm N
Lithology:
Decalcified silty sandstone, pinkish brown, fine- to medium-grained
Occurrence:
30 m above Locality 36, high on slope between two beds of pipe-rock
Collector:
J. Gilbert-Tomlinson, 1964
Pelecypods:
Pharcidoconcha raupi
Associated fossils:
Molluscs: gastropod indet.
Ichnolites: *Skolithos*

Locality No. 38

Field No.:
NT 617
1:250 000 Sheet:
HERMANNSBURG, N.T.
Formation:
Pacoota Sandstone
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
Ellery Creek, left bank, narrow strike valley
Co-ordinates:
433 mm E; 80 mm N
Lithology:
Pinkish sandstone; greenish sandy siltstone, slightly calcareous
Occurrence:
Approximately same level as Locality 36
Collector:
J. Gilbert-Tomlinson, 1964
Pelecypods:
Colpantyx woolleyi
Associated fossils:
Molluscs: gastropod indet; nautiloid indet.
Trilobites: asaphid fragments

Locality No. 39

Field No.;
PW-10-74
1:250 000 Sheet:
HERMANNSBURG, N.T.
Run, Photo, Point Nos.:
9/082/- (RC-9 Series)
Formation:
Pacoota Sandstone
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
ca. 3.5 km S of Ellery Creek Big Hole and 2 km S of Glen Helen road. W bank of Ellery Ck; narrow strike valley
Co-ordinates:
430 mm E; 79 mm N
Lithology:
Micaceous silty sandstone, slightly calcareous
Occurrence:
427 m above base of formation; same level as Localities 36 and 38 on opposite bank of Creek
Collectors:
John Pojeta and A. T. Wells, 1974
Pelecypods:
Colpantyx woolleyi, Xestoconcha kraciukae
Associated fossils:
Trilobites: asaphid indet., kainellid indet., *Koraipsis*

Locality No. 40

Field No.:
PW-11-74
1:250 000 Sheet:
HERMANNSBURG, N.T.

Run, Photo, Point Nos.:
9/082/- (RC-9 Series)
Formation:
Pacoota Sandstone
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
ca. 3.5 km S of Ellery Creek Big Hole and 2 km due S of Glen Helen road. W bank of Ellery Creek, western MacDonnell Ranges
Co-ordinates:
427 mm E; 79 mm N
Lithology:
Decalcified silicified fine-grained sandstone, some medium-grained layers
Occurrence:
572-587 m above base of formation
Collectors:
John Pojeta and A. T. Wells, 1974
Pelecypods:
Cyrtodontula hadzeli
Associated fossils:
Trilobites: asaphid indet.
Brachiopod: linguloid

Locality No. 41

Field No.:
PW-12-74
1:250 000 Sheet:
HERMANNSBURG, N.T.
Run, Photo, Point Nos.
6/051/- (RC9 Series)
Formation:
Stokes Siltstone
Age, Stage:
Middle Ordovician
Geographical position:
ca. 3 km E of Stokes Pass in Mereenie Range within the MacDonnell Ranges
Co-ordinates:
123 mm E; 172 mm N
Lithology:
Buff recrystallized silty limestone, some silicification
Collectors:
John Pojeta and A. T. Wells, 1974
Pelecypods:
Palaeoneilo smithi, Sthenodonta eastii
Associated fossils:
Trilobites: asaphid indet.
Bryozoans: trepostomes indet.
Brachiopods: *Dinorthis leviensis,* strophomenoid indet.
Echinoderms: crinoid ossicles

Locality No. 42

Field No.:
PW-13-74
1:250 000 Sheet:
HERMANNSBURG, N.T.
Run, Photo, Point Nos.:
6/051/- (RC9 Series)
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Stokes Pass in Mereenie Range within the western MacDonnell Ranges
Co-ordinates:
113 mm E; 174 mm N
Lithology:
Silty buff sandstone, slightly micaceous; some clay-pellets
Collectors:
John Pojeta and A. T. Wells, 1974
Pelecypods:
Sthenodonta eastii
Associated fossils:
Molluscs: nautiloid indet.
Trilobites: asaphid indet.

Locality No. 43

Field No.:
H 114*
1:250 000 Sheet:
HUCKITTA, N.T.
Run, Photo, Point Nos.:
8/5107/5278
Formation:
Mapped as Tomahawk Beds but probably Nora Formation
Age, Stage:
Ordovician
Geographical position:
1.6 km E of Mt Ultim in foothills of Dulcie Plateau
Co-ordinates:
169 mm E; 224 mm N
Lithology:
Fine- and coarse-grained buff silicified sandstone
Pelecypods:
Sthenodonta eastii, Leconychia doylei, Copidens browni
Associated fossils:
Molluscs: several gastropods, including *?Helicotoma*
Trilobites: asaphid indet.; *?Annamitella*

Locality No. 44 (74713121)

Field No.:
312/1-74
1:250 000 Sheet:
HUCKITTA, N.T.
Formation:
Nora Formation
Age, Stage:
Ordovician
Geographical position:
5 km at c. 20° from Jinka Waterhole (= H 65*)

Co-ordinates:
335 mm E; 176 mm N
Lithology:
Decalcified medium-grained sandstone, with limonite oolites scattered and in layers
Occurrence:
Base of measured section in Tomahawk Creek
Collectors:
John Pojeta and J. H. Shergold, 1974
Pelecypods:
Sthenodonta passmoreae, Copidens browni
Associated fossils:
Molluscs: gastropods indet.
Trilobites: asaphid indet.

Locality No. 45

Field No.:
K 34*
1:250 000 Sheet:
KULGERA, N.T.
Run, Photo, Point Nos.:
1/5124/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Mount Sunday Range, N flank of anticline
Co-ordinates:
521 mm E; 431 mm N
Lithology:
Decalcified pink-white fine-grained sandstone
Occurrence:
Overlain by Stokes Siltstone
Collectors:
A. T. Wells and J. Gilbert-Tomlinson, 1963
Pelecypods:
Cyrtodonta wattii
Associated fossils:
Molluscs: ?bellerophontid; nautiloid indet.
Trilobites: *'Asaphus' thorntoni*
Brachiopods: orthid indet.

Locality No. 46

Field No.:
A 1/70
1:250 000 Sheet:
KULGERA, N.T.
Run, Photo, Point Nos.:
1/5126/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Mount Sunday Range
Lithology: Decalcified slightly silicified fine-grained sandstone, cream with orange staining
Occurrence:
Overlain by Stokes Siltstone
Collectors:
Frome-Broken Hill Pty Ltd, 1959
Pelecypods:
Cyrtodonta wattii
Associated fossils:
Molluscs: euomphaloid; monoplacophoran
Ichnolites: *Diplocraterion, Cruziana*

Locality No. 47

Field No.:
LA 19*
1:250 000 Sheet:
LAKE AMADEUS, N.T.
Run, Photo, Point Nos.:
6/5223/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
N flank of Parana Hill anticline
Co-ordinates:
588 mm E; 290 mm N
Lithology:
Decalcified silicified fine- to medium-grained bioturbated sandstone
Occurrence:
Measured section LAR 1; overlain by Stokes Siltstone, underlain by Horn Valley Siltstone
Collector:
L. C. Ranford, 1962
Pelecypods:
Sthenodonta eastii
Associated fossils:
Molluscs: nautiloid indet.
Trilobites: asaphid indet.

Locality No. 48

Field No.:
LA 40*
1:250 000 Sheet:
LAKE AMADEUS, N.T.
Run, Photo, Point Nos.:
7/5155/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
S flank of Parana Hill anticline
Co-ordinates:
602 mm E; 263 mm N
Lithology:
Decalcified silicified bioturbated fine-grained sandstone
Occurrence:
Measured Section LAR 2; overlain by Stokes Siltstone, underlain by Horn Valley Siltstone

Collector:
L. C. Ranford, 1962
Pelecypods:
Sthenodonta eastii, Cyrtodonta hazeli
Associated fossils:
Molluscs: euomphaloid; nautiloid indet.

Locality No. 49

Field No.:
LA 46*
1:250 000 Sheet:
LAKE AMADEUS, N.T.
Run, Photo, Point Nos.:
8/5145/-
Formation:
Probably Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Core of unnamed syncline S of Parana Hill anticliine
Co-ordinates:
531 mm E; 236 mm N
Lithology:
Decalcified, silicified fine-grained sandstone
Occurrence:
Float on outcrop of Horn Valley Siltstone
Collector:
L. C. Ranford, 1962
Pelecypods:
Sthenodonta eastii
Associated fossils:
Molluscs: monoplacophoran
Trilobites: aff. *Prosopiscus*

Locality No. 50

Field No.:
LA 56*
1:250 000 Sheet:
LAKE AMADEUS, N.T.
Run, Photo, Point Nos.:
5/5024/-
Formation:
?Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
7.5 km SW of Mount Tucker
Co-ordinates:
282 mm E; 305 mm N
Lithology:
Mottled white-yellow-brown silty sandstone
Collector:
L. C. Ranford, 1962
Pelecypods:
Cyrtodonta sp.
Associated fossils:
Molluscs: gastropod indet.
Trilobites: asaphid indet.
Brachiopod: plectambonitid indet.

Locality No. 51

Field No.:
LA 110*
1:250 000 Sheet:
LAKE AMADEUS, N.T.
Run, Photo, Point Nos.:
2/5144/1038
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
11.5 km ESE of Mount Olifent
Co-ordinates:
278 mm E; 380 mm N
Lithology:
Decalcified silicified fine-grained orange-yellow silty sandstone
Occurrence:
Very close to base of formation
Collector:
P. J. Cook, 1962
Pelecypods:
Sthenodonta eastii
Associated fossils:
Molluscs: ?*Helicotoma*
Trilobites: *'Asaphus' howchini,* ?leiostegiid
Brachiopods: articulate indet.

Locality No. 52

Field No.:
LA 115 F
1:250 000 Sheet:
LAKE AMADEUS, N.T.
Run, Photo, Point Nos.:
2/5144/1039
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Same as Locality 51
Lithology:
Yellow/brown fine-grained ferruginous silty sandstone with phosphate nodules
Collector:
P. J. Cook, 1962
Pelecypods:
Sthenodonta eastii
Associated fossils:
Trilobites: indet.

Locality No. 53

Field No.:
LA 135*
1:250 000 Sheet:
LAKE AMADEUS, N.T.
Run, Photo, Point Nos.:
4A/5082/-

Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Johnnys Creek anticline, N limb
Co-ordinates:
512 mm E; 343 mm N
Lithology:
Decalcified silicified grey sandstone
Occurrence:
Float in measured section LAC 3
Collector:
P. J. Cook, 1962
Pelecypods:
Sthenodonta eastii
Associated fossils:
None

Locality No. 54

Field No.:
LA 136*
1:250 000 Sheet:
LAKE AMADEUS, N.T.
Run, Photo, Point Nos.:
4A/5082/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
See locality 53
Lithology:
Decalcified silicified fine-grained sandstone
Occurrence:
Float in measured section LAC 3
Collector:
P. J. Cook, 1962
Pelecypods:
Sthenodonta eastii
Associated fossils:
Molluscs: endoceroid
Trilobites: ?*'Asaphus' thorntoni*

Locality No. 55

Field No.:
LA 137*
1:250 000 Sheet:
LAKE AMADEUS, N.T.
Run, Photo, Point Nos.:
4 A/5082/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
See locality 53
Lithology:
Decalcified medium-grained grey to buff silty sandstone
Occurrence:
Measured section LAC 3
Collector:
P. J. Cook, 1962
Pelecypods:
Sthenodonta eastii
Associated fossils:
None

Locality No. 56

Field No.:
LA 145*
1:250 000 Sheet:
LAKE AMADEUS, N.T.
Run, Photo, Point Nos.:
3/5101/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Johnnys Creek anticline, N flank
Co-ordinates:
417 mm E; 376 mm N
Lithology:
Decalcified white sandstone, yellow staining
Occurrence:
Measured section LAC 4
Collector:
P. J. Cook, 1962
Pelecypods:
Cyrtodona wattii, Sthenodonta eastii
Associated fossils:
Molluscs: monoplacophoran; gastropod indet.
Trilobites: asaphid and indet.
Brachiopods: orthid indet.

Locality No. 57

Field No.:
LA 165*
1:250 000 Sheet:
LAKE AMADEUS, N.T.
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
41 km SE of Reedy Rockhole on track to Wallera Ranch
Co-ordinates:
591 mm E; 244 mm N
Lithology:
Decalcified heavily silicified fine-grained grey sandstone; orange staining; some limonite
Occurrence:
29.5 m above base of formation; Horn Valley Siltstone underlies
Collector:
P. J. Cook, 1962

Pelecypods:
Sthenodonta eastii
Associated fossils:
Trilobites: asaphids indet. (fragmented)
Brachiopods: orthid indet.

Locality No. 58

Field No.:
LA 211*
1:250 000 Sheet:
LAKE AMADEUS, N.T.
Run, Photo, Point Nos.:
11/5034/63
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
21 km S of S scarp of George Gill Range
Co-ordinates:
599 mm E; 165 mm N
Lithology:
Decalcified silicified fine-grained yellow/white sandstone
Occurrence:
Poor outcrop in imperfectly documented sequence
Collector:
A. T. Wells, 1962
Pelecypods:
Cyrtodonta wattii
Associated fossils:
Molluscs: monoplacophoran; ?bellerophontid; euomphaloid
Trilobites: asaphids

Locality No. 59

Field No.:
LA220
1:250 000 Sheet:
AYERS ROCK, N.T.
Run, Photo, Point Nos.:
2/5192/91
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
14.4 km SSE of Inindia Bore, 1.2 km E of AR 607*
Co-ordinates:
574 mm E; 412 mm N
Lithology:
Decalcified silicified fine-grained grey sandstone; brown and orange staining
Occurrence:
Nose of small W-plunging anticline
Collector:
A. T. Wells, 1962
Pelecypods:
Cyrtodonta wattii
Associated fossils:
None

Locality No. 60

Field No.:
LA 536*
1:250 000 Sheet:
LAKE AMADEUS, N.T.
Run, Photo, Point Nos.:
5/5011/1010
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Johnnys Creek anticline, S. flank
Co-ordinates:
519 mm E; 329 mm N
Lithology:
Decalcified silicified fine-grained white sandstone; yellow and orange staining
Occurrence:
Overlain by Stokes Siltstone; measured section LAC13
Collector:
P. J. Cook, 1962
Pelecypods:
Sthenodonta eastii
Associated fossils:
Trilobites: asaphid indet.

Locality No. 61

Field No.:
LA 701
1:250 000 Sheet:
LAKE AMADEUS, N.T.
Run, Photo, Point Nos.:
Henbury 15/5025/5018
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
7.5 km NE of Inindia Bore
Co-ordinates:
566 mm E; 33 mm N
Lithology:
Decalcified silicified fine-grained grey sandstone, reddish-brown staining; some phosphate
Occurrence:
Rests unconformably on Upper Proterozoic; Stokes Siltstone overlies
Collector:
J. Gilbert-Tomlinson, A. T. Wells, 1963
Pelecypods:
Sthenodonta eastii
Associated fossils:
Molluscs: monoplacophoran
Trilobites: aff. *Ptyocephalus*

Locality No. 62

Field No.:
A1/21
1:250 000 Sheet:
LAKE AMADEUS, N.T.

Run, Photo, Point Nos.:
4/5071/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Johnnys Creek anticline, eastern end
Lithology:
Decalcified fine-grained pinkish-buff sandstone
Collector:
Frome-Broken Hill Co Pty Ltd, 1959
Pelecypods:
Sthenodonta eastii
Associated fossils:
Trilobites: asaphid indet.

Locality No. 63

Field No.:
ML 7*
1:250 000 Sheet:
MOUNT LIEBIG, N.T.
Run, Photo, Point Nos.:
11/5076/9
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Haast Bluff, Idirriki Range
Co-ordinates:
543 mm E; 159 mm N
Lithology:
Decalcified brown-grey fine-grained silty sandstone
Occurrence:
Underlain by Horn Valley Siltstone; overlain by Stokes Siltstone
Collector:
A. T. Wells, 1961
Pelecypods:
Eritropis opiformis
Associated fossils:
Trilobites: asaphid indet.

Locality No. 64

Field No.:
ML 16*
1:250 000 Sheet:
MOUNT LIEBIG, N.T.
Run, Photo, Point Nos.:
12/5090/43
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Hills S of Deering Creek
Co-ordinates:
481 mm E; 122 mm N
Lithology:
Decalcified yellow and white silty micaceous sandstone; brown staining
Occurrence:
Overturned sequence; lies between Horn Valley Siltstone and Stokes Siltstone
Collector:
A. T. Wells, 1961
Pelecypods:
Cyrtodonta staffordae, Cyrtodonta wattii
Associated fossils:
Molluscs: monoplacophoran; ?*Clathrospira*
Trilobites: asaphid indet.

Locality No. 65

Field No.:
ML 47A*
1:250 000 Sheet:
MOUNT LIEBIG, N.T.
Run, Photo, Point Nos.:
14/5165/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Gardiner Range, S flank of anticline
Co-ordinates:
512 mm E; 59 mm N
Lithology:
Decalcified silty white micaceous sandstone; brown and orange staining
Occurrence:
Measured section W9; 9 m below top of Stairway Sandstone
Collector:
A. T. Wells, 1961
Pelecypods:
Cyrtodonta carberryi, Cyrtodonta sp.
Associated fossils:
Molluscs: ?*Clathrospira*
Trilobites: asaphid indet.

Locality No. 66

Field No.:
ML 47B*
1:250 000 Sheet:
MOUNT LIEBIG, N.T.
Run, Photo, Point Nos.:
14/5165/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
See locality 65
Lithology:
Decalcified silicified grey-white-yellow sandstone

Occurrence:
Measured section W9; interval of 18.6 m between 41 m and 59.6 m below locality 65
Collector:
A. T. Wells, 1961
Pelecypods:
Cyrtodonta staffordae
Associated fossils:
Trilobites: asaphid indet.

Locality No. 67

Field No.:
ML 47C*
1:250 000 Sheet:
MOUNT LIEBIG, N.T.
Run, Photo, Point Nos.:
14/5165/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
See locality 65
Lithology:
Decalcified fine-grained white and yellow sandstone
Occurrence:
Measured section W9; within same interval as Locality 66 and 55.4 m below Locality 65
Collector:
A. T. Wells, 1961
Pelecypods:
Sthenodonta eastii
Associated fossils:
Molluscs: *Technophorus* sp.; gastropod indet.
Trilobites: asaphid indet.

Locality No. 68

Field No.:
ML 47D*
1:250 000 Sheet:
MOUNT LIEBIG, N.T.
Run, Photo, Point Nos.:
14/5165/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
See locality 65
Lithology:
Decalcified silicified fine-grained grey/white sandstone; orange-yellow staining
Occurrence:
Measured section W9; 47 m below locality 67 and 110 m above base of formation
Collector:
A. T. Wells, 1961
Pelecypods:
Palaeoneilo smithi, Sthenodonta eastii, Cyrtodonta wattii
Associated fossils:
Molluscs: monoplacophoran; nautiloid indet.
Trilobites: asaphid indet.

Locality No. 69

Field No.:
ML 133 (iii)*
1:250 000 Sheet:
MOUNT LIEBIG, N.T.
Run, Photo, Point Nos.:
10/5004/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Idirriki Range, 10 km NE of Haast Bluff
Co-ordinates:
507 mm E; 175 mm N
Lithology:
Decalcified silicified fine-grained white sandstone, brown and orange staining
Occurrence:
Measured section R5; 304 m above base of formation
Collector:
L. C. Ranford, 1961
Pelecypods:
Cyrtodonta hazeli
Associated fossils:
None

Locality No. 70

Field No.:
ML154 (5)*
1:250 000 Sheet:
MOUNT LIEBIG, N.T.
Run, Photo, Point Nos.:
15/5232/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Gardiner Range, S limb of anticline
Co-ordinates:
623 mm E, 24 mm N
Lithology:
Decalcified silicified fine-grained sandstone, brown and orange staining; phosphatic nodules
Occurrence:
Measured section R7; 127.6 m above base of formation
Collector:
L. C. Ranford, 1961
Pelecypods:
Sthenodonta eastii, Cyrtodonta hazeli
Associated fossils:
Molluscs: euomphaloid; nautiloid indet.

Locality No. 71

Field No.:
ML 157*
1:250 000 Sheet:
MOUNT LIEBIG, N.T.
Run, Photo, Point Nos.:
13/5149/57
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
Gardiner Range, near nose (NW) of anticline
Co-ordinates:
422 mm E; 92 mm N
Lithology:
Fine-grained brown sandstone, partly calcareous
Occurrence:
Underlain by Horn Valley Siltstone, overlain by Stokes Siltstone
Collector:
A. T. Wells, 1961
Pelecypods:
Inaequidens campbelli
Associated fossils:
Molluscs: gastropod indet.

Locality No. 72

Field No.:
W 271*
1:250 000 Sheet:
MOUNT WHELAN, Qld
Formation:
Coolibah Formation
Age, Stage:
Early Ordovician, Arenigian
Geographical position:
4 km NE of Cravens Peak
Co-ordinates:
38 mm E; 311 mm N
Lithology: Grey to yellow limestone with silicified fossils
Occurrence:
Overlain by Nora Formation
Pelecypods:
Cyrtodontid?
Associated fossils:
Molluscs: *Teiichispira cornucopiae*

Locality No. 73

Field No.:
15 (Corbett & Banks, 1974)
1:250 000 Sheet:
QUEENSTOWN, Tas.
Formation:
Westfield Beds
Age, Stage:
Late Ordovician, Richmondian
Geographical position:
8.5 km ENE of Tim Shea
Co-ordinates:
651 mm E; 59 mm N
Lithology:
Weathered yellowish shale
Occurrence:
Core of Westfield syncline, overlies Benjamin Limestone
Collector:
K. D. Corbett
Pelecypods:
Pterinea sp. A
Associated fossils (from Corbett & Banks, 1974, p. 226):
Trilobites: *Neseuretus* cf. *N. birmanicus*, and indet.
Ostracodes: indet.
Bryozoans: trepostomes, stictoporellids
Brachiopods: *Lepidocyclus*

Locality No. 74

Field No.:
None
1:250 000 Sheet:
QUEENSTOWN, Tas.
Formation:
Gordon Limestone
Age, Stage:
Middle Ordovician, Blackriveran
Geographical position:
Bubs Hill, S of Lyell Highway, c 19 km ESE of Queenstown (c 25 km from Queenstown by road)
Co-ordinates:
420 mm E; 294 mm N
Lithology:
Limestone with silicified fossils
Occurrence:
Overlain (at uncertain interval) by bed containing the trilobite *Eobronteus*. Beds containing the fossils listed below are provisionally correlated with the coralline calcarenite below the Lords Siltstone Member of the Benjamin Limestone (Corbett & Banks, 1974, p. 222)
Collector:
K. O. Reid, University of Tasmania
Pelecypods:
Ctenodonta macalesteri, Deceptrix banksi
Associated fossils (M. R. Banks, written communication, March 1975):
Molluscs: *Bucanella, ?Raphistoma tasmanica, Trochonema etheridgei; Beloitoceras kirtoni, Spyroceras, Trocholitoceras idaense*
Trilobites: *Girvanagnostus*
Ostrocodes: indet.
Conodonts: *Mixoconus, Microcoelodus, Bryantodina*
Corals: *Tetradium compactum, Lichenaria, Nyctopora, Eofletcheria ida*

Locality No. 75

Field No.:
None
1:250 000 Sheet:
QUEENSTOWN, Tas.
Formation:
Gordon Limestone and probably Gordon Limestone
Age, Stage:
Middle or Late Ordovician: Trentonian
Geographical position:
Smelters Quarry, 2.5 km S of Zeehan
Co-ordinates:
280 mm E; 383 mm N
Lithology:
Limestone with silicified fossils; weathered shale with calcareous fossils
Occurrence:
c. 300 m exposed; base faulted against Silurian shales on the west (Blissett, 1962)
Collectors:
University of Tasmania, various times; J. Gilbert-Tomlinson, 1964
Pelecypods:
Fidera maryae (silicified), *Deceptrix banksi* (silicified), *Inaequidens davisi* (silicified), *Zeehania jacksoni* (calcareous JGT); *Ambonychia*? sp. *A* (silicified), *Cyrtodontula sohli* (calcareous)
Rostroconch:
Bransonia townleyi (calcareous JGT)
Associated fossils:
According to M. R. Banks (written communication, March 1975), bivalved molluscs enter the exposed section near the base with the tabulate *Tetradium tasmaniense*. Higher in the quarry other groups are also present, including the bryozoans *Stictoporella* and *Batostoma*, the gastropods *'Eunema' montgomerii*, *Raphistomina*, and *Hormotoma*, and the cephalopods *Hecatoceras longinquum*, *H. obliquatum*, *Tasmanoceras zeehanense*, and *Anaspyroceras anzaas*. This part of the section has been thought to be Trentonian

Locality No. 76

Field No.:
None
1:250 000 Sheet:
QUEENSTOWN, Tas.
Formation:
Gordon Limestone
Age, Stage:
Middle or Late Ordovician, Edenian or older
Geographical position:
Beds exposed near and at the banks of Austral Creek, immediately E of Locality 75; also known as 'Austral Valley'
Lithology:
Limestone with silicified fossils
Occurrence:
30 m below a sandstone member in Gordon Limestone; believed to be faulted against the beds exposed in the Smelters Quarry (Loc. 75)
Collector:
R. J. Pitt
Pelecypods:
Fidera maryae
Associated fossils (written communication, M. R. Banks, March 1975):
Corals, gastropods, trilobites, and strophomenid brachiopods. Another horizon, a calcareous siltstone, ca. 24 m higher stratigraphically, has yielded the cephalopods *'Beloitoceras kirtoni* and *Trocholitoceras* and many trilobites, including a large *Bumastus* and *Eobronteus*. This latter genus occurs elsewhere in Tasmania at only a single horizon in each locality, one at Bubs Hill (Loc. 74), the other in the Florentine Valley near the top of the Upper Limestone Member of the Benjamin Limestone, where it may well be Edenian'.

Locality No. 77

Field No.:
Rd 214
1:250 000 Sheet:
RODINGA, N.T.
Run, Photo, Point Nos.:
11/5091/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
2.4 km ENE of Maryvale hstd
Co-ordinates:
237 mm E; 148 mm N
Lithology:
Decalcified very friable buff/white fine-grained silty sandstone
Occurrence:
c. 5 m above local base of formation (= Rd160 of P. J. Cook in measured section* RdC5) and 24 m below base of 'red-bed' sequence. N.B. Position of samples Rd160-Rd173 wrongly marked on map.
Collector:
J. Gilbert-Tomlinson, 1964
Pelecypods:
Sphenosolen draperi
Associated fossils:
Molluscs: monoplacophoran
Trilobites: asaphids indet.
Brachiopod: orthid indet.

Locality No. 78

Field No.:
Rd224*
1:250 000 Sheet:
RODINGA, N.T.
Run, Photo, Point Nos.:
11/5089/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
8 km NE of Mount Charlotte
Co-ordinates:
216 mm E; 130 mm N
Lithology:
Decalcified pinkish-buff fine-grained silty sandstone; red-brown staining
Occurrence:
Float in measured section RdC3 c. 60 m above local base of formation, and c. 12 m above 'red-bed' sequence
Collector:
J. Gilbert-Tomlinson, 1964
Pelecypods:
Eritropis opiformis
Associated fossils:
Ichnolites: *Cruziana*
Note: Locality 78 (Rd224) overlies Rd223 (= Rd150 of P. J. Cook, 51 m above local base of formation and 6 m above top of 'red-bed' sequence), which contains *Alococoncha crassatellaeformis* and *Johnmartinia orbicularis*. Specimens of these pelecypods are now lost.

Locality No. 79

Field No.:
Rd231
1:250 000 Sheet:
RODINGA, N.T.
Run, Photo, Point Nos.:
14/5058/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
32 km SW of Mount Charlotte
Co-ordinates:
77 mm E; 65 mm N
Lithology:
Decalcified brown to orange sandstone
Occurrence:
Top of Stairway Sandstone in measured section RdC1* (P. J. Cook). Does not correspond to any fossiliferous sample recorded in that section. Stokes Siltstone overlies
Collector:
J. Gilbert-Tomlinson, 1964
Pelecypods:
Ambonychiid genus B species A
Associated fossils:
None

Locality No. 80

Field No.:
Rd232
1:250 000 Sheet:
RODINGA, N.T.
Run, Photo, Point Nos.:
14/5058/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
See locality 79
Lithology:
Decalcified grey/yellow fine-grained silty sandstone
Occurrence:
Below locality 79 in measured section RdC1*. Does not correspond to any fossil locality recorded in that section. Forms a prominent ridge
Collector:
J. Gilbert-Tomlinson, 1964
Pelecypods:
Sthenodonta eastii
Associated fossils:
Molluscs: monoplacophoran; euomphaloid
Trilobites: asaphids, including *'Asaphus' thorntoni*
Ichnolites: *Cruziana*
Note: In the same section as localities 79 and 80 and stratigraphically below locality 79, a succession of faunas has been observed (by JGT, 1964) which is here set on record (although most of the fossils are now lost), as it confirms the Ordovician age of the otherwise poorly documented faunas at locality No. 9 (Mount Watt, Finke Sheet)
Descending order:
Rd233: pelecypod (*?Pteronychia haupti*)
Rd234: pelecypods (*Alococoncha crassatellaeformis, Johnmartinia orbicularis*)
Rd235: brachiopods (orthid indet.), agnathan vertebrates (dermal plates and gill-rakers)
Rd236: molluscs (*?Helicotoma*), trilobites (*Prosopiscus*)

Disconformity
Middle Cambrian

Locality No. 81

Field No.:
Rd251*
1:250 000 Sheet:
RODINGA, N.T.
Run, Photo, Point Nos.:
8/5163/-

Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
4 km NW of Bloodwood Bore
Co-ordinates:
162 mm E; 244 mm N
Lithology:
Decalcified grey fine-grained sandstone with yellow/brown staining
Occurrence:
Faulted syncline
Collector:
P. J. Cook, 1964
Pelecypods:
Ctenodonta youngi, Palaeoneilo smithi, Sthenodonta eastii, Cyrtodonta wattii, Modiolopsis? sp. A
Associated fossils:
Molluscs: *Ribeiria csiro, ?Technophorus;* gastropod indet.; monoplacophoran
Trilobites: asaphid indet., aff. *Prosopiscus*

Locality No. 82

Field No.:
CSIRO 303
1:250 000 Sheet:
RODINGA, N.T.
Run, Photo, Point Nos.:
14/5057/ 6'9"E, 7'5"N of SW corner of photo
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
40 km SW of Maryvale hstd on road to Idracowra hstd. Low outcrop forming flat-topped hill 0.4 km N of road. (= Rostroconch locality 86, Pojeta, et al., 1977)
Co-ordinates:
79 mm E; 74 mm N
Lithology:
Decalcified fine-grained silicified sandstone
Collector:
T. Quinlan, 1956
Pelecypods:
Eritropis opiformis
Associated fossils:
Mollusc: *Ribeiria csiro*

Locality No. 83

Field No.:
E 25
1:250 000 Sheet:
RODINGA, N.T.
Run, Photo, Point Nos.:
11/5090/-
Formation:
Stairway Sandstone
Age, Stage:
Early Middle Ordovician
Geographical position:
c. 2 km E of Mount Charlotte
Lithology:
Decalcified fine-grained buff friable silty sandstone; surface silicification
Occurrence:
Above 'red-beds'.
Collector:
D. J. Taylor, Frome-Broken Hill Co Pty Ltd, 1959
Pelecypods:
Pteronychia haupti
Associated fossils:
Fragments, not identifiable

Locality No. 84

Field No.:
T 15
1:250 000 Sheet:
TOBERMORY, N.T.
Run, Photo, Point Nos.:
9/5161/-
Formation:
Nora Formation
Age, Stage:
Ordovician
Geographical position:
N tongue of Tarlton Range, 1.5 km WNW of Tarlton Downs hstd
Co-ordinates:
119 mm E; 163 mm N
Lithology:
Decalcified compact fine-grained silty sandstone; grey-brown, black staining
Occurrence:
Scree
Collectors:
J. Gilbert-Tomlinson, K. G. Smith 1957
Pelecypods:
Sthenodonta passmoreae
Associated fossils:
Molluscs: *?Helicotoma*
Ichnolites: *Diplocraterion*

Locality No. 85

Field No.:
T 412
1:250 000 Sheet:
TOBERMORY, N.T.
Run, Photo, Point Nos.:
10/5013/910
Formation:
Carlo Sandstone
Age, Stage:
Middle Ordovician

Geographical position:
Tarlton Range, 8.5 km SSE of Tarlton Downs hstd
Co-ordinates:
147 mm E; 136 mm N
Lithology:
Decalcified silicified fine-grained pinkish-buff sandstone
Occurrence:
Not far above contact with Nora Formation
Pelecypods:
Pteronychia aff. *P. haupti*
Associated fossils:
Not determinable (fragments)

Locality No. 86 (74710113)

Field No.:
MISC 6 (015/6-74)
1:250 000 Sheet:
TOBERMORY, N.T.
Formation:
Nora Formation
Age, Stage:
Ordovician
Geographical position:
3.2 km W of N of Burnt Well
Co-ordinates:
c. 556 mm E; 30 mm N
Lithology:
Decalcified fine-grained grey-brown sandstone
Collector:
J. J. Draper, 1974
Pelecypods:
Sthenodonta passmoreae, Noradonta shergoldi
Associated fossils:
Trilobites: *Carolinites,* asaphid indet. (fragments), cf. *Encrinurella*
Brachiopods: orthid and plectambonitid indet.

Locality No. 87 (74713107)

Field No.:
307/1-74
1:250 000 Sheet:
TOBERMORY, N.T.
Formation:
Nora Formation
Age, Stage:
Ordovician
Geographical position:
Gaphole Creek, second gully SW of Gap on Gaphole Creek Road, 45 m NW of road.
Co-ordinates:
571 mm E; 17 mm N
Lithology:
Pinkish-grey decalcified siltstone
Occurrence:
Immediately below Carlo escarpment
Collectors:
J. H. Shergold and John Pojeta, 1974
Pelecypods:
Palaeoneilo smithi, Sthenodonta passmoreae
Associated fossils:
Molluscs: *Technophorus* sp.; euomphaloid
Trilobites: *Carolinites, ?'Asaphus' howchini,* other asaphid fragments
Brachiopods: inarticulates (comminuted); plectambonitids indet.
Echinoderms: crinoid ossicles

Locality No. 88 (74713108)

Field No.:
308/1-74
1:250 000 Sheet:
TOBERMORY, N.T.
Formation:
Nora Formation
Age, Stage:
Ordovician
Geographical position:
5.6 km NNW of Burnt Well on road to Coolibah Yard (The Gap). Hill on SW side of road opposite two hills of Nora Formation on NE side
Co-ordinates:
551 mm E; 35 mm N
Lithology:
Decalcified sandstone
Occurrence:
Overlain by Carlo Sandstone
Collectors:
J. H. Shergold and John Pojeta, 1974
Pelecypods:
Cyrtodonta sp.
Associated fossils:
Molluscs: *Technophorus, ?Euchasma; Raphistomina. ?Helicotoma, ?Clathrospira;* bellerophontid
Trilobites: *Carolinites, ?'Asaphus' howchini,* asaphids indet., *?Annamitella,* dikelokephalinid, aff. *Prosopiscus, Encrinurella, ?Pliomerina, ??Ceraurinus*
Brachiopods: orthid and plectambonitid
Echinoderms: ossicles

Locality No. 89 (74713109)

Field No.:
308/2-74
1:250 000 Sheet:
TOBERMORY, N.T.
Formation:
Nora Formation
Age, Stage:
Ordovician
Geographical position:
See locality 88. NE side of road between two hills in Nora Formation
Lithology:
Decalcified silicified grey-white sandstone
Occurrence:
Float material over limestone

Collectors:
J. H. Shergold and John Pojeta, 1974
Pelecypods:
Noradonta shergoldi
Associated fossils:
Trilobites: asaphid fragments indet.
Brachiopods: plectambonitid
Echinoderms: ossicles

Locality No. 90

Field No.:
NT 242 (B4)
1:250 000 Sheet:
TOBERMORY, N.T.
Run, Photo, Point Nos.:
9A/5051/-
Formation:
Nora Formation
Age, Stage:
Ordovician
Geographical position:
Toko Range, 2.4 km SE of No. 8 Dam; 8.3 km N of Coolibah Yard
Co-ordinates:
507 mm E; 108 mm N
Lithology:
Decalcified silicified fine-grained flaggy grey-brown sandstone
Occurrence:
High in Nora Formation, beneath Carlo escarpment
Collector:
N. O. Jones, 1955
Pelecypods:
Sthenodonta passmoreae, Copidens browni
Associated fossils:
Molluscs: ?*Helicotoma;* nautiloid, indet.
Trilobites: asaphid indet.
Brachiopods: orthid indet.

Locality No. 91

Field No.:
None
1:250 000 Sheet:
HOBART, T
Formation:
Gordon Limestone
Age, Stage:
Ordovician, Blackriveran-Trentonian
Geographical position:
Picton River, c. 8 km above junction with Huon River ('460.83 kiloyards E; 685.1 kiloyards N on Riveaux 1:31 680 Sheet 8211-IV-S, Picton Quadrangle, Hobart 1:250 000 Sheet,' written communication M. R. Banks, March 1974)
Lithology:
Limestone with silicified fossils
Pelecypods:
Fidera maryae
Associated fossils (M. R. Banks, oral communication, May 1975):
Conodonts; corals, *Eofletcheria,* heliolitids; trepostome bryozoans; orthid brachiopods; gastropods; cephalopods; and trilobites

5. REFERENCES

BABIN, Claude, 1966—Mollusques bivalves et céphalopodes du Paléozoïque Armoricain: Brest, *Imprimerie Commerciale et Administrative,* 471 p., 18 pls.

BANKS, M. R., 1957—Stratigraphy of Tasmanian Limestones: *Tasmanian Dept Mines, Geological Survey, Mineral Resources* No. 10,. p. 39-85.

BANKS, M. R., 1962—Ordovician System; *in* SPRY, A. and BANKS, M. R., The Geology of Tasmania: *J. Geol. Soc. Aust. J.,* 9(2), 147-176.

BARROIS, Charles, 1891—Memoire sur la fauna du grès Armoricain: *Soc. Geol. Nord Annales,* 19, 134-237, pls. 1-5.

BIGSBY, J. J., 1868—Thesaurus Siluricus: London, *John van Voorst,* lii, 214 p.

BILLINGS, Elkanah, 1858—Black River fauna: Canadian Geological Survey Rep. Prog. 1857, p. 147-192.

BLISSETT, A. H., 1962—Geological Survey Explanatory Report one mile geological map series K'55-5-50, Zeehan: Tasmania Dept of Mines, 272 p., 11 pls.

BRADSHAW, M. A., 1970—The dentition and musculature of some Middle Ordovician (Llandeilo) bivalves from Finistère, France: *Palaeontology,* 13, 623-645.

BRADSHAW, J. D., & BRADSHAW, M. A., 1971—Functional morphology of some fossil palaeotaxodont bivalve hinges as a guide to orientation: *Palaeontology,* 14, 242-249.

CONRAD, T. A., 1838—Report on the palaeontological department of the Survey [of New York]: *New York Geol. Survey Ann. Rep.* 2, 107-119.

CONRAD, T. A., 1841—Fifth annual report on the palaeontology of the State of New York: *New York Geol. Survey Ann. Rep.* 5, 25-57.

CONRAD, T. A., 1842—Observations on the Silurian and Devonian systems of the United States, with descriptions of new organic remains: *Philadelphia Acad. Nat. Sci. J.,* 8(2), 280-288, pls. 12-17.

COOK, P. J., 1968a—Henbury, N.T., 1:250 000 Geological Series. *Bur. Miner. Resour. Aust. Explan. Notes* SG/53-1, 19 p., map.

COOK, P. J. 1968b—Lake Amadeus, N.T., 1:250 000 Geological Series. *Bur. Miner. Resour. Aust. Explan. Notes* SG/52-4, 15 p., map.

COOK, P. J., 1972a—Sedimentological studies of the Stairway Sandstone of central Australia: *Bur. Miner. Resour. Aust. Bull.* 95, 73 p., 22 pls.

COOK, P. J., 1972b—Rodinga, N.T., 1:250 000 Geological Series. *Bur. Miner. Resour. Aust. Explan. Notes* SG/53-2, 23 p., map.

CORBETT, K. D. & BANKS, M. R., 1974—Ordovician stratigraphy of the Florentine Synclinorium, southwest Tasmania: *Roy. Soc. Tasmania Paps. & Proc.,* 107, 207-238, 4 pls.

CRESPIN, Irene, 1943—Conodonts from the Waterhouse Range, central Australia: *Roy. Soc. South Aust. Trans.,* 67, 231-232.

CROCKFORD, Joan, 1943—An Ordovician bryozoan from central Australia: *Linnean Soc. New South Wales Proc.,* 68, 148-149.

DRISCOLL, E. G., 1964—Accessory muscle scars, an aid to protobranch orientation: *J. Paleont.,* 38, 61-66.

DRUCE, E. C., & JONES, P. J., 1971—Cambro-Ordovician conodonts from the Burke River structural belt, Queensland: *Bur. Miner. Resour. Aust. Bull.* 110, 158 p., 20 pls.

ETHERIDGE, Robert, Sr., 1878—Notes on a few Silurian fossils from Ayrshire: *Roy. Physical Soc. Edinburgh Proc.,* 4, 167-176, pl. 4.

ETHERIDGE, Robert, Jun., 1883—A description of the remains of trilobites from the Lower Silurian rocks of the Mersey River District, Tasmania: *Roy. Soc. Tasmania Paps. & Proc.* for 1882, p. 150-163, 2 pls.

ETHERIDGE, Robert, Jun., 1891a—Description of some Australian Silurian and Mesozoic fossils: *South Australian Parliamentary Paper* 158, p. 9-13, 2 pls.

ETHERIDGE, Robert, Jun., 1891b—On the occurrence of an *Orthis* allied to *O. actoniae* J. de C. Sby, and *O. flabellulum* J. de C. Sby, in the Lower Silurian rocks of central Australia: *South Australia Parliamentary Paper* 158, p. 13-14, pl. 1.

ETHERIDGE, Robert, Jun., 1892—On a species of *Asaphus* from the Lower Silurian rocks of central Australia: *South Australia Parliamentary Paper* 23, p. 8-9, pl. 1.

ETHERIDGE, Robert, Jun., 1893—Official contributions to the palaeontology of South Australia, No. 5—Additional Silurian and Mesozoic fossils from central Australia: *South Australia Parliamentary Paper* 52, p. 5-8, pl. 1.

ETHERIDGE, Robert, Jun., 1894—Official contributions to the palaeontology of South Australia, No. 7—Further additions to the Lower Silurian fauna of central Australia: *South Australia Parliamentary Paper* 25, p. 23-26, pl. 3.

FORMAN, D. J., 1965—Ayers Rock, N.T., 1:250 000 Geological Series. *Bur. Miner. Resour. Aust. Explan. Notes* SG/52-8, 12 p., map.

FORMAN, D. J., 1966—The geology of the southwestern margin of the Amadeus Basin, central Australia. *Bur. Miner. Resour. Aust. Rep.* 87, 54 p., 13 pls.

FORMAN, D. J., MILLIGAN, E. N., & MCCARTHY, W. R., 1967—Regional geology and structure of the northeastern margin of the Amadeus Basin, Northern Territory: *Bur. Miner. Resour. Aust. Rep.* 103, 69 p., 13 pls.

FUCHS, A., 1919—Beitrag zur Kenntnis der Devonfauna der Verse-und Hobräcker Schichten des sauerlandischen Faciesgebietes: *Preuss. Geol. Landesanstalt, Jahrbuch* 1918, v. 29, pt. 1, no. 1, p. 58-95, pls. 5-9.

GILBERT-TOMLINSON, Joyce, 1973—The Lower Ordovician gastropod *Teiichispira* in northern Australia: *Bur. Miner. Resour. Aust. Bull.* 126, p. 65-88, pls. 29-34.

GOLDFUSS, G. A., 1832—Ausführliche Erläuterung des Naturh. Atlas, v. 4, p. 73.

HALL, James, 1847—Description of the organic remains in the lower division of the New York system: *Palaeontology of New York,* v. 1, 338 p., 88 pls.

HALL, James, 1885—Geol. Surv. New York, Palaeont., vol. 5, pt. 1, Lamellibranchiata 2, p. 269-561, pls. 34-80, 93-96: Albany, New York.

HALL, James & WHITFIELD, R. P., 1869—Preliminary notice of the lamellibranchiate shells of the upper Helderberg, Hamilton, and Chemung groups, with others from the Waverly sandstones, part 2, 80 p.

HAMADA, Takashi, IGO, Hisayoshi, & KOIKE, Toshio, 1975—Older and Middle Palaeozoic formations and fossils of Thailand and Malaysia: Geology and palaeontology of Southeast Asia, 15, p. 1-38.

HARRINGTON, H. J., 1938—Las faunas del Ordoviciano inferior del norte Argentino: *La Plata Univ. Nac. Inst. Mus. Rev.,* new ser., v. 1, Sec. Paleontologia, no. 4, 290 p., 14 pls.

HARRINGTON, H. J., et al., 1959—*in* MOORE, R. C., ed., Treatise on Invertebrate Paleontology, pt. O, Arthropoda 1: New York and Lawrence, Kansas, Geol. Soc. America and Univ. Kansas Press, 560 p., 415 figs.

HENDERSON, R. A., 1974—Shell adaptation in achrothelid (sic) brachiopods to settlement on a soft substrate: *Lethaia,* 7(1), 57-61.

HENDERSON, R. A. & SHERGOLD, J. H., 1971—*Cyclocystoides* from early Middle Cambrian rocks of northwestern Queensland: *Palaeontology,* 14(4), 704-710, pl. 138.

HILL, Dorothy, PLAYFORD, G., & WOODS, J. T., 1969—Ordovician and Silurian fossils of Queensland: Brisbane, Queensland Palaeontog. Soc., 15 p., 7 pls. (Ordovician), 18 p., 8 pls. (Silurian).

HINTZE, L. F., 1952—Lower Ordovician trilobites from western Utah and eastern Nevada: *Utah Geol. and Miner. Survey Bull.* 48, 249 p., 28 pls.

HOWELL, B. F. & KOBAYASHI, Teiichi, 1936—A new notostracan genus from the Ordovician of Siberia: *Annals Carnegie Mus.,* v. 25, p. 59-61.

Hsü, S. C. & MA, C. T., 1948—The I-Chang Formation and the Ichangian fauna: National Research Institute of Geol. *Academia Sinica,* Contrib. 8, 51 p., 9 pls.

ISBERG, Orvar, 1934— Studien über Lamellibranchiaten des Leptaenakalkes in Dalarna: Lund, *Håken Ohlssons Buchdruckerei,* 493 p., 32 pls.

JOHNSTON, R. M., 1888—Systematic account of the geology of Tasmania: Hobart, *J. Walch & Sons,* 408 p., 57 pls.

JONES, P. J., 1971—Lower Ordovician conodonts from the Bonaparte Gulf Basin and the Daly River Basin, northwestern Australia: *Bur. Miner. Resour. Aust. Bull.* 117, 80 p., 9 pls.

JONES, P. J., SHERGOLD, J. H., & DRUCE, E. C., 1971—Late Cambrian and Early Ordovician stages in western Queensland: *J. Geol. Soc. Aust.,* 18, p. 1-32.

KOBAYASHI, Teiichi, 1940—Lower Ordovician fossils from Caroline Creek, near Latrobe, Mersey River District, Tasmania: *Roy. Soc. Tasmania Paps. & Proc.* 1939, p. 67-76, pl. 12.

KRISHNAN, M. S., & JACOB, K., 1955—Burma (Birmanie): Lexique Stratigraphique International Asie, v. 3, fasc. 8b, p. 285-328.

MCALESTER, A. L., 1969—Families Ctenodontidae, Praenuculidae, and Malletiidae; *in* MOORE, R. C., ed., Treatise on Invertebrate Paleontology, pt. N, Mollusca 6, Bivalvia, v. 1: Boulder, Colorado and Lawrence Kansas, Geol. Soc. America and Univ. Kansas Press, p. 228-235.

MILLER, S. A., 1889—North American geology and paleontology: Cincinatti, 664 p.; First appendix, 1892, p. 665-718; Second appendix, 1897, p. 719-793.

NEWELL, N. D. & LAROCQUE, Aurèle, 1969—Family Orthonotidae; *in* MOORE, R. C., ed., Treatise on Invertebrate Paleontology, pt. N, Mollusca 6, Bivalvia, v. 2: Boulder, Colorado and Lawrence Kansas, Geol. Soc. America and Univ. Kansas Press, p. 818-819.

NIEPER, C. M., 1970—Middle Ordovician conodont faunas from the Toko and MacDonnell Ranges, Australia: University of Queensland, unpublished Ph.D. dissertation, 386 p., 7 pls.

ÖPIK, A. A., 1956—Cambrian geology of the Northern Territory; *in* RODGERS, John, ed., El sistema Cambrico su paleogeografia y el problema de su base: XX International Geological Congress, v. 2, p. 25-54. Reprinted in *Bur. Miner. Resour. Aust. Bull.* 49, 1957.

ÖPIK, A. A., 1958—The Cambrian trilobite *Redlichia*: organization and generic concept: *Bur. Miner. Resour. Aust. Bull.* 42, 50 p., 6 pls.

ÖPIK, A. A., 1961—The geology and palaeontology of the headwaters of the Burke River, Queensland: *Bur. Miner. Resour. Aust. Bull.* 53, 248 p., 24 pls.

ÖPIK, A. A., 1963—Early Upper Cambrian fossils from Queensland: *Bur. Miner. Resour. Aust. Bull.* 64, 133 p., 9 pls.

ÖPIK, A. A., 1967—The Mindyallan fauna of north-western Queensland: *Bur. Miner. Resour. Bull.* 74, 404 p., 67 pls. (Bound in two volumes).

ÖPIK, A. A., 1968—Ordian (Cambrian) Crustacea Bradoriida of Australia: *Bur. Miner. Resour. Bull.* 103, 44 p., 4 pls.

ÖPIK, A. A., 1970a—*Redlichia* of the Ordian (Cambrian) of northern Australia and New South Wales: *Bur. Miner. Resour. Aust. Bull.* 114, 66 p., 14 pls.

ÖPIK, A. A., 1970b—Nepeid trilobites of the Middle Cambrian of northern Australia: *Bur. Miner. Resour. Aust. Bull.* 113, 48 p., 17 pls.

PFAB, Leo, 1934—Revision der Taxodonta des böhmischen Silurs: *Palaeontographica,* v. 80, abt A, p. 195-253, pls. 2-4.

PHILLIP, G. M., 1962—The palaeontology and stratigraphy of the Siluro-Devonian sediments of the Tyers Area, Gippsland, Victoria: *Roy. Soc. Victoria Proc.*, new ser., v. 75, p. 123-246, pls. 11-36.

POJETA, John, Jr., 1962—The pelecypod genus *Byssonychia* as it occurs in the Cincinnatian at Cincinnati, Ohio: *Palaeontographica Americana,* 4, p. 169-216, pls. 22-31.

POJETA, John, Jr., 1966—North American Ambonychiidae (Pelecypoda): *Palaeontographica Americana,* 5, 129-241, pls. 19-47.

POJETA, John, Jr., 1968—Additional data on the Paleozoic pelecypod family Ambonychiidae: *J. Paleontology,* 42, 1255-1257, pls. 163-164.

POJETA, John, Jr., 1971—Review of Ordovician pelecypods: *U.S. Geol. Survey Prof. Paper* 695, 46 p., 20 pls.

POJETA, John, Jr., 1975—*Fordilla troyensis* Barrande and early pelecypod phylogeny: *Bulls. American Paleont.*, 67, 363-384, pls. 1-5.

POJETA, John, Jr., GILBERT-TOMLINSON, Joyce, and SHERGOLD, J. H., 1977—Cambrian and Ordovician rostroconch molluscs from northern Australia: *Bur. Miner. Resour. Aust. Bull.* 171.

POJETA, John, Jr., & RUNNEGAR, Bruce, 1976—The paleontology of rostroconch molluscs and the early history of the Phylum Mollusca: *U.S. Geol. Survey Prof. Pap.* 968, 88 p., 54 pls.

PRICHARD, C. E., & QUINLAN, T., 1962—The geology of the southern half of the Hermannsburg 1:250 000 sheet: *Bur. Miner. Resour. Aust. Rep.* 61, 39 p., 2 pls.

QUINLAN, T., & FORMAN, D. J., 1968—Hermannsburg, N.T., 1:250 000 Geological Series. *Bur. Miner. Resour. Aust. Explan. Notes* SF/53-13, 19 p., map.

RANFORD, L. C., 1969—Mount Liebig, N.T., 1:250 000 Geological Series. *Bur. Miner. Resour. Aust. Explan. Notes* SF/52-16, 15 p., map.

RANFORD, L. C., COOK, P. J., & WELLS, A. T., 1965—The geology of the central part of the Amadeus Basin, Northern Territory: *Bur. Miner. Resour. Aust. Rep.* 86, 48 p., 16 pls.

REED, F. R. C., 1915—Supplementary memoir on new Ordovician and Silurian fossils from the northern Shan States: *Mem. Geol. Survey India, Palaeontologia Indica,* new series, v. 6, mem. 1, 122 p., 12 pls.

REYNOLDS, M. A., 1965—Glenormiston, Qld., 1:250 000 Geological Series. *Bur. Miner. Resour. Aust. Explan. Notes* SF/54-9, 22 p., map.

REYNOLDS, M. A., 1968—Mount Whelan, Qld., 1:250 000 Geological Series. *Bur. Miner. Resour. Aust. Explan. Notes* SF/54-13, 16 p., map.

ROSS, R. J., Jr., 1951—Stratigraphy of the Garden City Formation in northeastern Utah and its trilobite faunas: *Peabody Mus. Nat. Hist., Yale Univ. Bull.* 6, 161 p., 36 pls.

RUNNEGAR, Bruce, 1974—Evolutionary history of the bivalve subclass Anomalodesmata: *J. Paleont.*, 48, 904-939, 5 pls.

RUNNEGAR, Bruce, & POJETA, John, Jr., 1974—Molluscan phylogeny: the paleontological viewpoint: *Science,* 186, 311-317.

SALTER, J. W., 1852—Note on the fossils above mentioned, from the Ottawa River: *British Assoc. Adv. Sci. Rept.,* 21st Meeting, 1851, Notices and Abs., etc., p. 63-65.

SALTER, J. W., 1859—Fossils from the base of the Trenton group: *Geol. Survey Canada,* Figs. and Descriptions of Canadian Organic Remains, decade 1, 47 p., 10 pls.

SHARPE, Daniel, 1853—Description of the new species of Zoophyta and Mollusca (Appendix B to Ribeiro, Carlos, Carboniferous and Silurian formations of the neighbourhood of Bussaco in Portugal): *Geol. Soc. London Quart. J.*, 9, 146-158, pls. 7-9.

SHERGOLD, J. H., 1969—Oryctocephalidae (Trilobita: Middle Cambrian) of Australia: *Bur. Miner. Resour. Aust. Bull.* 104, pp. 66, 12 pls.

SHERGOLD, J. H., 1971a—Late Upper Cambrian trilobites from the Gola Beds, western Queensland: *Bur. Miner. Resour. Aust. Bull.* 112, 126 p., 19 pls.

SHERGOLD, J. H., 1971b—Résumé of data on the base of the Ordovician in northern and central Austria (sic) [Australia]: *France Bur. de Recher. Géol. et Min.*, Mem., 73, p. 391-402.

SHERGOLD, J. H., 1973—A new conocoryphid trilobite from the Middle Cambrian of western Queensland: *Bur. Miner. Resour. Aust. Bull.* 126, p. 19-26, pls. 10-12.

SHERGOLD, J. H., 1975—Late Cambrian and Early Ordovician trilobites from the Burke River structural belt, western Queensland, Australia: *Bur. Miner. Resour. Aust. Bull.* 153, 253 p., 58 pls. (bound in 2 volumes).

SMITH, K. G., 1963—Huckitta, N.T., 1:250 000 Geological Series. *Bur. Miner. Resour. Aust. Explan. Notes* SF/53-11, 20 p., map.

SMITH, K. G., 1964—Progress report on the geology of the Huckitta 1:250 000 sheet, Northern Territory: *Bur. Miner. Resour. Aust. Rep.* 67, 76 p., 5 pls.

SMITH, K. G., 1965—Tobermory, N.T., 1:250 000 Geological Series. *Bur. Miner. Resour. Aust. Explan. Notes* SF/53-12, 20 p., map.

SMITH, K. G., 1972—Stratigraphy of the Georgina Basin: *Bur. Miner. Resour. Aust. Bull.* 111, 156 p., 6 pls.

SOOT-RYEN, Helen, 1964—Nuculoid pelecypods from the Silurian of Gotland: *Arkiv för Mineralogi och Geologi, Bd.* 3, nr. 28, p. 489-519, 5 pls.

SOOT-RYEN, Helen, 1966—The Middle Ordovician of the Oslo Region, Norway, 21: A new pelecypod of the genus *Palaeosolen* Hall, 1885: *Norsk Geol. Tidsskrift,* v. 46, p. 21-26.

STEWART, A. J., 1967—Kulgera, N.T., 1:250 000 Geological Series. *Bur. Miner. Resour. Aust. Explan. Notes* SG/53-5, 17 p., map.

STOLICZKA, Ferd., 1870-1871—Cretaceous fauna of southern India. The Pelecypoda: *Geol. Surv. India. Palaeontologia Indica,* Mem., v. 3, ser. 6, p. 1-222, 1870, p. 223-537, 1871, 50 pls.

TATE, Ralph, 1891—Note on fossils: *in* CHEWINGS, Charles, Geological notes on the upper Finke River Basin: *Roy. Soc. South Aust. Trans. Proc., & Rep.,* v. 14, pt. 2, p. 255.

TATE, Ralph, 1896—Palaeontology, *in* SPENCER, B., ed. Report on the work of the Horn Scientific Expedition to central Australia: Melbourne and London, v. 3, p. 97-116, pls. 1-3.

TEICHERT, Curt, 1939—The nautiloid *Bathmoceras* Barrande: *Roy. Soc. South Aust. Trans.,* v. 63, p. 384-391, pl. 19.

TEICHERT, Curt, & GLENISTER, Brian, 1952—Fossil nautiloid faunas from Australia: *J. Paleont.,* 26, 730-752, pls. 104-108.

THEIN, M. L., 1973—The Lower Paleozoic stratigraphy of western part of the southern Shan State, Burma: *Geol. Soc. Malaysia Bull.* 6, p. 143-163.

THOMAS, D. E., 1960—The zonal distribution of Australian graptolites: *Roy. Soc. New South Wales J. & Proc.,* v. 94, p. 1-58.

TOMLIN, J. R., 1931—Some preoccupied names—III: *Malacological Soc. London Proc.,* v. 19, p. 174-175.

ULRICH, E. O., 1890—New Lamellibranchiata: *American Geologist,* 6, 173-181.

ULRICH, E. O., 1895—New and little known Lamellibranchiata from the Lower Silurian rocks of Ohio and adjacent states: *Ohio Div. Geol. Surv. Rep.,* 7(2), 627-693, pls. 45-56. (Title page bears date 1893; see Pojeta, 1966, p. 135.)

WARRIS, B. J., 1967—The Palaeozoic stratigraphy and palaeontology of northwestern New South Wales: University of Sydney, unpublished Ph.D. dissertation, 470 p., 20 pls.

WARRIS, B. J., 1969—The Mount Arrowsmith area; *in* PACKHAM, G. H., Geology of New South Wales: *Geol. Soc. Australia J.,* 16, 69-70.

WELLS, A. T., 1969a—Alice Springs, N.T., 1:250 000 Geological Series: *Bur. Miner. Resour. Aust. Explan. Notes* SF/53-14, 24 p., map.

WELLS, A. T., 1969b—Finke, N.T., 1:250 000 Geological Series: *Bur. Miner. Resour. Aust. Explan. Notes* SG/53-6, 15 p., map.

WELLS, A. T., FORMAN, D. J., & RANFORD, L. C., 1965—The geology of the northwestern part of the Amadeus Basin, Northern Territory: *Bur. Miner. Resour. Aust. Rep.* 85, 45 p., 11 pls.

WELLS, A. T., FORMAN, D. J., RANFORD, L. C., & COOK, P. J., 1970—Geology of the Amadeus Basin, central Australia: *Bur. Miner. Resour. Aust. Bull.* 100, 222 p., 46 pls.

WELLS, A. T., RANFORD, L. C., STEWART, A. J., COOK, P. J., & SHAW, R. D., 1967—Geology of the northeastern part of the Amadeus Basin, Northern Territory: *Bur. Miner. Resour. Aust. Rep.* 113, 93 p., 23 pls.

WELLS, A. T., STEWART, A. J., & SKWARKO, S. K., 1966—Geology of the southeastern part of the Amadeus Basin, Northern Territory: *Bur. Miner. Resour. Aust. Rep.* 88, 59 p., 11 pls.

WILLIAMS, H. S., & BREGER, C. L., 1916—The fauna of the Chapman Sandstone of Maine: *U.S. Geol. Survey Prof. Paper* 89, 347 p., 27 pls.

PLATE 1

Eritropis opiformis (Tate, 1896)
(p. 12)

Fig. 1. Right-lateral view of latex replica of external mould (CPC 15479), locality 82, X3.

Fig. 2. Right-lateral view of latex replica of external mould (CPC 15480), locality 78, X3.

Figs. 3–4. Internal mould of left valve, showing teeth and adductor muscle scars (CPC 15481); fig. 3, latex replica, fig. 4, original, locality 82, X3.

Figs. 5–7. Right-lateral, left-lateral, and posterior views of internal mould (CPC 15482), locality 30, X3.

Figs. 8–9. Posterior and left lateral views of latex replica of external mould (CPC 15483), locality 82, X3.

Eritropis sp. A
(p. 13)

Fig. 10. Left lateral view of internal mould showing teeth (CPC 15484), locality 9, X3.

Plate 1

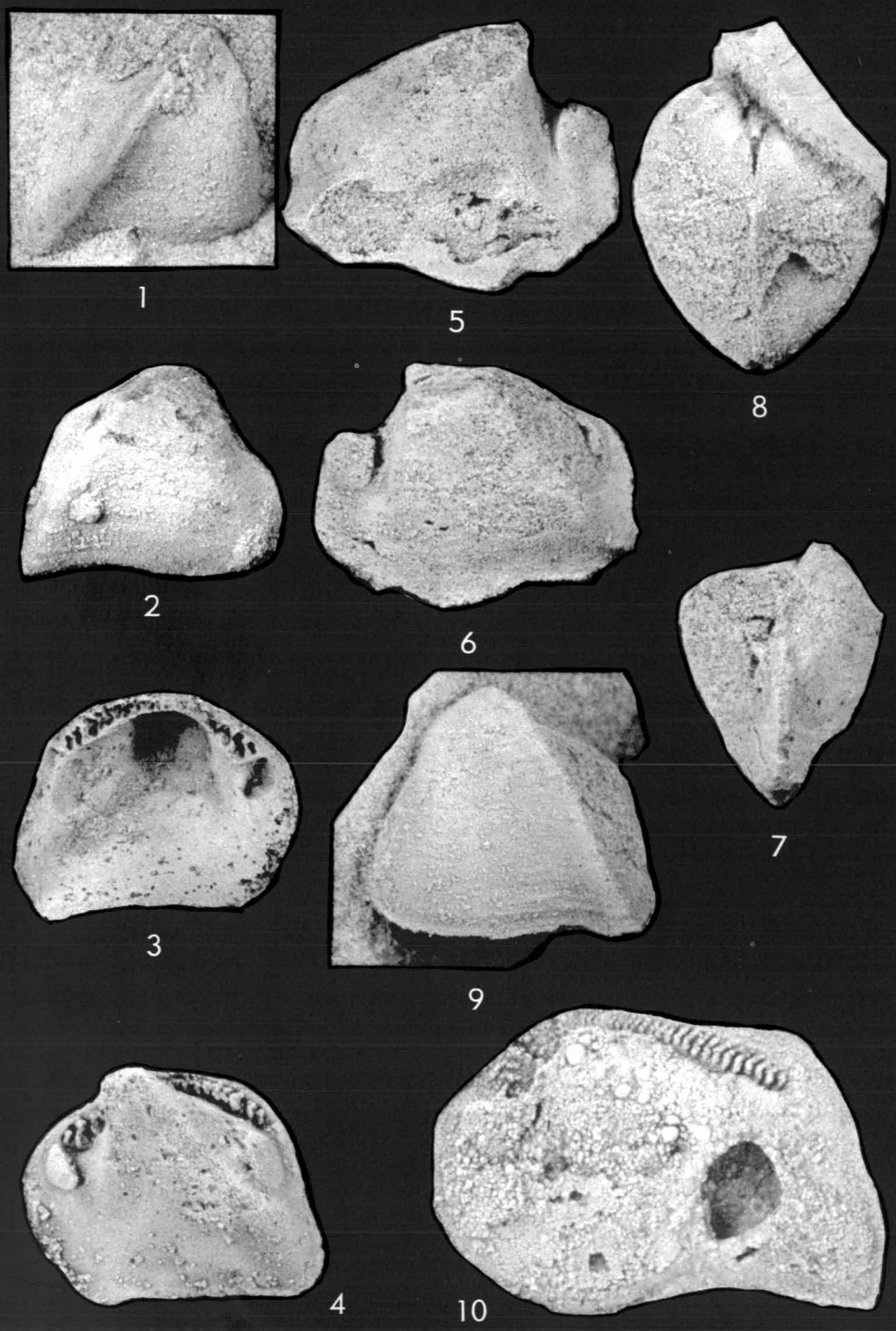


PLATE 2

Alococoncha crassatellaeformis (Tate, 1896)

(All specimens from locality 9; p. 10)

Figs. 1–2. Latex replica of part and counterpart of left valve showing ornament and teeth (CPC 15485), X2.

Fig. 3. Latex replica of left valve, showing teeth (CPC 15486), X2.

Fig. 4. Latex replica of external mould of left valve, showing ornament (CPC 15487), X2.

Figs. 5–6. Latex replica and original of right valve, showing dentition and posterior adductor muscle scar (CPC 15488), X2.

Fig. 7. Wax replica of **lectotype** (SAM T 1223a), left valve, showing ornament, X2. This replica was figured by Tate, 1896, on his plate 2, fig. 19.

Fig. 8. Latex replica of internal mould of right valve, showing teeth and adductor muscle scars (CPC 15489), X2.

Fig. 9. Latex replica of external mould of right valve, showing ornament (CPC 15490), X2.

Fig. 10. Paralectotype, internal mould left valve, showing adductor muscle scars (SAM T 1223b), X3. This specimen was not figured by Tate (1896).

Eritropis opiformis (Tate), 1896

(p. 12)

Figs. 11–13. Left-lateral, posterior, and dorsal views of **lectotype** (SAM T 1261a), X3. Tate (1896) figured this specimen on his plate 2, figure 16a, he gave the locality as: 'In quartzite, between Petermann Creek and Tempe Downs'.

Plate 2

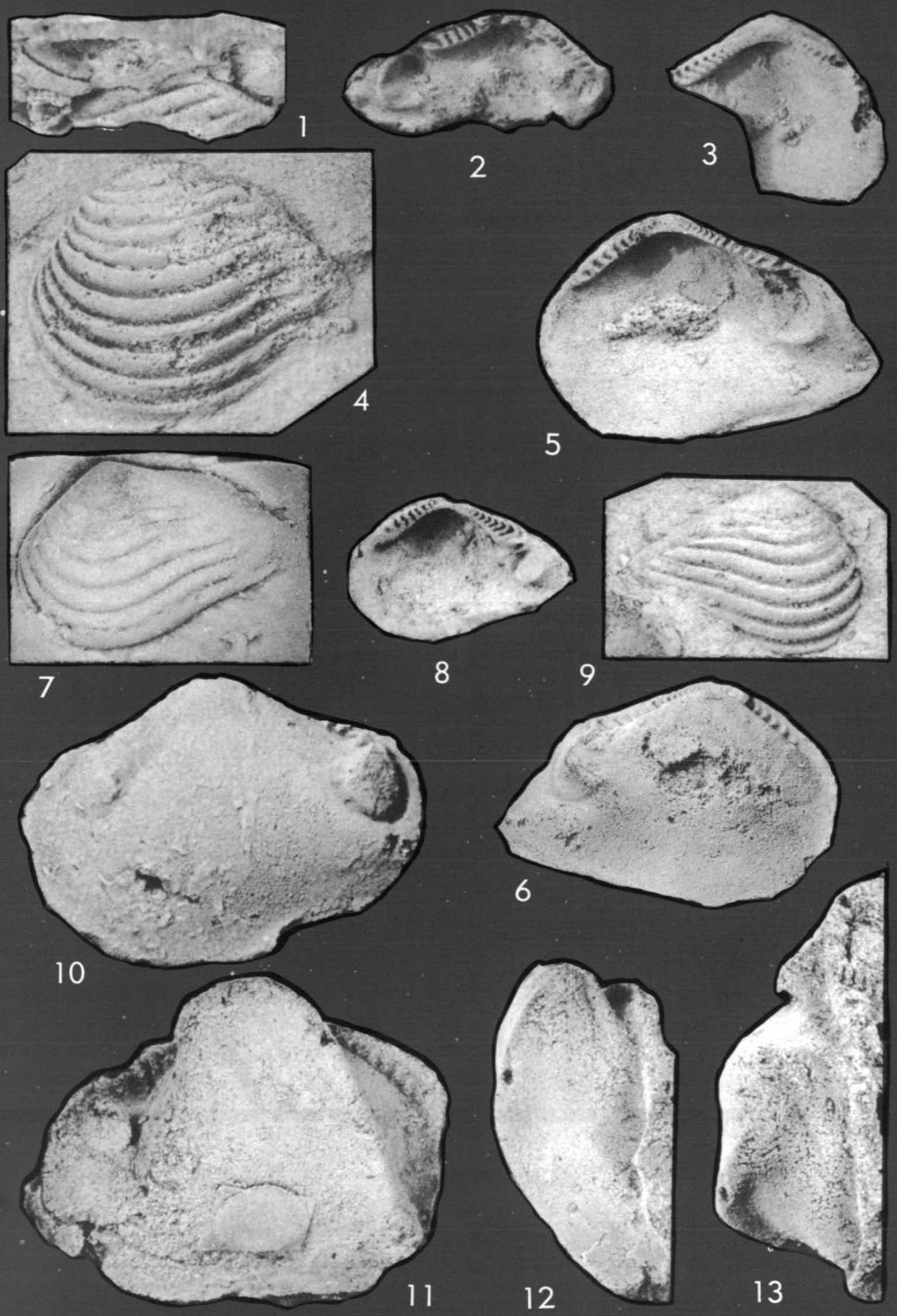


PLATE 3

Ctenodonta youngi sp. nov.
(All specimens from locality 81; p. 9)

Fig. 1. Internal mould of left valve, paratype (CPC 15491), X4.

Fig. 2. Internal mould of left valve, paratype (CPC 15492), X4.

Fig. 3. Internal mould of right valve, paratype (CPC 15493), X4.

Figs. 4–5. Internal mould and latex replica of right valve showing teeth, **holotype** (CPC 15494), fig. 4, X4; fig. 5, X8.

Ctenodonta macalesteri sp. nov.
(p. 9)

Figs. 6–7. Left-lateral and medial views of silicified replica, **holotype** (UT 80908), locality 74, X5.

Deceptrix? sp. A
(p. 12)

Fig. 8. Internal mould right valve (CPC 15495), locality 1, X2.

Zeehania jacksoni gen. et sp. nov.
(p. 19)

Figs. 9–11. Dorsal, medial, and lateral views of right valve, **holotype** (CPC 15495), locality 75, X3.

Plate 3

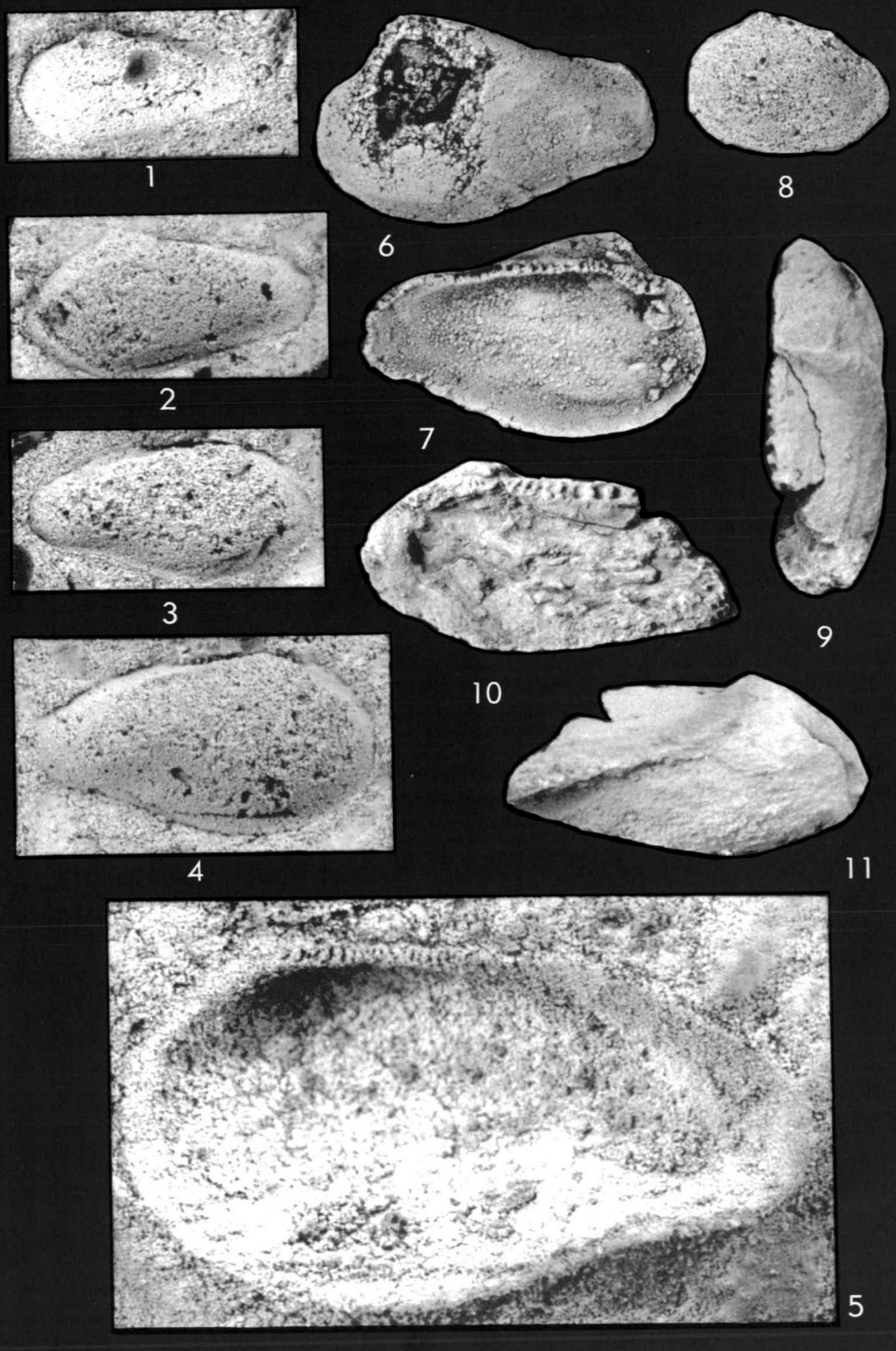


PLATE 4

Palaeoneilo smithi sp. nov.
(p. 16)

Fig. 1. Left valve, showing dentition, **holotype** (CPC 15497), locality 41, X4.
Fig. 2. Latex replica of right valve, showing dentition, paratype (15498), locality 11, X4.
Fig. 3. Right valve, showing dentition, paratype (CPC 15499), locality 41, X4.
Fig. 4. Right valve, paratype (CPC 15500), locality 41, X4.
Fig. 5. Right valve, paratype (CPC 15501), locality 41, X4.
Fig. 6. Left valve, paratype (CPC 15502), locality 41, X4.
Fig. 7. Right valve, paratype (CPC 15503), locality 41, X4.

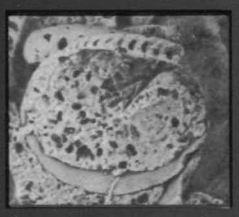
Inaequidens campbelli gen. et sp. nov.
(p. 14)

Fig. 8. Latex replica of left valve, showing lateral profile and dentition, **holotype** (CPC 15504), locality 71, X4.
Fig. 9. Latex replica of right valve, showing dentition, paratype (CPC 15505), locality 71, X4.

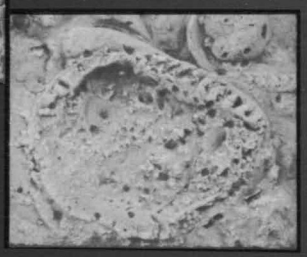
Plate 4

1

2



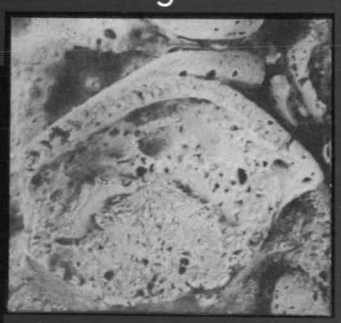
3



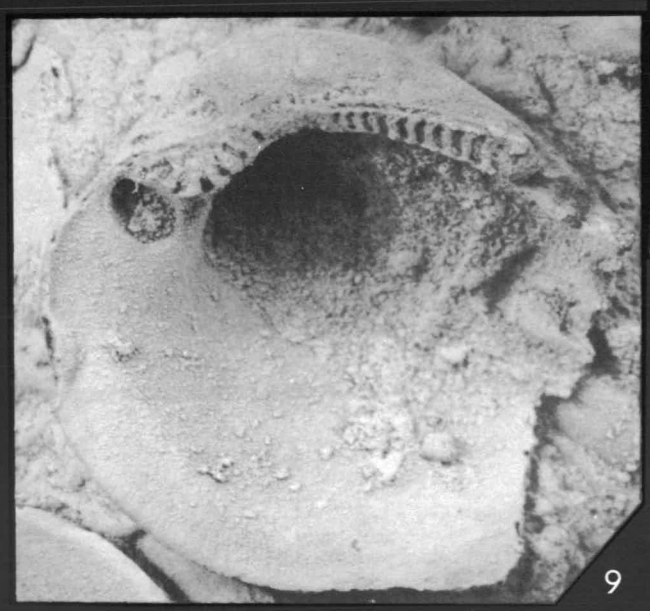
4

8

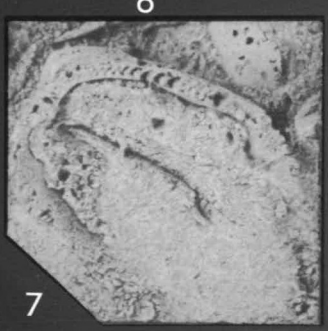
5



6



9



7

PLATE 5

Fidera maryae gen. et sp. nov.
(p. 11)

Fig. 1. Right valve exterior, showing ornament, silicified replica, paratype (UT 82743), locality 76, X5.

Fig. 2. Right valve interior, showing teeth, silicified replica, paratype (UT 94492), locality 76, X5.

Figs. 3–4. Left valve interior and exterior showing ornament and teeth, silicified replica, **holotype** (UT 94493), locality 76, X5.

Figs. 5–6. Dorsal and right valve exterior views of an articulated specimen showing lunule and escutcheon, silicified replica, paratype (UT 94500), locality 75, X5.

Inaequidens davisi gen. et sp. nov.
(p. 13)

Fig. 7. Left valve interior, showing dentition, silicified replica, paratype (UT 94496), locality 75, X5.

Fig. 8. Right valve interior, showing dentition, silicified replica, paratype (UT 94497), locality 75, X5.

Figs. 9–10. Dorsal and right valve exterior views of an articulated specimen showing profile and ornament, silicified replica, **holotype** (UT 94498), locality 75, X5.

Plate 5

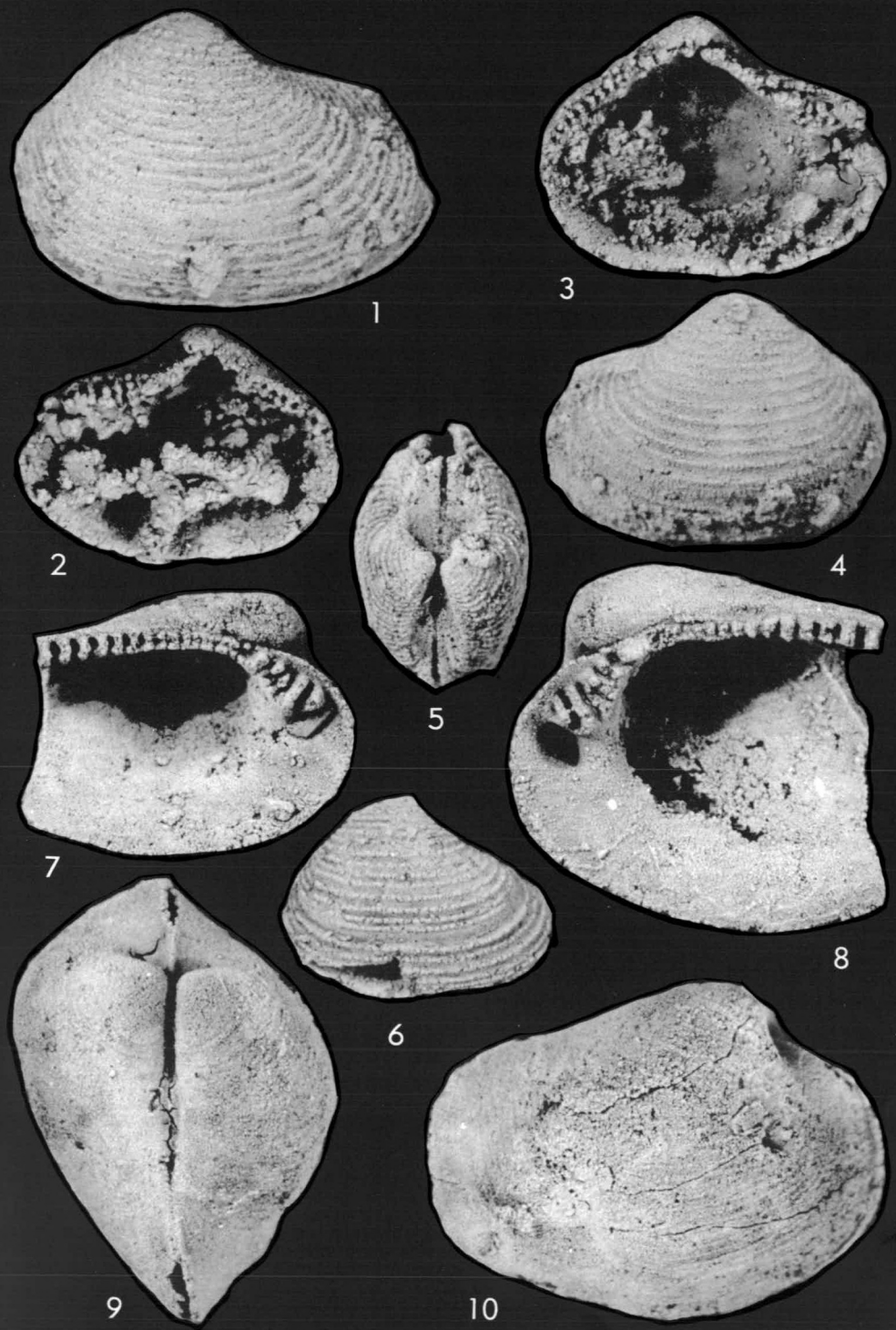


PLATE 6

Sthenodonta jelli gen. et sp. nov.
(All specimens from locality 26; p. 18)

Fig. 1. Left valve exterior, paratype (CPC 15506), X2.

Fig. 2. Right valve interior, showing teeth and anterior adductor muscle scar, paratype (CPC 15507), X2.

Fig. 3. Right valve interior, showing teeth and adductor muscle scars, paratype (CPC 15508).

Fig. 4. Left valve interior, showing teeth and anterior adductor muscle scar, paratype (CPC 15509), X2.

Fig. 5. Right valve interior showing teeth, **holotype** (CPC 15510), X2.

Nuculites wattii (Tate, 1896)
(p. 16)

Figs. 6–7. Left-lateral and dorsal views of internal mould, **lectotype** (SAM T 1220a). This specimen was figured by Tate (1896) on his plate 2, figure 17a, he gave the locality as 'In quartzite between Petermann Creek and Tempe Downs,' X3.

'Pteronites' micans Tate, 1896
(p. 33)

Fig. 8. Ventral? view of **holotype** (SAM T 1268). Although Tate placed this specimen in the Pelecypoda, we regard it as a trilobite genal spine. Tate (1896) gave the locality as 'In limestone, Tempe Downs,' X5.

Plate 6

PLATE 7

Deceptrix banksi sp. nov.
(p. 12)

Figs. 1–2. Exterior and interior views of right valve showing profile and teeth, silicified replica, **holotype** (UT 94494), locality 74, X4.

Fig. 3. Dorsal view of articulated specimen, silicified replica, paratype (UT 94495), locality 74, X4.

Sthenodonta jelli gen. et sp. nov.
(p. 18)

Fig. 4. Right valve interior, paratype (CPC 15511), locality 26, X2.

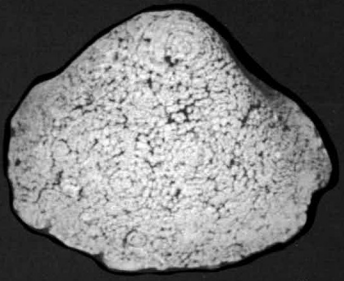
Fig. 5. Left valve interior, paratype (CPC 15512), locality 26, X2.

Sthenodonta etheridgei (Tate, 1896)
(p. 18)

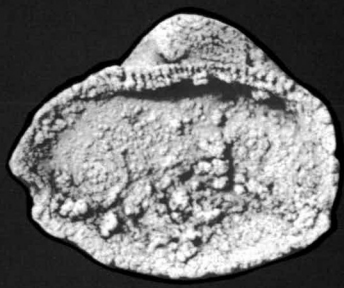
Figs. 6–7. Dorsomedial view, showing teeth and left valve exterior, **lectotype** (SAM T 1221b). This specimen was not figured by Tate (1896), the locality is uncertain, as Tate gave several localities at which he found this species, X3.

Figs. 8–9. Latex replica and original of right valve-external mould, paralectotype (SAM T 1221a). This specimen was figured by Tate (1896) on his plate 2, figure 15; the locality is uncertain as Tate gave several localities at which he found this species, X3.

Plate 7



1

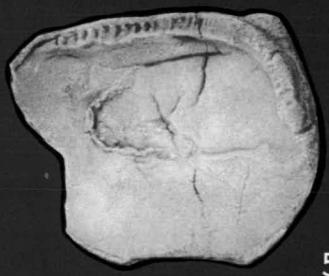


2

3

4

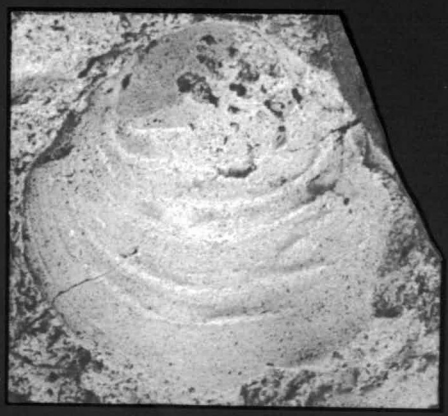
6



5

7

8



9

PLATE 8

Johnmartinia cordata gen. et sp. nov.
(p. 14)

Figs. 1–3. Left-lateral, anterior, and dorsal views of internal mould showing profiles and divergent umbos, paratype (CPC 15513), locality 30, X3.

Figs. 4–7. Left-lateral, anterior, right-lateral, and dorsal views of internal mould, showing profiles and adductor muscle scars, **holotype** (CPC 15514) locality 30, X3.

Fig. 8. Dorsal view of internal mould, showing divergent umbos, paratype (CPC 15515), locality 33, X3.

Fig. 9. Anterior view of internal mould, showing anterior adductor muscle scar, paratype (CPC 15516), locality 30, X3.

Fig. 10. Dorsal view of left valve, internal mould, paratype (CPC 15517), locality 30, X3.

Fig. 11. Right valve internal mould, showing teeth, paratype (CPC 15518), locality 30, X3.

Fig. 12. Left valve internal mould, showing teeth, paratype (CPC 15519), locality 30, X3.

Fig. 13. Left valve internal mould, showing teeth, paratype (CPC 15520), locality 30, X3.

Fig. 14. Left valve internal mould, showing teeth, paratype (CPC 15521), locality 30, X3.

Plate 8

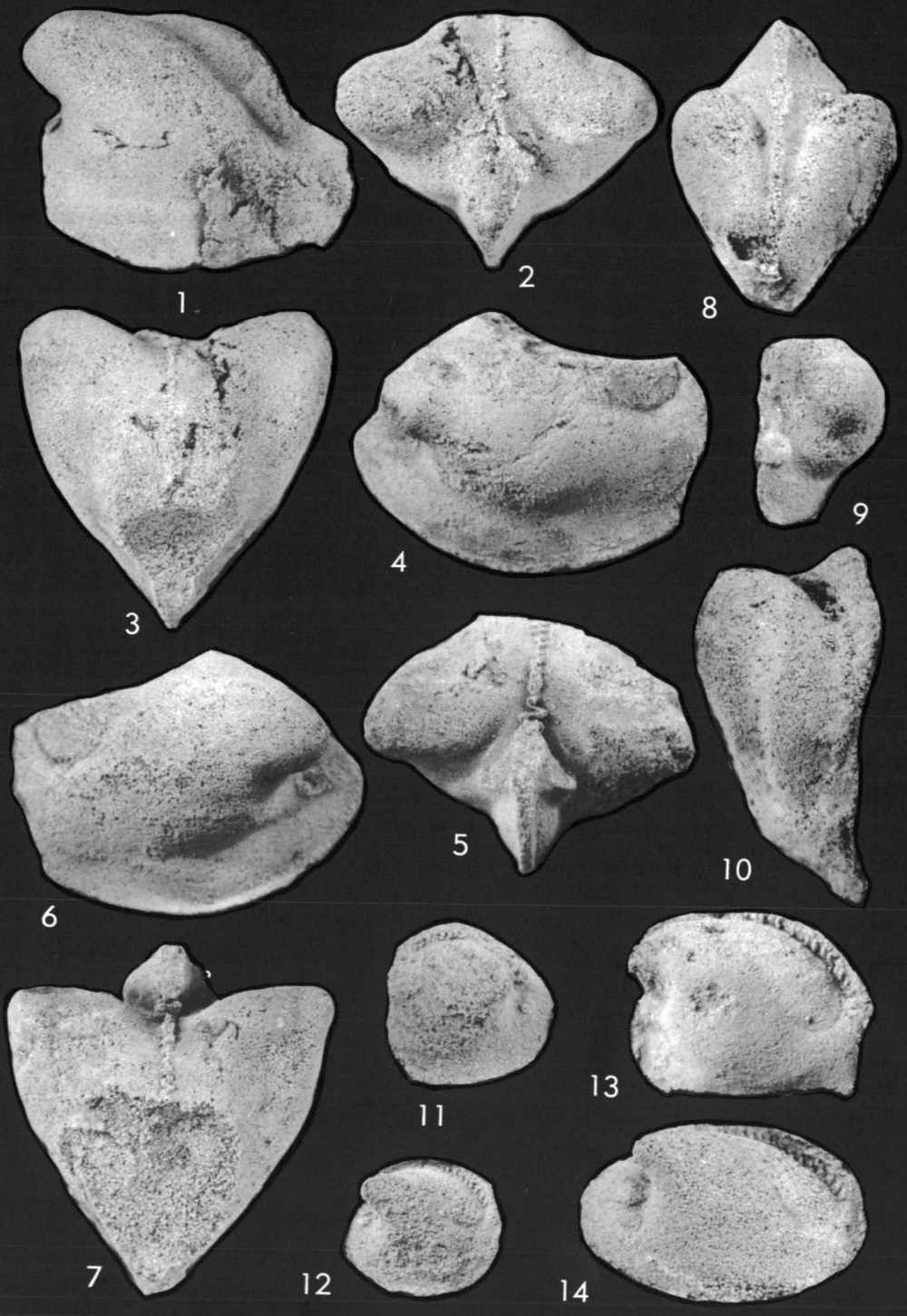


PLATE 9

Johnmartinia orbicularis (Tate, 1896)
(All specimens from locality 9; p. 15)

Figs. 1–4. Left-lateral view, showing adductor muscle scars and teeth, anterior view, showing anterior adductor muscle scar, latex replica, showing dentition, and oblique left-lateral view, showing teeth, posterior adductor muscle scar, and trace of this muscle scar, internal mould (CPC 15522), X2.

Figs. 5–7. Latex replica of right valve, showing dentition, original from which the latex replica in figure 5 was made, enlargement of dorsal part of figure 6, showing dentition, internal mould (CPC 15523), figs. 5, 6, X2; fig. 7, X5.

Fig. 8. Latex replica of anteroventral part of shell, showing ornament, external mould (CPC 15524), X2.

Plate 9

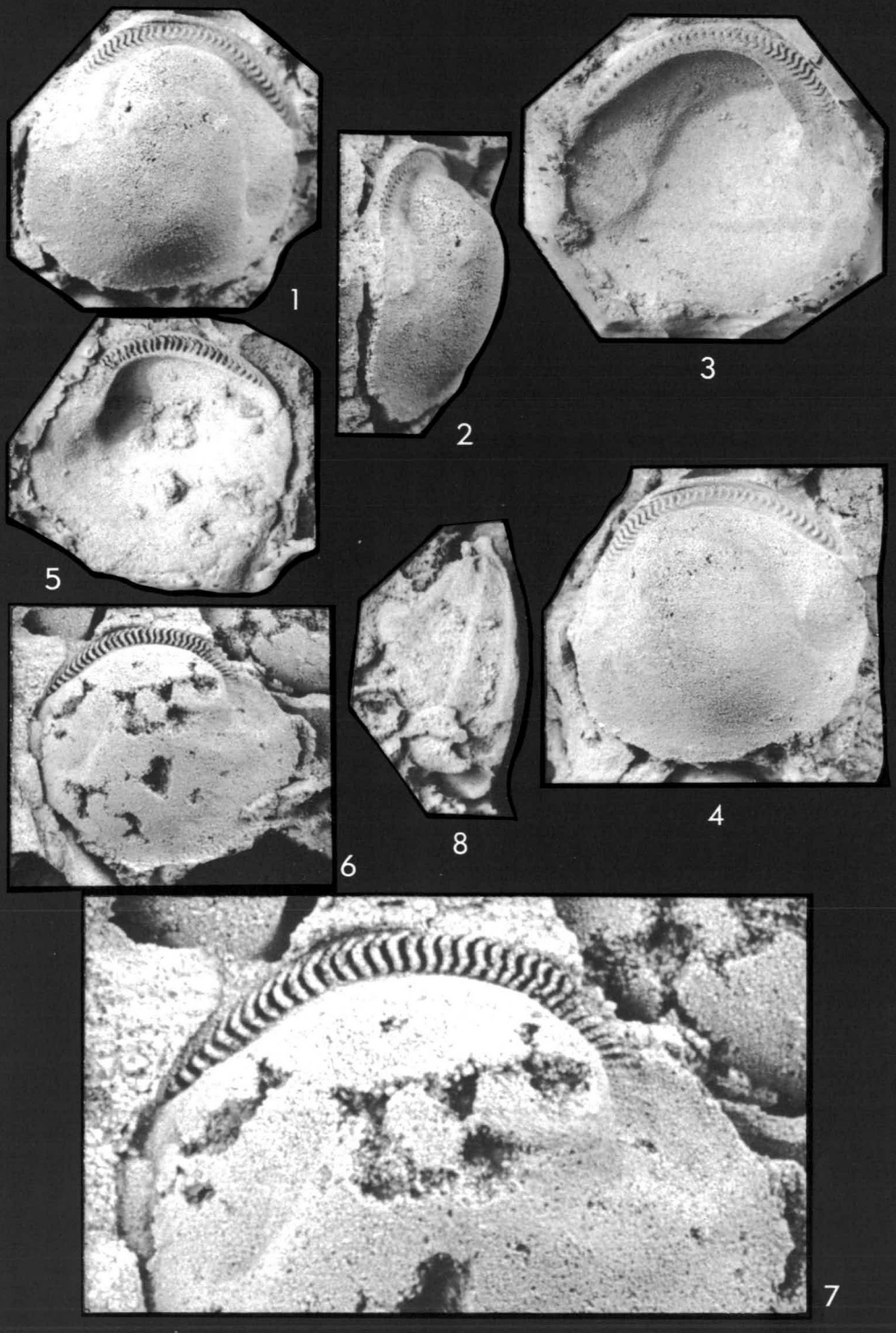


PLATE 10

Johnmartinia orbicularis (Tate, 1896)
(All specimens from locality 9; p. 15)

Fig. 1. Internal mould right valve, showing teeth and posterior adductor muscle scar, CPC 15525, X2.

Figs. 2–4. Anterior, right-lateral, and dorsal views of internal mould, CPC 15526, X2.

Figs. 5–6. Left-lateral and oblique anterior views of latex replica of composite mould, showing ornament, CPC 15527, X2.

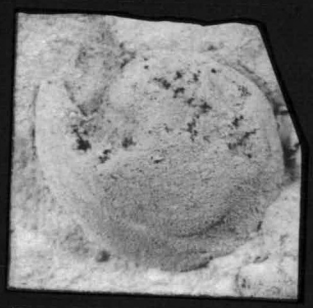
Fig. 7. Oblique anterior view of latex replica of external mould, CPC 15528, X2.

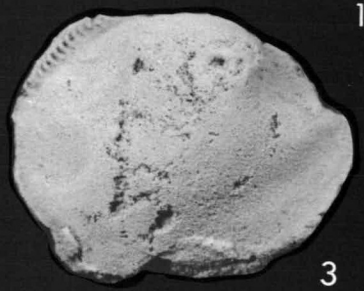
Figs. 8–10. Left-lateral view, showing teeth and anterior adductor muscle scar, dorsoanterior view, showing teeth and anterior adductor muscle scar, enlargement of figure 8, showing teeth, **lectotype** (SAM T 1222a), fig. 8, 9, X2; fig. 10, X5. This specimen was figured by Tate (1896) on his plate 2, figure 18a.

Plate 10


1


2

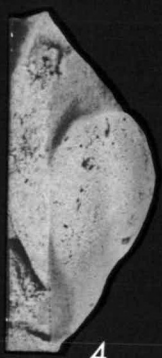

5


3


6


7


8


4


9


10

PLATE 11

Sthenodonta passmoreae gen. et sp. nov.
(p. 18)

Figs. 1–2. Left-lateral and hinge line views of **holotype** (GSQ F 11678) showing growth lines, lateral profile, and teeth, fig. 1, X1; fig. 2, X2. The specimen is from the Toko Group, Toko Range, and was previously figured by Hill, Playford, and Woods (1969), plate 0 1, figure 19.

Fig. 3. Latex replica of left valve showing posterior dentition, paratype (UQ F 67207), locality 13, X3.

Fig. 4. Latex replica of left valve, showing profile and posterior tooth row, paratype (CPC 15529), locality 11, X3.

Fig. 5. Latex replica showing dentition, paratype (UQ F 60115), locality 14, X2. This specimen was previously figured by Hill, Playford, and Woods (1969), plate 0 I, figure 20.

Figs. 6–7. Latex replica and original showing teeth and anterior adductor muscle scar, paratype (CPC 15530), locality 86, X3.

Fig. 8. Latex replica of left valve exterior, paratype (CPC 15531), locality 84, X1.

Fig. 9. Latex replica of right valve, showing dentition, paratype (CPC 15532), locality 90, X3.

Plate 11

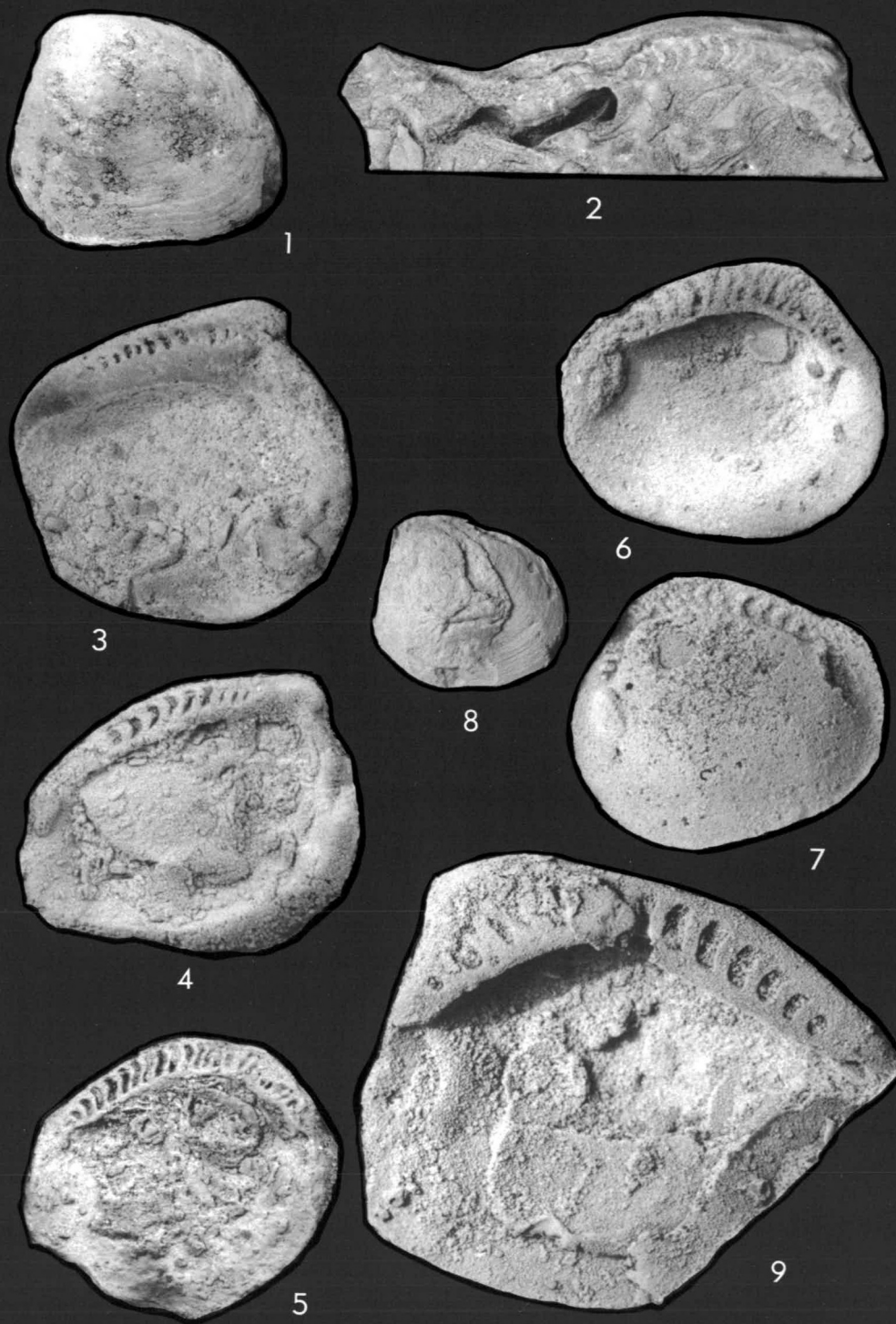


PLATE 12

Sthenodonta eastii (Tate, 1896)
(p. 17)

Fig. 1. Left-lateral view of internal mould. This specimen is the **lectotype** of *Isoarca eastii* var. *modiolaeformis* Tate (1896) and was figured by him on plate 2, figure 12b. SAM T 1271a, X1. Tate gave the locality as: Middle Valley (Tempe Downs).

Fig. 2. Latex replica of left valve, showing teeth and anterior adductor muscle scar, paralectotype (SAM 1274b), X2. The locality is the same as in figure 1 above.

Figs. 3–4. Left-lateral view of internal mould, showing teeth and anterior adductor muscle scar, latex replica of dorsal part showing teeth, **lectotype** (SAM T 1274a), fig. 3, X1.5; fig. 4, X2. This specimen was figured by Tate (1896) on plate 2, figure 12a; locality the same as in figure 1 above.

Figs. 5–6. Left-lateral and dorsal views of internal mould (CPC 15533), locality 68, X1.

Figs. 7–9. Left-lateral, dorsal, and anterior views of internal mould (CPC 15534), locality 68, X1.

Fig. 10. Dorsal view of internal mould (CPC 15535), locality 16, X1.

Plate 12

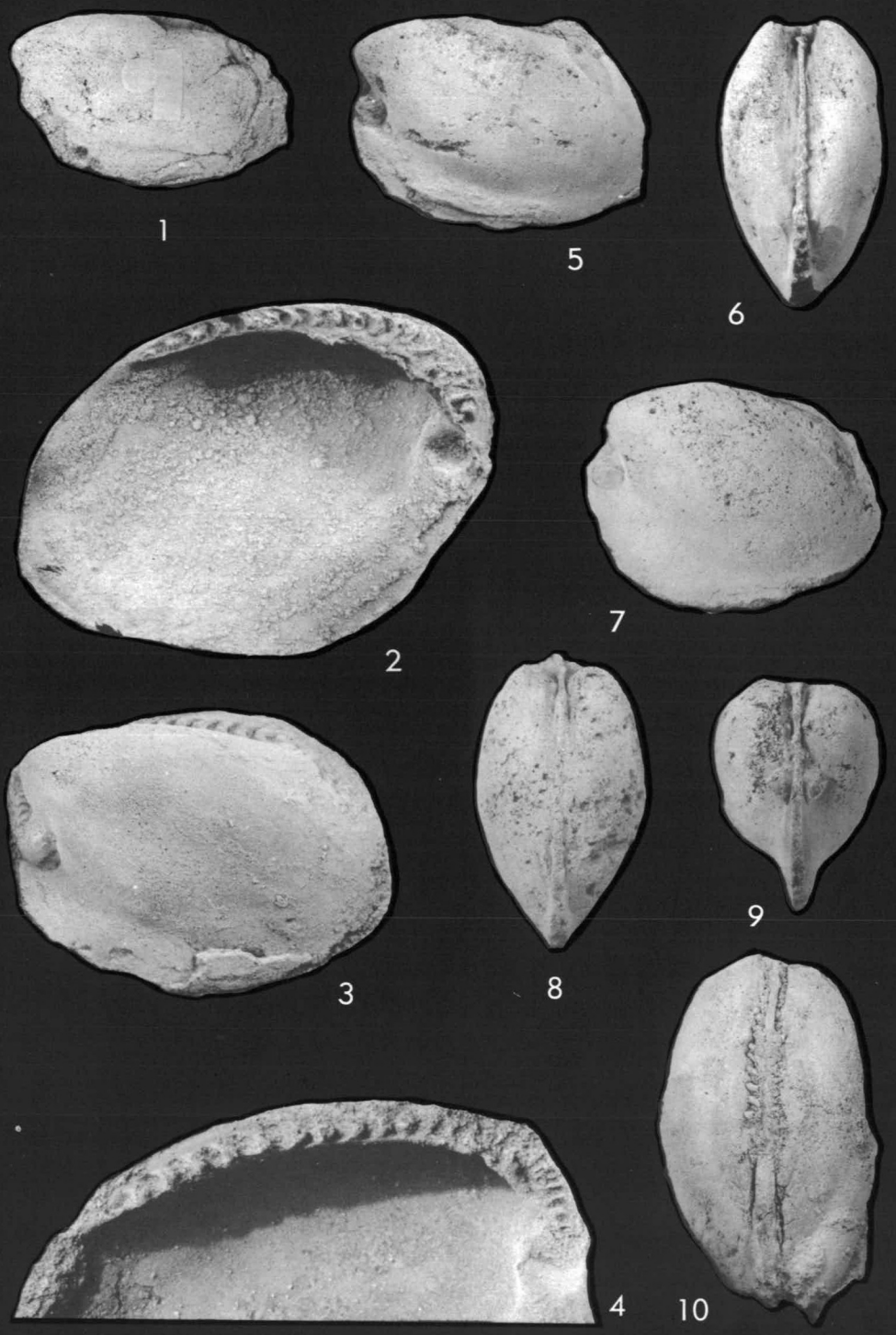


PLATE 13

Sthenodonta eastii (Tate, 1896)
(p. 17)

Figs. 1–3. Left-lateral and dorsal views and enlargement of the posterodorsal part of internal mould, showing posterior adductor muscle scars (CPC 15536), locality 68, figs. 1, 2, X1; fig. 3, X3.

Figs. 4–6. Dorsal and left-lateral views and enlargement of posterodorsal part of internal mould, showing posterior adductor and pedal retractor muscle scars (CPC 15537), locality 54, figs. 4, 5 X1; fig. 6, X3.

Fig. 7. Latex replica of external mould showing growth lines (CPC 15538), locality 55, X2.

Fig. 8. Right lateral view of internal mould, showing teeth and adductor muscle scars (CPC 15539), locality 67, X2.

Plate 13

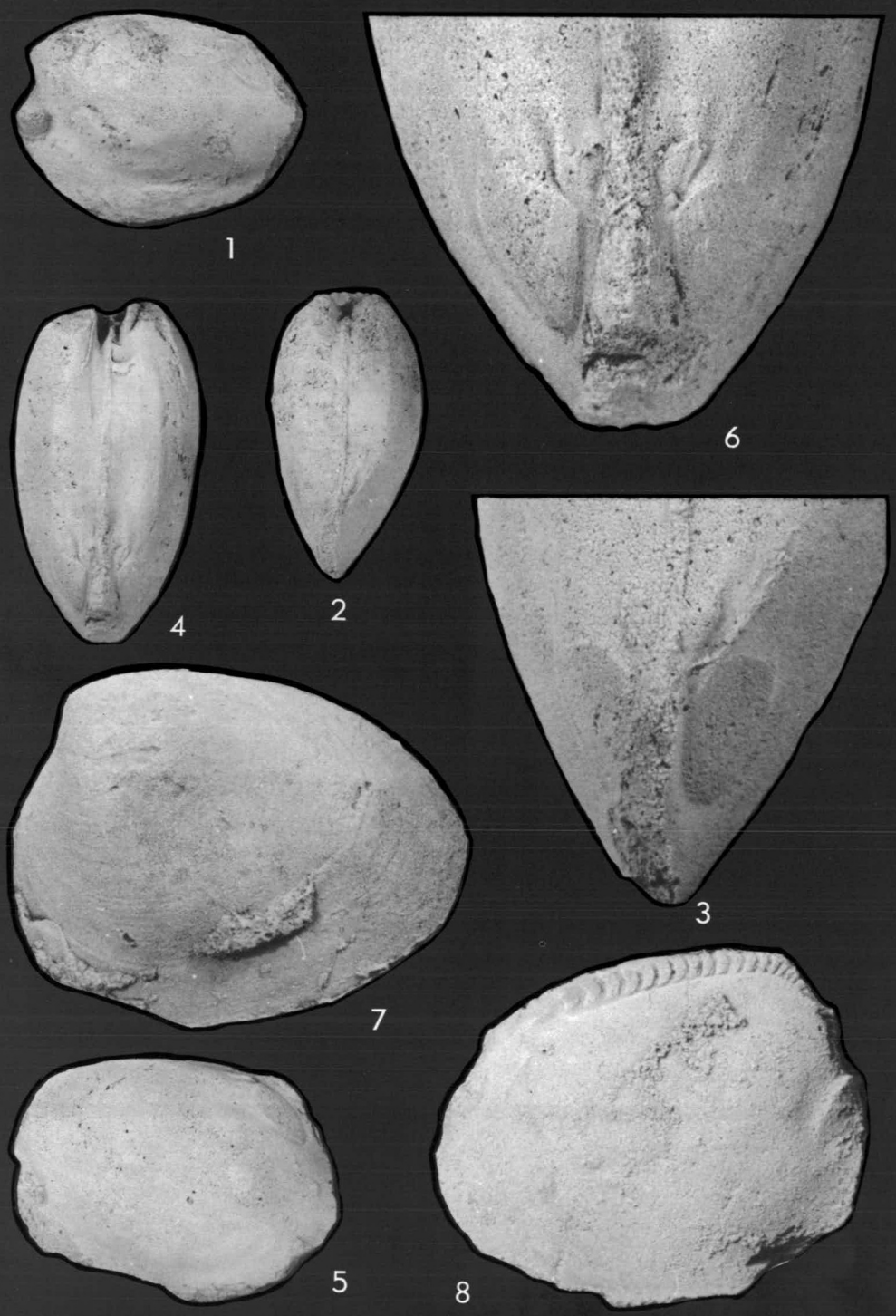


PLATE 14

Cyrtodonta staffordae sp. nov.
(p. 20)

Figs. 1–2. Right valve, part and counterpart, showing profile and posterior lateral tooth, **holotype** (CPC 15541), locality 64, X2.

Fig. 3. Right-lateral view of internal mould, paratype (CPC 15540), locality 66, X2.

Cyrtodonta sp. A
(p. 21)

Fig. 4. Right-lateral view of composite mould (GSQ F 11677), the specimen is from the Toko Group, Toko Range, X1. The specimen was previously figured by Hill, Playford, and Woods (1969), plate 0 I, figure 22.

Sthenodonta? sp. A
(p. 19)

Fig. 5. Left-lateral view of weathered exterior (AM F 46132), the specimen is from the Ordovician of the MacDonnell Ranges, X3. The specimen was previously figured by Etheridge (1894), plate 3, figure 8.

Lophoconcha corrugata (Tate, 1894)
(p. 15)

Fig. 6. Left-lateral view showing ornament, **lectotype** (SAM T 1272a) X10. Tate (1896) gave the locality information as: "Middle Valley (Tempe Downs), also Ilpilla Gorge." The specimen was figured by Tate (1896) on plate 1, figure 8.

Fig. 7. Left valve exterior, showing ornament, paralectotype (SAM T 1272b), X10. Locality information the same as in figure 6 above.

Fig. 8. Left valve interior, showing dentition, paralectotype (SAM T 1272c), X10. Locality information as in figure 6 above.

Fig. 9. Right valve exterior, showing ornament, paralectotype (SAM T 1272d), X10. Locality information as in figure 6 above.

Plate 14

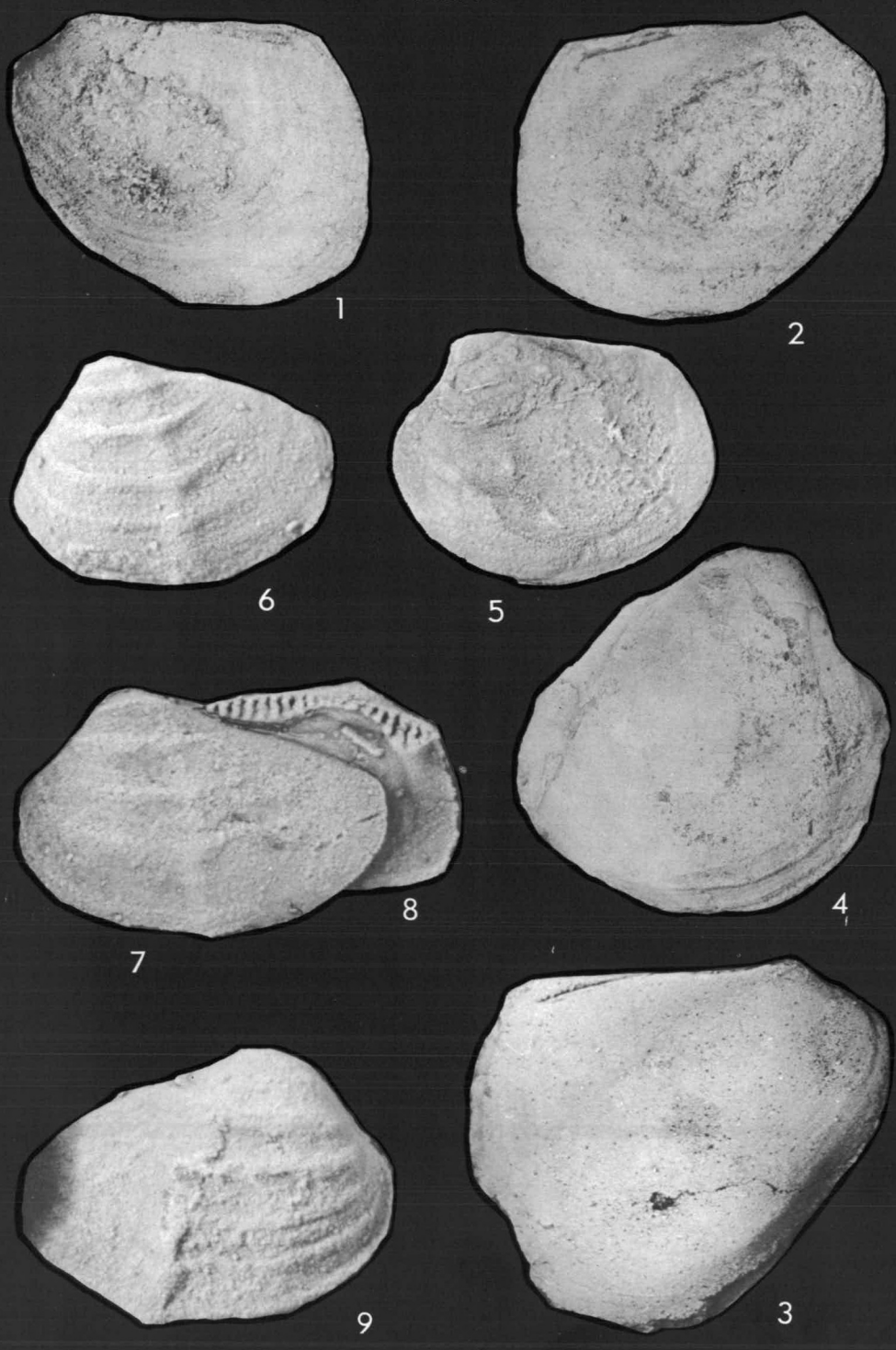


PLATE 15

Cyrtodonta wattii (Tate, 1896)
(p. 21)

Fig. 1. Right-lateral view of composite mould, showing anterior adductor muscle scar, posterior lateral teeth, and growth lines, **lectotype** (SAM T 1258a), X2. The locality is uncertain, as Tate (1896) gave three localities from which he obtained the type suite of this species. Tate figured this specimen on plate 2, figure 14.

Fig. 2. Left-lateral view of internal mould, showing anterior and posterior teeth and anterior adductor muscle scar (CPC 15542), locality 25, X3.

Fig. 3. Left-lateral view of internal mould showing posterior teeth (CPC 15543), locality 25, X3.

Figs. 4–5. Part and counterpart of a specimen, showing growth lines and anterior and posterior dentition (CPC 15544), locality 68, X3.

Figs. 6–7. Right-lateral and dorsal views of an articulated specimen, showing anterior adductor muscle scar and a short segment of the pallial line (CPC 15545), locality 68, X1.

Plate 15

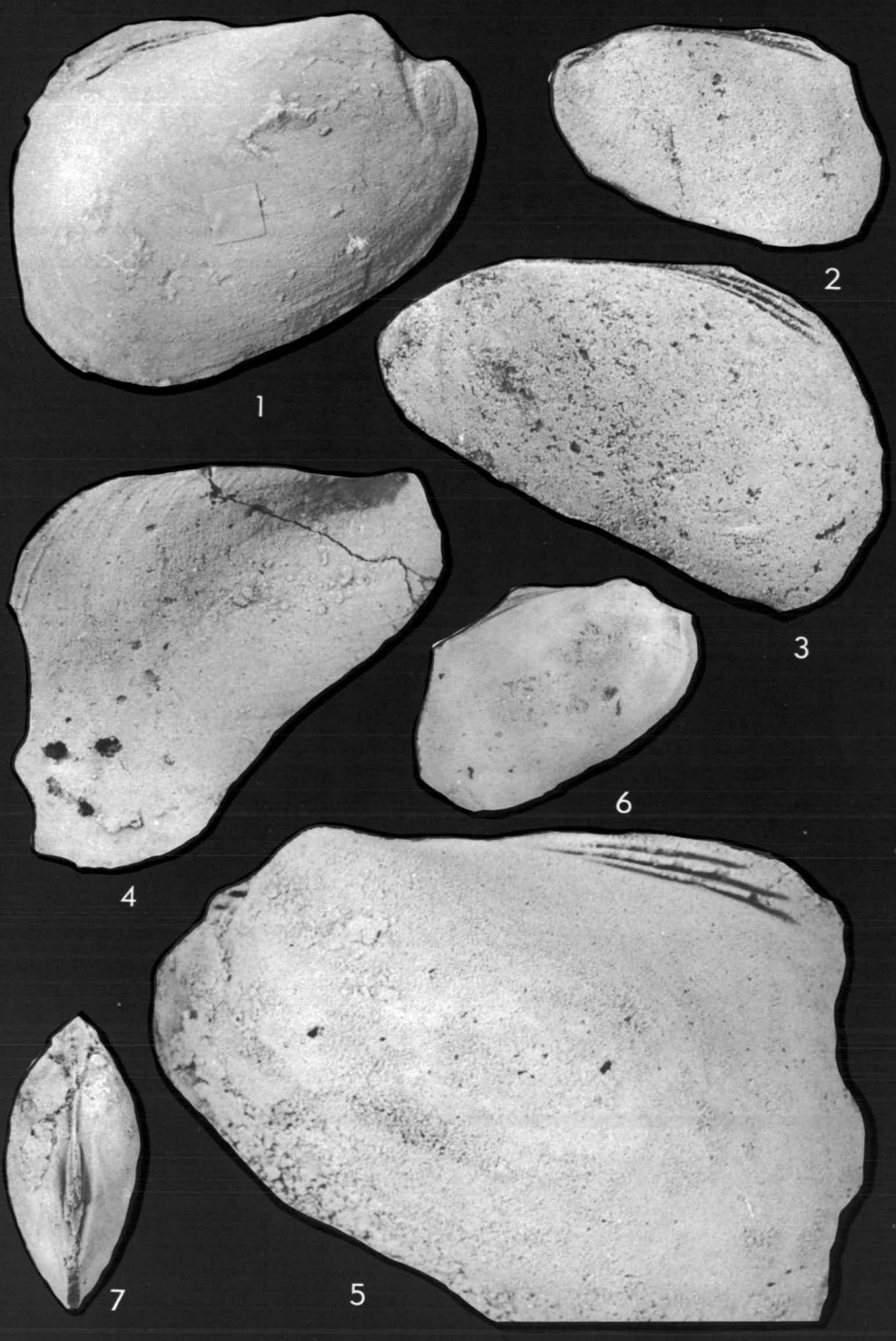


PLATE 16

Cyrtodonta hazeli sp. nov.
(p. 20)

Figs. 1–2. Internal mould right valve and latex replica showing anterior and posterior teeth, anterior adductor muscle scar, and short section of pallial line, **holotype** (CPC 15546) locality 69, X2.

Figs. 6–7. Right-lateral and dorsal views of composite mould, paratype (CPC 15550), locality 70, X1.

Cyrtodonta carberryi sp. nov.
(p. 20)

Fig. 3. Incomplete internal mould of left valve, showing posterior lateral teeth, paratype (CPC 15547), locality 65, X1.

Fig. 4. Composite mould of right valve, paratype (CPC 15548), locality 65, X1.

Fig. 5. Composite mould of left valve, showing posterior dentition and ornament, **holotype** (CPC 15549), locality 65, X1.

Plate 16

PLATE 17

Pharcidoconcha raupi gen. et sp. nov.
(p. 22)

Fig. 1. Left-lateral view, showing ornament and anterior adductor muscle scar, paratype (CPC 15551), locality 37, X3.

Fig. 2. Left-lateral view, showing ornament and anterior adductor muscle scar, paratype (CPC 15552), locality 37, X3.

Figs. 3–4. Part and counterpart of left valve, showing posterior teeth and ornament, **holotype** (CPC 15553), locality 35, X3.

Fig. 5. Right-lateral view, showing ornament and anterior adductor muscle scar, paratype (CPC 15554), locality 37, X3.

Fig. 6. Right-lateral view, showing ornament and anterior adductor muscle scar, paratype (CPC 15555), locality 37, X3.

Fig. 7. External mould of left valve, showing ornament, paratype (CPC 15556), locality 35, X3.

Cyrtodontula hadzeli sp. nov.
(p. 21)

Fig. 8. Internal mould right valve, showing profile, anterior adductor muscle scar, and posterior teeth, **holotype** (CPC 15557), locality 40, X3.

Figs. 9–10. Part and counterpart right valve, showing profile and posterior teeth (CPC 15558), locality 40, X3.

Fig. 11. Composite mould right valve, paratype (CPC 15559), locality 40, X3.

Plate 17

PLATE 18

Leconychia doylei gen. et sp. nov.
(p. 23)

Figs. 1–3. Left-lateral, anterior, and dorsal views, showing profiles, and globose anterior lobe separated from body of shell by thin shell thickening which forms an incised line seen in the anterior view of this internal mould, **holotype** (CPC 15560), locality 43, fig. 1, X1; figs. 2, 3, X2.

Cyrtodontula sohli sp. nov.
(p. 22)

Fig. 4. Left valve, paratype (UT 81805), locality 75, X2.

Fig. 5. Right valve, **holotype** (UT 81815), locality 75, X2.

Plate 18

PLATE 19

Ambonychiid genus A, species A
(p. 25)

Figs. 1–2. Right-lateral and dorsal views, showing ornament, anterior lobe, and equality of valves (UQ F 60111), locality 15, X3. This specimen was figured by Hill, Playford, and Woods (1969), plate 0 I, figure 15.

Fig. 3. Left-lateral view, showing ornament and anterior lobe (UQ F 60110), locality 15, X3. This specimen was figured by Hill, Playford, and Woods (1969), plate 0 I, figure 14.

Ambonychiid genus B, species A
(p. 25)

Fig. 4. Right-lateral view, showing profile and posterior lateral teeth (CPC 15561), locality 79, X4.

Glyptonychia wilsoni gen. et sp. nov.
(p. 23)

Fig. 5. Latex replica right valve, paratype (UQ F 60114), locality 15, X3. This specimen was figured by Hill, Playford, and Woods (1969), plate 0 1, figure 18.

Fig. 6. Left valve, showing ribs and anterior lobe, paratype (UQ F 60112), locality 15, X3. This specimen was figured by Hill, Playford, and Woods (1969), plate 0 1, figure 16.

Fig. 7. Left valve, showing ornament, paratype (UQ F 60113), locality 15, X2. This specimen was figured by Hill, Playford, and Woods (1969), plate 0 I, figure 17.

Plate 19

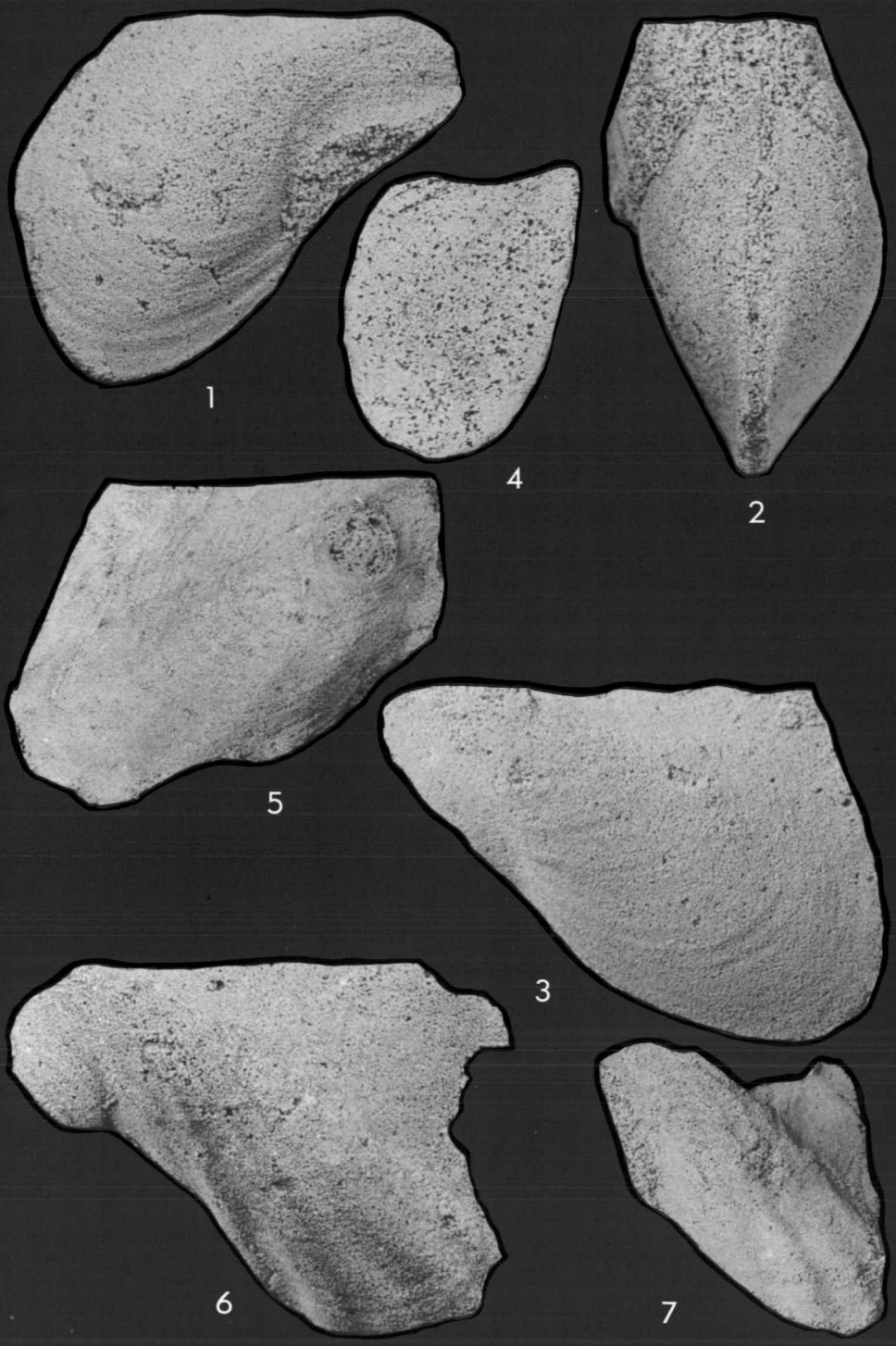


PLATE 20

Glyptonychia wilsoni gen. nov. et sp. nov.
(All specimens from locality 15; p. 23)

Figs. 1–3. Right-lateral, dorsal, and left-lateral views, showing ornament, anterior lobe, and equality of the valves, **holotype** (UQ F 67208), X3.

Fig. 4. Right-lateral view, showing posterior lateral teeth, paratype (UQ F 67209), X3.

Fig. 5. Right-lateral view, showing ornament and anterior lobe, paratype (UQ F 67210), X3.

Fig. 6. Right-lateral view, showing ornament, paratype (UQ F 67211), X3.

Plate 20

PLATE 21

Pteronychia haupti gen. et sp. nov.
(p. 24)

Figs. 1–2. Anterior and left-lateral views, showing ornament and equality of valves, paratype (CPC15562), locality 83, X2.

Figs. 4–6. Anterior, left-lateral, and dorsal views, showing equality of valves, profiles, and midumbonal carina, **holotype** (CPC 15564), locality 83, X2.

Pteronychia aff. *P. haupti*
(p. 24)

Fig. 3. Composite impression of right valve, showing ornament and posterior teeth (CPC 15563), locality 85, X2.

Pterinea sp. A
(p. 26)

Fig. 7. Left valve, showing lateral profile (UT 81383), locality 73, X4.

Denticelox tortuosa (Tate, 1896)
(p. 25)

Fig. 8. Anterior view of an articulated specimen, showing valve inequality (CPC 15565), locality uncertain, X3. See plate 22, figures 5, 6.

Plate 21

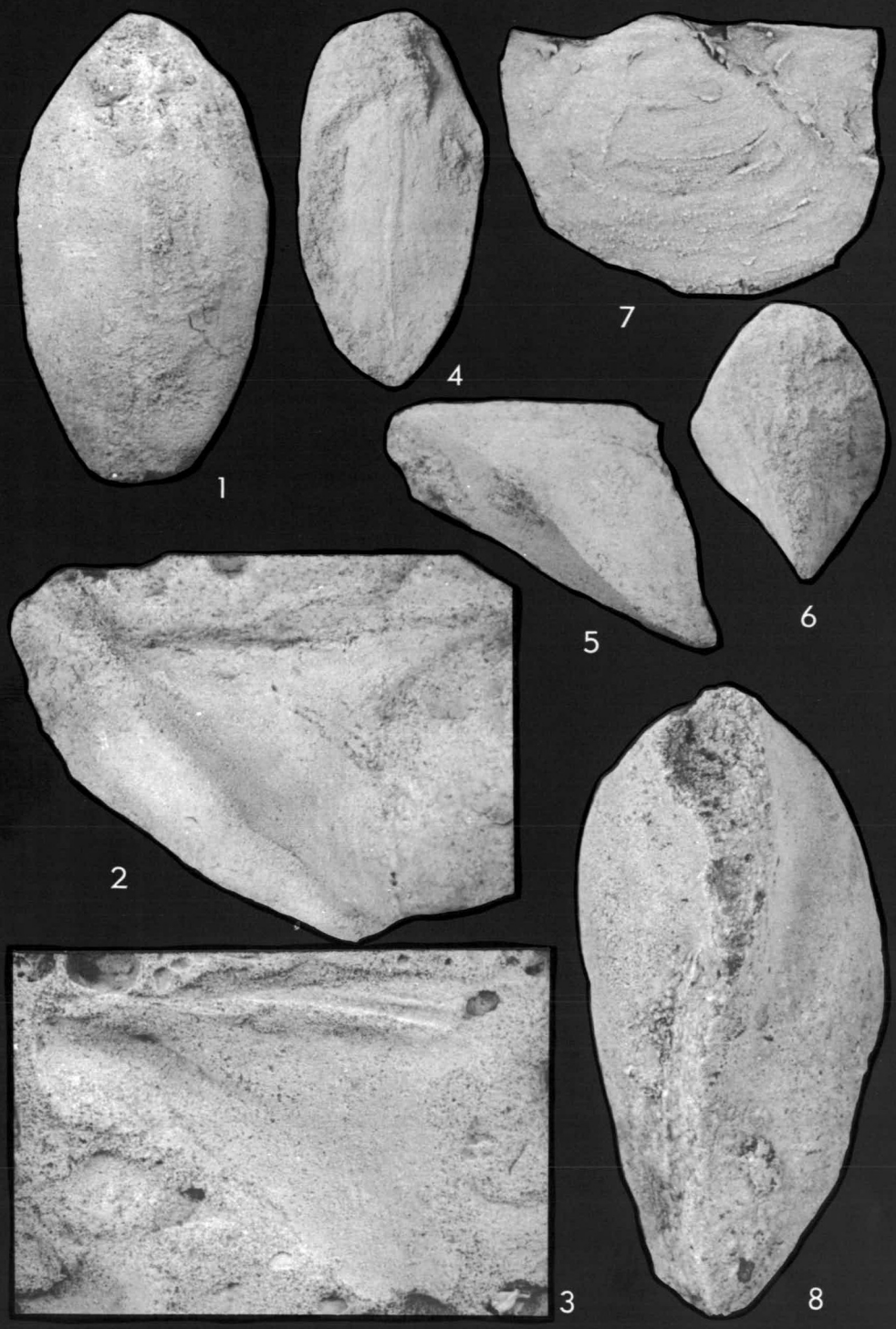


PLATE 22

Denticelox tortuosa (Tate, 1896)
(p. 25)

Figs. 1–3. Internal mould of left valve, latex replica of same, and anterior view, showing profiles and posterior lateral teeth, **lectotype** (SAM T 1719a), X4. Tate (1896) gave two localities from which he obtained the type suite of this species. This specimen was figured by Tate (1896) on his plate 3, figure 31.

Fig. 4. Dorsal view of internal mould showing profile (CPC 15566), locality 30, X4.

Figs. 5–6. Dorsal and left lateral views of an articulated specimen, showing valve inequality and profiles (CPC 15565), locality uncertain, X3. See plate 21, figure 8.

Plate 22

PLATE 23

Runnegaria cuneata gen. et sp. nov.
(All specimens from locality 15; p. 27)

Figs. 1–3. Dorsal, right-lateral, and anterior views of composite mould, showing growth lines, myophoric buttress, and anterior adductor muscle scars, **holotype** (UQ F 67212), figs. 1, 2, X2; fig. 3, X3.

Figs. 4–5. Right-lateral and dorsal views of a partially articulated specimen, showing growth lines, paratype (UQ F 67213), X2.

Figs. 6–7. Posterior and left-lateral views, paratype (UQ F 67214), X2.

Fig. 8. Right-lateral view, paratype (UQ F 67215), X2.

Fig. 9. Left-lateral view, paratype (UQ F 67216), X3.

Modiolopsis? sp. A
(p. 26)

Fig. 10. Right-lateral view, showing profile (CPC 15567), locality 81, X3.

Plate 23

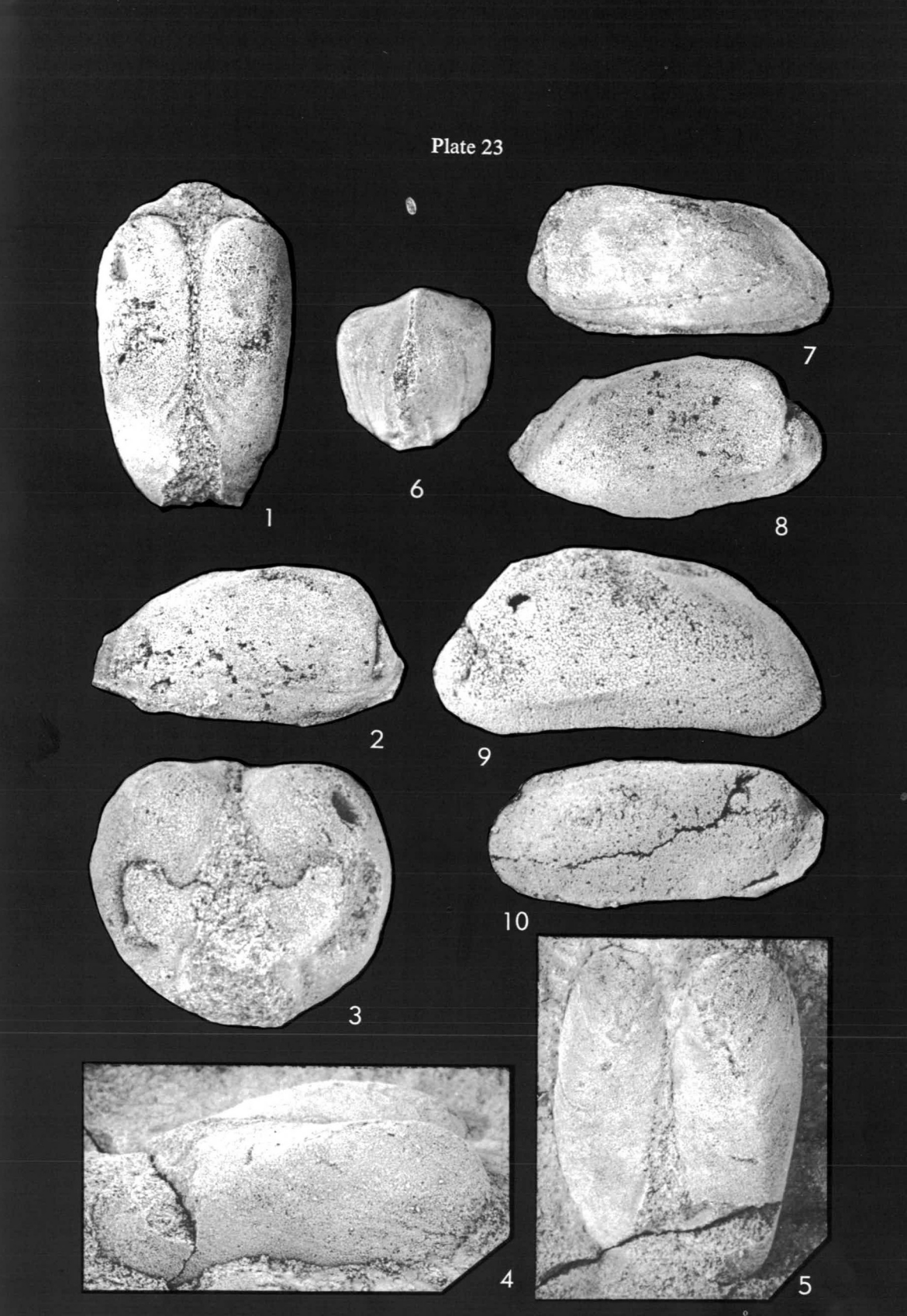


PLATE 24

Colpantyx woolleyi gen. et sp. nov.
(p. 28)

Fig. 1. Latex replica of right valve exterior, showing ornament, paratype (CPC 15568), locality 3, X3.

Fig. 2. Latex replica of right valve exterior, showing ornament, paratype (CPC 15569), locality 6, X3.

Fig. 3. Latex replica of left valve exterior, showing ornament, paratype (CPC 15570), locality 4, X3.

Fig. 4. Latex replica of left valve exterior, showing ornament, paratype (CPC 15571), locality 19, X3.

Fig. 5. Latex replica of left valve exterior, showing ornament, paratype (CPC 15572), locality 27, X3.

Fig. 6. Latex replica of left valve exterior, paratype (CPC 15573), locality 3, X3.

Fig. 7. Latex replica of left valve exterior, showing ornament, paratype (CPC 15574), locality 19, X3.

Fig. 8. Latex replica of right valve exterior, showing ornament, paratype (CPC 15575), locality 4, X3.

Fig. 9. Left valve internal mould, paratype (CPC 15576), locality 5, X3.

Fig. 10. Latex replica of right valve exterior, showing ornament, paratype (CPC 15577), locality 27, X3.

Fig. 11. Latex replica of right valve interior, showing bulbous anterior tooth, paratype (CPC 15578), locality 4, X3.

Fig. 12. Latex replica of right valve interior, showing bulbous anterior tooth, paratype (CPC 15579), locality 27, X3.

Figs. 13–15. Right valve internal mould and two latex replicas, showing bulbous anterior tooth, **holotype** (CPC 15580), locality 27, figs. 13, 14, X3; fig. 15, X7.

Figs. 16–17. Latex replicas of left valve interior, showing lamellar anterior tooth, paratype (CPC 15581), locality 6, fig. 16, X3; fig. 17, X7.

Plate 24

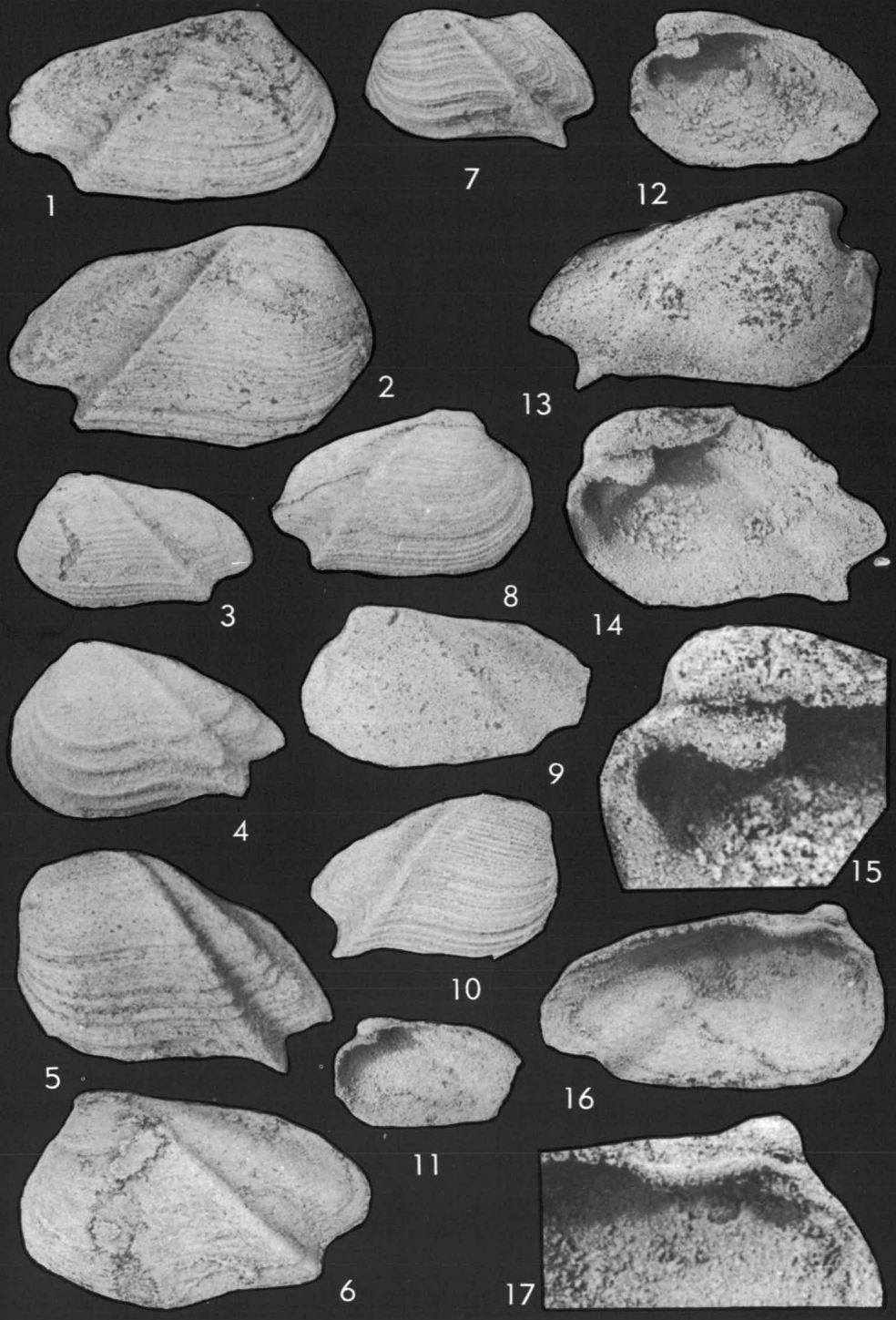


PLATE 25

Sphenosolen draperi gen. et sp. nov.
(p. 31)

Fig. 1. Left-lateral view showing profile, **holotype** (CPC 15582), locality 77, X2.

Fig. 2. Right-lateral view showing profile, paratype (CPC 15583), locality 77, X2.

Xestoconcha kraciukae gen. et sp. nov.
(p. 28)

Figs 3–5. Right-lateral view internal mould and latex replicas, showing bulbous tooth of right valve, paratype (CPC 15584), locality 27, fig. 3, X2; fig. 4, X3; fig. 5, X7.

Fig. 6. Right-lateral view of internal mould, paratype (CPC 15585), locality 5, X2.

Fig. 7. Left-lateral view of internal mould, paratype (CPC 15586), locality 4, X2.

Figs. 8–9. Right-lateral view of internal mould and latex replica, showing bulbous anterior tooth of right valve, paratype (CPC 15587), locality 23, fig. 8, X2; fig. 9, X3.

Figs. 10–11. Right-lateral view of internal mould and latex replica, showing bulbous anterior tooth of right valve, **holotype** (CPC 15588), locality 4, fig. 10, X2; fig. 11, X4.

Fig. 12. Anterior part of dorsal margin of internal mould, showing impression of bulbous tooth of right valve, paratype (CPC 15589), locality 28, X3.

Plate 25

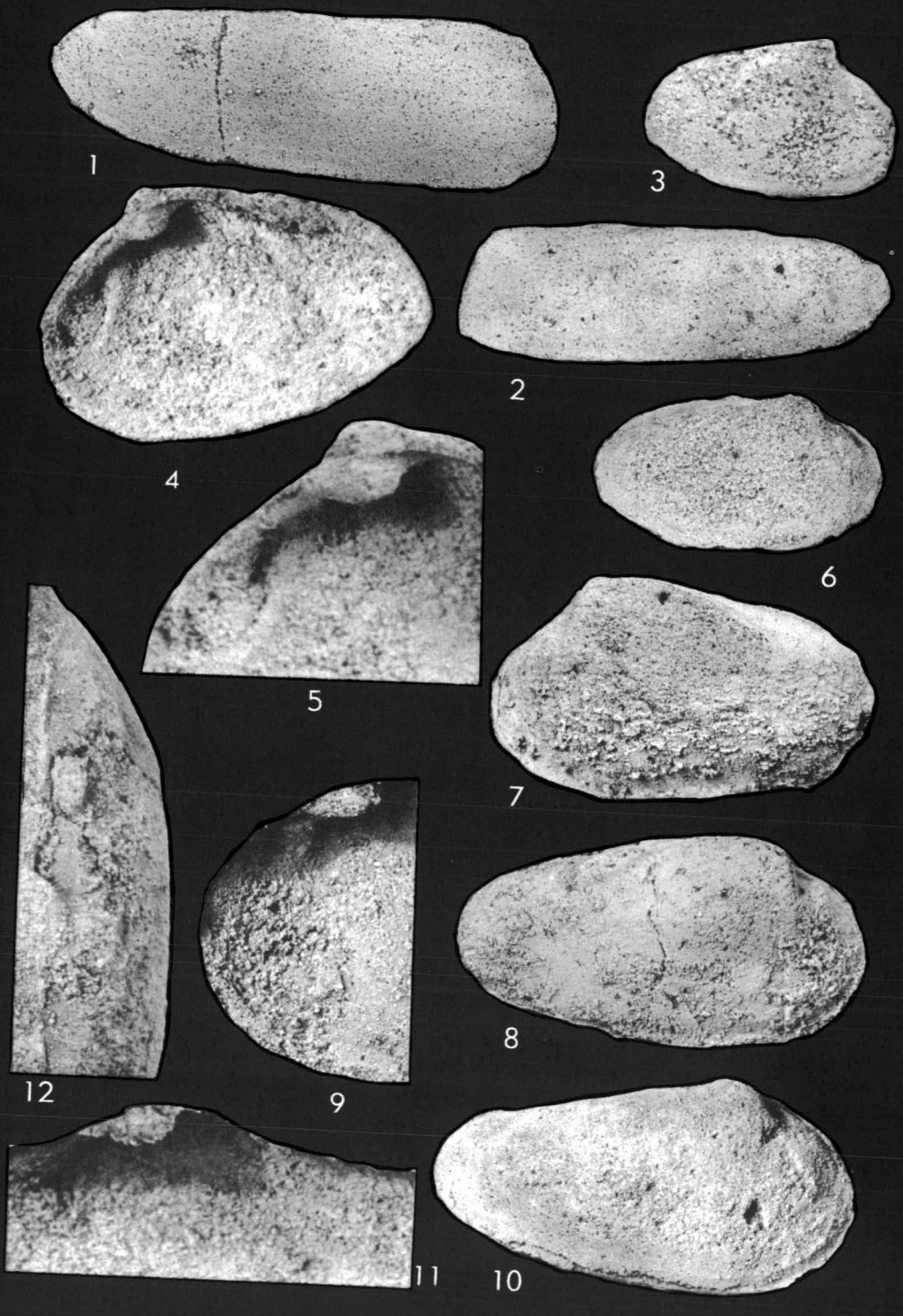


PLATE 26

Brachilyrodesma radkei gen. et sp. nov.
(p. 29)

Figs. 1–5. Oblique dorsal view, showing posterodorsal ribs, left-lateral view, showing profile and comarginal ornament, dorsal view, showing posterodorsal ribs, polished medial surface, showing teeth in section, polished medial surface, showing teeth in section with ventral edges of teeth outlined in ink, **holotype** (GSQ F 11679), from the Toko Group in the Toko Range, figs. 1, 3, X3; fig. 2, X2; figs. 4, 5, X8. This specimen was figured by Hill, Playford, and Woods (1969) on their plate 0 I, fig. 23.

Plate 26

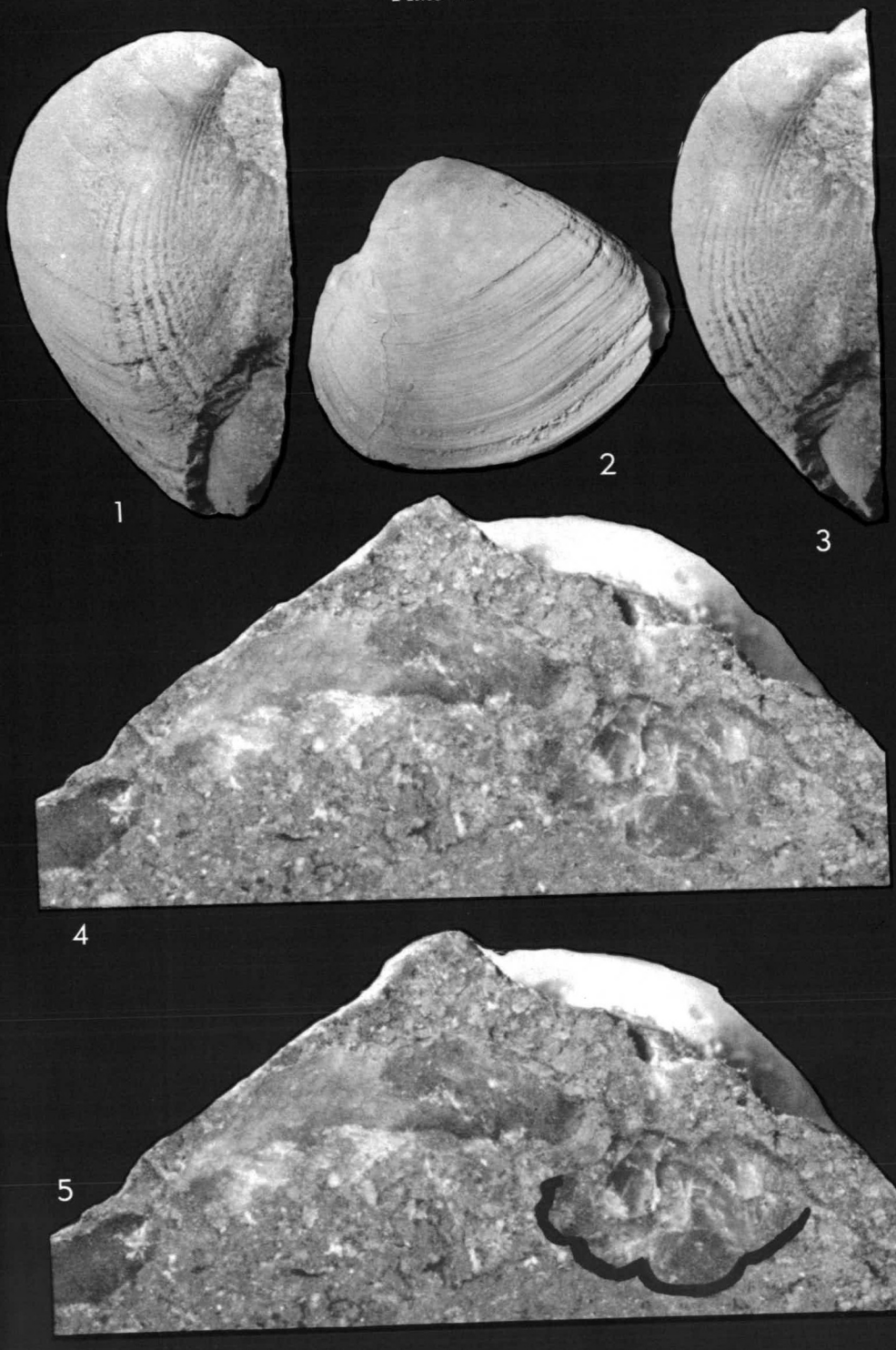


PLATE 27

Noradonta shergoldi gen. et sp. nov.
(p. 30)

Fig. 1. Latex replica of left valve, showing posterior socket with denticles, remnants of anterior teeth, anterior adductor muscle scar, and lateral profile, paratype (CPC 15590), locality 89, X4.

Figs. 2–3. Latex replicas of right valve, showing posterior tooth with denticles and radiating anterior teeth mounted on a hinge plate, **holotype** (UQ F 67217), locality 13, fig. 2, X4; fig. 3, X10.

Fig. 4. Latex replica of left valve, showing posterior socket with denticles and anterior adductor muscle scar, paratype (UQ F 67218), locality 14, X4.

Fig. 5. Latex replica of left valve, showing socket with denticles, paratype (CPC 15591), locality 89, X4.

Fig. 6. Latex replica of right valve, showing posterior denticles, paratype (CPC 15592), locality 89, X4.

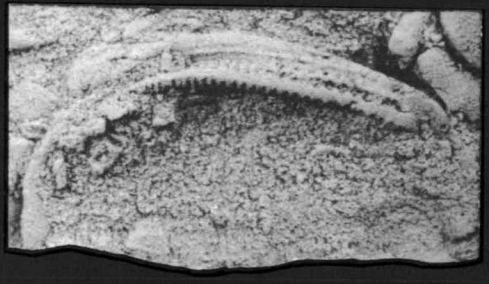
Plate 27

1

4

5

2



6

3

PLATE 28

Copidens browni gen. et sp. nov.
(p. 29)

Fig. 1. Left valve, showing dentition and hinge plate, paratype (UQ F 67219), locality 13, X4.

Fig. 2. Right valve internal mould, showing dentition, anterior adductor muscle scar, and profile, paratype (CPC 15593), locality 43, X4.

Fig. 3. Latex replica of dentition and hinge plate of right valve, paratype (UQ F 60116), locality 14, X4. This specimen was figured by Hill, Playford, and Woods (1969) on their plate 0 I, figure 21.

Figs. 4–5. Latex replica of dentition and hinge plate of left valve, paratype (CPC 15594), locality 11, fig. 4, X8; fig. 5, X4.

Fig. 6. Latex replica of right valve, showing dentition, hinge plate, anterior adductor muscle scar, and profile, **holotype** (CPC 15595), locality 90, X4.

Fig. 7. Latex replica of right valve, showing dentition and hinge plate, paratype (UQ F 67220), locality 14, X4.

Fig. 8. Latex replica of left valve, showing dentition and hinge plate paratype (CPC 15596), locality 11, X4.

Plate 28

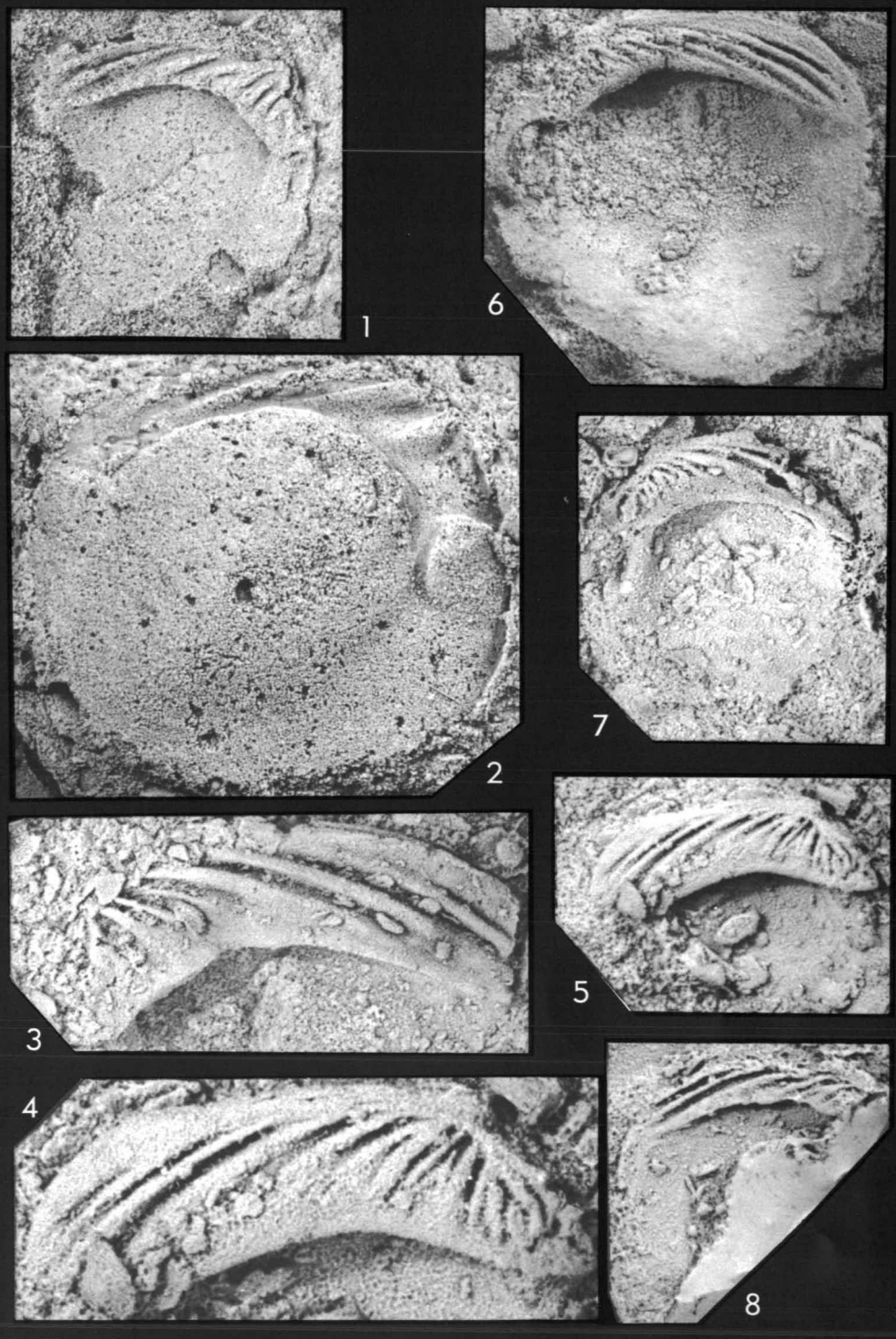


PLATE 29

Ambonychia? sp. A
(p. 24)

Figs. 1–3. Anterior, right-lateral, and dorsal views (UT 94499), locality 75, X4.

Bransonia townleyi sp. nov.
(p. 33)

Figs. 4–7. Left-lateral, posterior, dorsal, and anterior views, **holotype** (CPC 15597), locality 75, X6.

Tolmachovia corbetti sp. nov.
(p. 32)

Fig. 8. Right-lateral view, showing pegmas and beak, paratype (BM L 11637a), locality 8, X3.

Fig. 9. Left-lateral view, paratype (BM L 11637b), locality 8, X3.

Fig. 10. Left-lateral view, showing pegmas and beak, **holotype** (BM L 11637c), locality 8, X3.

Fig. 11. Left-lateral view, paratype (BM L 11637d), locality 8, X3.

Pinnocaris? sp. C
(p. 31)

Fig. 12. Right-lateral view, showing profile and pegma (CPC 15598), locality 5, X2.

Technophorus walteri Pojeta, Gilbert-Tomlinson, and Shergold, 1977
(p. 32)

Figs. 13–15. Left-lateral, dorsal, and right-lateral views of an articulated internal mould (CPC 15599), locality 5, X5.

Fig. 16. Latex replica of left valve exterior, showing ornament (CPC 15600), locality 6, X5.

Ribeiria csiro Pojeta, Gilbert-Tomlinson, and Shergold, 1977
(p. 31)

Fig. 17. Left valve internal mould, showing beak and pegma (CPC 15601), locality 18, X5.

Conocardioid sp. A
(p. 32)

Fig. 18. Left valve internal mould (SAM T 1267), locality Tempe Downs, X4. This specimen was figured by Tate (1896) on his plate 2, figure 13.

Plate 29